

Detailed Traffic Analysis

West Dover Connector Retained Alternatives

I. Introduction

The traffic analysis for the West Dover Connector Study was conducted in two steps. As the first step, a preliminary traffic analysis was conducted using DelDOT's travel demand model results for all the concepts/alternatives developed by the Working Group, members of the public and the project team. The results of this preliminary traffic analysis were presented to the Working Group and general public and have been included in the Preliminary Alternatives Analysis Report.

As the second step, a detailed analysis was conducted for each of the five retained alternatives by creating study area intersection performance evaluation and simulation models. This technical memorandum provides a summary of the detailed traffic analysis.

II. Elements of the Detailed Traffic Analysis

The detailed traffic analysis included the following elements:

For each retained alternative,

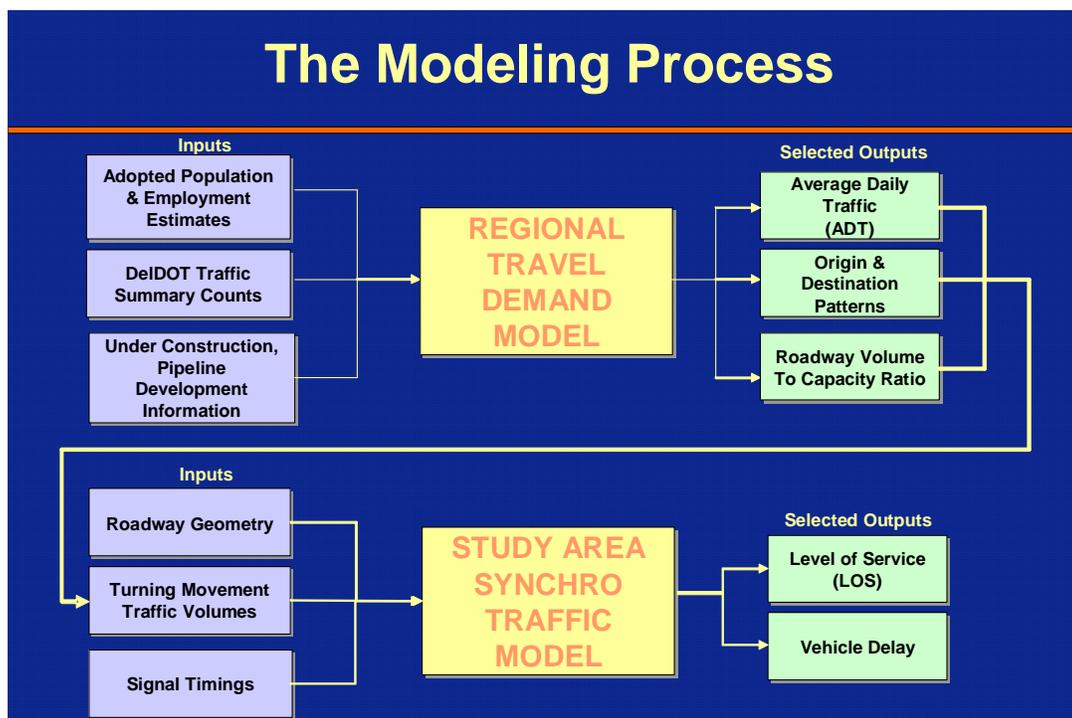
- Future daily traffic volumes provided by DelDOT's travel demand model were analyzed to determine the future traffic flow patterns within the study area.
- Future evening peak hour traffic volumes were calculated from the daily volumes to analyze worst case traffic performance.
- Roadway segment volumes were converted to intersection turning movement volumes based on the review of the study area traffic flow patterns.
- Potential future trips estimated to be generated by the proposed Eden Hill Farm development and Kesselring Farm development (west of the Railroad) were calculated using the Institute of Transportation engineers' (ITE) Trip Generation Manual. These trips were assigned to the study area roadway network based on established traffic distribution patterns.
- Intersection performance evaluation and traffic simulation models were developed to analyze the performance of study area intersections.
- The performance of major intersections related to the connector alignment was analyzed and compared to the future no-build condition to determine the improvement achieved due to the connector roadway.
- Intersection improvements were identified at affected intersections where performance degrades to an unacceptable level of service.

III. Use of Travel Demand Model in the Detailed Traffic Analysis

The travel demand model is DelDOT's statewide accepted planning tool. The model, which is validated and calibrated based on observed existing traffic conditions, uses county approved future demographic attribute projections (mainly population and employment) to estimate associated traffic under future conditions.

A model validation process was undertaken for the West Dover Study area using existing condition traffic counts gathered by the project team, and the model was calibrated to yield realistic outputs based on field-observed traffic counts and traffic flows. For a particular study area like the West Dover Connector study area, a sub-area model accounts for study area traffic growth due to developments outside the study area through background growth projections. To increase the accuracy of analysis at intersection level for a relatively small study area, traffic associated with major proposed developments within the study area is assigned to study area roadways manually based on established traffic distribution patterns. The evening peak hour traffic condition was analyzed to determine worst case condition performance.

The travel demand model outputs provide estimated traffic volumes along roadway segments within the study area. The patterns of traffic flows can also be analyzed using the model. If a particular roadway segment is selected, the model provides information about origins and destinations of traffic traveling on that roadway segment. These traffic patterns were analyzed and used to estimate turning movement volumes at the study area intersections and computerized performance evaluation and simulation models were created to conduct detailed traffic analysis at intersection level. The following flow diagram explains the modeling process.



IV. Traffic Related to Proposed Eden Hill Farm and Kesselring Farm Developments

The 2015 and 2030 No-Build traffic analysis previously presented to the Working Group included proposed developments outside of our study area in the form of background traffic growth. However, that analysis was done without consideration of any development on the Eden Hill Farm or the Kesselring Farm as the project team's intent was to determine the need for a West Dover Connector without influence from the above-mentioned developments. The previous future No-Build condition traffic analysis clearly indicated that even without the development of Eden Hill Farm or the Kesselring Farm, a new roadway connection in the form of extension of Saulsbury Road would be warranted to improve study area traffic circulation and access across the Norfolk Southern Railroad and to alleviate congestion at study area intersections.

In the detailed traffic analysis, the project team has now added the anticipated traffic volumes from the Eden Hill Farm and Kesselring developments. This was essential, not to further justify the need for the West Dover

Connector, but to account for significantly large proposed developments within our study area that will directly affect study area traffic performance.

The Institute of Transportation engineers' (ITE) Trip Generation Manual was used to estimate trip generation from the Eden Hill Farm and Kesselring developments. Appendix 1 shows the details of the trip generation for these developments. Cumulatively these two developments will generate more than 1600 new trips during the evening peak hour. These trips were assigned to the study area roadway network based on the established traffic distribution patterns. Provision of the West Dover Connector will help improve the circulation of these trips along with other trips that will travel on study area roadways in the future.

V. Intersection Performance Results and Improvements

Intersection performance evaluation and traffic simulation models were developed to analyze the performance of study area intersections. Evening peak hour intersection performance (worst case scenario) was analyzed under year 2015 and 2030 build conditions for each of the 5 retained alternatives.

This section presents the results of the intersection analysis for year 2030 build conditions, which demonstrates the long term performance of the West Dover Connector alternative and the needed intersection improvements. It should be noted that for build alternatives, the improved level of service presented in the tables incorporates the needed intersection improvements listed in the tables. The needed intersection improvements will be further examined through a detailed civil engineering analysis to determine feasibility of providing these improvements.

A. Alternative 1 – No-Build Alternative

Intersection performance analysis for the future “No-Build” alternative was conducted and already presented to the Working Group to compare existing condition intersection performance with the 2030 future “No-Build” condition. The analysis showed that by 2030, almost all study area intersections analyzed would show a near failing (E) or failing LOS (F) and excessively high delays.

As discussed earlier, traffic volumes in the previously conducted 2030 “No-Build” analysis have been updated to reflect the trip generation, distribution and traffic assignment associated with the proposed Eden Hill Farm and Kesselring Farm developments. With the increased traffic associated with these developments, study area intersection performance would further deteriorate under 2030 No-Build conditions adding to the excessively high delays and failing level of service reported earlier. The following table provides a summary of intersection performance and how it would affect traffic conditions on the study area roadways.

Intersection Performance	# of Intersections	How does it affect study area roads?
Intersections with failing Level of Service (LOS F) and average intersection delays per vehicle > 600 seconds	12	During the evening peak hour, vehicles will crawl and wait at these intersections for over 10 minutes before being able to pass through the intersections. For signalized intersections, vehicles will wait for more than 6 signal cycles to clear intersection. For stop-controlled intersections, vehicles will wait in long traffic backups sometimes more than a half mile.
Intersections with failing Level of Service (LOS F) and average intersection delays per vehicle between 120 to 600 seconds	8	During the evening peak hour traffic, vehicles will wait for 2 to 10 minutes in order to pass through these intersections.
Intersections with near failing (LOS E) or failing Level of Service (LOS F) and average intersection delays per vehicle less than 120 seconds	4	During the evening peak hour, vehicles will wait for less than 2 minutes in order to pass through these intersections.
Total intersections near failing (LOS E) or failing (LOS F) condition	24	
Total study area intersections analyzed	25	

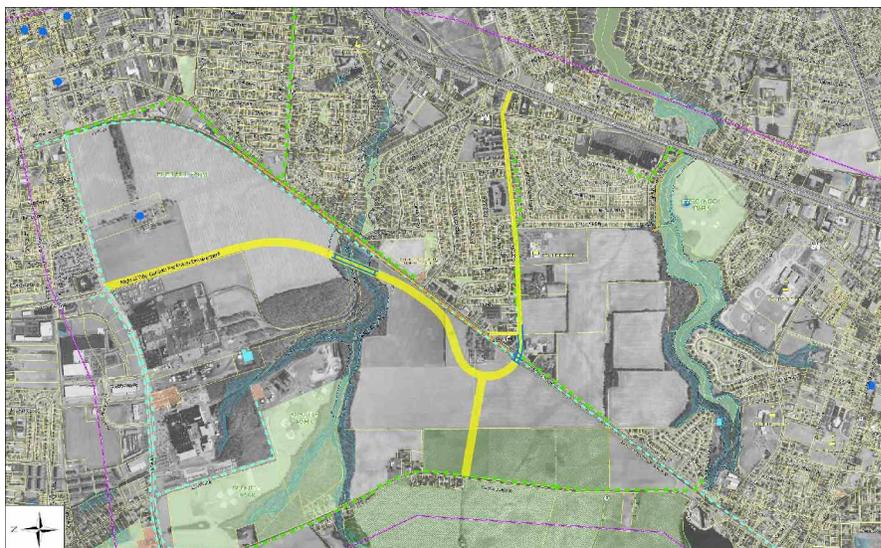
Results of the updated No-Build condition analysis were used as a base to compare the performance of study area intersections for each of the retained build alternatives to determine the extent of intersection performance improvement that could be achieved due to the connector road.



Alternative 1 – No-Build

B. Alternative 4 - Extension of Saulsbury Road to Webbs Lane to US 13

The West Dover Connector alignment under Alternative 4 will significantly reduce traffic movements circulating around Eden Hill Farm and Schutte Park. Thus, intersections along North Street, West Street and New Burton Road will benefit from the connector as shown in the tables below. Performance of some intersections along Camden-Wyoming Avenue will also moderately improve.



Alternative 4

Comparison of 2030 Intersection Performance - Alternative 4 vs. No-Build Condition

1. Performance of existing intersections that will serve as termini of the West Dover Connector for Alternative 4

Intersection	Alternative 4 Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ Saulsbury Road/WDC	LOS D from LOS F	66 seconds	<ul style="list-style-type: none"> 1. Signal timing optimization due to changed intersection geometry and functionality. 2. Provision of an additional through storage lane in northbound and southbound directions to move more traffic through the intersection during the green phase of the signal. 3. Provision of storage lanes for turning movements along the new northbound approach. 4. Extension of turning movement storage lanes along existing approaches.
2. Webbs Lane @ US 13	LOS D from LOS F	90 seconds	<ul style="list-style-type: none"> 1. Signal timing optimization. 2. Provision of double left turn storage lanes on northbound US 13 approach. 3. Double left turn storage lanes on eastbound Webbs Lane approach.

2. Performance of other existing intersections along the path of the West Dover Connector for Alternative 4

Intersection	Alternative 4 Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. Webbs Lane @ Governors Avenue	LOS D from LOS E	23 seconds	<ul style="list-style-type: none"> 1. Provision of double left turn storage lanes on northbound and southbound Governors Avenue approaches. 2. Additional through storage lane on eastbound and westbound Webbs Lane approaches.

3. Performance of new intersections along the path of the West Dover Connector for Alternative 4

Intersection	Alternative 4 Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
1. Auxiliary Connection @ WDC	LOS C	22 seconds	<ul style="list-style-type: none"> 1. Stop controlled intersection with eastbound stop control for the auxiliary connection from Wyoming Mill Road and free movements along north and southbound WDC. 2. Lane Configuration: EB Auxiliary Connection - 1 shared lane for left and right turns SB WDC - 1 shared through and right turn lane NB WDC - 1 left turn storage lane and 1 through lane

Intersection	Alternative 4 Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
2. Auxiliary Connection @ Wyoming Mill Road	LOS D	26 seconds	1. Stop controlled intersection with westbound stop control for the auxiliary connection from WDC and free movements along north and southbound Wyoming Mill Road. 2. Lane Configuration: WB auxiliary connection - 1 shared lane for left and right turns NB Wyoming Mill Rd. - 1 shared through and right turn lane SB Wyoming Mill Rd. - 1 left turn storage lane and 1 through lane
3. New Burton Road Ramp (via Garton Rd.) @ WDC/Webbs Lane	LOS B	12 seconds	1. Signalized intersection. 2. Lane Configuration: EB Webbs Lane - 1 left turn storage lane and 1 through lane WB Webbs Lane - 1 shared through and right turn lane SB New Burton Ramp (via Garton Rd.) - 1 left turn storage lane and 1 right turn lane
4. WDC/Webbs Lane Ramp (via Garton Rd.) @ New Burton Road	LOS B	10 seconds	1. Stop controlled intersection with westbound stop control for the ramp from WDC and free movements along north and southbound New Burton Road. 2. Lane Configuration: WB ramp from Webbs (via Garton Rd.) - 1 left turn storage lane and 1 right turn lane NB New Burton Rd. - 1 right turn storage lane and 1 through lane SB New Burton Rd. - 1 left turn storage lane and 1 through lane

4. Performance of existing study area intersections that will benefit from West Dover Connector Alternative 4

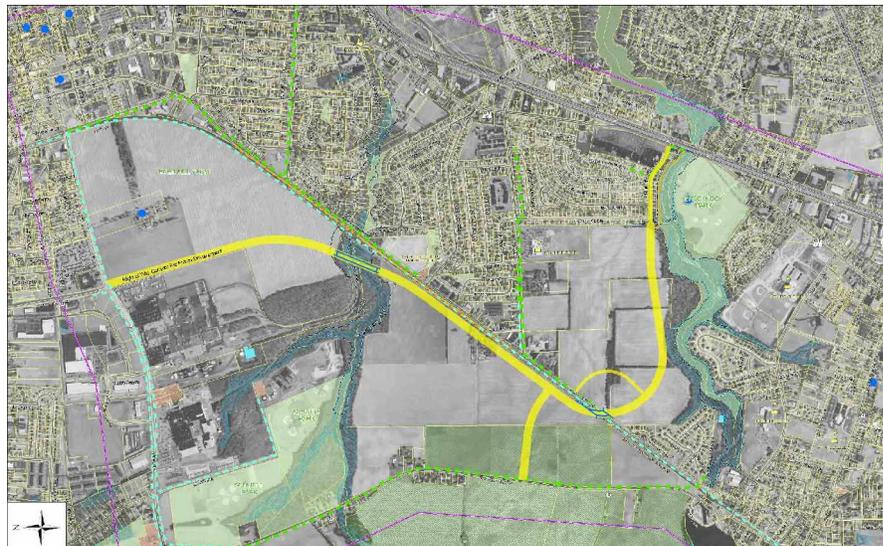
Intersection	Alternative 4 Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ West St.	-	> 300 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
2. North St. @ Mifflin Road	LOS B from LOS F	395 seconds	Signal timing and phasing optimization to adapt to the changed traffic flow patterns.
3. North St. @ Wyoming Mill Rd.	-	> 170 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
4. West St. @ New Burton Rd.	LOS D from LOS F	> 900 seconds	-

Intersection	Alternative 4 Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
5. Wyoming Ave. @ New Burton Road	LOS D from LOS F	720 seconds	-
6. Kesselring Ave. @ New Burton Road	LOS C from LOS F	110 seconds	-
7. Railroad Avenue @ Camden-Wyoming Avenue	-	> 200 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
8. SR10 @ Camden-Wyoming Avenue	-	20 seconds	-
9. Alt. US 13 @ Camden-Wyoming Avenue	-	27 seconds	-

C. Alternative 5C - Extension of Saulsbury Road to Charles Polk Road to US 13

The West Dover Connector alignment under Alternative 5C will provide for the extension of Saulsbury Road beyond North Street. Thus, traffic movements circulating around Eden Hill Farm and Schutte Park will be significantly reduced and intersections along North Street will benefit from the connector.

Also, since the new connector road will be located on the west side of the railroad parallel to New Burton Road, it will reduce traffic on New Burton Road. Performance of some intersections along Camden-Wyoming Avenue will also improve moderately as some traffic will shift to the new connector alignment located parallel to Camden-Wyoming Avenue, especially due to the provision of an auxiliary connection from Wyoming Mill Road to the connector road.



Alternative 5C

Comparison of 2030 Intersection Performance - Alternative 5C vs. No-Build Condition

1. Performance of existing intersections that will serve as termini of the West Dover Connector for Alternative 5C

Intersection	Alternative 5C Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ Saulsbury Road/WDC	LOS C from LOS F	89 seconds	<ul style="list-style-type: none"> 1. Signal timing optimization due to changed intersection geometry and functionality. 2. Provision of an additional through storage lane in northbound and southbound directions to move more traffic through the intersection during the green phase of the signal. 3. Provision of storage lanes for turning movements along the new northbound approach. 4. Extension of turning movement storage lanes along existing approaches.
2. Charles Polk Rd./WDC @ US 13	LOS D from LOS E	23 seconds	<ul style="list-style-type: none"> 1. Signal timing optimization. 2. Provision of double left turn storage lanes along northbound US 13 approach. 3. Extension of turning movement storage lanes along eastbound Charles Polk Rd. approach. 4. Modification of lane groups on eastbound Charles Polk Road approach.

2. Performance of other existing intersections along the path of the West Dover Connector for Alternative 5C

No other existing intersections will be along the path of the West Dover Connector under the Alt. 5C alignment.

3. Performance of new intersections along the path of the West Dover Connector for Alternative 5C

Intersection	2030 Build Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
1. Auxiliary Connection @ WDC	LOS A	5 seconds	<ul style="list-style-type: none"> 1. Stop controlled intersection with eastbound stop control for the auxiliary connection from Wyoming Mill Road and free movements along north and southbound WDC. 2. Lane Configuration: EB auxiliary connection - 1 shared lane for left and right turns SB WDC - 1 shared through and right turn lane NB WDC - 1 left turn storage lane and 1 through lane
2. Auxiliary Connection @ Wyoming Mill Road	LOS C	20 seconds	<ul style="list-style-type: none"> 1. Stop controlled intersection with westbound stop control for the auxiliary connection from WDC and free movements along north and southbound Wyoming Mill Road. 2. Lane Configuration: WB auxiliary connection - 1 shared lane for left and right turns NB Wyoming Mill Rd. - 1 shared through and right turn lane SB Wyoming Mill Rd. - 1 left turn storage lane and 1

Intersection	2030 Build Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
			through lane
3. New Burton Road Ramp @ WDC	LOS B	11 seconds	1. Signalized intersection. 2. Lane Configuration: EB WDC - 1 left turn storage lane and 1 through lane WB WDC- 1 shared through and right turn lane SB New Burton Ramp. - 1 left turn storage lane and 1 right turn lane
4. WDC Ramp @ New Burton Road	LOS C	18 seconds	1. Stop controlled intersection with westbound stop control for the ramp from WDC and free movements along north and southbound New Burton Road. 2. Lane Configuration: WB ramp from WDC - 1 left turn storage lane and 1 right turn lane NB New Burton Rd. - 1 right turn storage lane and 1 through lane SB New Burton Rd. - 1 left turn storage lane & 1 through lane

4. Performance of the existing study area intersections that will benefit from the West Dover Connector Alternative 5C

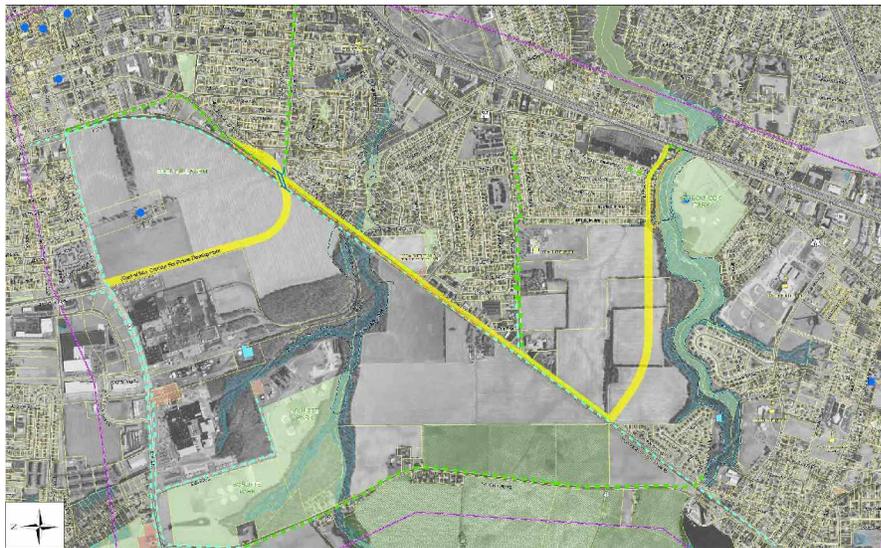
Intersection	Alternative 5C Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ West St.	-	> 365 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
2. North St. @ Mifflin Road	LOS B from LOS F	400 seconds	Signal timing and phasing optimization to adapt to the changed traffic flow patterns.
3. North St. @ Wyoming Mill Rd.	-	> 200 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
4. West St. @ New Burton Rd.	LOS D from LOS F	> 900 seconds	-
5. Wyoming Ave. @ New Burton Road	LOS D from LOS F	740 seconds	-
6. Kesselring Ave. @ New Burton Road	LOS C from LOS F	105 seconds	-
7. Webbs Lane @ New Burton Road	LOS E from LOS F	> 950 seconds	To improve LOS to an acceptable level, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
8. Railroad Avenue @ Camden-Wyoming Avenue	-	> 325 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
9. SR10 @ Camden-Wyoming Avenue	-	30 seconds	

D. Alternative 7C - Extension of Saulsbury Road to New Burton Road to Charles Polk Road to US 13

The West Dover Connector alignment under the Alternative 7C will significantly reduce traffic movements circulating around Eden Hill Farm and Schutte Park as traffic will be able to continue straight on the extension of Saulsbury Road beyond North Street. Thus, intersections along North Street will benefit from the connector. Performance of some intersections along Camden-Wyoming Avenue will also improve moderately as an alternative route will be available parallel to Camden-Wyoming Avenue in the close vicinity in the form of new connector road through Kesselring farm on the east side of the railroad.

Alternative 7C will use New Burton Road and thus, several improvements have been suggested to improve the performance of intersections along New Burton Road. These improvements are in the form of signalization of some of the existing stop-controlled intersections and provisions of storage lanes for turning movements.

However, since this alternative uses New Burton Road, there will be no opportunity to restrict cut-through traffic along the local streets between New Burton Road and Governors Avenue. In order to discourage traffic from using these local streets, traffic calming treatments should be considered.



Alternative 7C

Comparison of 2030 Intersection Performance - Alternative 7C vs. No-Build Condition

1. Performance of existing intersections that will serve as termini of the West Dover Connector for Alternative 7C

Intersection	Alternative 7C Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ Saulsbury Road/WDC	LOS C from LOS F	88 seconds	1. Signal timing optimization due to changed intersection geometry and functionality. 2. Provision of an additional through storage lane in northbound and southbound directions to move more traffic through the intersection during the green phase of

Intersection	Alternative 7C Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
			the signal. 3. Provision of storage lanes for turning movements along the new northbound approach. 4. Extension of turning movement storage lanes along existing approaches.
2. Charles Polk Rd./WDC @ US 13	LOS D from LOS E	18 seconds	1. Signal timing optimization. 2. Provision of double left turn storage lanes along northbound US 13 approach. 3. Extension of turning movement storage lanes along eastbound Charles Polk Rd. approach. 4. Modification of lane groups on eastbound Charles Polk Road approach.

2. Performance of other existing intersections along the path of the West Dover Connector for Alternative 7C

Intersection	Alternative 7C Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. New Burton Road @ Wyoming Avenue	LOS B from LOS F	758 seconds	1. Intersection signalization - signal phasing will be synchronized with the signal phasing of new WDC intersection in the immediate vicinity. 2. Provision of left turn storage lane along southbound New Burton Road approach.
2. New Burton Road @ Kesselring Avenue	LOS D from LOS F	92 seconds	-
3. New Burton Road @ Webbs Lane	LOS B from LOS F	>980 seconds	1. Intersection signalization. 2. Extension of storage lane along westbound Webbs Lane approach.

3. Performance of new intersections along the path of the West Dover Connector for Alternative 7C

Intersection	Alternative 7C Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
1. New Burton Road @ WDC (North End)	LOS C	24 seconds	1. Signalized intersection – signal phasing will be synchronized with the signal phasing of Wyoming Avenue intersection in the immediate vicinity.

Intersection	Alternative 7C Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
			2. Lane Configuration: WB Connector Road - 1 left turn lane and 1 right turn storage lane NB New Burton Road - 1 through lane and 1 right turn storage lane SB New Burton Road - 1 left turn storage lane and 1 through lane
2. New Burton Road @ WDC (South End)	LOS D	42 seconds	1. Signalized intersection. 2. Lane Configuration: WB WDC - 1 left turn storage lane and 1 right turn lane NB New Burton Road - 1 through lane and 1 right turn storage lane SB New Burton Road - 1 left turn storage lane and 1 through lane

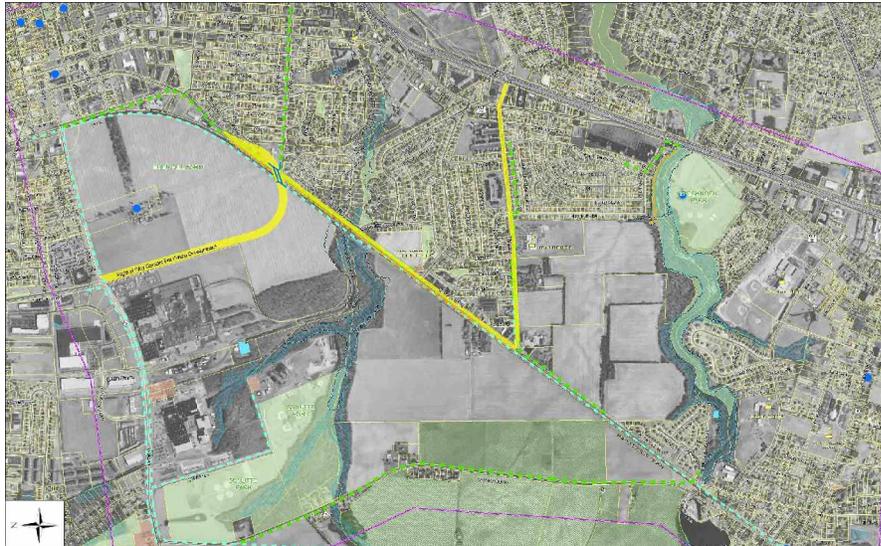
4. Performance of the existing study area intersections that will benefit from the West Dover Connector Alternative 7C

Intersection	Alternative 7C Performance Improvement over 2030 No-Build Condition		Suggested Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ West St.	-	670 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
2. North St. @ Mifflin Road	LOS C from LOS F	390 seconds	Signal timing and phasing optimization to adapt to the changed traffic flow patterns.
3. North St. @ Wyoming Mill Rd.	-	>145 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
4. West St. @ New Burton Rd.	LOS C from LOS F	> 950 seconds	-
5. Railroad Avenue @ Camden-Wyoming Avenue	-	270 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
6. SR10 @ Camden-Wyoming Avenue	-	50 seconds	-
7. Alt. US 13 @ Camden-Wyoming Avenue	-	37 seconds	-

E. Alternative 7D - Extension of Saulsbury Rd. to New Burton Road to Webbs Lane to US 13

The West Dover Connector alignment under Alternative 7D differs from Alternative 7C only at the southern terminus. Alternative 7D uses Webbs Lane to connect to US 13. Thus, benefits to North Street and Camden-Wyoming Avenue intersections due to the connector will remain almost similar as already discussed under the Alternative 7C. The required improvements to New Burton Road intersections will also be similar to Alt. 7C.

Since this alternative also uses New Burton Road, there will be no opportunity to restrict cut-through traffic along the local streets between New Burton Road and Governors Avenue. In order to discourage traffic from using these local streets, traffic calming treatments should be considered.



Alternative 7D

Comparison of 2030 Intersection Performance - Alternative 7D vs. No-Build Condition

1. Performance of existing intersections that will serve as termini of the West Dover Connector for alternative 7D

Intersection	Alternative 7D Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ Saulsbury Road/WDC	LOS C from LOS F	90 seconds	<ol style="list-style-type: none"> 1. Signal timing optimization due to changed intersection geometry and functionality. 2. Provision of an additional through storage lane in northbound and southbound directions to move more traffic through the intersection during the green phase of the signal. 3. Provision of storage lanes for turning movements along the new northbound approach. 4. Extension of turning movement storage lanes along existing approaches.
2. Webbs Lane @ US 13	LOS D from LOS F	86 seconds	<ol style="list-style-type: none"> 1. Signal timing optimization. 2. Provision of double left turn storage lanes on northbound US 13 approach. 3. Double left turn storage lanes on eastbound Webbs Lane approach.

2. Performance of other existing intersections along the path of the West Dover Connector for Alternative 7D

Intersection	Alternative 7D Performance Improvement over 2030 No-Build Condition		Needed Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. New Burton Road @ Wyoming Avenue	LOS B from LOS F	761 seconds	1. Intersection signalization - signal phasing will be synchronized with the signal phasing of new WDC intersection in the immediate vicinity. 2. Provision of left turn storage lane along southbound New Burton Road approach.
2. New Burton Road @ Kesselring Avenue	LOS D from LOS F	91 seconds	-
3. New Burton Road @ Webbs Lane	LOS D from LOS F	>950 seconds	1. Intersection signalization. 2. Extension of storage lane along westbound Webbs Lane approach. 3. Extension of left turn storage lane along southbound New Burton Road approach. 4. Provision of right turn storage lane along northbound New Burton Road approach.
3. Webbs Lane @ Governors Avenue	LOS D from LOS E	23 seconds	1. Provision of double left turn storage lanes on northbound and southbound Governors Avenue approaches. 2. Additional through storage lane on eastbound and westbound Webbs Lane approaches.

3. Performance of new intersections along the path of the West Dover Connector for Alternative 7D

Intersection	Alternative 7D Performance		Suggested New Intersection Layout
	LOS	Avg. delay per vehicle	
1. New Burton Road @ WDC (North End)	LOS B	19 seconds	1. Signalized intersection – signal phasing will be synchronized with the signal phasing of Wyoming Avenue intersection in the immediate vicinity. 2. Lane Configuration: WB Connector Road - 1 left turn lane and 1 right turn storage lane NB New Burton Road - 1 through lane and 1 right turn storage lane SB New Burton Road - 1 left turn storage lane and 1 through lane

4. Performance of the existing study area intersections that will benefit from the West Dover Connector Alternative 7D

Intersection	Alternative 7D Performance Improvement over 2030 No-Build Condition		Suggested Intersection Improvements
	LOS improvement	Reduction in avg. intersection delay per vehicle	
1. North St. @ West St.	-	617 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
2. North St. @ Mifflin Road	LOS C from LOS F	385 seconds	Signal timing and phasing optimization to adapt to the changed traffic flow patterns.
3. North St. @ Wyoming Mill Rd.	-	> 130 sec	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
4. West St. @ New Burton Rd.	LOS C from LOS F	> 950 seconds	-
5. Railroad Avenue @ Camden-Wyoming Avenue	-	235 seconds	Average stop controlled approach delay per vehicle will reduce significantly due to WDC. However, to improve LOS, provision of a traffic signal should be analyzed by conducting a signal warrants analysis.
6. SR10 @ Camden-Wyoming Avenue	-	40 seconds	-
7. Alt. US 13 @ Camden-Wyoming Avenue	-	33 seconds	-

VI. Detailed Traffic Analysis - Highlights

- The 2030 No-Build scenario (Alternative # 1), updated with additional traffic that will be generated from the proposed Eden Hill Farm and Kesselring developments, showed that all but one of the study area intersections analyzed would fail or nearly fail with excessive traffic delays.
- All the four retained “build” alternatives for the West Dover Connector showed that the connector and the associated improvements will not only improve the study area traffic circulation and access across the Norfolk Southern Railroad but will also enhance performance of many study area intersections. Appendix 2 provides a comparative matrix displaying performance improvement for some study area intersections due to the West Dover Connector.
- All the four retained “build” alternatives would extend Saulsbury Road beyond North Street and thus, eliminate the circling of traffic around Eden Hill Farm and Schutte Park resulting in performance improvement for North Street intersections.
- All the four retained “build” alternatives will improve the performance of New Burton Road intersections. For alternatives 4 and 5C, the performance will be improved because of a shift of significant traffic from New Burton Road to the new connector alignment, while for alternatives 7C and 7D, the performance will be improved due to intersection improvements associated with the West Dover Connector where it uses New Burton Road.
- All the four retained “build” alternatives will reduce traffic on Camden-Wyoming Avenue and thus, will help improve intersection performance along Camden-Wyoming Avenue. Provision of the auxiliary connection from Wyoming Mill Road to the new connector road under alternatives 4 and 5C would also help reduce traffic along Camden-Wyoming Avenue.
- The analysis showed that the intersection performance for the US 13 corridor within the study area would not further deteriorate compared to the 2030 No-Build condition. This confirms that the West Dover connector will only provide an improved connection to US 13 by channeling dispersed traffic flows that anyway lead to US 13 using multiple study area roadways (some of which are local roads) but will not add additional traffic on the already congested US 13 corridor.
- However, the West Dover Connector will neither improve the performance of US 13 within the study area as traffic performance along this highway will be mainly governed by the major north-south travel movements on US 13, rather than traffic movements from east-west side street approaches.

VII. Next Steps in Detailed Study

- For each of the retained alternatives, a detailed civil engineering analysis will be conducted based on the needed intersection improvements suggested by the detailed traffic analysis. Cross-section and profile drawings for the West Dover Connector alignment will be created for each retained alternative.
- Detailed environmental analysis will follow the civil engineering analysis to refine the impacts associated with the alignment of the West Dover Connector under each retained alternative.

APPENDIX 1

Trip Generation for Eden Hill Farm and Kesselring Farm Developments



Evening Peak Hour Trip Generation – Eden Hill Farm Development

Development Mix	Units/Area	Evening Peak Hour Trip Generation		
		Entering Trips	Exiting Trips	Total Trips
Residential Units				
- Single Family Detached	141	92	54	146
- Duplex	160	72	52	124
- Townhouses	132	51	25	76
- Condominiums	187	67	33	100
Residential Total	620	282	164	446
Retail + Office+ Service Space	134,400 sq. ft.	291	355	646
Medical Complex	280,000 sq. ft.	143	290	433
Total Trips		716	809	1525
Trip reduction for pass-by trips* and internal trips** in a mixed use development		-107	-121	-228
Total New Trips to be Assigned to the Road Network		609	687	1296

* Pass-by trip reduction is recommended by the ITE Trip Generation Manual for certain retail and commercial land uses. Pass-by trips are not new trips generated by the development but they are existing trips on adjacent roads that are diverted to the development for a limited time period. (Example of pass by trips - a quick stop at a convenience store or a bank on the way home from the office.)

**Internal trip reduction is applied to mixed-used developments where certain retail or commercial or office trips are attracted from the residential units on the site. In other words, these trips do not leave the site and do not add to roadway traffic volumes.

Evening Peak Hour Trip Generation – Kesselring Development (on the west side of the railroad)

Development	Units/Area	Evening Peak Hour Trip Generation		
		Entering Trips	Exiting Trips	Total Trips
Single Family Detached Residential Units	326	196	115	311
Total New Trips to be Assigned to the Road Network		196	115	311

Cumulative New Trips during the Evening Peak Hour

Developments	Evening Peak Hour New Trips		
	Entering Trips	Exiting Trips	Total Trips
Eden Hill Farm and Kesselring Farm	805	802	1,607

APPENDIX 2

Comparative Performance Improvement for Study Area Intersections not along the West Dover Connector

Comparative performance improvement for study area intersections that are not along the West Dover Connector

Intersection	Alternative 4 Performance Improvement over 2030 No-Build Condition		Alternative 5C Performance Improvement over 2030 No-Build Condition		Alternative 7C Performance Improvement over 2030 No-Build Condition		Alternative 7D Performance Improvement over 2030 No-Build Condition	
	LOS improvement	Reduction in avg. intersection delay per vehicle	LOS improvement	Reduction in avg. intersection delay per vehicle	LOS improvement	Reduction in avg. intersection delay per vehicle	LOS improvement	Reduction in avg. intersection delay per vehicle
1. North St. @ West St.	-	> 300 seconds	-	> 365 seconds	-	670 seconds	-	617 seconds
2. North St. @ Mifflin Road	LOS B from LOS F	395 seconds	LOS B from LOS F	400 seconds	LOS C from LOS F	390 seconds	LOS C from LOS F	385 seconds
3. North St. @ Wyoming Mill Rd.	-	> 170 seconds	-	> 200 seconds	-	>145 seconds	-	> 130 sec
4. West St. @ New Burton Rd.	LOS D from LOS F	> 900 seconds	LOS D from LOS F	> 900 seconds	LOS C from LOS F	> 950 seconds	LOS C from LOS F	> 950 seconds
5. Wyoming Ave. @ New Burton Road	LOS D from LOS F	720 seconds	LOS D from LOS F	740 seconds	-	-	-	-
6. Kesselring Ave. @ New Burton Road	LOS C from LOS F	110 seconds	LOS C from LOS F	105 seconds	-	-	-	-
7. Webbs Lane @ New Burton Road	-	-	LOS E from LOS F	> 950 seconds	-	-	-	-
8. Railroad Avenue @ Camden-Wyoming Avenue	-	> 200 seconds	-	> 325 seconds	-	270 seconds	-	235 seconds
9. SR10 @ Camden-Wyoming Avenue	-	20 seconds	-	30 seconds	-	50 seconds	-	40 seconds
10. Alt. US 13 @ Camden-Wyoming Avenue	-	27 seconds	-	-	-	37 seconds	-	33 seconds