



STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. BOX 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

July 20, 2015

Mr. Ramesh Batta
Ramesh C. Batta Associates, P.A.
Brownstone Plaza
4600 New Linden Hill Road
Wilmington, DE 19808

Dear Mr. Batta:

The Traffic Impact Study (TIS) for the **Milltown Square** development (Tax Parcels 0803700040, 041, 0803800002) has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. The TIS conforms to DelDOT's Development Coordination Manual and other accepted practices and procedures for such studies. DelDOT accepts this summary letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed summary letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel
Project Engineer

TEB:km

Enclosures

cc with enclosures: Robert Sevensky, Ramesh C. Batta Associates, P.A.
Larry Tarabicos, Tarabicos Grosso, L.L.P.
Constance C. Holland, Office of State Planning Coordination
George Haggerty, New Castle County Department of Land Use
Marco Boyce, New Castle County Department of Land Use
Owen Robatino, New Castle County Department of Land Use
Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
Kevin Hickman, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

Annie Cordo, Deputy Attorney General
Robert McCleary, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, Chief Traffic Engineer, Traffic, DOTs
Mark Tudor, Assistant Director, Project Development North, DOTs
J. Marc Coté, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Thomas E. Meyer, Traffic Studies Manager, Traffic, DOTs
Kevin Canning, Canal District Engineer, Canal District
Matthew Lichtenstein, Canal District Public Works Engineer, Canal District
Wayne Henderson, Service Development Planner, Delaware Transit Corporation
Jeff Van Horn, New Castle Subdivision Coordinator, Development Coordination
Ahmed Abdelmoteleb, New Castle Traffic Engineer, Traffic, DOTs
Anthony Aglio, Statewide & Regional Planning
Claudy Joinville, Project Engineer, Development Coordination



July 17, 2015

Mr. Troy Brestel
Project Engineer
Development Coordination
DelDOT Division of Planning
P O Box 778
Dover, DE 19903

RE: Agreement No. 1654
Project Number T201469011
Traffic Impact Study Services
Task 1B-Milltown Square

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the Traffic Impact Study (TIS) for the Milltown Square development. This task was assigned Task Number 1B. JMT prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TIS evaluates the impacts of the Milltown Square development, which is proposed on the northwest corner of the intersection of Limestone Road (Delaware Route 7) and Milltown Road (New Castle Road 318), and to the east of Old Limestone Road (New Castle Road 31A) in New Castle County, Delaware. The development would consist of a 42,000 square foot medical office building and 4 single-family detached houses. The subject property is on an approximately 8.56 acre assemblage of parcels currently zoned S (Suburban) and the land is proposed to be rezoned to ON (Office Neighborhood) and ST (Suburban Transition).

The developer is proposing two access points for the medical office space: one right-in/left-out access along Old Limestone Road and one right-in/right-out access along Limestone Road. The houses will have separate driveway entrances along Old Limestone Road. Construction is anticipated to be completed by 2018. In addition, the following changes will be made to the operation of Old Limestone Road when the site is completed:

- 1) Old Limestone Road will be closed to through traffic by the construction of a cul-de-sac, serving the north part of the road, south of the residential driveways.
- 2) The section of Old Limestone Road south of the cul-de-sac, presently restricted to one-way northbound flow, will be returned to two-way operation.
- 3) The connection of Old Limestone Road to Milltown Road, presently limited to in-only operation, will be changed to rights-in/rights-out operation with a channelizing island to prohibit illegal southbound lefts-out (from Old Limestone Road), eastbound lefts-in (from Milltown Road), and northbound through (from Old Milltown Road) movements.



DelDOT currently has two relevant projects within the study area: *the BR 1-191 on Milltown Road over Mill Creek* project (Contract #T201407402) and an improvement project at the Milltown Road intersections with Limestone Road and McKennans Church Road (Contract #T201500401).

The BR 1-191 on Milltown Road over Mill Creek project includes full deck and joint replacement, upgrading pedestrian standards and painting and sealing of abutments and piers of the bridge. Additionally, this bridge rehab project will replace and relocate overhead signage along the westbound Milltown Road approaches to Limestone Road and McKennans Church Road per recommendations contained in the 2014 Hazard Elimination Program (HEP) Site A Task I report discussed further below. Construction will take place during the summer of 2015, when John Dickinson High School is out for the summer. The estimated construction work is to be completed no later than the end of August 2015. Additional information can be found on the DelDOT website at http://deldot.gov/information/projects/bridges/MilltownRdBridge_BR1-191/index.shtml.

DelDOT's 2014 HEP identified one location within the project area. The 2014 HEP Site A is a 0.10-mile corridor located along McKennans Church Road from Limestone Road to Milltown Road. The Site A Task I report included a crash summary as well as review of the Milltown Road and McKennans Church Road intersection. Suggested Task I remedial improvements at the Milltown Road and McKennans Church Road include the removal and relocation of existing overhead signing on westbound Milltown Road, restripe all faded roadway striping and symbols, and rebuild the existing signal to include mast arms and backplates for the signal heads. Other improvements include the installation of a new "Signal Ahead" sign and upgrades to larger "Do Not Enter" and "One Way" signs. No additional studies were required for this location. The improvements related to this study have not yet been implemented.

The improvement project at the Milltown Road intersections with Limestone Road and McKennans Church Road implements recommendations from the 2014 HEP Site A. The project proposes for the rebuilding of the signal at the Milltown Road intersection with McKennans Church Road, adding pedestrian signals and crosswalks at the Milltown Road intersections with Limestone Road and McKennans Church Road, adding a median island along the southbound McKennans Church Road approach to Milltown Road, and formalizing the turn restriction at the southern Milltown Shopping Center exit with a concrete island. Design is currently underway and construction is anticipated to take place Fall/Winter of 2015.

In addition, DelDOT has a future pavement rehabilitation and resurfacing project within the project area. The project includes the entire length of Milltown Road from Kirkwood Highway (Delaware Route 2) to Newport Gap Pike (Delaware Route 41). The scope involves milling, patching, overlays and ADA upgrades; however, a contract number has not yet been assigned. The anticipated construction date is Spring of 2016. There is also a potential future pavement rehabilitation project along Limestone Road from Delaware Route 72 to the Pennsylvania State Line. A contract number has not been assigned and the scope of work as well as the construction date has not been finalized.



Based on our review of the traffic impact study, we have the following comments and recommendations:

None of the intersections within the study area experience level of service (LOS) deficiencies in the existing scenario, nor are they anticipated to experience LOS deficiencies in 2018 with or without the development of Milltown Square. Additionally, the proposed development will meet the New Castle County LOS Standards as stated in Section 40.11.210 of the Unified Development Code (UDC) for all signalized intersections analyzed in this study.

Although all intersections would operate with acceptable LOS under all future conditions (per New Castle County Standards), the Limestone Road/Milltown Road and Milltown Road/McKennans Church Road intersections are expected to have 95th percentile queue lengths that would exceed available storage lengths based on the HCS analysis, without the implementation of physical roadway and/or traffic control improvements. However, during our multiple field visits along with observations from the 2014 HEP Site A Task I report (August 2014) yielded no reportable queueing issues along the eastbound approach of Milltown Road to McKennans Church Road or the westbound approach of Milltown Road to Limestone Road. As such, we do not recommend any additional improvements be implemented by the developer at these two signalized intersections. It should be noted that the intersections of Limestone Road/Milltown Road and Milltown Road/McKennans Church Road operate under one signal controller (new 16-channel cabinet installed in July 2014) with coordination and overlapping phases. A field visit during both the AM and PM peak hours noted a 150 second cycle length at both intersections. Figure 1 outlines the signal phasing and geometric layout of the two intersections.

The two proposed site access points meet the DelDOT LOS criteria and have minimal queue lengths. However, there are potential weaving issues for vehicles exiting the eastern driveway on Limestone Road and attempting to make a U-turn at the Milltown Shopping Center or at Milltown Road. Desirable weaving distances were derived from an Oregon Department of Transportation (ODOT) Access Management Technical Services Bulletin on weaving in the vicinity of an intersection approach. Specifically, the bulletin describes desirable weaving distances for an urban area with speeds greater than 35 miles per hour.

For the eastern driveway, 225 feet of weaving distance (two lane changes) is needed from this driveway to the back of queue for the southbound through movements of Limestone Road at Milltown Road. Based on the Case 3 AM peak hour, the southbound Limestone Road 95th percentile back of queue length from Milltown Road is 810 feet. The total roadway distance from the Limestone Road stop bar at Milltown Road to the middle of the right turn lane (per ODOT's Bulletin) of the eastern driveway is approximately 875 feet. The difference between the total roadway segment (875 feet) and the back of queue distance (810 feet) shows an available weaving distance of only 65 feet, which is less than the 225 feet required. Due to insufficient weaving distance during the AM peak hour, it was assumed that vehicles exiting the site and attempting to travel north on Limestone Road would do so by making the U-turn south of Milltown Road at Limestone Road/McKennans Church Road intersection. Based on the Case 3 PM peak hour, the



southbound Limestone Road 95th percentile back of queue length from Milltown Road is 580 feet. The difference between the total roadway segment (875 feet) and the back of queue distance (580 feet) shows an available weaving distance of 295 feet, which is greater than the 225 feet required. Therefore, during the PM peak hour, the weaving distance along Limestone Road between the eastern driveway and Milltown Road is sufficient.

Should New Castle County approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan. All applicable agreements (i.e. letter agreements for off-site improvements and traffic signal agreements) should be executed prior to entrance plan approval for the proposed development.

1. The developer should provide a bituminous concrete overlay to the southbound Limestone Road existing travel lanes along the site frontage at DeIDOT's discretion. DeIDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer, if necessary.
2. The developer should provide a bituminous concrete overlay to the existing travel lanes along westbound Milltown Road from the Limestone Road intersection to the Old Limestone Road intersection at DeIDOT's discretion. DeIDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer, if necessary.
3. The developer should construct a rights-in/rights-out only entrance for the proposed Milltown Square development on southbound Limestone Road along the eastern side of the property limits, approximately 815 feet north of the Limestone Road intersection with Milltown Road, to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Site Entrance	Approach does not exist	One right turn lane
Northbound Limestone Road	Two through lanes and one continuous right turn lane	No Change
Southbound Limestone Road	Two through lanes	Two through lanes and one right turn lane

Based on DeIDOT's *Development Coordination Manual*, the recommended minimum storage length (excluding taper) is 240 feet for the southbound Limestone Road right turn lane.

4. The connection of Old Limestone Road to Milltown Road, presently limited to in-only operation, is proposed to be changed to rights-in/rights-out operation with a channelizing



island to prohibit illegal southbound lefts-out (from Old Limestone Road), eastbound lefts-in (from Milltown Road), and northbound through (from Old Milltown Road) movements. As such, the developer should reconstruct the intersection of Milltown Road and Old Limestone Road per DelDOT standards at its current location, approximately 210 feet west of the Limestone Road intersection with Milltown Road, to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Milltown Road	One shared left/through/right turn lane	One shared through/right turn lane
Westbound Milltown Road	One shared through/left turn lane and one shared through/right turn lane	One shared through/left turn lane, one through lane, and one right turn lane
Northbound Old Milltown Road	One shared left/through/right turn lane	One shared left/right turn lane
Southbound Old Limestone Road	One-way egress from intersection	One right turn lane

Based on DelDOT's *Development Coordination Manual*, the recommended minimum storage length (excluding taper) is 100 feet for the westbound Milltown Road right turn lane. The developer should submit a plan and coordinate with DelDOT's Subdivision Section to specifically identify the restriping needed to accommodate the reconstruction of the Milltown Road intersection with Old Limestone Road. Improvements should include the extension of the double yellow centerline on the Milltown Road eastbound approach to Limestone Road approximately 265 feet west of the Limestone Road intersection with Milltown Road to prohibit vehicles which may attempt to turn left onto Old Limestone Road.

5. The developer should improve Old Limestone Road in accordance with the following recommendations:
 - a. Construct Old Limestone Road to meet DelDOT's local road standards. These standards include, but are not limited to, two eleven-foot travel lanes and two five-foot shoulders. The developer should provide a bituminous concrete overlay to the existing travel lanes along Old Limestone Road from Limestone Road to Milltown Road (site frontage) at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary.
 - b. Close Old Limestone Road to through traffic by the construction of a cul-de-sac, serving the north part of the road, south of the residential driveways.



- c. Return Old Limestone Road south of the cul-de-sac, presently restricted to one-way northbound flow to two-way operation.
- d. Construct a rights-in/lefts-out only entrance for the proposed Milltown Square development on Old Limestone Road approximately 200 feet north of Milltown Road, to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Utility Driveway	One left turn lane (gated)	One right turn lane (gated)
Westbound Site Entrance	Approach does not exist	One left turn lane
Northbound Old Limestone Road	One through lane (one-way)	One through lane
Southbound Limestone Road	Approach does not exist	One through lane south of Site Entrance

- 6. The developer should enter into a traffic signal agreement with DeIDOT to fund an equitable portion of the pedestrian upgrades planned for the improvement project at the Milltown Road intersections with Limestone Road and McKennans Church Road (Contract #T201500401). The agreement should include signal heads, pedestrian signals, and crosswalks at DeIDOT's discretion. The developer should coordinate with DeIDOT on the implementation and equitable cost sharing of these improvements.
- 7. The following bicycle, pedestrian, and transit improvements should be included:
 - a. The developer should construct a ten foot wide multi use path that meets current AASHTO and ADA standards along the medical building site frontage, which includes Limestone Road from Old Limestone Road to Milltown Road, Milltown Road from Limestone Road to Old Limestone Road, and Old Limestone Road from Milltown Road to the site entrance. In addition, a ten foot wide multi use path should be constructed for non-motorized vehicles from the proposed cul-de-sac on Old Limestone Road to the southern portion of Old Limestone Road. All paths should be contained within a dedicated permanent easement to DeIDOT and/or State right of way. The developer will coordinate with DeIDOT's Subdivision Section during the plan review process to identify the exact locations of the proposed pathways.
 - b. Where internal sidewalks are located alongside of parking spaces, a buffer, physical barrier or signage should be added to eliminate vehicular overhang onto the sidewalk.
 - c. When a right turn lane is added along southbound Limestone Road and westbound Milltown Road, the five-foot wide bicycle lane should be maintained through the right turn lane in order to facilitate safe and unimpeded bicycle travel. A RIGHT TURN YIELD TO BIKES sign (MUTCD R4-4) should be added before the start of each right



- turn lane. Striping for the bike lane along southbound Limestone Road should be continued through the intersection with Milltown Road.
- d. ADA compliant curb ramps and marked crosswalks should be provided at the site entrances to the medical office facility. The use of Type 3 curb ramps is discouraged.
 - e. Bike parking should be provided near the medical office building's entrance. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
 - f. Utility covers should be moved outside of any designated bicycle lanes or should be flush with the pavement.
 - g. The developer should remove two bus stops along southbound Limestone Road, at the intersections of Old Limestone Road and Milltown Road, and combine them into a single bus stop with a 5'x8' pad. The location of this new bus stop would be midway between the previous two bus stops along Limestone Road. The developer should coordinate with DART to specify the exact location of the new bus stop.

Please note that this review generally focuses on capacity and level of service issues; additional safety and operational issues will be further addressed through DeIDOT's subdivision review process.

Improvements in this TIS may be considered "significant" under DeIDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DeIDOT's website at http://www.deldot.gov/information/pubs_forms/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Adam Weiser of DeIDOT's Traffic Section. Mr. Weiser can be reached at (302) 659-4073 or by email at Adam.Weiser@state.de.us.

Additional details on our review of the TIS are attached. Please contact me at (302) 266-9600 if you have any questions concerning this review.

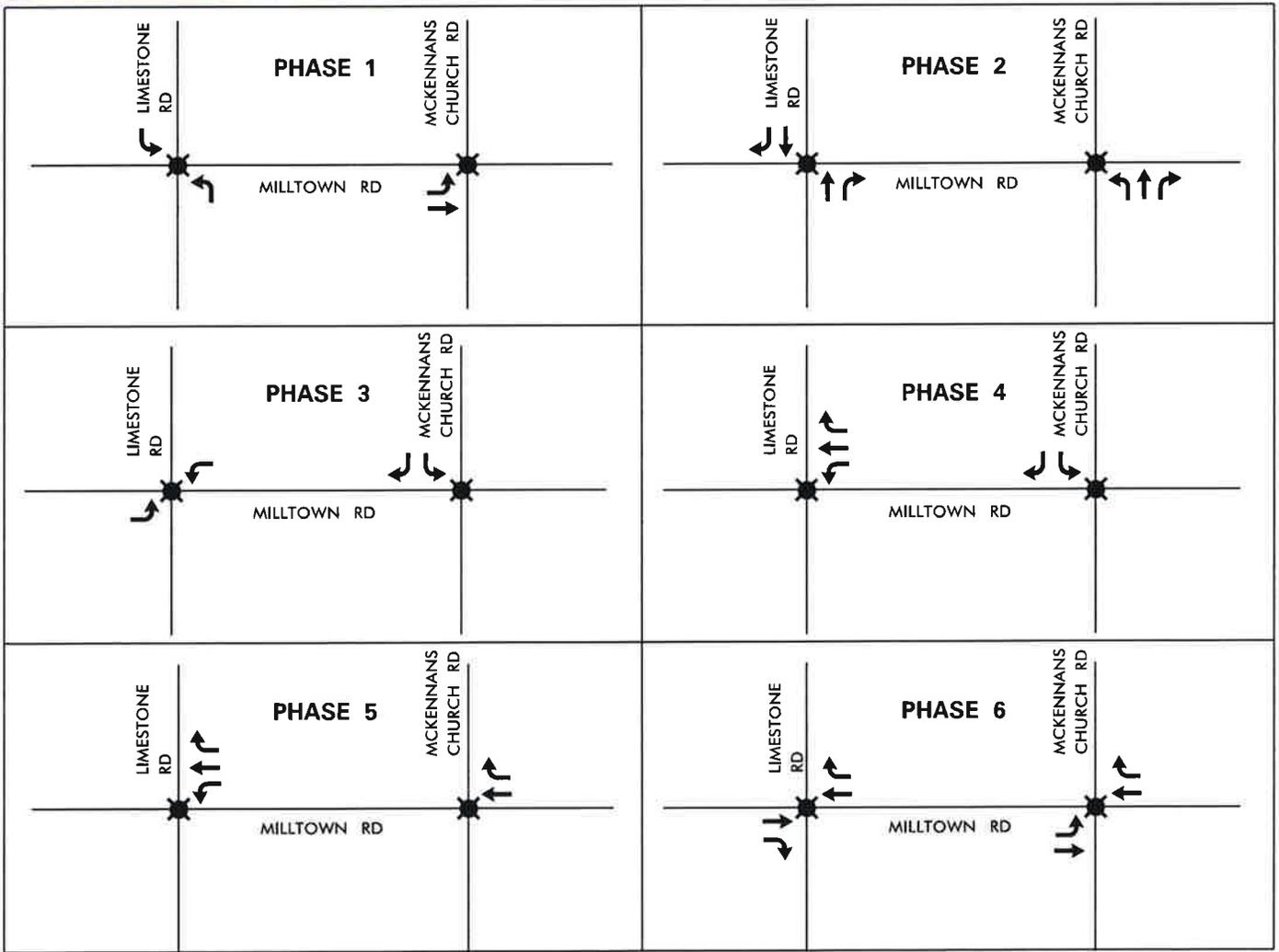
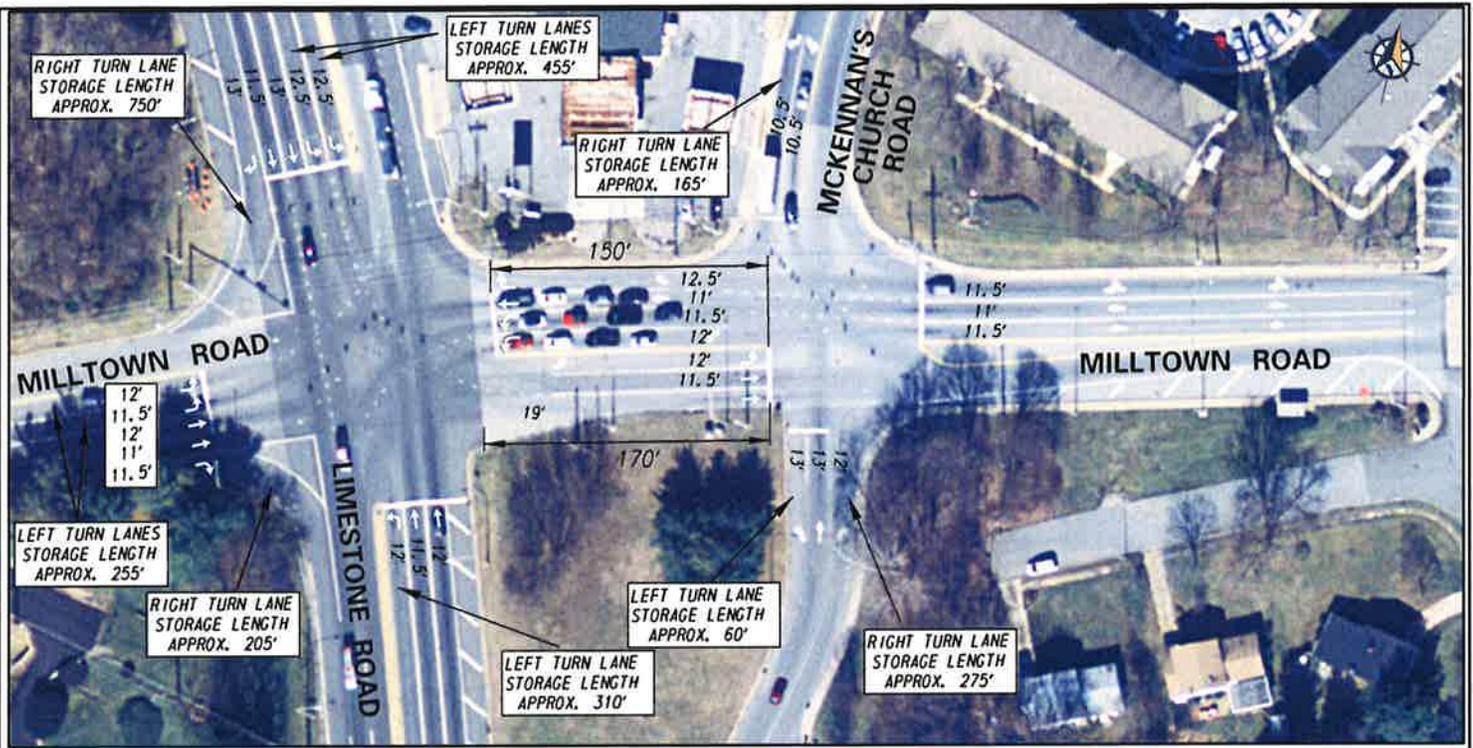
Sincerely,
Johnson, Mirmiran, and Thompson, Inc.

Mir Wahed

Mir Wahed, P.E., PTOE

cc: Richard A. Mishura
Joanne J. Maulit, P.E.

Enclosure



LIMESTONE ROAD / MILLTOWN ROAD AND
MILLTOWN ROAD / MCKENNANS CHURCH ROAD
PHASING AND GEOMETRIC LAYOUT



MILLTOWN SQUARE
TRAFFIC IMPACT STUDY
NEW CASTLE COUNTY, DELAWARE

N.T.S | FIGURE 1 | JULY, 2015

General Information

Report date: June 2015

Prepared by: JMT

Prepared for: Milltown, LLC

Tax Parcels: 08-037.00-040, 041, and 08-038.00-002

Generally consistent with DelDOT's *Development Coordination Manual*: Yes.

Project Description and Background

Description: The development will consist of a 42,000 square foot medical office and 4 single family detached houses.

Location: The subject site is on the northwest corner of Limestone Road (Delaware Route 7) and Milltown Road (New Castle Road 318) in New Castle County.

Amount of Land to be developed: The subject property is an 8.56-acre assemblage of parcels.

Land Use approval(s) needed: Office Neighborhood and Suburban Transition rezoning approval, subdivision approval, and site plan approval.

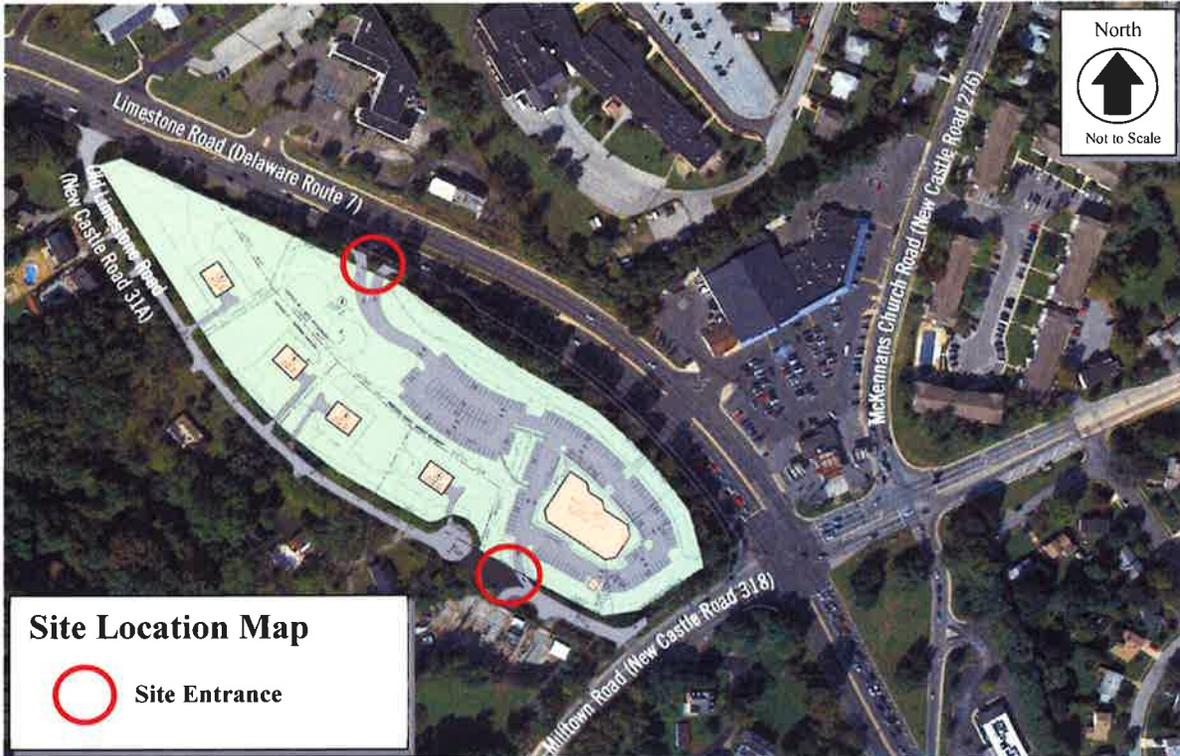
Proposed completion date: 2018.

Proposed access locations: The proposed office space is to be served by two access points. A rights-in/lefts-out entrance on Old Limestone Road and a rights-in/rights-out entrance on Limestone Road. The residential units will have separate driveway entrances along Old Limestone Road.

Daily Traffic Volumes:

- 2015 Average Annual Daily Traffic on Limestone Road: 36,475 vehicles per day.
- 2015 Average Annual Daily Traffic on Old Limestone Road: 75 vehicles per day.

Site Map



**Graphic is an approximation based on the Site Plan dated December 8, 2014.*

Relevant and On-going Projects

DelDOT currently has two relevant projects within the study area: *the BR 1-191 on Milltown Road over Mill Creek* project (Contract #T201407402) and an improvement project at the Milltown Road intersections with Limestone Road and McKennans Church Road (Contract #T201500401).

The BR 1-191 on Milltown Road over Mill Creek project includes full deck and joint replacement, upgrading pedestrian standards and painting and sealing of abutments and piers of the bridge. Additionally, this bridge rehab project will replace and relocate overhead signage along the westbound Milltown Road approaches to Limestone Road and McKennans Church Road per recommendations contained in the 2014 Hazard Elimination Program (HEP) Site A Task I report discussed further below. Construction will take place during the summer of 2015, when John Dickinson High School is out for the summer. The estimated construction work is to be completed no later than the end of August 2015. Additional information can be found on the DelDOT website at http://deldot.gov/information/projects/bridges/MilltownRdBridge_BR1-191/index.shtml.

DelDOT's HEP recently identified one location within the project area. The location is 2014 Site A. Site A is a 0.10-mile corridor located along McKennans Church Road from Limestone Road to Milltown Road. The Site A Task I report included a crash summary as well as a review of the Milltown Road and McKennans Church Road intersection. Suggested Task I remedial improvements at the Milltown Road and McKennans Church Road include the removal and

relocation of existing overhead signing on westbound Milltown Road, restripe all faded roadway striping and symbols, and rebuild the existing signal to include mast arms and backplates for the signal heads. Other improvements include the installation of a new "Signal Ahead" sign and upgrades to larger "Do Not Enter" and "One Way" signs. No additional studies were required for this location. The improvements related to this study have not yet been implemented.

The improvement project at the Milltown Road intersections with Limestone Road and McKennans Church Road implements recommendations from the 2014 HEP Site A. The project proposes for the rebuilding of the signal at the Milltown Road intersection with McKennans Church Road, adding pedestrian signals and crosswalks at the Milltown Road intersections with Limestone Road and McKennans Church Road, adding a median island along the southbound McKennans Church Road approach to Milltown Road, and formalizing the turn restriction at the southern Milltown Shopping Center exit with a concrete island. Design is currently underway and construction is anticipated to take place Fall/Winter of 2015.

In addition, DelDOT has a future pavement rehabilitation and resurfacing project within the project area. The project includes the entire length of Milltown Road from Kirkwood Highway (Delaware Route 2) to Newport Gap Pike (Delaware Route 41). The scope involves milling, patching, overlays and ADA upgrades; however, a contract number has not yet been assigned. The anticipated construction date is Spring of 2016. There is also a potential future pavement rehabilitation project along Limestone Road from Delaware Route 72 to the Pennsylvania State Line. A contract number has not been assigned and the scope of work as well as the construction date has not been finalized.

Livable Delaware

(Source: Delaware Strategies for State Policies and Spending, 2010)

Location with respect to the Strategies for State Policies and Spending Map of Delaware:
Milltown Square is located within the Investment Level 1 area.

Investment Level 1

These areas are often municipalities, towns, or urban/urbanizing places in counties where density is generally higher than in surrounding areas. In Investment Level 1 Areas, state investments and policies should support and encourage a wide range of uses and densities, promote other transportation options, foster efficient use of existing public and private investments, and enhance community identity and integrity. Overall, it is the state's intent to use its spending and management tools to maintain and enhance community character, to promote well-designed and efficient new growth, and to facilitate redevelopment in Investment Level 1 Areas.

In Level 1 Areas the state's first priority will be for preserving existing facilities and making safety improvements. Level 1 Areas will also be the highest priority for context sensitive transportation system capacity enhancements, transit-system enhancements, ADA accessibility, and for closing gaps in the pedestrian system, including the Safe Routes to School projects. Further, Level 1 Areas are the first priority for planning projects and studies, bicycle facilities, signal-system enhancements, and the promotion of interconnectivity between neighborhoods and public facilities.

Proposed Development's Compatibility with Livable Delaware:

The proposed development is located in Investment Level 1 Areas. The site is also located in the New Castle County Growth Zone. According to Livable Delaware, Level 1 reflects areas that are already developed in an urban or suburban fashion where infrastructure is existing or readily available, and where future redevelopment or infill projects are expected and encouraged by State policy. Therefore, the proposed development is generally consistent with the 2010 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plans

(Source: New Castle County, 2012 Comprehensive Plan)

New Castle County Comprehensive Plan:

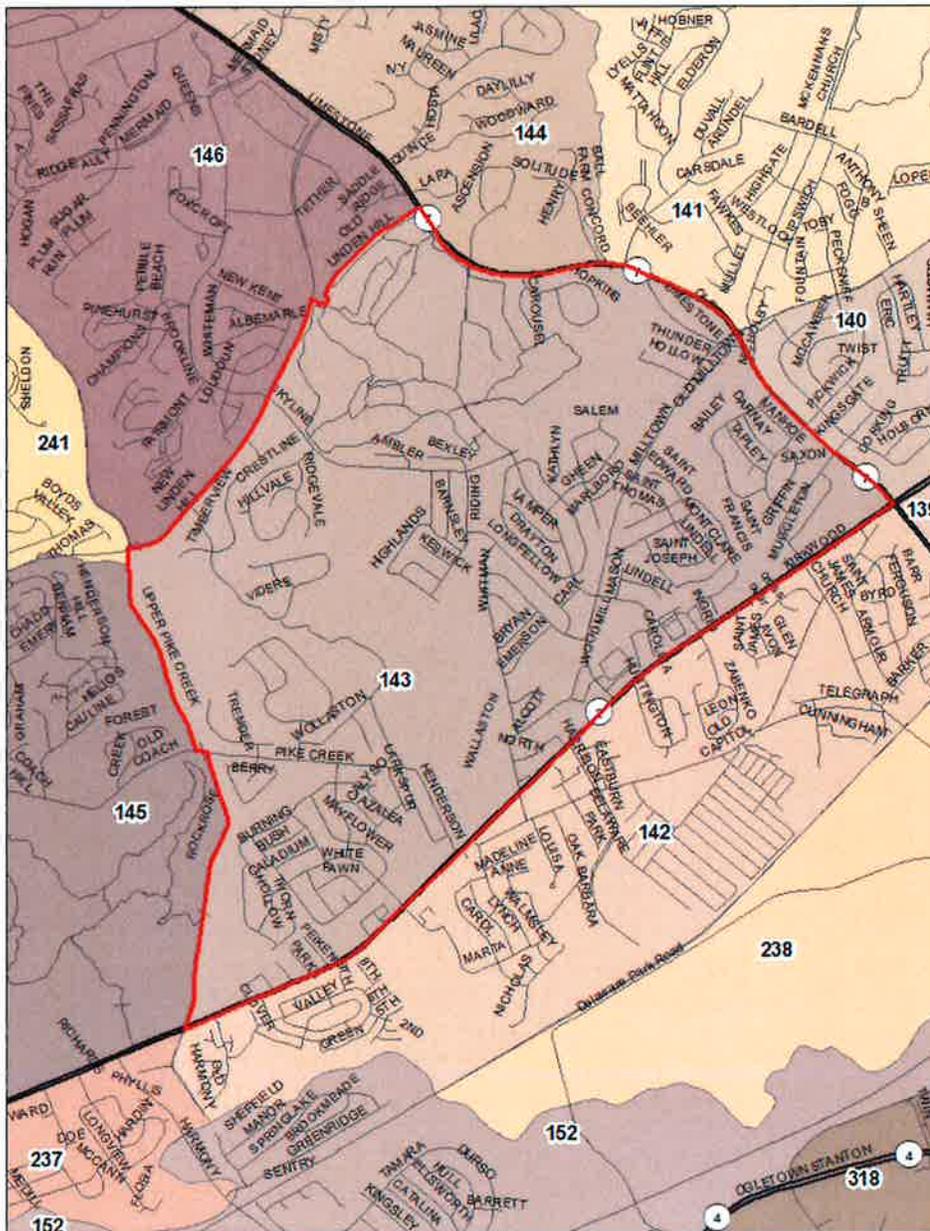
The subject property currently zoned as S (Suburban). The proposed development plans to rezone the S as a split-zone of ON (Office Neighborhood) and ST (Suburban Transition). According to the New Castle County Comprehensive Plan, the future land use of the property would be within the Low Residential Density area.

Proposed Development's Compatibility with the New Castle County Comprehensive Plan:

Per the New Castle County Comprehensive Plan, providing a mix of land uses, while keeping a pedestrian friendly design, in low density suburban areas are encouraged. The proposed development consists of commercial and residential uses and will be located adjacent to residential areas. As such, the development is generally compatible with the New Castle County Comprehensive Plan.

Transportation Analysis Zones (TAZ)

Transportation Analysis Zones (TAZ) where development would be located: 143



TAZ Boundaries (143):

- Current employment estimate for TAZ: 3,068 in 2010**
- Future employment estimate for TAZ: 3,250 in 2040**
- Current Population estimate for TAZ: 6,426 in 2010**
- Future Population estimate for TAZ: 6,172 in 2040**
- Current household estimate for TAZ: 2,622 in 2010**

Future household estimate for TAZ: 2,712 in 2040

Relevant committed developments in the TAZ: None.

Would the addition of committed developments to current estimates exceed future projections: No.

Would the addition of committed developments and the proposed development to current estimates exceed future projections: No.

Trip Generation

The trip generation for the proposed development was determined by using the comparable land use and rates/equations contained in the *Trip Generation, 9th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 720 (Medical-Dental Office Building) and Land Use Code 210 (Single-Family Detached Housing).

The peak period trip generation for the Milltown Square development is included in Table 1.

Table 1
MILLTOWN SQUARE

Land Use	ADT	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
42,000 Square Feet Medical Office	1517	79	21	100	37	96	133
4 Single-Family Detached Houses	54	3	10	13	4	2	6
Total New Trips	1571	82	31	113	41	98	139

Overview of TIS

Intersections examined:

1. Limestone Road (Delaware Route 7) / East Site Access
2. Old Limestone Road (New Castle Road 31A) / West Site Access
3. Limestone Road / Old Limestone Road
4. Limestone Road / Arundel Drive / Doherty Funeral Home
5. Limestone Road / Concord Drive
6. Limestone Road / Hopkins Drive
7. Limestone Road / Pike Creek Sports Medicine Center
8. Limestone Road / Milltown Shopping Center
9. Limestone Road / Milltown Road (New Castle Road 318)
10. Limestone Road / U-turn (south of Milltown Road)
11. Milltown Road / McKennans Church Road (New Castle Road 276)
12. Milltown Road / Old Limestone Road
13. Milltown Road / Thunder Hollow Road / Old Milltown Road (New Castle Road 318C)

14. Milltown Road / John Dickinson High School Entrance

Note: For the purpose of this study Milltown road is considered an Eastbound / Westbound roadway.

Conditions examined:

1. Case 1 – 2015 Existing conditions
2. Case 2 – 2018 No Build conditions
3. Case 3 – 2018 Build conditions

Peak hours evaluated: Weekday morning and weekday evening peak hours.

Committed Developments considered:

1. Linden Hill Offices (48,000 square foot general office)
2. Limestone Shopping Center (3,000 square foot bank with drive-through to replace 10,450 square foot shopping center)
3. Sports Plus Indoor Recreation Center (33,000 square foot recreation center)
4. Pike Creek Medical Buildings (18,000 square foot medical office buildings)
5. Rice Restaurant (4,000 square foot restaurant)

Intersection Descriptions

1. Limestone Road (Delaware Route 7) / East Site Access

Type of Control: proposed stop controlled intersection (T-intersection)

Northbound Approach: (Limestone Road) existing two through lanes and one continuous right turn lane

Southbound Approach: (Limestone Road) existing two through lanes; proposed two through lanes and one channelized right turn lane

Eastbound Approach: (Proposed East Site Access) proposed one channelized right turn lane, stop controlled

2. Old Limestone Road (New Castle Road 31A) / West Site Access

Type of Control: proposed stop controlled intersection (T-intersection)

Northbound Approach: (Old Limestone Road) existing one through lane

Southbound Approach: (Old Limestone Road) existing approach does not exist due to one-way operation northbound; proposed one through lane starting at Site Access

Eastbound Approach: (Utility Driveway) existing one left turn lane; proposed one right turn lane, stop controlled

Westbound Approach: (Proposed West Site Access) proposed one left turn lane, stop controlled

Note: Old Limestone Road is an existing one-way road. It is proposed to change to a two-direction roadway as part of the Milltown Square development.

3. Limestone Road / Old Limestone Road

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (Limestone Road) existing one left turn lane, two through lanes, and one continuous right turn lane

Southbound Approach: (Limestone Road) existing one left turn lane, two through lanes, and one right turn lane

Eastbound Approach: (Old Limestone Road) existing one shared through/left turn/right turn lane, stop controlled

Westbound Approach: (Church Entrance) existing one way receiving driveway into Church parking lot

4. Limestone Road / Arundel Drive / Doherty Funeral Home

Type of Control: existing signal controlled intersection

Northbound Approach: (Limestone Road) existing one left turn lane, two through lanes, and one right turn lane

Southbound Approach: (Limestone Road) existing one left turn lane, two through lanes, and one right turn lane

Eastbound Approach: (Doherty Funeral Home) existing one shared through/left turn/right turn lane

Westbound Approach: (Arundel Drive) existing one shared through/left turn lane and one right turn lane

5. Limestone Road / Concord Drive

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (Limestone Road) existing two through lanes and one channelized right turn lane

Southbound Approach: (Limestone Road) existing two through lanes

Westbound Approach: (Concord Drive) existing one channelized right turn lane, stop controlled

6. Limestone Road / Hopkins Drive

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (Limestone Road) existing one left turn lane and two through lanes

Southbound Approach: (Limestone Road) existing one left turn lane (for U-turns), two through lanes, and one right turn lane

Eastbound Approach: (Hopkins Drive) existing one shared left turn/right turn lane, stop controlled

7. Limestone Road / Pike Creek Sports Medicine Center

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (Limestone Road) existing one left turn lane (for U-turns), two through lanes and one continuous right turn lane

Southbound Approach: (Limestone Road) existing one left turn lane and two through lanes

Westbound Approach: (Pike Creek Sports Medicine Center) existing one shared left turn/right turn lane, stop controlled

Note: The westbound Pike Creek Sports Medicine Center approach is striped with a channelized rights-out island. However, field observations indicate this approach operates as a shared left turn/right turn lane.

8. Limestone Road / Milltown Shopping Center

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (Limestone Road) existing two through lanes and one continuous right turn lane that terminates at the Milltown Road intersection

Southbound Approach: (Limestone Road) existing one left turn lane for Milltown Shopping Center, one left turn lane for the Milltown Road intersection, two through lanes, and one right turn lane for the Milltown Road intersection

Westbound Approach: (Milltown Shopping Center) existing one channelized right turn lane, stop controlled

9. Limestone Road / Milltown Road

Type of Control: existing signal controlled intersection

Northbound Approach: (Limestone Road) existing one left turn lane and two through lanes

Southbound Approach: (Limestone Road) existing two left turn lanes, two through lanes, and one channelized right turn lane

Eastbound Approach: (Milltown Road) existing two left turn lanes, two through lanes, and one channelized right turn lane

Westbound Approach: (Milltown Road) existing two left turn lanes, one through lane, and one right turn lane

Note: Milltown Road is designated north/south, but for the purpose of this analysis it is assumed to run east/west.

10. Limestone Road / U-turn (south of Milltown Road)

Type of Control: none

Northbound Approach: (Limestone Road) existing two through lanes and one right turn lane for McKennans Church Road

Southbound Approach: (Limestone Road) existing one left turn lane (for U-turns) and two through lanes

11. Milltown Road / McKennans Church Road

Type of Control: existing signal controlled intersection

Northbound Approach: (McKennans Church Road) existing one left turn lane, one through lane, and one right turn lane

Southbound Approach: (McKennans Church Road) existing one left turn lane and one right turn lane

Eastbound Approach: (Milltown Road) existing one left turn lane and two through lanes

Westbound Approach: (Milltown Road) existing two through lanes and one shared through/right-turn lane

Note: Milltown Road is designated north/south, but for the purpose of this analysis it is assumed to run east/west.

12. Milltown Road / Old Limestone Road

Type of Control: existing stop controlled intersection

Northbound Approach: (Old Milltown Road) existing one shared through/left turn/right turn lane, stop controlled; proposed one shared left turn/right turn lane, stop controlled

Southbound Approach: (Old Limestone Road) existing one-way receiving lane; proposed one channelized right turn lane, stop controlled

Eastbound Approach: (Milltown Road) existing one shared through/left turn/right turn lane; proposed one shared through/right turn lane

Westbound Approach: (Milltown Road) existing one shared through/left turn lane and one shared through/right turn lane; proposed one shared through/left turn lane, one through lane, and one right turn lane

Note: Milltown Road is designated north/south, but for the purpose of this analysis it is assumed to run east/west.

13. Milltown Road / Thunder Hollow Road / Old Milltown Road (New Castle Road 318C)

Type of Control: existing stop controlled intersection

Northbound Approach: (Old Milltown Road) existing one shared through/left turn/right turn lane, stop controlled

Southbound Approach: (Thunder Hollow Road) existing one shared through/left turn/right turn lane, stop controlled

Eastbound Approach: (Milltown Road) existing one shared through/left turn/right turn lane

Westbound Approach: (Milltown Road) existing one shared through/left turn lane and one right turn lane

Note: Milltown Road is designated north/south, but for the purpose of this analysis it is assumed to run east/west.

14. Milltown Road / John Dickinson High School Entrance

Type of Control: existing signal controlled intersection

Southbound Approach: (John Dickinson High School Entrance) existing one left turn lane and one right turn lane

Eastbound Approach: (Milltown Road) existing one left turn lane and one through lane

Westbound Approach: (Milltown Road) existing one shared through/right turn lane

Note: Milltown Road is designated north/south, but for the purpose of this analysis it is assumed to run east/west.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Delaware Transit Corporation (DTC) currently provides existing services via DART Route 18 and Route 30 within the study area. The designated bus stops for Route 18 that exist within the study area are located along Limestone Road at the intersections of Arundel Drive and Old Limestone Road, as well as at the intersection of Milltown Road and Cratchett Road. Additionally, DART Route 18 provides 20 round trips on Monday through Fridays from 5:10 a.m. to 7:59 p.m. Route 18 does not run on Saturdays. The designated bus stops for Route 30 that exist within the study area are located along Limestone Road at the intersections of Arundel Drive, Old Limestone Road, Milltown Road, and Bailey Drive. Additionally, DART Route 30 provides 4 round trips on Monday through Fridays from 6:50 a.m. to 5:59 p.m. Route 30 does not run on Saturdays.

Planned transit service: JMT contacted Even Horgan and Wayne Henderson, Service Development Planner at the DTC and David Dooley, Transit Planner at the DTC. In a May 22, 2015 email, Mr. Horgan recommended that two bus stops along southbound Limestone Road, at the intersections of Old Limestone Road and Milltown Road, be removed and combined into a single bus stop with a 5'x8' pad (M-9 standard construction detail). The location of this new bus stop would be midway between the previous two bus stops along Limestone Road. Furthermore, Mr. Horgan recommended that a sidewalk be installed on the east side of Limestone Road connecting the intersections between Milltown Road and McKennans Church Road. The bus stop location on Limestone Road north of Baily Drive should be relocated north of McKennans Church Road and connect to the proposed sidewalk.

Existing bicycle and pedestrian facilities: According to DelDOT's *Delaware Bicycle Facility Master Plan* (October 2005) and the *New Castle County Bicycle Map*, connector and regional bicycle routes exist within the study area. The regional bicycle route runs along Milltown Road and traverses through five of the project's study intersections (the Milltown Road intersections with Limestone Road, McKennans Church Road, Old Limestone Road, Thunder Hollow Road/Old Milltown Road, and John Dickinson High School Entrance). The connector bicycle route runs along Limestone Road and McKennans Church Road and traverses through ten of the project's study intersections (the Limestone Road intersections with Old Limestone Road, Arundel Drive/Doherty Funeral Home, Concord Drive, Hopkins Drive, Pike Creek Sports Medical Center, Milltown Shopping Center, Milltown Road, U-Turn (south of Milltown Road) and the McKennans Church Road intersection with Milltown Road).

Planned bicycle and pedestrian facilities: JMT contacted Mr. Anthony Aglio, DelDOT's Bicycle and Pedestrian Coordinator. Per a June 25, 2015 telephone conversation with Mr. Aglio, it was requested that a multi-use path be constructed along the site frontage on Limestone Road, Milltown Road, and the southern portion of Old Limestone Road. It was mentioned that this multi-use path should provide connection to the proposed cul-de-sac on Old Limestone Road for non-motorized vehicles. Furthermore, it was suggested that a bike lane be provided along the site frontage on southbound Limestone Road and westbound Milltown Road. For the bike lane along Limestone Road it is recommended that striping be provided through the intersection with Milltown Road.

Bicycle Level of Service and Bicycle Compatibility Index: According to the League of Illinois Bicyclists (LIB), Bicycle Level of Service (BLOS) is an emerging national standard for

*Detailed TIS Review by:
Johnson, Mirmiran, & Thompson*

quantifying the bike-friendliness of a roadway by measuring on-road bicyclist comfort levels for specific roadway geometries and traffic conditions. Utilizing the 10-year projected AADT along the site frontages, the BLOS with the construction of the proposed development are summarized below. Five-foot bike lanes are expected to be provided along Limestone Road. The BLOS was determined utilizing the calculators published on the LIB website:

<http://www.bikelib.org/roads/blos/blosform.htm>

- Limestone Road – BLOS: C
- Old Limestone Road – BLOS: A
- Milltown Road – BLOS: D

Previous Comments

None.

General HCS Analysis Comments

(See table footnotes on the following pages for specific comments)

1. JMT performed analysis using HCS 2010, Version 6.65.
2. Per DelDOT's *Development Coordination Manual*, JMT utilized the future PHF of 0.80 for roadways with less than 500 vph, 0.88 for roadways between 500 and 1,000 vph, and 0.92 for roadways with more than 1,000 vph or the existing PHF, whichever was higher.
3. Per DelDOT's *Coordination Manual*, JMT used a heavy vehicle percentage of 3% for each movement in future scenario analysis, unless the existing heavy vehicle percentage was greater than 3% and there was no significant increase of vehicles along that movement, in which case the existing heavy vehicle percentage was used for analysis of future scenarios.

Table 2
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ¹ Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/East Site Access		
2018 with development of Milltown Square (Case 3)		
Eastbound Site Access Right	B (11.3)	B (11.9)

¹ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ² Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Old Limestone Road (New Castle Road 31A)/ West Site Access		
2018 with development of Milltown Square (Case 3)		
Westbound Site Access Left	A (8.5)	A (8.6)

² For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ³ Two-Way Stop Control	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/Old Limestone Road		
Existing (Case 1)		
Eastbound Old Limestone Road	B (11.0)	B (10.7)
Northbound Limestone Road Left	B (14.0)	B (11.9)
Southbound Limestone Road Left	A (9.5)	C (15.1)
2018 without development of Milltown Square (Case 2)		
Eastbound Old Limestone Road	B (11.1)	B (11.0)
Northbound Limestone Road Left	B (14.8)	B (12.8)
Southbound Limestone Road Left	A (9.9)	C (16.2)
2018 with development of Milltown Square (Case 3)		
Eastbound Old Limestone Road	C (17.6)	B (14.3)
Northbound Limestone Road Left	C (16.9)	B (13.4)
Southbound Limestone Road Left	A (9.9)	C (16.5)

³ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 5
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Signalized Intersection ⁴	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/Arundel Drive/Doherty Funeral Home⁵		
Existing (Case 1)	A (9.7)	A (9.9)
2018 without development of Milltown Square (Case 2)	A (9.8)	A (9.9)
2018 with development of Milltown Square (Case 3)	A (9.9)	B (10.1)

⁴ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

⁵ Contrary to the PM peak hour existing and future volume figures, a peak hour volume of one was incorporated into each eastbound Doherty Funeral Home movement for the calculation of LOS.

Table 6
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ⁶ Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/Concord Drive		
Existing (Case 1)		
Westbound Concord Drive Right	B (10.5)	B (11.6)
2018 without development of Milltown Square (Case 2)		
Westbound Concord Drive Right	B (10.7)	B (11.8)
2018 with development of Milltown Square (Case 3)		
Westbound Concord Drive Right	B (10.7)	B (11.9)

⁶ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 7
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ⁷ Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/Hopkins Drive		
Existing (Case 1)		
Eastbound Hopkins Drive	C (18.8)	C (18.6)
Northbound Limestone Road Left	C (15.6)	B (12.5)
Southbound Limestone Road U-turn	A (9.7)	B (13.7)
2018 without development of Milltown Square (Case 2)		
Eastbound Hopkins Drive	C (19.6)	C (20.3)
Northbound Limestone Road Left	C (16.1)	B (13.4)
Southbound Limestone Road U-turn	B (10.1)	B (14.4)
2018 with development of Milltown Square (Case 3)		
Eastbound Hopkins Drive	C (19.7)	C (20.4)
Northbound Limestone Road Left	C (16.3)	B (13.5)
Southbound Limestone Road U-turn	B (10.1)	B (14.7)

⁷ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 8
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ⁸ Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/Pike Creek Sports Medicine Center		
Existing (Case 1)		
Westbound Pike Creek Sports Medicine Center	B (13.9)	C (15.3)
Northbound Limestone Road U-turn	B (14.5)	B (11.5)
Southbound Limestone Road Left	A (9.6)	C (15.4)
2018 without development of Milltown Square (Case 2)		
Westbound Pike Creek Sports Medicine Center	B (14.3)	C (16.3)
Northbound Limestone Road U-turn	C (15.3)	B (12.3)
Southbound Limestone Road Left	A (9.9)	C (16.5)
2018 with development of Milltown Square (Case 3)		
Westbound Pike Creek Sports Medicine Center	C (15.1)	C (17.1)
Northbound Limestone Road U-turn	C (16.4)	B (12.6)
Southbound Limestone Road Left	B (10.3)	C (17.5)

⁸ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 9
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ⁹ Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/Milltown Shopping Center		
Existing (Case 1)		
Westbound Milltown Shopping Center Right	A (9.7)	B (11.9)
Southbound Limestone Road Left	B (10.1)	C (17.7)
2018 without development of Milltown Square (Case 2)		
Westbound Milltown Shopping Center Right	A (9.7)	B (12.1)
Southbound Limestone Road Left	B (10.5)	C (19.4)
2018 with development of Milltown Square (Case 3)		
Westbound Milltown Shopping Center Right	A (9.8)	B (12.2)
Southbound Limestone Road Left	B (10.9)	C (21.7)

⁹ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 10
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Signalized Intersection ¹⁰	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/ Milltown Road (New Castle Road 318) ¹¹		
Existing (Case 1)	D (50.5)	D (50.9)
2018 without development of Milltown Square (Case 2)	D (53.5)	D (53.5)
2018 with development of Milltown Square (Case 3)	D (54.4)	D (54.6)

¹⁰ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹¹ A peak hour multi period analysis based on arrival volumes was conducted at the intersection. The highest delay from the multi period analysis is presented in the results table.

Table 11
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ¹² Two-Way Stop Control (T-intersection)	LOS	
	Weekday AM	Weekday PM
Limestone Road (Delaware Route 7)/U-turn (south of Milltown Road)		
Existing (Case 1)		
Southbound Limestone Road U-turn	B (11.0)	B (13.9)
2018 without development of Milltown Square (Case 2)		
Southbound Limestone Road U-turn	B (11.6)	B (14.9)
2018 with development of Milltown Square (Case 3)		
Southbound Limestone Road U-turn	B (11.8)	C (15.0)

¹² For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

Table 12
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Signalized Intersection ¹³	LOS	
	Weekday AM	Weekday PM
Milltown Road/ McKennans Church Road (New Castle Road 276) ^{14,15,16}		
Existing (Case 1)	D (50.3)	D (53.9)
2018 without development of Milltown Square (Case 2)	D (50.4)	D (53.9)
2018 with development of Milltown Square (Case 3) ¹⁷	D (51.1)	D (55.0)

¹³ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹⁴ A peak hour multi period analysis based on arrival volumes was conducted at the intersection. The highest delay from the multi period analysis is presented in the results table.

¹⁵ Although a left turn movement does not exist, the westbound Milltown Road approach was modeled with one left turn lane and a volume of one to model the westbound lead phase into the signal timing.

¹⁶ The southbound McKennans Church Road approach was modeled with one left turn lane, one through lane, and one right turn lane as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

¹⁷ A delay of 55.0 seconds is borderline LOS D and LOS E. However, HCS 2010 reported LOS D in the results during the PM Case 3 analysis.

Table 13
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ¹⁸ Two-Way Stop Control	LOS	
	Weekday AM	Weekday PM
Milltown Road/Old Limestone Road/ Old Milltown Road¹⁹		
Existing (Case 1)		
Eastbound Milltown Road Through/Left/Right	A (8.4)	A (8.2)
Westbound Milltown Road Through/Left	A (8.2)	A (8.3)
Northbound Old Milltown Road	B (12.8)	B (12.8)
2018 without development of Milltown Square (Case 2)		
Eastbound Milltown Road Through/Left/Right	A (8.5)	A (8.2)
Westbound Milltown Road Through/Left	A (8.3)	A (8.4)
Northbound Old Milltown Road	B (13.0)	B (13.1)
2018 with development of Milltown Square (Case 3) ²⁰		
Westbound Milltown Road Through/Left	A (8.4)	A (8.4)
Northbound Old Milltown Road	B (14.0)	B (13.9)
Southbound Old Limestone Road Right	A (9.1)	A (8.9)

¹⁸ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹⁹ Contrary to the AM and PM peak hour existing and future volume figures, a peak hour volume of one was incorporated for the northbound Old Milltown Road left and right turn movements for the calculation of LOS.

²⁰ For this scenario, the Old Limestone Road north leg is proposed to be a right-in/right-out roadway only.

Table 14
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Unsignalized Intersection ²¹ Two-Way Stop Control	LOS	
	Weekday AM	Weekday PM
Milltown Road/Thunder Hollow Road/Old Milltown Road (New Castle Road 318C)²²		
Existing (Case 1)		
Eastbound Milltown Road Through/Left/Right	A (9.0)	A (8.5)
Westbound Milltown Road Through/Left	A (8.2)	A (8.1)
Northbound Old Milltown Road	B (13.5)	C (17.2)
Southbound Thunder Hollow Road	C (24.8)	C (19.9)
2018 without development of Milltown Square (Case 2)		
Eastbound Milltown Road Through/Left/Right	A (9.0)	A (8.6)
Westbound Milltown Road Through/Left	A (8.2)	A (8.2)
Northbound Old Milltown Road	B (13.7)	C (17.6)
Southbound Thunder Hollow Road	D (25.2)	C (20.6)
2018 with development of Milltown Square (Case 3)		
Eastbound Milltown Road Through/Left/Right	A (9.1)	A (8.6)
Westbound Milltown Road Through/Left	A (8.3)	A (8.2)
Northbound Old Milltown Road	B (13.9)	C (18.1)
Southbound Thunder Hollow Road	D (26.0)	C (21.5)

²¹ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

²² Contrary to the PM peak hour existing and future volume figures, a peak hour volume of one was incorporated into each northbound Old Milltown Road movement for the calculation of LOS.

Table 15
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Impact Study for Milltown Square Development
Report Dated June 2015
Prepared by JMT

Signalized Intersection ²³	LOS	
	Weekday AM	Weekday PM
Milltown Road/ John Dickinson High School Entrance ^{24,25}		
Existing (Case 1)	B (13.3)	A (8.8)
2018 without development of Milltown Square (Case 2)	B (13.3)	A (8.9)
2018 with development of Milltown Square (Case 3)	B (13.4)	A (9.1)

²³ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

²⁴ The John Dickinson High School Entrance approach was modeled with one left turn lane, one through lane, and one right turn lane as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

²⁵ Signal runs under free operation. As such, based on field observations, a cycle length of 75 seconds was assumed in the analysis.