



STATE OF DELAWARE

**DEPARTMENT OF TRANSPORTATION**

800 BAY ROAD  
P.O. BOX 778  
DOVER, DELAWARE 19903

SHAILEN BHATT  
SECRETARY

July 13, 2011

Ms. Debbie Pfeil  
Senior Planner  
URS Corporation  
24845 DuPont Boulevard  
Millsboro, DE 19966

Dear Ms. Pfeil:

I am writing to you in the context of your role as City Planner for the City of Harrington.

The enclosed Traffic Impact Study (TIS) review letter for **The Legacy (a.k.a. Scenic Acres a.k.a. the Adamo/Wheeler Property)** has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TIS to conform to DelDOT's Standards and Regulations for Subdivision Streets and State Highway Access and other accepted practices and procedures for such studies. DelDOT accepts this TIS review and concurs with the recommendations.

You may notice that the letter is dated July 30, 2009. The review was completed at that time and the letter was held pending discussions with the developer. Those discussions have concluded and we understand that the developer wants to proceed with their development now. In our opinion, conditions have not changed enough since then to warrant a new TIS.

If you have any questions concerning this letter or the attached review letter, please contact me at (302) 760-2109.

Sincerely,

T. William Brockenbrough, Jr.  
County Coordinator

TWB:km

Enclosures

cc with enclosures: Mr. Norman Barlow, Interim City Manager, City of Harrington  
Ms. Constance C. Holland, Office of State Planning Coordination  
Mr. Derrick S. Kennedy, Orth-Rodgers & Associates  
Mr. Andrew Parker, McCormick Taylor  
Mr. Mir Wahed, Johnson, Mirmiran, and Thompson

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July 30, 2009  
Mr. Todd Sammons, P.E.  
Project Engineer  
DelDOT Division of Planning  
P O Box 778  
Dover, DE 19903

RE: Agreement No. 1406-Task 211A  
Traffic Impact Study Services  
Scenic Acres development– TIS Review

Dear Mr. Sammons,

Johnson, Mirmiran and Thompson (JMT) has completed a review of the Traffic Impact Study for Scenic Acres development, prepared by Orth-Rodgers and Associates dated June 25, 2008. This review was assigned Task Number 211A. Orth-Rodgers and Associates prepared the report in a manner generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*.

The TIS evaluates the impacts of Scenic Acres development, which is proposed on the west side of Raughley Hill Road (Kent Road 405) situated between Delaware Avenue (Kent Road 81) and Hopkins Cemetery Road (Kent Road 289) in the City of Harrington, Kent County. The development would consist of 52 single family homes, 362 townhouses, and 8,000 square feet retail on a 72-acre assemblage of parcels. The parcels are currently zoned as residential and are proposed to be rezoned as Multi-Use. Orth-Rodgers analyzed the TIS considering two site access points along Raughley Hill Road. However, during the TIS review process the developer is proposing a single site access on Raughley Hill Road. Construction is anticipated to be completed by 2010.

DelDOT currently has one relevant project in the study area. US Route 13/DuPont Highway (Kent Road 5) is subject to DelDOT's Corridor Capacity Preservation Program (CCPP). The CCPP is a statewide program intended to sustain the capacity of adopted highway corridors by various means such as limiting access points and using service roads for local vehicle trips. The general purpose of the program is to ensure that the existing principal arterial highways, such as US Route 13, are able to efficiently carry regional traffic without impedance from the effects of local development. The CCPP includes the "Harrington Plan (North)", which is a conceptual improvement plan that would affect the intersection of US Route 13 and Carpenter Bridge Road (Kent Road 35). This project proposes the realignment of Carpenter Bridge Road to intersect US Route 13 approximately 800 feet to the north of the existing location, and constructing a new intersection of US Route 13 and Carpenter Bridge Road as a right-in/right-out only intersection. Additionally, the project proposes to create a cul-de-sac of the existing Carpenter Bridge Road alignment, just to the east of where it currently intersects US Route 13. At this time, the project is in the early stages of design. The Project Engineering (PE) is scheduled to be completed by Fiscal Year 2011. The anticipated construction start date will be in fiscal Year 2013.



Based on our review, we have the following comments and recommendations:

The following intersection exhibits Level of Service (LOS) deficiencies without the implementation of physical roadway and/or traffic control improvements:

<i>Intersection</i>	<i>Situations for which deficiencies occur</i>
Hopkins Cemetery Road/Winkler Road & US Route 13	2010 AM and PM with Scenic Acres development

The intersection of US Route 13 and Hopkins Cemetery Road/Winkler Road exhibits LOS deficiencies under future conditions for the AM and PM peak hours. However, we do not recommend any improvements be implemented by the developer at this intersection. The LOS deficiency is only E, it would exist only on the eastbound Hopkins Cemetery Road approach, and the 95<sup>th</sup> percentile queue length there during the typical peak hours is expected to be approximately 120 feet. In addition, the intersection of US Route 13 and Hopkins Cemetery Road/Winkler Road is an unsignalized intersection within the limits of DelDOT's CCPP. While signalization of these intersections could potentially address the future LOS deficiencies, DelDOT is generally opposed to this solution in an effort to maintain capacity along the principal arterials within the CCPP. Additionally, due to low volumes, and the existence of a business structure/commercial property on the southwest corner, no improvements are recommended at the intersection of US Route 13 and Hopkins Cemetery Road/Winkler Road.

Should the City of Harrington 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 improve Raughley Hill Road from the north end of the site frontage to the intersection of Raughley Hill Road and Delaware Avenue 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, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary.
2. The developer should construct the site entrance on Raughley Hill Road to include one separate left-turn lane and one right-turn lane on the eastbound site approach, one through lane and one separate right-turn lane on the southbound approach and one left-turn lane and one through lane on the northbound approach.
3. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements to the intersection of Carpenter Bridge Road and US Route 13. These improvements include the realignment of Carpenter Bridge Road to intersect US Route 13 approximately 800 feet north of the existing location, and the construction of a new

intersection of US Route 13 and Carpenter Bridge Road as a right-in/right-out only intersection. At least one other developer (Thistlewood) is expected to enter into intersection improvements as well. The developer should coordinate with DeIDOT on the implementations and equitable cost sharing of these improvements.

4. The developer should provide a future stub road connection to the Gateway Farm, LLC (Tax Parcel MN-09-170.00-02-13.02) on the northern edge of the property boundary to increase potential interconnectivity between adjacent sites.
5. The following bicycle, pedestrian, and transit improvements should be included:
  - a. A fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DeIDOT for future use within the site frontage along Raughley Hill Road. Within this easement, a ten-foot wide multi-use path that meets current AASHTO and ADA standards should be constructed with a five-foot setback from the edge of pavement. A seven-foot wide ADA compliant sidewalk that connects into this multi-use path should be included in front of the commercial site.
  - b. Pedestrian crosswalks should be provided at all entrance intersections. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
  - c. All internal streets should include five-foot wide ADA compliant sidewalks that meet current AASHTO standards, setback five feet from the roadway. These internal sidewalks should extend to the site entrances and connect to the multiuse path.
  - d. 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
  - e. Appropriate bike symbols and directional arrows should be provided within bike lanes as well as through all right-turn lanes. Share the Road (MUTCD W16-1) and appropriate bicycle warning signs should be installed.
  - f. Where right-turn lanes are added to Raughley Hill Road, a minimum of a five-foot bicycle lane should be dedicated and striped with appropriate markings for bicyclists through the turn lane in order to facilitate safe and unimpeded bicycle travel.
  - g. A right-turn yield to bikes sign (MUTCD R4-4) should be added at the start of each right-turn lane.
  - h. Stop bars should be extended across bike lanes.
  - i. Utility covers should be moved outside of the designated bicycle lane or should be flush with the pavement.
  - j. Covered bike parking racks should be provided near the commercial business entrances.
  - k. Pedestrian and bicycle paths should be provided within the site as well as between the site and its adjoining properties, so as to reduce vehicular traffic and provide non-motorized connections.
  - l. The developer should coordinate with the local school district to provide a covered bus stop installed on a concrete pad. Internal sidewalks shall be connected to this stop. This bus stop should include parking facilities for bicyclists.



- m. The developer should coordinate with the Delaware Transit Corporation (DTC) regarding the possibility of adding transit services and facilities at this location. DTC indicated incorporating the infrastructure to accommodate future expansion of transit facilities in the area. An 8-foot x 8-foot concrete bus pad with ADA accessible ramps and sidewalk connections should be constructed. Internal sidewalks should also be connected to this 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 DelDOT's subdivision review process.

Improvements in this TIS may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at [http://www.deldot.gov/information/pubs\\_forms/manuals/de\\_mutcd/index.shtml](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 DelDOT's Traffic Section. Mr. Weiser can be reached at (302) 659-4073 or by email at [Adam.Weiser@state.de.us](mailto: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.

David DuPlessis, P.E.  
cc: Mir Wahed, P.E., PTOE

Enclosure

## **General Information**

**Report date:** June 25, 2008

**Prepared by:** Orth-Rodgers and Associates

**Prepared for:** Lucky Estates/ Scenic Acres LP

**Tax Parcels:** MN-00-170.00-02-17.00, 17.01, 17.02, 17.03, 17.04, 17.05 and 17.06

**Generally consistent with DelDOT's Rules and Regulations for Subdivision Streets:** Yes

## **Project Description and Background**

**Description:** 52 single-family homes, 362 townhouses, and 8,000 square feet of retail

**Location:** The project is proposed to be located on the west side of Raughley Hill Road (Kent Road 405) between Delaware Avenue (Kent Road 81) and Hopkins Cemetery Road (Kent Road 289) /Winkler Road (Kent Road 428) in the City of Harrington, Kent County.

**Amount of Land to be developed:** Approximately 72 acres of land

**Land Use approval(s) needed:** Subdivision approval

**Proposed completion date:** 2010

**Proposed access location:** Two stop controlled T-intersection site access roads are proposed along Raughley Hill Road.

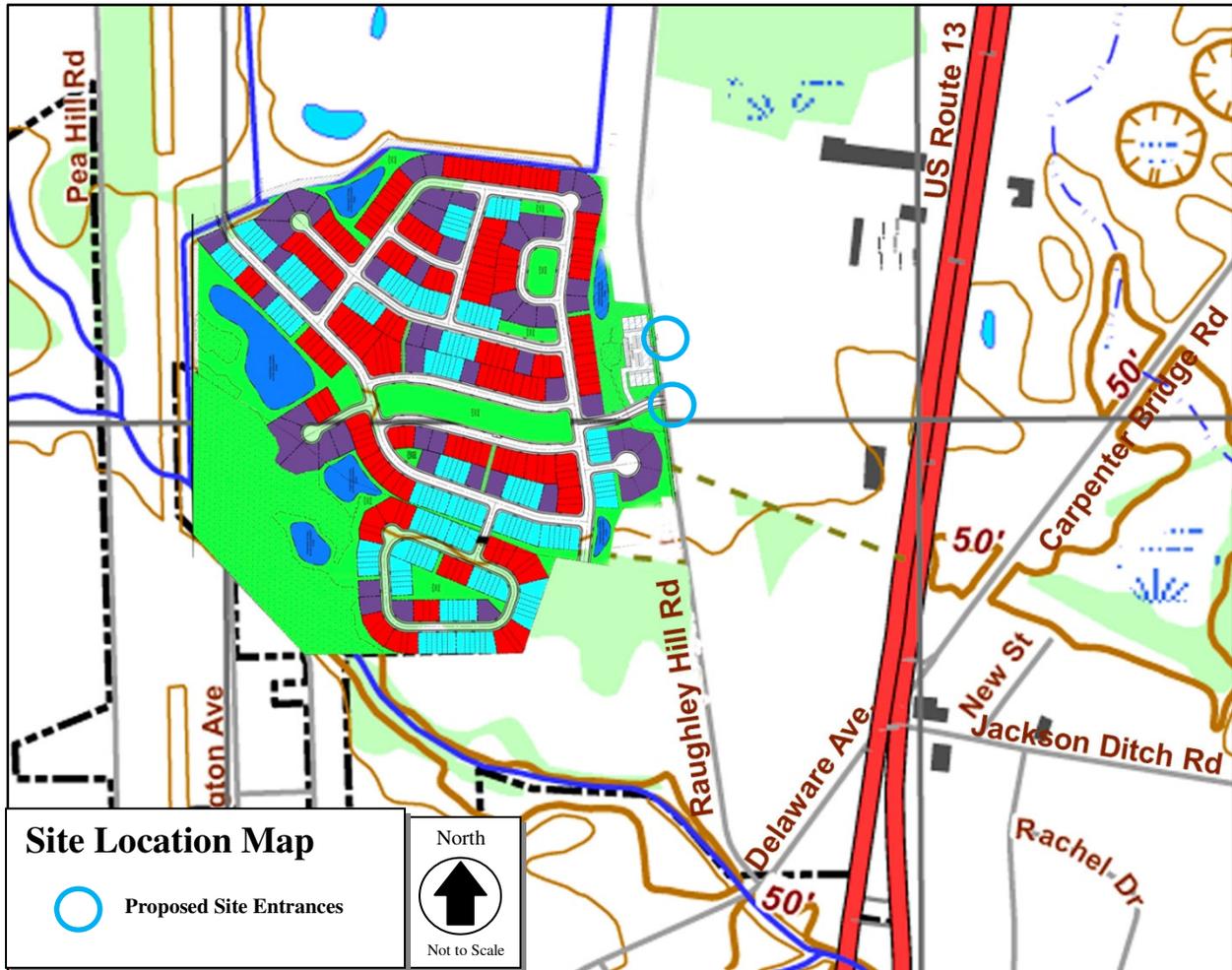
**Daily Traffic Volumes:**

- 2008 Average Annual Daily Traffic on Raughley Hill Road: 384 vehicles per day

## **Relevant and On-going Projects**

DelDOT currently has one relevant project in the study area. The Delaware Department of Transportation's Corridor Capacity Preservation Program (CCPP) includes the "Harrington Plan (North)", which is a conceptual improvement plan that would affect the intersection of US Route 13 and Carpenter Bridge Road. This is also noted in the City of Harrington Comprehensive plan. This project proposes the realignment of Carpenter Bridge Road to intersect US Route 13 approximately 800 feet to the north of the existing location, and constructing a new intersection of US Route 13 and Carpenter Bridge Road as a right-in/right-out only intersection. Additionally, the project proposes to create a cul-de-sac of the existing Carpenter Bridge Road alignment, just to the east of where it currently intersects US Route 13. Orth-Rodgers & Associates contacted Charles Altevogt of DelDOT. He indicated that these improvements are in the concept plan stage. There is no current schedule in place for the implementation of these improvements. He also indicated that no improvements are planned at the intersection of US Route 13 and Cemetery Road/Winkler Road.

## Site Map



*\*Graphic is an approximation based on site concept plan included in TIS dated June 25, 2008*

## Livable Delaware

*(Source: Delaware Strategies for State Policies and Spending, July 2004)*

**Location with respect to the Strategies for State Policies and Spending Map of Delaware:**  
The proposed development is located within Investment Level 2.

### Investment Level 2

These areas, generally adjacent to Investment Level 1 Areas, include less developed areas within municipalities, rapidly growing areas that have or will have public water and wastewater services, and may include smaller towns, rural villages, and suburban areas. These areas typically include single-family detached housing developments, commercial and office uses serving primarily local residents, and a limited range of entertainment, parks and recreation, cultural and institutional facilities. Investment Level 2 reflects areas where growth is anticipated

by local, county, and State plans in the near term future. State investments will support growth in these areas.

In Investment Level 2 Areas, state investments and policies should be based on available infrastructure to accommodate orderly growth, encourage departure from the typical single family-dwelling developments and promote a broader mix of housing types and commercial sites, and encourage development that is consistent with the character of the area. Transportation projects should expand or provide roadways, public transportation, pedestrian walkways, bicycle paths, and other transportation modes that manage flow, support economic development efforts, and encourage connections between communities and the use of local streets for local trips.

**Proposed Development’s Compatibility with Livable Delaware:**

The proposed development falls within Investment Level 2 Area. The development consists of single-family homes, townhomes and commercial which is largely consistent with State strategy to promote compact, mixed use development where infrastructure and services are available and thereby using the existing streets and utilities. The site concept plan includes a proposed connection to the developer’s other lands (Tax Parcel MN-09-170.00-02-13.00). While this connection is appreciated, the PLUS comments recommended that a second connection be provided to the Gateway Farm, LLC parcel (Tax Parcel MN-09-170.00-02-13.02). However, it does not appear that any such attempt was made. It is recommended that stub roads be provided to adjacent parcels to enable future connections. It is also recommended that an effort be made to maintain the existing forested area, especially in the southern part of the plan as this portion of forest connects to a larger forest block. This will minimize environmental impacts and promote orderly development allowing the site plan to be more compatible with the Livable Delaware “Strategies for State Policies and Spending.”

**Comprehensive Plans**

**City Of Harrington Comprehensive Plan:** The proposed development was situated in parcels that were identified as an annexation area in Harrington’s certified comprehensive plan. These parcels have been annexed into the City of Harrington on October 15, 2007. Harrington’s Comprehensive plan identifies the future land use of this area as “Mix Density and Service Commercial.” This land use category would result in a mixture of residential housing units of various types and densities, as well as some commercial use.

The Comprehensive plan states that the City will consider the addition of a mixed use/mixed density provision to promote variety in housing type and value in new sections of the City. The City of Harrington recognizes that variety in housing choices, from multi-family and low cost manufactured housing to single-family homes conveniently located near the City’s schools and commercial enterprises, promotes steady and sustainable growth.

**Proposed Development’s Compatibility with the City Comprehensive Plan:** The proposed development consists of a mixed land use with single family homes and townhomes with a commercial component and is generally compatible with the City’s Comprehensive plan.

**Transportation Analysis Zones (TAZ)**

**Transportation Analysis Zones (TAZ) where development would be located: 347**

**TAZ Boundaries:**



**Current employment estimate for TAZ: 162 in 2005**

**Future employment estimate for TAZ: 205 in 2030**

**Current Population estimate for TAZ: 236 in 2005**

**Future Population estimate for TAZ: 376 in 2030**

**Current household estimate for TAZ: 89 in 2005**

**Future household estimate for TAZ: 148 in 2030**

**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: Yes**

## Trip Generation

Trip generation for the proposed development was computed using comparable land uses and equations contained in Trip Generation, Seventh Edition, published by the Institute of Transportation Engineers (ITE). The following land use was utilized to estimate the amount of new traffic generated for this development.

- 52 single-family homes - (ITE Land Use code 210)
- 362 townhouses - (ITE Land Use code 230)
- 8,000 square feet Shopping Center - (ITE Land Use code 820)

The peak period trip generation for Scenic Acres development is included in Table 1.

Table 1  
SCENIC ACRES DEVELOPMENT TRIP GENERATION

Land Use	ADT	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
52 Single Family Housing	570	12	34	46	38	22	60
Internal Capture		0	0	0	2	1	3
Sub-Total (External Trips)		12	34	46	36	21	57
Pass-By Trips		0	0	0	0	0	0
<b>Net Primary Trips</b>		<b>12</b>	<b>34</b>	<b>46</b>	<b>36</b>	<b>21</b>	<b>57</b>
362 Townhouses	1916	25	120	145	116	57	173
Internal Capture		0	0	0	6	3	9
Sub-Total (External Trips)		25	120	145	110	54	164
Pass-By Trips		0	0	0	0	0	0
<b>Net Primary Trips</b>		<b>25</b>	<b>120</b>	<b>145</b>	<b>110</b>	<b>54</b>	<b>164</b>
8,000 square feet Shopping Center	1316	21	13	34	57	61	118
Internal Capture		0	0	0	6	6	12
Sub-Total (External Trips)		21	13	34	51	55	106
Pass-By Trips		0	0	0	41	45	86
<b>Net Primary Trips</b>		<b>21</b>	<b>13</b>	<b>24</b>	<b>10</b>	<b>10</b>	<b>20</b>
<b>Total Trips</b>	<b>3802</b>	<b>58</b>	<b>167</b>	<b>225</b>	<b>156</b>	<b>84</b>	<b>241</b>

## Overview of TIS

### **Intersections examined:**

1. Raughley Hill Road and North Site Access
2. Raughley Hill Road and South Site Access
3. Delaware Avenue and Raughley Hill Road
4. Hopkins Cemetery Road and Raughley Hill Road
5. Hopkins Cemetery Road/Winkler Road and US Route 13
6. US Route 13 and Delaware Avenue/Jackson Ditch Road (Kent Road 430) /Carpenter Bridge Road(Kent Road 35)

7. US Route 13 and Carpenter Bridge Road

**Conditions examined:**

- Case 1 - Existing 2008 conditions
- Case 2- No Build - 2010 background conditions without Scenic Acres development
- Case 3- Build -2010 Full build conditions with Scenic Acres development

**Peak hours evaluated:** Weekday morning and evening peak hours

**Committed Developments considered:**

- Winkler Farm (138 single-family detached, 56 duplexes and 81 townhouses)
- Midway Park Center (56 townhouses)
- New Junction Station (272 townhouses)

**Intersection Descriptions**

**1. Raughley Hill Road and Proposed North Site Access**

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

**Eastbound Approach:** (Site Access Road) proposed shared left-turn/right-turn lane

**Northbound Approach:** (Raughley Hill Road) existing one through lane, proposed one shared through/left-turn lane with bypass lane

**Southbound Approach:** (Raughley Hill Road) existing one through lane, proposed one through lane and one right-turn lane

**2. Raughley Hill Road and Proposed South Site Access**

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

**Eastbound Approach:** (Site Access Road) proposed shared left-turn/right-turn lane

**Northbound Approach:** (Raughley Hill Road) existing one through lane, proposed one shared through/left-turn lane with bypass lane

**Southbound Approach:** (Raughley Hill Road) existing one through lane, proposed one through lane and one right-turn lane

**3. Delaware Avenue and Raughley Hill Road**

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

**Eastbound Approach:** (Delaware Avenue) one shared through/left-turn lane

**Westbound Approach:** (Delaware Avenue) one shared through/right-turn lane

**Southbound Approach:** (Raughley Hill Road) one shared left-turn/right-turn lane

**4. Hopkins Cemetery Road and Raughley Hill Road**

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

**Northbound Approach:** (Raughley Hill Road) one shared left-turn/right-turn lane

**Eastbound Approach:** (Hopkins Cemetery Road) one shared through/right-turn lane

**Westbound Approach:** (Hopkins Cemetery Road) one shared through/left-turn lane

**5. Hopkins Cemetery Road/Winkler Road and US Route 13**

**Type of Control:** existing stop-controlled intersection (T-Intersection) with yield control on the US Route 13 median

**Northbound Approach:** (US Route 13) one left-turn lane, one through lane and one shared through/right-turn lane

**Southbound Approach:** (US Route 13) one left-turn lane, two through lanes and one right turn lane

**Eastbound Approach:** (Hopkins Cemetery Road) one shared though/left-turn/right-turn lane

**Westbound Approach:** (Winkler Road) one shared though/left-turn/right-turn lane

#### 6. US Route 13 and Delaware Avenue/Jackson Ditch Road/Carpenter Bridge Road

**Type of Control:** existing signal controlled five- legged intersection

**Eastbound Approach:** (Delaware Avenue) existing shared through/left-turn lane and a channelized right-turn lane

**Westbound Approach:** (Jackson Ditch Road) one shared though/left-turn/right-turn lane

**Northbound Approach:** (US Route 13) one left-turn lane, two through lanes and one right turn lane

**Southbound Approach:** (US Route 13) one left-turn lane, two through lanes and one right turn lane

**Northeast Approach:** (Carpenter Bridge Road) one receiving lane only

#### 7. US Route 13 and Carpenter Bridge Road

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

**Northbound Approach:** (US Route 13) two through lanes

**Southbound Approach:** (US Route 13) two through lanes

**Westbound Approach:** (Carpenter Bridge Road) one shared left-turn/right-turn lane

### Transit, Pedestrian, and Bicycle Facilities

**Existing transit service:** There is no existing DART bus line in the vicinity of the area within a comfortable walking distance of three-quarters of a mile. DART currently operates the free Harrington-Dover shuttle, available through the Welfare to Work program which can be used to connect to DART Route 104 in Dover at Mifflin Meadows near Camden. This shuttle has a bus stop at the intersection of US Route 13 and Delaware Avenue in the project area.

**Planned transit service:** Orth-Rodgers and Associates contacted Lisa Collins, Service Development Planner of DTC and she indicated that she anticipated an expansion of transit services in the future to meet recent growth in Kent County. She recommended installing the infrastructure to accommodate future needs of the community. This included construction of a five-foot ADA compliant frontage sidewalk from the community to the proposed commercial center and an 8x 8 concrete bus pad with ADA accessible ramps and sidewalk connections.

**Existing bicycle and pedestrian facilities:** According to DelDOT's *Delaware Bicycle Facility Master Plan* (October 2005), US Route 13 is designated as a Regional Connector. Hopkins Cemetery Road/Winkler Road, Raughley Hill Road, Delaware Avenue and Jackson Ditch Road are all designated as Local Roads in the vicinity of the Scenic Acres development. Statewide

Bicycle Route 3 that begins in Kent County, runs south along Little Mastens Corner Road (Kent Road 284) is in the site vicinity and situated west of the proposed development. This route eventually crosses US Route 13 and continues southeast. Also, Regional Route K-6 that provides a Cross-Delaware Route and links Milford and Harrington is in proximity of the site and runs further south of the site.

The *Delaware Bicycle Touring Map* designates US Route 13 as having above average cycling conditions with high traffic volumes (greater than 10,000 vehicles per day). Carpenter Bridge Road is also designated as average cycling conditions but with low traffic volumes (less than 2000 vehicles per day). Hopkins Cemetery Road, Jackson Ditch Road and Raughley Hill Road are designated as having above average cycling conditions with low traffic volumes (less than 2000 vehicles per day). Delaware Avenue also has above average cycling conditions but with moderate traffic volumes (between 2000 and 10000 vehicles per day).

**Planned bicycle and pedestrian facilities:** JMT received the following comments from Mr. Anthony Aglio, DeIDOT's Bicycle and Pedestrian Coordinator, requesting the following pedestrian and bicycle improvements:

- Five-foot shoulders should be provided along both sides of Raughley Hill road
- A fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DeIDOT for future use within the site frontage along Raughley Hill Road. Within this easement, a ten-foot wide multi-use path that meets current AASHTO and ADA standards should be constructed with a five-foot setback from the edge of pavement. A seven-foot wide ADA compliant sidewalk that connects into this multiuse path should be included in front of the commercial location.
- Pedestrian crosswalks should be provided at all entrance intersections. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances.
- Internal streets should be designed for low speeds. All internal streets should include five-foot wide ADA compliant sidewalks that meet current AASHTO standards, setback five feet from the roadway. These internal sidewalks should extend to the site entrances and connect to the multiuse path.
- 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
- Appropriate bike symbols and directional arrows should be provided within bike lanes as well as though all right-turn lanes. Proper signage including Begin Right Turn lane, Share the Road and appropriate bicycle warning signs should be installed.
- Stop bars should be extended across bike lanes.
- Covered bike parking racks should be provided near the commercial business entrances.
- Pedestrian and Bicycle connection should be provided within the site connecting the residential and commercial within this site as well as between the site and its adjoining properties, so as to reduce vehicular traffic and provide non-motorized connections.
- The developer of this project should contact DART regarding the addition of transit service and transit facilities at this location, including the installation of a covered bus stop. The internal sidewalks should connect to this stop.

- The developer of this project shall coordinate with the local school district to provide a covered bus stop, installed on a concrete pad. Internal sidewalks shall be connected to this stop. This bus stop should include parking facilities for bicyclists.

### **Previous Comments**

Orth-Rodgers and Associates, Inc. has addressed and incorporated all previous comments made on the TIS based on the correspondence included in the Appendices. According to the letter dated June 16, 2008, Delaware Department of Transportation has reviewed and accepted the trip distributions and trip generations on Scenic Acres development.

### **General HCS/Synchro Analysis Comments**

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

- 1) The TIS analysis sometimes used incorrect peak hour factors. JMT applied the peak hour factor as per lane groups for existing conditions per customary DelDOT TIS Review methodology.
- 2) The TIS analysis sometimes used heavy vehicle percentages based on traffic movements, rather than lane group. JMT applied the heavy vehicle percentages as per customary DelDOT TIS Review methodology.
- 3) The TIS sometimes used a peak hour factor of 0.88 for future condition analysis. JMT applied a peak hour factor of 0.92 as customary to DelDOT TIS Review methodology for a development in an urban area.
- 4) The TIS analysis uses peak hour factors lower than 0.92 for future conditions if volumes remain unchanged. JMT has deemed this acceptable for the TIS review.

Table 2  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>1</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Raughley Hill Road &amp; Proposed North Site Access</b>				
2010 with Scenic Acres development				
Northbound Raughley Hill Road	A (7.3)	A (7.5)	A (7.3)	A (7.4)
Eastbound North Site Access	A (9.0)	A (9.5)	A (9.0)	A (9.5)

<sup>1</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 3  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>2</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Raughley Hill Road &amp; Proposed South Site Access</b>				
2010 with Scenic Acres development				
Northbound Raughley Hill Road	A (7.3)	A (7.6)	A (7.3)	A (7.5)
Eastbound South Site Access	A (9.6)	A (9.9)	A (9.5)	A (9.8)

<sup>2</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 4  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>3</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Raughley Hill Road &amp; Proposed Single Site Access<sup>4</sup></b>				
2010 with Scenic Acres development				
Northbound Raughley Hill Road	-	-	A (7.4)	A (7.6)
Eastbound South Site Access	-	-	A (9.6)	B (10.5)

<sup>3</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>4</sup> JMT performed additional analysis considering a single site access.

Table 5  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>5</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Raughley Hill Road &amp; Delaware Avenue</b>				
2008 Existing Conditions				
Southbound Raughley Hill Road	B (11.1)	A (9.8)	B (11.1)	A (9.8)
Eastbound Delaware Avenue	A (7.8)	A (7.8)	A (7.8)	A (7.8)
2010 without Scenic Acres development				
Southbound Raughley Hill Road	B (10.9)	A (9.9)	B (10.8)	A (9.8)
Eastbound Delaware Avenue	A (7.8)	A (7.8)	A (7.8)	A (7.8)
2010 with Scenic Acres development				
Southbound Raughley Hill Road	B (13.7)	B (12.4)	B (13.2)	B (12.2)
Eastbound Delaware Avenue	A (7.9)	A (8.0)	A (7.8)	A (8.0)

<sup>5</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 6  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>6</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Raughley Hill Road &amp; Hopkins Cemetery Road</b>				
2008 Existing Conditions				
Northbound Raughley Hill Road	A (9.1)	A (9.7)	A (9.1)	A (9.7)
Westbound Hopkins Cemetery Road	A (7.5)	A (7.4)	A (7.5)	A (7.4)
2010 without Scenic Acres development				
Northbound Raughley Hill Road	A (9.0)	A (9.4)	A (8.9)	A (9.4)
Westbound Hopkins Cemetery Road	A (7.5)	A (7.4)	A (7.5)	A (7.4)
2010 with Scenic Acres development				
Northbound Raughley Hill Road	A (9.4)	A (9.4)	A (9.4)	A (9.4)
Westbound Hopkins Cemetery Road	A (7.5)	A (7.5)	A (7.5)	A (7.5)

<sup>6</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 7  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>7</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Hopkins Cemetery Road /Winkler Road &amp; US Route 13</b>				
2008 Existing Conditions				
Northbound US Route 13 -Left	A (9.8)	B (11.9)	A (9.7)	B (12.0)
Southbound US Route 13 -Left	B (12.5)	A (9.5)	B (12.5)	B (10.7)
Eastbound Hopkins Cemetery Road	C (23.8)	D (26.1)	C (24.3)	C (24.0)
Westbound Winkler Road	B (13.0)	D (32.2)	B (13.0)	D (29.8)
2010 without Scenic Acres development				
Northbound US Route 13 -Left	A (9.8)	B (12.0)	A (9.8)	B (12.0)
Southbound US Route 13 -Left	B (12.5)	A (9.4)	B (12.5)	A (9.4)
Eastbound Hopkins Cemetery Road	C (22.1)	C (24.5)	C (22.4)	C (22.0)
Westbound Winkler Road	B (13.1)	D (31.2)	B (13.1)	D (25.6)
2010 with Scenic Acres development				
Northbound US Route 13 -Left	A (9.9)	B (12.4)	A (9.9)	B (12.5)
Southbound US Route 13 -Left	B (12.5)	A (9.4)	B (12.5)	A (9.4)
Eastbound Hopkins Cemetery Road	E (45.2)	E (42.1)	E (46.1)	E (41.7)
Westbound Winkler Road	C (17.0)	E (36.5)	C (15.8)	D (34.9)

<sup>7</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 7 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>Hopkins Cemetery Road /Winkler Road &amp; US Route 13</b>				
2010 with Scenic Acres development With Improvement Option 1 <sup>8</sup>				
Northbound US Route 13 -Left	-	-	A (9.9)	B (12.5)
Southbound US Route 13 -Left	-	-	B (12.5)	A (9.4)
Eastbound Hopkins Cemetery Road- Left	-	-	E (38.7)	E (42.8)
Eastbound Hopkins Cemetery Road- Through /Right	-	-	C (16.5)	C (19.9)
Westbound Winkler Road	-	-	C (15.1)	D (34.9)
2010 with Scenic Acres development With Improvement Option 2 <sup>9</sup>				
Northbound US Route 13 -Left	-	-	A (9.9)	B (12.5)
Southbound US Route 13 -Left	-	-	B (12.5)	A (9.4)
Eastbound Hopkins Cemetery Road- Through /Right	-	-	C (15.4)	C (17.7)
Westbound Winkler Road- Through /Right	-	-	C (15.1)	D (31.2)

<sup>8</sup> Improvement Option 1 consists of adding a left turn lane on eastbound Hopkins Cemetery Road to make it one left turn lane and one shared through/right-turn lane approach.

<sup>9</sup> Improvement Option 2 consists of prohibiting left turn movements from eastbound Hopkins Cemetery Road and westbound Winkler road allowing only through and right turns from the side street approaches.

Table 8  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates.

Unsignalized Intersection <sup>10</sup> Two-Way Stop Control (T-intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>US Route 13 &amp; Carpenter Bridge Road<sup>11</sup></b>				
2008 Existing Conditions				
Westbound Carpenter Bridge Road	D (28.6)	D (28.5)	D (30.4)	D (26.4)
2010 without Scenic Acres development				
Westbound Carpenter Bridge Road	D (29.6)	D (30.0)	D (31.8)	D (29.5)
2010 with Scenic Acres development				
Westbound Carpenter Bridge Road	D (30.0)	D (31.5)	D (32.1)	D (30.9)

<sup>10</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>11</sup> Both the TIS and JMT analyzed this intersection as a divided highway with two car storage in the median.

Table 9  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Traffic Impact Study for Scenic Acres development  
Report dated June, 2008  
Prepared by Orth-Rodgers and Associates

Signalized Intersection (HCS Analysis) <sup>12</sup>	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
<b>US Route 13 &amp; Delaware Avenue /Jackson Ditch Road/Carpenter Bridge Road<sup>13</sup></b>				
2008 Existing Conditions	C (0.65)	C (0.68)	C (0.66)	C (0.69)
2010 without Scenic Acres development	D (0.70)	C (0.70)	D (0.69)	D (0.71)
2010 with Scenic Acres development	D (0.71)	D (0.71)	D (0.71)	D (0.72)

<sup>12</sup> For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

<sup>13</sup> The TIS analysis did not reflect the lane widths observed in the field by JMT. JMT used lane widths as measured in the field.