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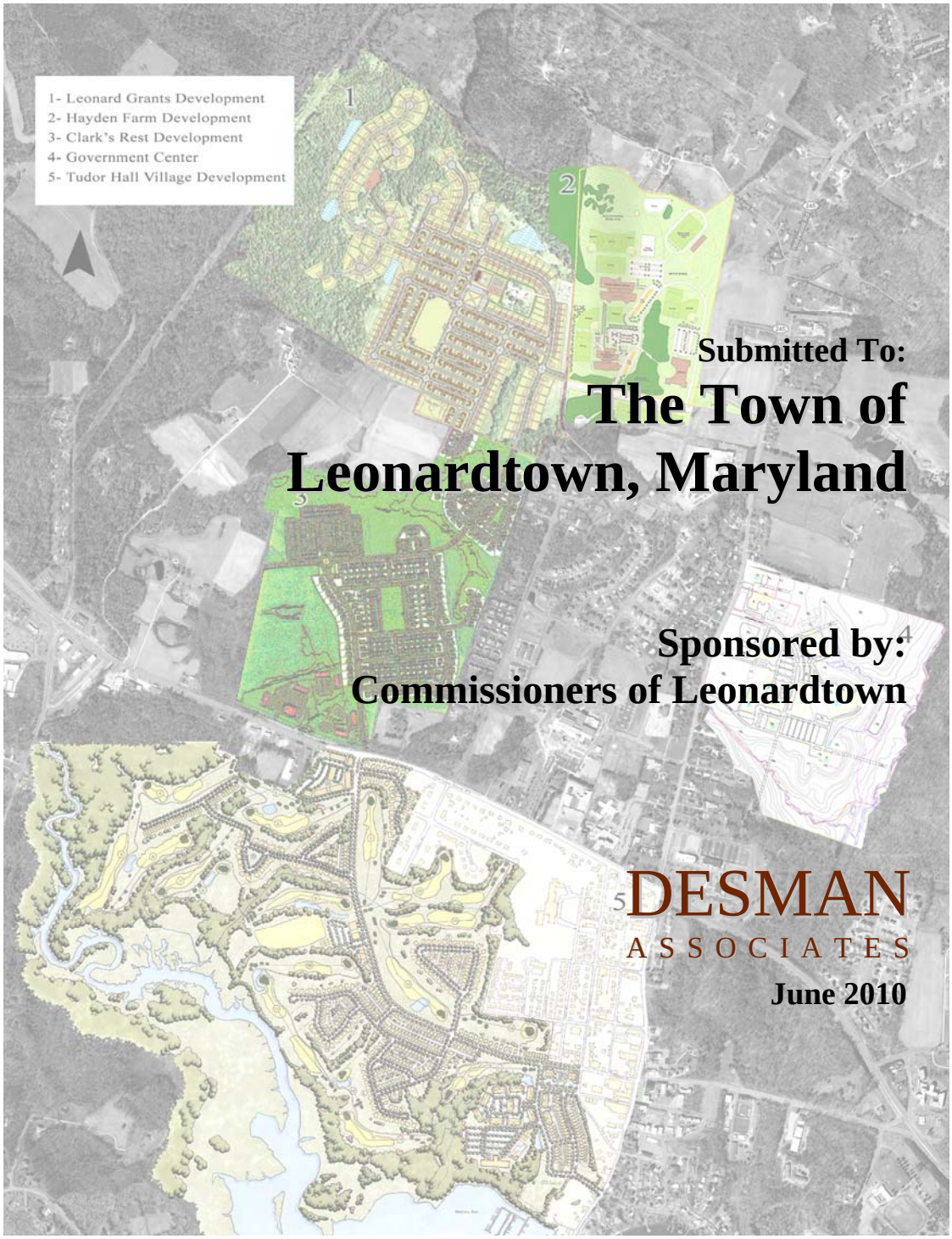
FINAL REPORT
Rt. 245 Traffic Planning Study



Submitted To:

The Town of Leonardtown, Maryland

Sponsored by:

Commissioners of Leonardtown

DESMAN
ASSOCIATES

June 2010

Rt. 245 Traffic Planning Study

Sponsored by
Commissioners of Leonardtown
Leonardtown, MD

Table of Contents

Rt. 245 Traffic Planning Study

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List of Figures

Figures *Pages*

Rt. 245 Traffic Planning Study

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List of Tables

Tables *Pages*

INTRODUCTION

The purpose of this comprehensive transportation study is to take a holistic approach in assessing existing and future transportation conditions in Leonardtown, developing recommendations that address micro and macro traffic issues, and creating a plan that supports the community's future vision of the area's various stakeholders. The study will concentrate on creating a transportation network that supports future growth and the safety of vehicles and pedestrians.

Leonardtown, Maryland is a historic small town that acts as the governmental center of St. Mary's County. It is a growing and diverse community that contains residential, governmental, educational, medical, office, and commercial entities. The main institutions located in the Town of Leonardtown include: St. Mary's Hospital, College of Southern Maryland (CSM), and the County Government Complex. Other than the growth of these existing institutions there are also a series of other future developments which will change the landscape and effect future transportation conditions. These major future developments include: Leonard's Grant, Clark's Rest, Tudor Hall Farm and Hayden Farm. This analysis will consider the potential traffic generated by each of these future developments, any other planned developments within the study area and the annual growth of the major institutions in Leonardtown. The future traffic conditions will be analyzed for a 2 year (2012), 5 year (2015), 10 year (2020) and 20 year projection (2030).

To determine the existing traffic conditions, site observations and traffic counts were performed during peak traffic periods at seven critical intersections. Stakeholder meetings with representatives from Leonardtown, CSM, St. Mary's Hospital, St. Mary's County Public Schools and the County Government Complex were conducted. These meetings provided insight to existing traffic issues, the vision of future growth and growth projections. Traffic recommendations will be provided based on the analysis of existing and future traffic conditions, field observations, and Stakeholder meetings. Cost estimates related to future traffic mitigation improvement recommendations will also be provided.

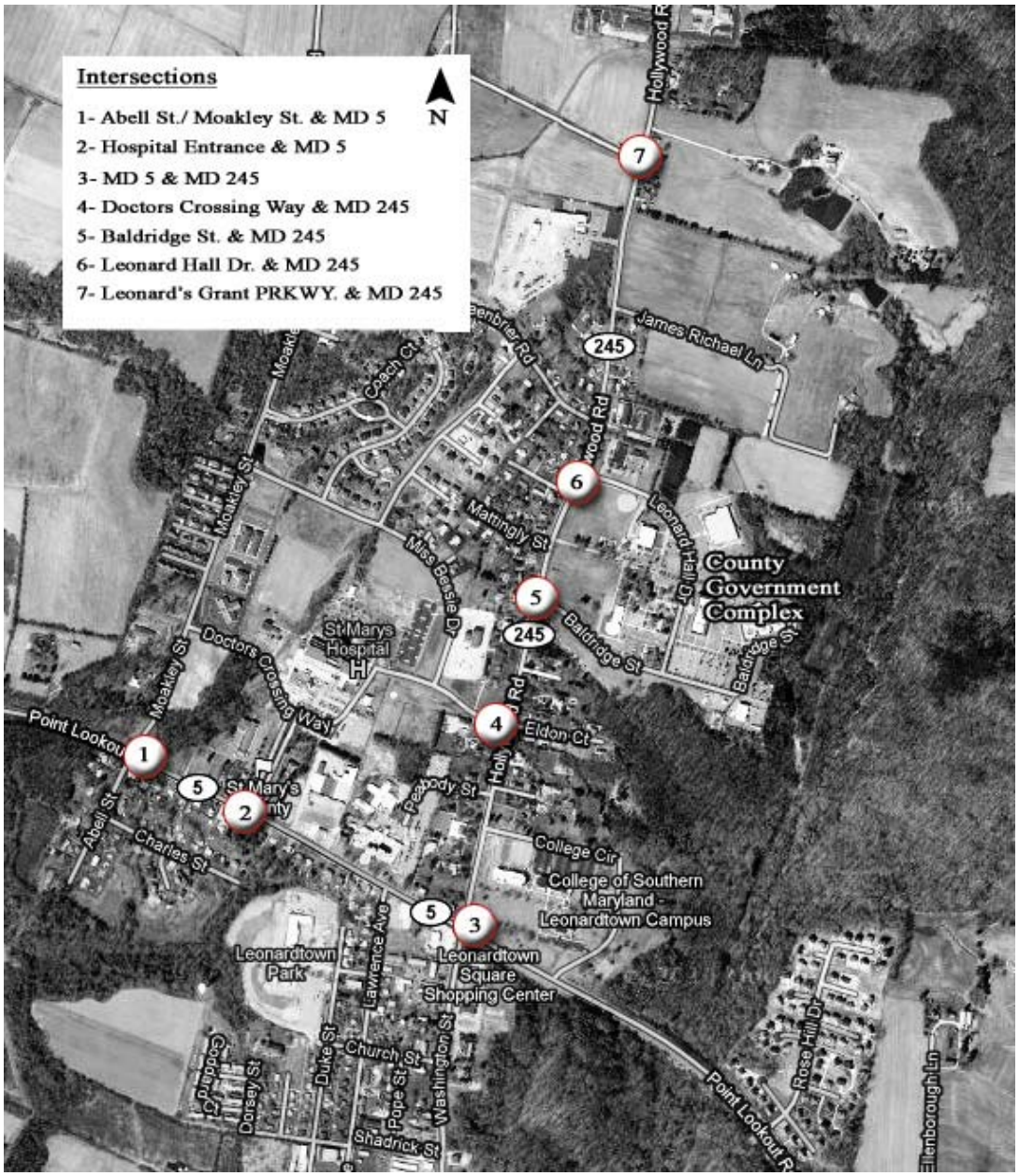
The report is organized to include both a technical analysis section and a discussion section addressing the major existing and future traffic issues in Leonardtown. The technical section of the report will provide an examination of seven intersections in the study area. The discussion section reflects the issues learned from observations, stakeholder meetings and the technical analysis. This portion of the report will also provide the area's stakeholders with a vision to help create interconnectivity between the various institutions, promote a pedestrian friendly environment, and provide insight regarding the use and recommended design of future connection roads.

STUDY AREA

Leonardtown is located in Southern Maryland at the headwaters of Breton Bay. State Route 5 (MD 5) and State Route 245 (MD 245) are the major thoroughfares that traverse the Town. At the western edge of the Town, along MD 5, are various shopping centers and commercial strips.

To the north, along MD 245, are driveways to CSM, the County Government Complex and St. Mary's Hospital. South of MD 5, along MD 5 Business, is the Old Town area, which consists of office, retail/restaurant and institutional uses including the Leonardtown Elementary School, Ryken High School facilities and County Courthouse functions. Dispersed throughout the area are residential uses, which is the dominant land use in Leonardtown's corporate limits. The location of the seven intersections where peak hour traffic counts were performed is displayed in **Figure 1**.

Figure 1 – Study Area



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EXISTING and FUTURE TRAFFIC ISSUES

This section of the traffic planning study will act as an executive summary and provide a qualitative analysis of the existing and future traffic issues facing Leonardtown. Some of the recommendations provided in this discussion will be based on the conclusions from the technical analysis section, which is provided later in the report. The major issues include stakeholder concerns, the inter-connectivity of institutions, future road additions, support of pedestrian/bike trips, site plan review of major facilities, and the overall design goals for Leonardtown to improve the standard of living for its residents.

Stakeholder Meetings

Stakeholder meetings were conducted with representatives from CSM, St. Mary's Hospital and the County Government Complex. A summary of the micro and macro traffic issues discussed during these meetings are listed below.

College of Southern Maryland

- There is a shortage of parking on campus during the evening peak period.
- Concern of added traffic and parking demand with the development of the Wellness Center/Recreation Center and future growth on campus.
- CSM feels that a connecting road between College Circle Road and Leonard Hall Drive would help relieve traffic pressure and allow the opportunity to share parking with the County Government Complex.
- There is some cut-through traffic from westbound vehicles along MD 5 bound to travel north along MD 245.

St. Mary's Hospital

- To help slow traffic along MD 5 and create safe ingress and egress accessibility to and from the Hospital campus, they feel a traffic light is needed along MD 5 at one of the following cross streets: Moakley Street, the proposed Clark's Rest Development Access, or the Hospital Access.
- Representatives from the Hospital also feel a traffic light should be installed at the intersection of MD 245 and Doctors Crossing Way, which will help traffic entering and exiting the Hospital campus.
- Despite the addition of the roundabout and expansion of the parking lot to eliminate a circumference road there is still some cut-through traffic from drivers exiting the adjacent strip mall along MD 5. This is primarily due to the difficulty of making a left onto MD 5 and then a left at the intersection of MD 5/MD 245.
- There is concern that the proposed Clark's Rest Development will promote cut-through traffic if no signal is installed along MD 5 at the development's access.

County Government Complex

- County Government Complex representatives feel a connecting road between the CSM and the County Government Complex would be beneficial for both parties since it would provide an outlet onto MD 5 for County employees/visitors and would provide an opportunity for shared parking with CSM.
- Traffic measures should be implemented along MD 5 to help slow traffic and limit the number of driveways/access roads along MD 5.
- There are minimal expansion plans at the County Government Complex other than the expansion of the Minimum Security Detention Center and some employee growth.

Overall, these meetings provided the major institutions in the study area an opportunity to highlight particular traffic conditions and concerns at their facilities and within Leonardtown. The information learned during these meetings was insightful and will be helpful in developing future traffic mitigation improvement recommendations.

Inter-Connectivity of Institutions

The major institutions and campuses in Leonardtown include: CSM, St. Mary's Hospital and the Government County Complex. All of the stakeholders noted the importance of creating internal links between these institutions to improve circulation and reduce traffic on the major arterials (MD 5 and MD 245). The major traffic link that has been considered includes a connecting road between CSM and the County Government Complex.

The traffic link between the CSM and County Government Complex would provide an opportunity to share parking and increase the number of ingress/egress points for both institutions. However, it would promote cut-through traffic of people traveling to and from the County Government Complex from the east along MD 5. The proposed layout of the CSM campus to include additional parking outside the ring road (College Circle) to serve the Wellness Center/Recreational Center will cause vehicle/pedestrian conflicts. It is suggested that if the connection road is constructed, a striped pedestrian crosswalk with signage be installed.

Overall, the construction of connecting roads between major institutions is advantageous for Leonardtown. They help reduce the amount of traffic using MD 5 and MD 245 and they enhance convenience for patrons traveling between these facilities. However, the addition of these internal connecting roads will not eliminate the recommended future intersection/signal improvements at intersections in Leonardtown. It is also suggested that pedestrian paths are provided adjacent to any future internal connecting roads, to enhance the walkability between institutions.

Future Road Additions

Leonardtown is planning to construct additional roads to support future developments. The locations and timeline for these street network additions within the study area are displayed in **Figure 2**. The addition of these streets will not only support future traffic, but will also change the travel patterns of existing traffic within the study area. The effect of these street network additions are taken into account in the analyses of future traffic conditions. Traffic was redistributed based on the location of future road additions, the directional distribution of existing traffic and the most effective method of travel.

The road additions will primarily be used by patrons of future developments in Leonardtown and not traffic traversing Leonardtown along either MD 5 or MD 245. Leonard's Grant Parkway is currently under construction and is being designed with narrow lanes, a low speed limit (15 mph), on-street parking and numerous driveways. These street design characteristics will deter non-local cut-through traffic, but would support the flow of traffic generated by adjacent developments. Though this analysis assumed that a high percentage of traffic would by-pass the intersection of MD 5 and MD 245, there is still a need for aggressive traffic mitigation improvements at that intersection.

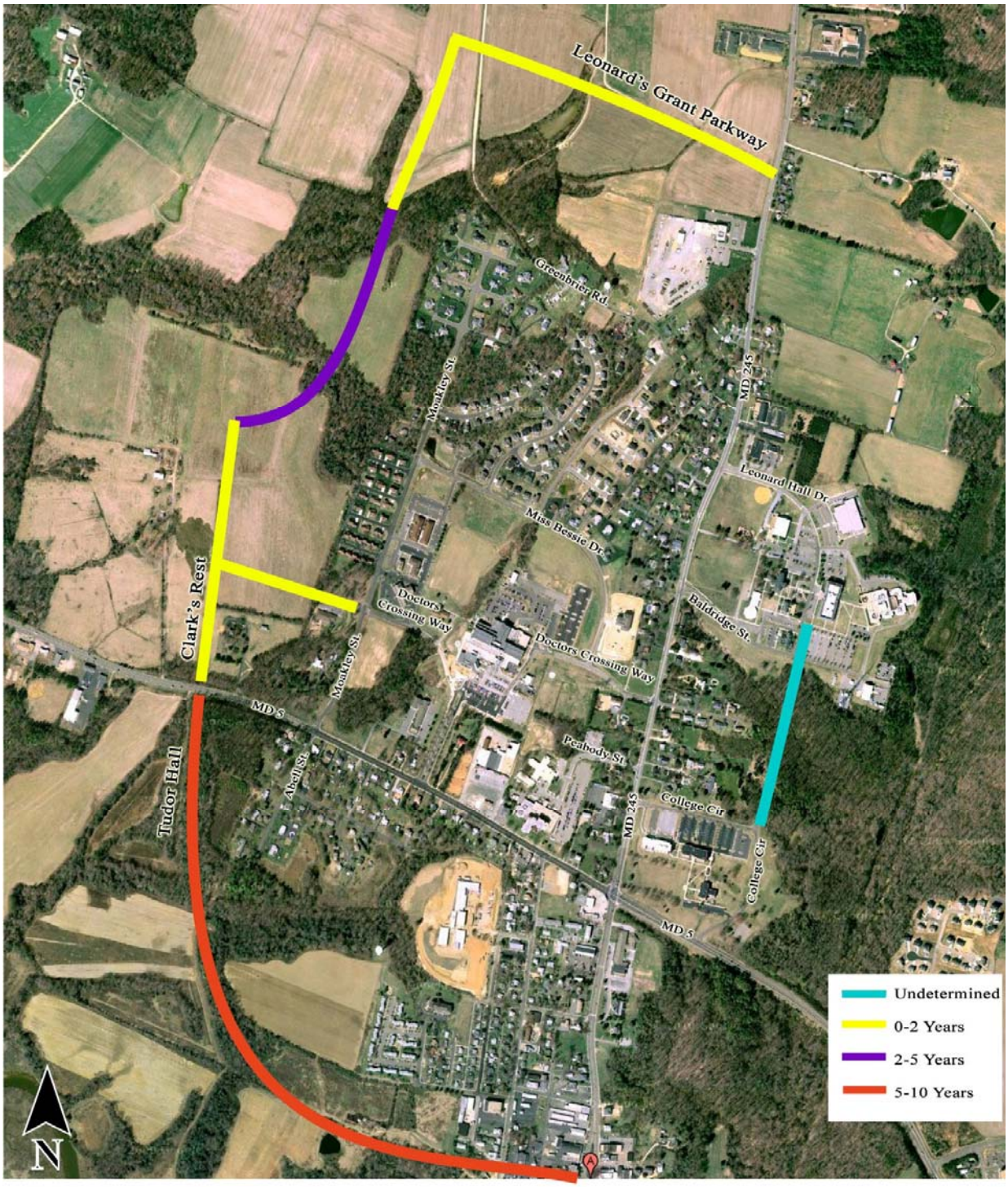
The proposed roads will provide access between major developments and the Leonardtown community. It is suggested that these streets be designed to support pedestrian and bike trips. Currently, the only continuous street which provides access between the residential areas north of MD 5 and the downtown area is MD 245. MD 245 is not adequately designed to safely support bike travel. In order to reduce vehicle trips and promote walking and biking between the downtown and residential areas north of MD 5, the proposed street network should be designed with pedestrian paths, streets of adequate width (24 feet or greater), low speed limits (25-30 mph) and signage warning vehicles of bike traffic. Providing a traffic signal with pedestrian push-buttons and crosswalks at the future intersection of MD 5 and Clark's Rest/Tudor Hall will also support pedestrian travel between future developments and the Downtown.

Site Plan Review

A review of the site plans for the major existing institutions and future developments has been performed to evaluate accessibility, cut-through traffic, effective design and pedestrian/vehicular safety.

The CSM campus currently has a circumference road (College Circle Road) which connects between MD 5 and MD 245 and provides access to all campus parking facilities. The shortage of parking on campus causes vehicles to park along College Circle Road. This reduces the effective width of the street and causes congestion. There are currently plans to construct 120 additional parking spaces outside the circumference road. These spaces will primarily serve the Wellness Center/Recreational Center at CSM. It is suggested that a pedestrian crosswalk with signage be provided across College Circle Road between the proposed lot and Wellness Center/Recreational Center. The campus suffers from both a shortage of parking and limited space for expansion. It is

Figure 2 – Future Road Improvement Program



* The future road alignment is approximate

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suggested that if additional parking is necessary that a shared parking agreement with shuttle parking be arranged at the County Government Complex until a permanent solution is determined. The construction of the connection road between the County Government Complex and the CSM campus will help reduce congestion, create more ingress/egress options for patrons, and provide a shared parking opportunity.

Future development plans at St. Mary's Hospital include the expansion of the main hospital, construction of a medical office building, and the expansion of the Emergency Department. These additions to the hospital campus will not change the general layout of the internal street network. The south parking lots will be expanded and additional access points on Miss Bessie Drive will be constructed, but this will not promote cut-through traffic. The layout of the street network at St. Mary's Hospital was previously reconfigured to discourage cut-through traffic. This was achieved by eliminating a circulation road, constructing an oblong traffic circle and installing speed bumps. Future residential developments to be constructed adjacent to the Hospital will be provided vehicular access to the Hospital from a proposed road extension to Moakley Street. This road addition is shown in **Figure 2**. It is the concern of the Hospital that this will promote cut-through traffic. The addition of a traffic signal at the future intersection of Clark's Rest and MD 5 will support vehicles turning left onto MD 5 and help prevent Hospital cut-through traffic.

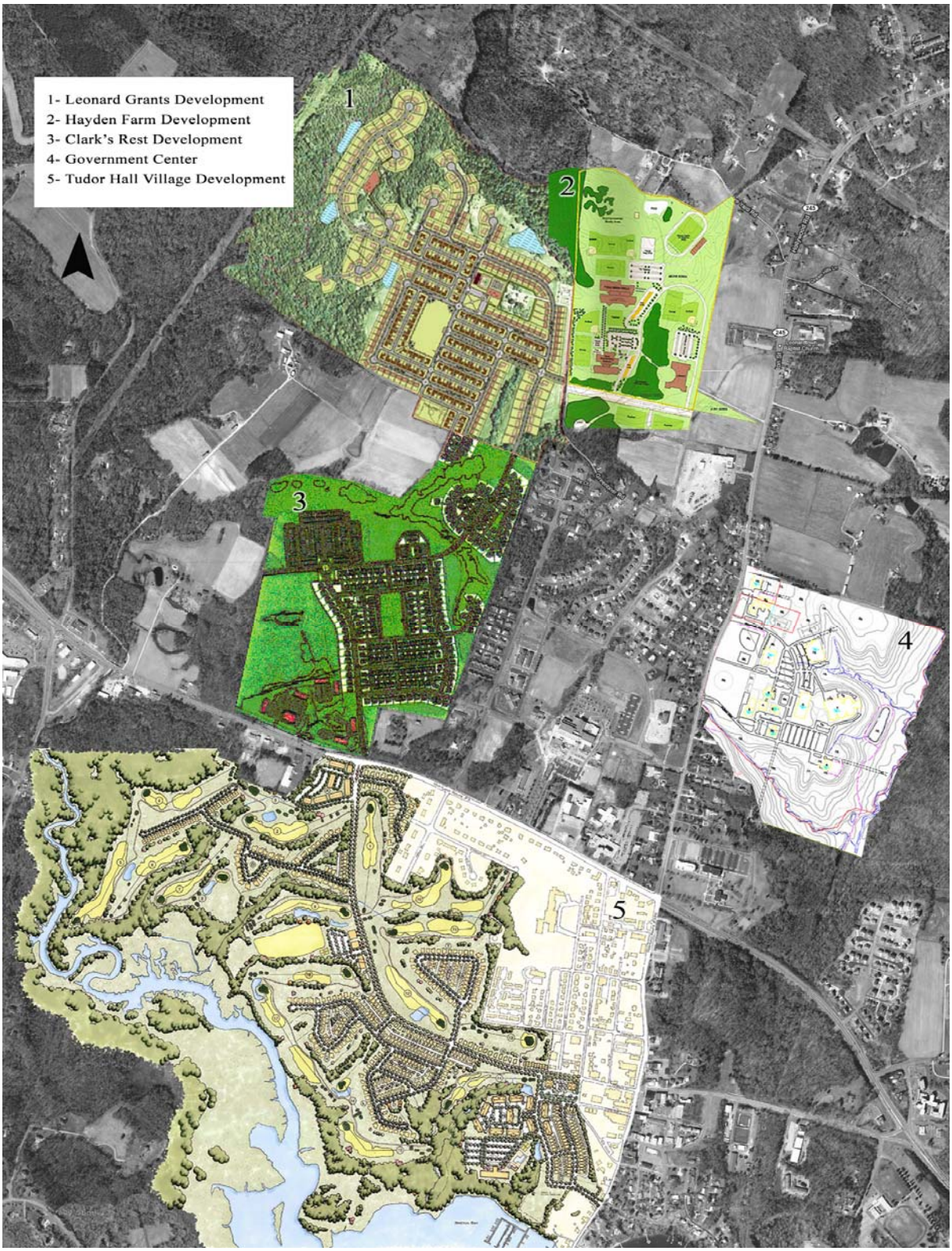
There are a number of future developments planned in Leonardtown. The five major future developments are shown in **Figure 3** and are listed below.

- Leonard Grant's Development
- Hayden Farm Development
- Clark's Rest Development
- Government Center Complex
- Tudor Hall Village Development

Leonard's Grant, Clark's Rest and Tudor Hall Village are large residential developments. Leonard's Grant is currently under construction and the design of the streets deters cut-through traffic with narrow streets, low speed limits, on-street parking and driveways. These types of design elements will deter non-local cut-through traffic. However, these residential streets will eventually be connected to create a link between MD 5 and MD 245, which will provide an opportunity to distribute internally generated traffic. This would permit an even distribution of neighborhood traffic to different intersections. This connectivity between residential streets will not only increase the convenience for vehicles, but will also promote pedestrian and bike trips.

The main collector road through Tudor Hall Village, which connects MD 5 and MD 5 Business (Washington Street), will offer an additional gateway to the downtown area and extra capacity should be provided with wider streets (24 feet or greater), minimal on-street parking and medium level speed limits (25-30 mph). It should also provide pedestrian paths and support bike traffic.

Figure 3 – Location of Future Developments



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The future Hayden Farm Development is planned to include a Library, Elementary School, Middle School and athletic fields. As shown in **Figure 3**, it will be located off Leonard's Grant Parkway adjacent to the Leonard's Grant Development. There is concern whether the existing street network will sufficiently support the traffic generated from these two developments. The layout concept has a ring road providing access to each of the facility's parking lots. Leonard's Grant Parkway is wide enough to support two-way traffic, but needs to be striped with dashed center line markings. The intersection design of MD 245 and Leonard's Grant Parkway includes a turning lane for southbound traffic along MD 245, an accelerator/merge lane for traffic turning onto MD 245 from Leonard's Grant Parkway and a left-turning lane and pass-by lane are along MD 245 for northbound traffic. Leonard's Grant Parkway has adequate width to support both a right-turn lane and left-turn lane, but needs to be striped accordingly. Once all the developments plans are constructed and operating at Hayden Farm Property and Leonard's Grant, there may be a need to install a traffic signal at the intersection of MD 245 and Leonard's Grant Parkway. It is suggested that a traffic impact analysis and signal warrant study be conducted for the Hayden Farm Development to determine the need for a future traffic signal.

Traffic Network Design Goals

Four major goals Leonardtown should work towards in creating a more convenient, safe and pedestrian friendly traffic environment include the diversion of local traffic from the intersection of MD 5/MD 245, the connection of the downtown with the north side of town, the construction of links between residential streets, and the implementation of Transportation Demand Management (TDM) strategies by the major employers in Leonardtown. Each of these four goals will require a consistent and concerned effort by the administration and local stakeholders, but they will help improve traffic conditions and the standard of living in Leonardtown.

Leonardtown is split in four quadrants by two major arterials (MD 5 and MD 245). It is essential to create a connection between the area north of MD 5 where most of the institutions are located and the Downtown area located south of MD 5. By slowing the traffic along MD 5 and constructing connector streets it helps to enhance accessibility for people to comfortably drive, walk or bike from the institutions located north of MD 5 into the Downtown area.

In order to help avoid major traffic mitigation improvements at the intersection of MD 5 and MD 245 local traffic should be diverted. A series of traffic improvements can be implemented to help intercept local traffic, which includes constructing a link between CSM and the County Government Complex, constructing left-turn lanes along MD 5 at Moakley Street and the Hospital access, designing future residential roads to support medium levels of traffic, and installing left-turn lanes and traffic signals at the future intersection of MD 5 and Clark's Rest/Tudor Hall.

The future residential streets which will connect MD 5 and MD 245 should be designed to support a medium level of traffic, but also deter non-local cut-through traffic. This includes designing the streets with medium level speed limits (25-30 mph), adequate width to support

two-way traffic (24 feet or greater) and dashed center line markings. Driveways should be permitted along these connector streets.

The SHA has considered four design alternatives along MD 5. Two of these design alternatives incorporate an additional lane along MD 5 to support left-turn lanes. It is suggested that any future mitigations implemented along MD 5 incorporate left-turn lanes at major intersections, including: Moakley Street, the Hospital Access and the future Clark's Rest/Tudor Hall access. These left-turn lanes will make drivers feel more comfortable in turning off of MD 5 and help divert traffic from crossing the intersection of MD 5 and MD 245.

The speed limit along MD 5 west of MD 245 is 40 mph, but traffic was observed traveling approximately 50 mph. There are also sight distance issues along MD 5, which make it difficult for vehicles to turn left from Moakley Street and the Hospital access. It is suggested that a signal coordination study be performed to synchronize the signals between MD 245 and MD 243 along MD 5 and any future traffic signals in this area. This will help regulate traffic speeds and create gaps for turning movements at unsignalized intersections. It is also suggested that a study be performed to determine the speed of traffic along MD 5 to show whether traffic speed reductions need to be implemented. Slower traffic speeds can be achieved by posting speed reduction signage, heightening enforcement, installing Automated Speed Enforcement (ASE) and adding a traffic signal at an intersection west of MD 245 along MD 5. Installing a signal along MD 5 will also create more gaps in traffic, which will make a safer situation for vehicles turning onto MD 5.

The layout of the Leonardtown traffic network has been designed to prevent cut-through traffic along residential streets. However, this also prevents accessibility for bike travel and limits people's options to access either MD 5 or MD 245, which places greater strain at the intersection of MD 245/MD 5. The creation of more links between residential streets will promote walking, biking and reduce vehicle trips along MD 5 and MD 245. Overall, the connection of residential streets will produce minimal cut-through traffic and enhance accessibility, convenience and the opportunity for pedestrian/bike trips for local residents.

There are a number of major employers in Leonardtown which generate the majority of traffic to the area, including: St. Mary's Hospital, CSM, and the County Government Complex. To help reduce the amount of traffic generated by these employers a TDM plan with goals and incentives should be implemented. Effective TDM strategies include: incentives for car-pooling and transit use, providing shuttle service, development of walkable communities and connectivity, implementing flexible or alternative work schedules, charging for parking, and constructing bike racks, showers, and lockers. St. Mary's County Transit System (STS) should also continue to improve their service and invest in its expansion.

TECHNICAL ANALYSIS

This section of the report provides an analysis of the existing and future traffic conditions of seven intersections identified by representatives of Leonardtown. The future traffic conditions were analyzed for a 2 year (2012), 5 year (2015), 10 year (2020) and 20 year projection (2030). This analysis includes recommendations to support future traffic for each of the periods examined. An assessment of vehicle queues and accident data was also performed in determining future traffic mitigation improvements. Cost estimates are provided for each recommended improvement, along with the percentage of traffic generated by each future development at each intersection analyzed.

Data Collection

Characteristics of the existing transportation network for seven intersections within the study area were collected through a field reconnaissance on Wednesday, March 10, 2010 and Thursday, March 11, 2010. Data gathered during this field reconnaissance included roadway and intersection geometrics, traffic control information, signal timings, manual turning movement traffic counts, pedestrian amenities and peak hour queuing. The traffic characteristics of each of the seven intersections are provided in **Figure 4**. On Thursday, March 11, 2010, peak hour manual turning movement traffic counts were performed between the hours of 6:30 AM to 9:30 AM and 3:30 PM to 6:30 PM at the seven intersections listed below.

1. MD 5 and Moakley Street/Abell Street
2. MD 5 and St. Mary's Hospital Access
3. MD 5 and MD 245/Washington Street
4. MD 245 and Eldon Court/Dr. Crossing Way
5. MD 245 and Baldridge Street
6. MD 245 and Leonard Hall Drive
7. MD 245 and Leonard's Grant Parkway

Twenty-four hour road tube traffic volume counts were also performed at the intersection of MD 5 and Moakley Street/Abell Street. Other data that was provided from various resources includes: signal timings, annual background growth factors along MD 5 and MD 245, accident data and development plans. Signal timings and annual background growth factors were provided by the Maryland State Highway Administration (SHA). Accident data was provided by the Sheriff's Department, the Maryland State Police and the SHA Office of Traffic and Safety. Development plans were provided by representatives from Leonardtown, St. Mary's Hospital and CSM.

Existing Roadway Network

The two main roads located in Leonardtown are MD 5 and MD 245. Information regarding these streets was collected during the field surveys, from previous studies and discussions with Stakeholders. The information learned from each of these sources is described below.

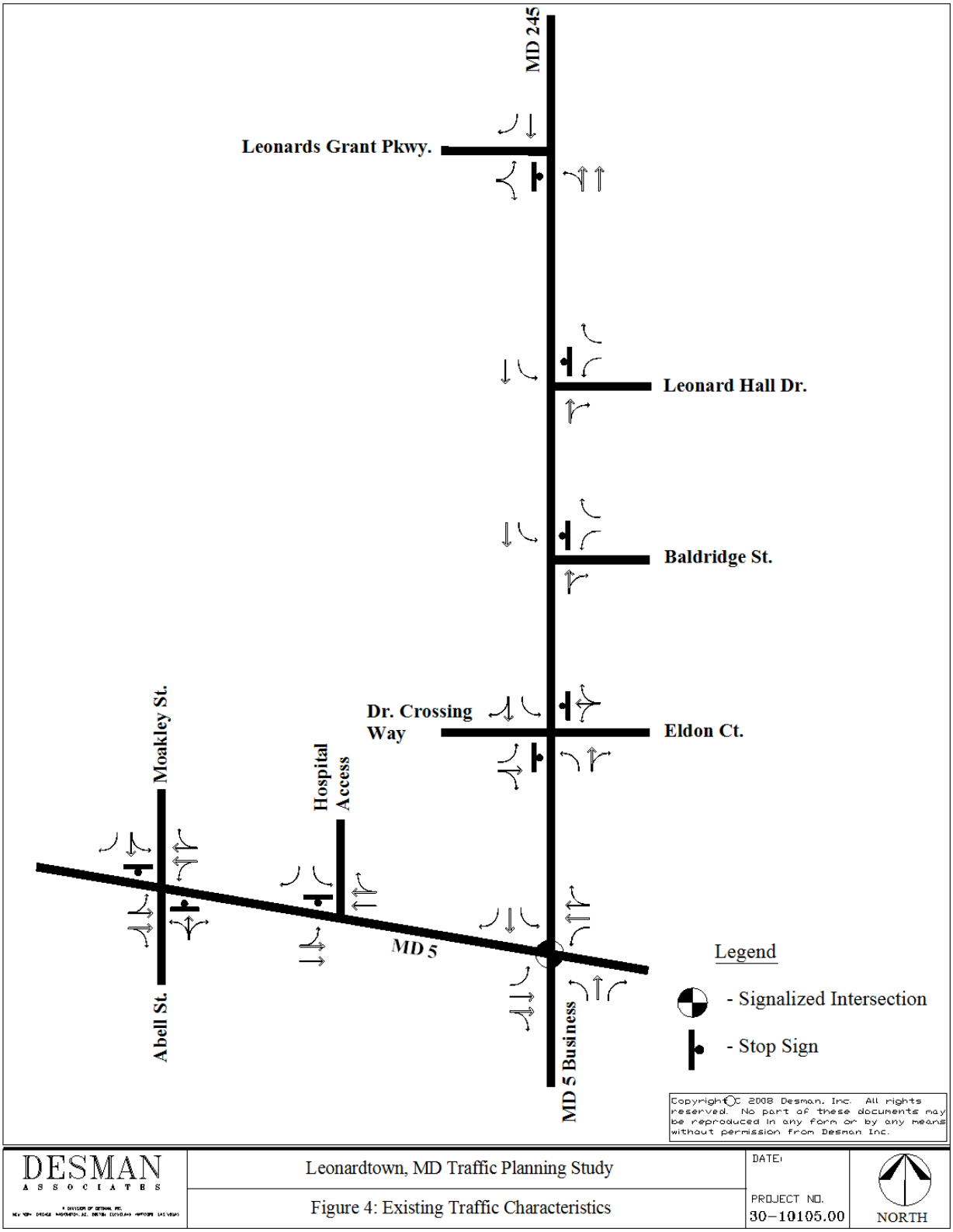
MD 245
Leonards Grant Pkwy.
Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Moakley St.
Hospital Access
MD 5
Abell St.
MD 5 Business
Legend
- Signalized Intersection
- Stop Sign
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Figure 4: Existing Traffic Characteristics
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MD 5 (Point Lookout Road) is a northwest-southeast state route which traverses Leonardtown. It has two lanes in each direction west of MD 245 and one lane in each direction east of MD 245. The intersection of MD 5 and MD 245 is signalized and is the only signalized intersection within the study area. All other traffic signals along MD 5 are located outside the study area. The speed limit along MD 5 is 40 mph within the study area, but traffic tends to travel 50 mph. There are a number of residential and commercial driveways located along MD 5, including access to both St. Mary's Hospital and CSM. The mix of high vehicle speeds, substantial traffic and an abundance of driveways has caused safety concerns among the community.

The SHA conducted a study to improve the portion of MD 5 between MD 243 and MD 245. These potential street mitigations would improve vehicular safety and traffic operations along MD 5 and address pedestrian, bicycle and horse drawn vehicle safety. The SHA developed four potential alternatives which are described below.

1. *Alternative 1* is a "no-build" alternative, which would provide minor short-term improvements as part of routine maintenance and safety operations.

2. *Alternative 2* is based on a Traffic System Management (TSM)/Travel Demand Management (TDM) approach, which does not include widening the corridor. Instead lower cost improvements including adding turn lanes, adding traffic signals, improving signal timing, providing spot safety improvements and consolidating entrances would be implemented.

3. *Alternative 3* would provide a 5-lane section of roadway, which would include a two-way left-turn lane the entire length of the corridor along with two travel lanes in each direction. The outside lanes would be made 16 feet wide to support bicycle compatible lanes. Also, 5 foot wide sidewalks would be constructed on both sides of the roadway the entire length of the corridor.

4. *Alternative 4* would provide 4 lanes and include a raised landscaped median with turn lanes at appropriate intersections throughout the corridor. This alternative would transform the corridor into a boulevard. Two travel lanes in each direction with the 16 foot wide outside bicycle compatible lanes and 5 foot sidewalks on both sides of the street would also be constructed.

There has also recently been an analysis performed to determine how effective a 4-lane roundabout would be at the intersection of MD 5 and the proposed location of the Cross-Town connector. The Cross-Town connector is a proposed circumference road which would be located off MD 5, west of MD 245. It would provide access to the Tudor Hall Farm, Clark's Rest and Leonard's Grant developments and help enhance their access to existing Town activity centers. It was determined that a roundabout at this location would not operate at a sufficient level of service due to the high traffic volumes along MD 5. Roundabouts are successful where there is a balance of traffic from all directions and not one street that has a substantially greater volume of traffic. However, there is currently a traffic study being performed to determine at what point a traffic signal would be needed at this future intersection.

Currently Leonardtown and the SHA are constructing a streetscape plan for the Business MD 5 section, which is the south leg at the intersection of MD 5 and MD 245. This streetscape plan includes sidewalk, lighting, striping and traffic signal improvements. These improvements will help provide more safe and accommodating pedestrian access to the Downtown Area. After completion of this project Leonardtown would accept ownership of this section of road.

MD 245(Hollywood Road) is a north-south state route which extends between MD 5 and MD 235. Between MD 5 and Greenbrier Road, MD 245 provides a two-way left-turn lane and one lane in each direction. North of Greenbrier Road, MD 245 simply consists of one lane in each direction. At the intersection of Leonard's Grant Parkway and MD 245 a passing lane is provided for northbound traffic and a deceleration/acceleration lane is provided for entering and exiting southbound traffic. Leonard's Grant Parkway currently provides access to the Leonard's Grant development and will service future traffic to the planned Hayden Farm development. The speed limit along MD 245 is 30 mph near the intersection of MD 245 and MD 5, but further north of MD 5 the speed limit transitions to 40 mph and then 50 mph. Access to the County Government Complex, St. Mary's Hospital, CSM, Nursing Center and Health Department are provided along MD 245.

Field Observations

During the field surveys, observations of AM and PM peak hour traffic conditions were noted along with existing traffic characteristics. The queuing of traffic at the seven intersections analyzed was observed during evening peak hours. The queuing of traffic was minimal and manageable at every intersection except at the intersection of MD 5 and MD 245. **Table 1** shows the largest queue of vehicles observed in each direction during the evening peak hours. Certain movements were observed to not clear during a signal cycle. Movements where a vehicle was observed having to wait more than one cycle length to clear the intersection include turning left from the south approach of MD 245 and turning left from the west approach of MD 5. This information is useful in verifying future traffic mitigation improvements necessary at the intersection of MD 5 and MD 245.

Traffic from the west along MD 5 was observed extending beyond the storage length of the left-turn lane, which caused the thru lane to be obstructed. The left turn lane along the west approach at the intersection of MD 5/MD 245 is approximately 230 feet long and the left-turn queue during the PM peak hour is approximately 420 feet. The queue did not block any major driveways or cross-streets. This traffic issue will be considered in the recommendation of future traffic mitigation improvements provided later in the report.

As stated prior, the SHA is in the process of constructing a streetscape plan along MD 5 Business. This streetscape plan includes the striping of the traffic lanes along MD 5 Business. The alignment of the southbound thru lane along MD 245 and receiving lane on MD 5 Business is currently offset by approximately 10 feet. This offset is not an ideal intersection design and increases the possibility of an accident. If a driver were not paying careful attention, this could

cause a head-on collision. There is adequate lane width to re-stripe the intersection to eliminate the 10 foot offset. It is suggested that this lane alignment be corrected.

Table 1 – Evening Peak Hour Vehicle Queues at the Intersection of MD 245 and MD 5

Intersection	Street	Approach	Queues (vehicles)
MD 245 and MD 25	MD 245	North	14
		South	17
	MD 5	East	13
		West	21

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Accident Analysis

An accident analysis was conducted for five intersections located in the study area. The Sheriff's Department and Maryland State Police provided accident data between January 1, 2009 and March 23, 2010. The Leonardtown Police Department supplied the total number of accidents at each intersection. St. Mary's County Police Department provided the types of accidents and contributing factors for the intersections and accidents where this information was documented. The SHA provided the severity index between January 1, 2006 and December 31, 2008 for each of the five intersections. The severity index is a weighted accident frequency adjustment to account for accident severity. The technique used in calculating the severity index is based on information from the police accident report form.

Table 2 shows a summary of the number of total accidents, the crash rate per million entering vehicles and the average severity index. This analysis helps to show which intersections have a high accident rate and which intersection is experiencing a greater average number of accidents. Per the SHA, any intersection meeting a threshold level of 1 accident/MVE is considered a priority candidate safety improvement intersection, which would apply for the following intersections: MD 5/MD 245, MD 5/St. Mary's Hospital, and MD 245/College of Southern Maryland. The access points for St. Mary's Hospital and the College of Southern Maryland have the two highest crash rates in the study area. The greatest total number of accidents occurs at the MD 5 and MD 245 intersection.

None of the five intersections analyzed qualified as a Priority Intersection on the SHA's latest listing in 2008. The intersection of MD 5 and Abell Street/Moakley Street was ranked as a Secondary Intersection of concern. Even-though no intersection qualified as a Priority Intersection, the average severity index reveals that the intersections of MD 5/MD 245 and MD 5/Moakley Street experience a high number of accidents that lead to either property damage or an injury. Over a 3 year period at the intersection of MD 5/Moakley Street there were 11 accidents that led to injury and 5 accidents with property damage, and at the intersection of MD 5/MD 245 there were 9 accidents that led to injury and 15 accidents with property damage. At

the intersection of MD 5/MD 245 ten of the 24 accidents identified by the SHA involved a vehicle turning left. Potential countermeasures that can be implemented to help prevent these accidents include providing more green time for left-turn vehicles, adding left-turn lanes, or rerouting left-turn traffic. At the intersection of MD 5/Moakley Street 11 of the intersections were a rear-end accident and 4 were from a vehicle turning left. Potential countermeasures to help prevent accidents at this intersection include reducing driver speeds, constructing a left-turn lane and installing a traffic signal.

Table 3 provides the type of accidents and contributing factors for accidents documented in the study area by the St. Mary's County Police Department between January 1, 2009 and March 23, 2010. There may be multiple contributing factors for an accident. This data helps in determining the reason for accidents in the study area and what mitigations would be most effective in reducing accidents. The data shows that rear end accidents are the primary type and that driver inattention/carelessness is the largest contributing factor. This shows that a high number of accidents were incidental and not caused particularly by the conditions of the street network. However, at the intersection of MD 5 and St. Mary's Hospital a left-turning vehicle was a primary contributing factor for accidents. It was expressed by the representatives of St. Mary's Hospital that it is difficult for a vehicle to turn left in and out of the access along MD 5. This is primarily related to the speed of vehicles along MD 5 and the lack of gaps available to turn left across opposing traffic. Traffic mitigations that would help slow traffic along MD 5 include a speed limit reduction, heightened enforcement to prevent speeding and a traffic signal.

Table 2 – Accident Data between 1/1/09 and 3/23/10

Intersection	Total Accidents (1/1/09-3/23/10)	Average Annual Accidents	Average Annual Entering Vehicles [1]	Average Crash Rate (Crashes per Million Entering Vehicles)	Average Severity Index [2]
MD 5 and MD 245	23	18	31,450	**1.52**	**12**
MD 5 and St. Mary's Hospital	18	14	24,080	**1.56**	**0**
MD 5 and Moakley Street	8	6	24,820	**0.67**	**22**
MD 245 and College of Southern Maryland	13	10	14,260	**1.90**	**2**
MD 245 and Leonard Hall Drive	1	1	12,490	**0.17**	**2**

[1] *AAEV based on existing PM peak hour counts at each intersection times a factor of 10.*

[2] *Based on data provided by SHA between January 1, 2006 and December 1, 2008.*

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Table 3 – Type of Accidents and Contributing Factors

	Type of Accident					Contributing Factors						
Intersection	Rear End	Right Angle	Improper Turn	Hit Object Off Road	Side Swipe	Left Turn	Right Turn	Improper Backing	Driver Inattention / Careless	Wet / Icey Pavement	Improper Lane Change	Ran Yield / Red Light
MD 5 and MD 245	8	1	4		2	3	2		9		2	1
MD 5 and St. Mary's Hospital	4		2	1		3			5			
MD 5 and Moakley Street	4	1	1			1	1		5		1	
MD 245 and College of Southern Maryland	2		1	1		1		1	1	1		

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Existing Peak-Hour Traffic Volumes

The morning peak hour occurs from 7:15 AM to 8:15 AM and the evening peak hour is from 4:30 PM to 5:30 PM. This was calculated by analyzing the manual turning traffic counts for the seven intersections which were counted during the field reconnaissance. These traffic counts along with the peak-hour analysis are provided in the **Appendix**. All of the traffic counts were analyzed for consistency and then balanced. The AM and PM peak hour traffic counts are shown in **Figure 5**. These traffic volumes were used in capacity analyses to determine the existing level of service at each of the 7 intersections.

Twenty-four hour traffic counts were also conducted at the intersection of MD 5 and Moakley Street/Abell Street. The results of the 24-hour counts are provided in **Table 4**. In comparison to 24-hour counts performed by the SHA in 2008 traffic along MD 5 has increased approximately 2.4% between 2008 and 2010.

Table 4 – 24-Hour Traffic Counts at MD 5 and Moakley Street/Abell Street

Street	Direction of Travel	24-Hour Volumes	Total Traffic in Both Directions
Abell Street	SB	228	378
	NB	150	
Moakley Street	SB	867	2,218
	NB	1,351	
MD 5	EB	12,312	25,246
	WB	12,934	

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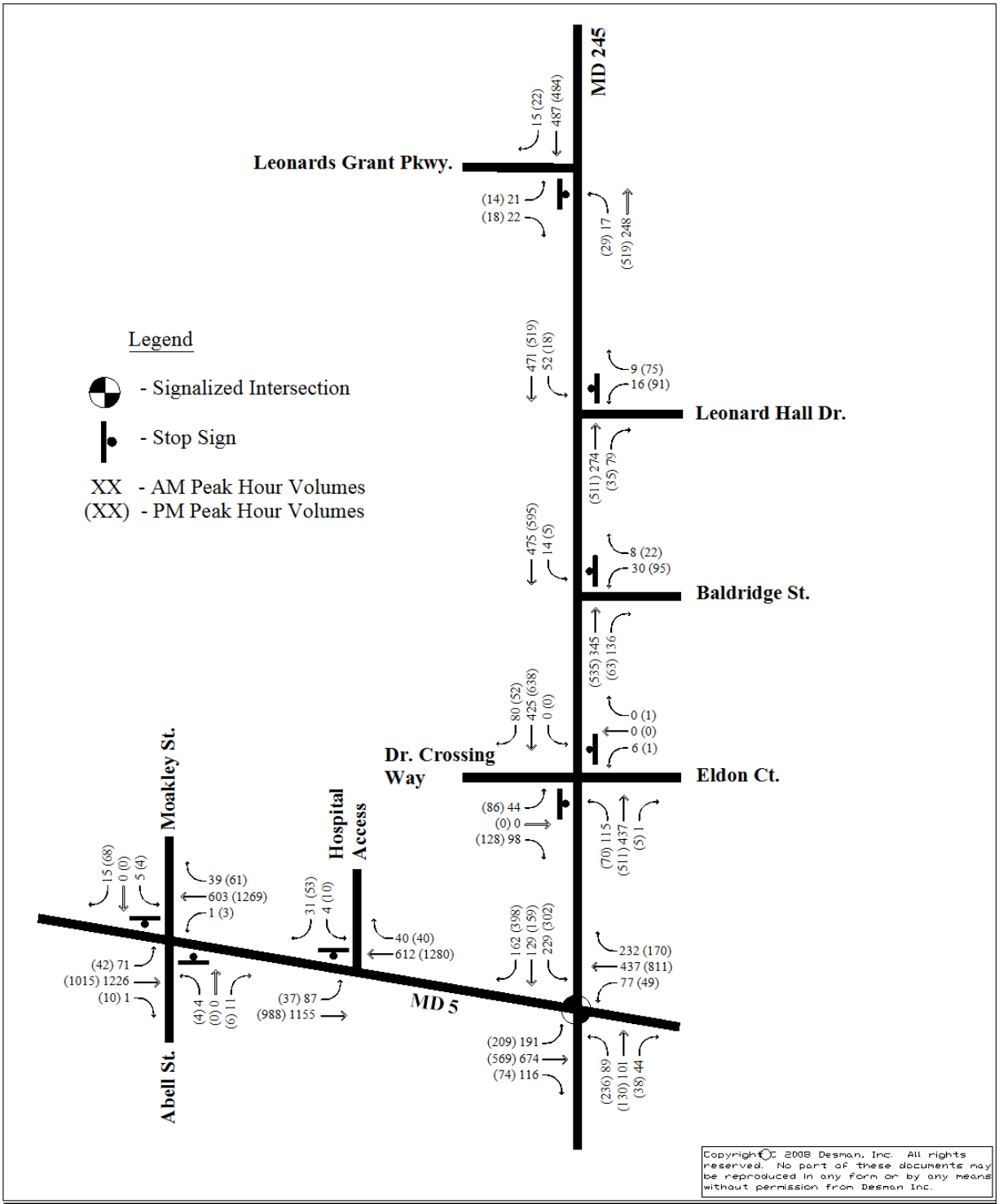

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Figure 5: Existing Peak Hour Traffic Volumes

DATE:

PROJECT NO. 30-10105.00

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Directional Distribution

The peak-hour traffic counts were utilized to determine the inbound and outbound directional distribution of traffic to the study area during the AM and PM peak-hours. An average directional distribution was determined between the AM and PM peak hour traffic counts. The directional distribution resulting from the AM and PM peak-hour traffic volumes surrounding the study area are shown in **Figure 6**.

The directional distribution displayed in **Figure 6** was applied in assigning future generated traffic and for reassigning traffic based on proposed traffic layout changes. However, for existing facilities where traffic counts were performed at all of the access points, including St. Mary's Hospital, the Government Center Complex and Leonard's Grant, specific directional distributions were calculated based on the direction of traffic entering and exiting these facilities. The specific directional distributions along with the overall directional distribution displayed in **Figure 6** were applied in assigning future traffic generated to these institutions.

Trip Generation Analysis

Based on discussions with representatives from Leonardtown, a number of substantial developments were identified within the study area which will affect the amount of traffic generated during the AM and PM peak hours. The major developments planned in the study area are listed in **Table 5**. In addition to these planned developments there is expected annual growth at CSM, St. Mary's Hospital, and the Government Center Complex. Maybe

Table 5 – Future Developments in Study Area

Development/Site	Land Use	Size	Timeline
Leonard's Grant - Phase 1	Residential	120 Single Family Units	0 - 2 years
Wellness Center/Recreation Center	Recreational Center	32,090 sq. ft.	
Clark's Rest	Residential	35 Single Family Units	
Leonard's Grant - Phase 2	Residential	124 Single Family Units	2 - 5 years
Clark's Rest - Phase 2	Residential	55 Single Family Units	
		50 Townhomes	
Government Center Complex	Minimum Security Detention Center	87,000 sq. ft.	
		500 beds	
		40 employees	
Hayden Farm - Phase 1	Library	39,000 sq. ft.	
	Elementary School	74,227 sq. ft.	
		644 students	
Clark's Rest - Phase 3	Residential	138 Single Family Units	5 - 10 years
		62 Townhomes	
Hayden Farm - Phase 2	Middle School	115,000 sq. ft.	
		1,100 students	
Tudor Hall	Residential	252 Single Family Units	
	Residential	155 Townhomes	
	Residential	186 Apartments	
	Office	123,250 sq. ft.	
	Hotel	255 rooms	
	Golf Course	18 holes	

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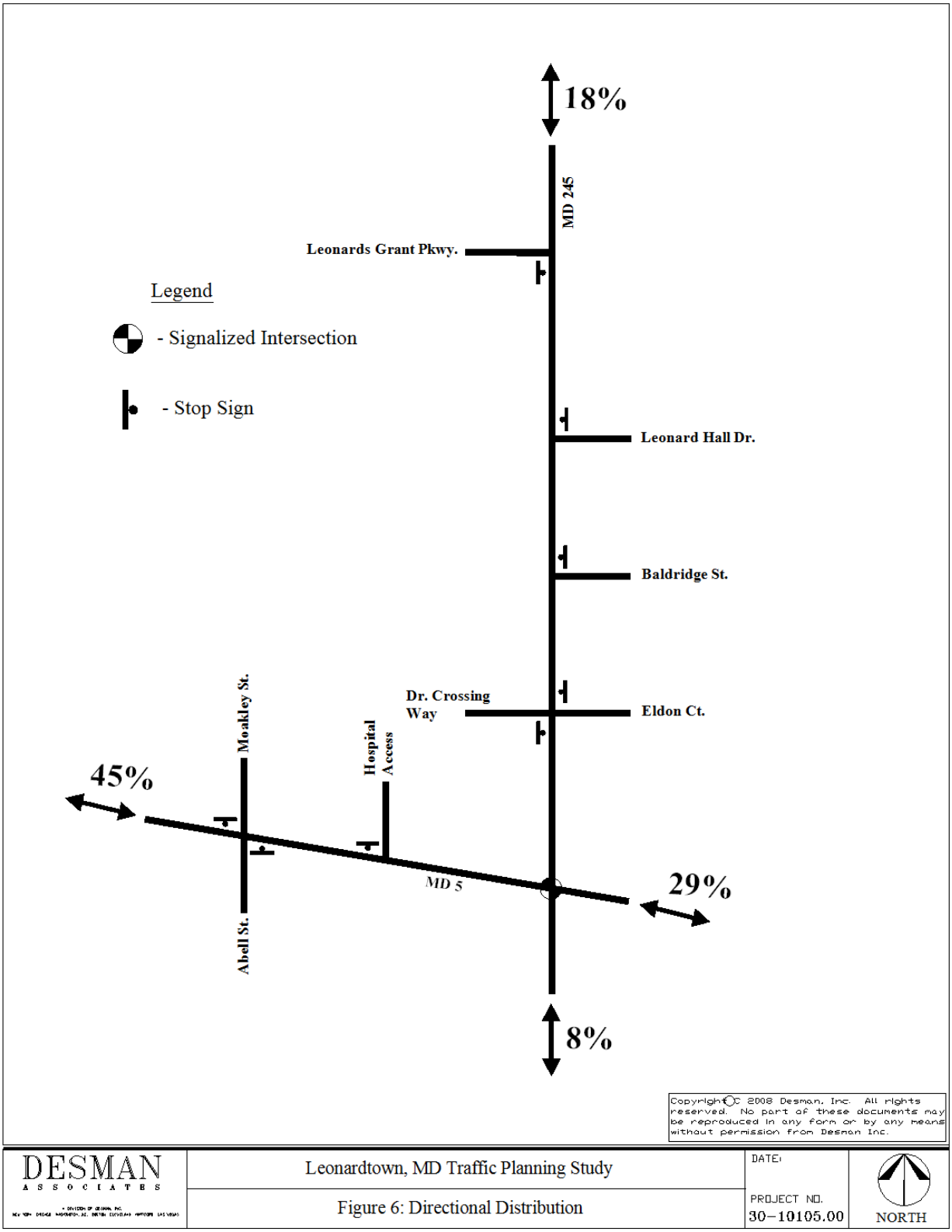

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Figure 6: Directional Distribution

DATE:

PROJECT NO. 30-10105.00

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Table 6 displays the future trips generated by each planned development within the study area. A variety of sources were applied in calculating the future traffic generated by each development. The three main sources include prior traffic studies, the *8th Edition of Trip Generation* by the Institute of Transportation Engineers (ITE) and from traffic counts conducted in the field. For the major developments listed in **Table 6** the project size factors (i.e. square feet, students, houses, etc.) were applied in calculating future trip generation. However, for CSM, St. Mary's Hospital and the Government Center Complex annual growth factors were provided by representatives of each institution. In calculating future trips, a modal split/capture factor was also applied for land uses (library, recreational center, and golf courses) where trips will be shared by adjacent land uses.

Table 6 – Trip Generation Analysis

						Trip Generation			
						AM		PM	
Analysis Period	Project	Land Use	Size	Trip Generation Source	Modal Split/Capture	IN	OUT	IN	OUT
0 -2 Years	Leonard's Grant - Phase 1	Residential	120 houses	Prior Traffic Study	0%	24	67	79	43
	Clark's Rest - Phase 1	Residential	35 houses	Prior Traffic Study	0%	7	20	23	13
	Wellness Center/Recreation Center	Recreational Center	32,090 sq. ft.	ITE - 492	20%	16	19	51	39
	Government Center Complex [1]	Government Center	24 employees	ITE - 733	0%	13	2	6	13
	College of Southern Maryland [2]	Community College	93 students	ITE - 540	0%	55	12	68	38
	St. Mary's Hospital [3]	Hospital Patients/Visitors	6.31% per year	Traffic Counts	0%	13	7	11	15
2 Year Trip Generation Projection Subtotal						**128**	**127**	**238**	**160**
2 - 5 Years	Leonard's Grant - Phase 2	Residential	124 houses	Prior Traffic Study	0%	25	69	82	45
	Clark's Rest - Phase 2	Residential	55 houses	Prior Traffic Study	0%	11	31	36	20
		Residential	50 townhomes	Prior Traffic Study	0%	4	19	18	10
	Minimum Security Jail Expansion	Institutional	500 Beds	ITE - 571	0%	27	23	3	23
	Hayden Farm - Phase 1	Library [4]	22,700 sq. ft.	ITE - 590	10%	15	6	68	74
		Elementary School	644 students	ITE - 520	0%	136	112	47	49
	College of Southern Maryland [2]	Community College	140 students	ITE - 540	0%	72	16	84	47
	Government Center Complex [1]	Government Center	36 employees	ITE - 733	0%	19	2	9	19
	St. Mary's Hospital [3]	Hospital Employees	96 employees	Traffic Counts	0%	20	11	11	15
		Hospital Patients/Visitors	6.31% per year	Traffic Counts	0%	19	11	16	22
2 - 5 Year Trip Generation Projection Subtotal						**349**	**299**	**373**	**323**
5 - 10 Years	Clark's Rest - Phase 3	Residential	138 houses	Prior Traffic Study	0%	28	77	91	50
		Residential	62 townhomes	Prior Traffic Study	0%	4	23	22	12
	Hayden Farm - Phase 2	Middle School	1,100 students	ITE - 522	0%	327	267	86	90
	Tudor Hall - Phase 1	Residential	126 houses	Prior Traffic Study	0%	25	71	83	45
		Residential	78 townhomes	Prior Traffic Study	0%	5	29	28	15
		Residential	93 apartments	Prior Traffic Study	0%	8	39	40	19
		Office	61,625 sq. ft.	Prior Traffic Study	10%	81	10	15	72
		Hotel/Commercial	150 rooms	ITE - 310	0%	26	59	18	71
	College of Southern Maryland [2]	Community College	233 students	ITE - 540	0%	99	22	110	62
	Government Center Complex [1]	Government Center	59 employees	ITE - 733	0%	32	4	15	32
	St. Mary's Hospital [3]	Hospital Employees	1% per year	Traffic Counts	0%	12	7	6	9
		Hospital Patients/Visitors	6.31% per year	Traffic Counts	0%	32	18	26	37
5 - 10 Year Trip Generation Projection Subtotal						**680**	**624**	**541**	**512**
10 - 20 Years	Tudor Hall - Phase 2	Residential	126 houses	Prior Traffic Study	0%	25	71	83	45
		Residential	77 townhomes	Prior Traffic Study	0%	5	40	7	33
		Residential	93 apartments	Prior Traffic Study	0%	8	39	40	19
		Office	61,625 sq. ft.	Prior Traffic Study	10%	81	10	15	72
	College of Southern Maryland [2]	Community College	465 students	ITE - 540	0%	121	68	77	171
	Government Center Complex [1]	Government Center	119 employees	ITE - 733	0%	65	8	29	65
	St. Mary's Hospital [3]	Hospital Employees	1% per year	Traffic Counts	0%	24	13	13	17
		Hospital Patients/Visitors	6.31% per year	Traffic Counts	0%	64	35	53	73
10+ Year Trip Generation Projection Subtotal						**393**	**284**	**317**	**495**
Cumulative Total Trips Generation Projection						**1,549**	**1,334**	**1,469**	**1,491**

[1] An annual employee growth factor of 1.6% was applied for the Government Center Complex.

[2] An annual student growth factor of 3% was applied for the College of Southern Maryland.

[3] A 4.6% per year growth factor is based on visitor and employee growth data provided by St. Mary's County Hospital.

[4] The square footage for the new library at Hayden Farm includes the net increase in square footage between the proposed (39,000 sf) and existing (16,300 sf) library.

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Future Traffic Conditions

The future traffic conditions were projected for the following years: 2012, 2015, 2020 and 2030. In developing the future traffic conditions for each of these time periods a base traffic condition and the future traffic generated by proposed developments were established. Total future traffic volumes include the addition of the base traffic and future traffic generated by specific developments. Trip generation figures for each time period were created and include the trip generation volumes provided in **Table 6**. Base traffic assumes a "no-build" condition. The base traffic condition includes annual background growth traffic along MD 5 and MD 245 and the redistribution of traffic from proposed street network additions. The SHA applied a 2.5% annual growth factor for traffic along MD 5 and an annual growth factor of 2% for MD 245 in their Leonardtown Project Planning Study. These same annual growth factors were used for this study.

A summary of the future developments and future road improvements planned during each time period is described below. In addition to the developments listed, there is also assumed annual growth at St. Mary's Hospital, CSM and the Government Center Complex. The projected developments, annual growth at the three major institutions and proposed road additions were all applied in determining the future traffic conditions during each time period.

The 2012 future traffic condition includes the addition of 120 residential homes at the Leonard's Grant development, the construction of 35 homes at the Clark's Rest development and the completion of the CSM Wellness Center/Recreation Center. The future road improvements planned by 2012 include the expansion of the Leonard's Grant street network and the addition of the Clark's Rest development access street. The Clark's Rest access street will be located off MD 5 west of Moakley Street and will include a connecting road to Moakley Street. The figures listed below show the peak hour traffic conditions for the year 2012.

- **Figure 7** – 2012 Base Traffic Volumes
- **Figure 8** – 2012 Trip Generation
- **Figure 9** – 2012 Total Future Traffic Volumes

The 2015 future traffic condition includes the construction of 124 homes at the Leonard's Grant development and 105 residences at the Clark's Rest development, the expansion of the existing Minimum Security Detention center located in the Government Center Complex and the construction of the proposed library and elementary school at the Hayden Farm development. The future road improvements planned by 2015 include a connecting road between the Leonard's Grant and Clark's Rest developments. This road addition will also create a connection between MD 5 and MD 245, which will have a substantial affect on the travel patterns for traffic generated by the Clark's Rest and Leonard's Grant developments. The figures listed below show the peak hour traffic conditions for the year 2015.

- **Figure 10** – 2015 Base Traffic Volumes
- **Figure 11** – 2015 Trip Generation
- **Figure 12** – 2015 Total Future Traffic Volumes

The 2020 future traffic condition includes the construction of 200 residences at the Clark's Rest development, the development of a 1,100 student middle school at Hayden Farm, and the construction of residential, office and hotel space at the Tudor Hall development. Future road improvements include the construction of the access road to service the Tudor Hall development. This road will connect between MD 5 and MD 5 Business, providing a new entry route to downtown Leonardtown. It was assumed that a percentage of existing traffic to and from the west along MD 5 would utilize the proposed Tudor Hall access road to travel in and out of the downtown Leonardtown area. The figures listed below show the peak hour traffic conditions for the year 2020.

- **Figure 13** – 2020 Base Traffic Volumes
- **Figure 14** – 2020 Trip Generation
- **Figure 15** – 2020 Total Future Traffic Volumes

The 2030 future traffic condition includes the completion of the Tudor Hall development. No additional street network additions are projected beyond the year 2020 which will have a major impact on future travel patterns. The figures listed below show the peak hour traffic conditions for the year 2030.

- **Figure 16** – 2030 Base Traffic Volumes
- **Figure 17** – 2030 Trip Generation
- **Figure 18** – 2030 Total Future Traffic Volumes

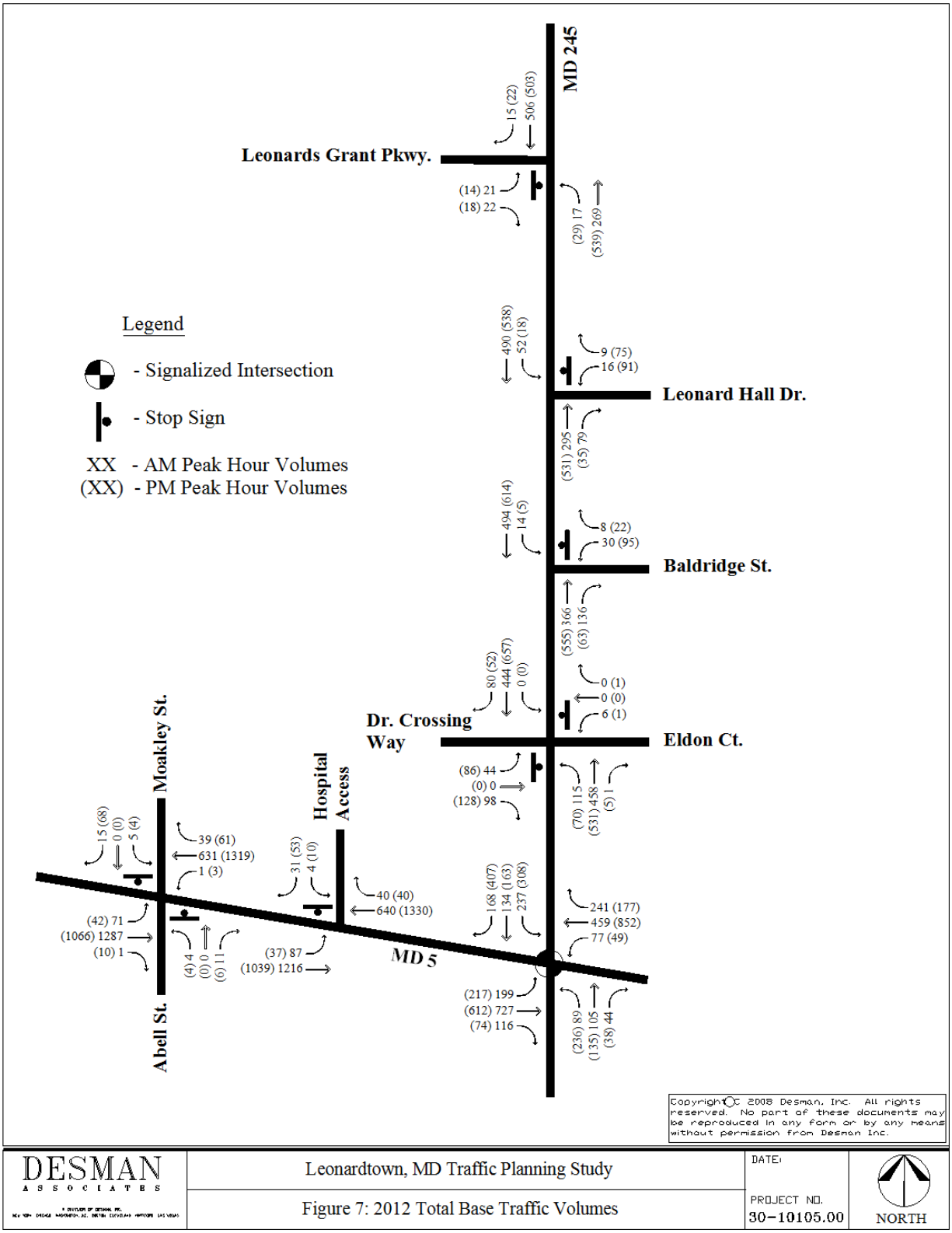

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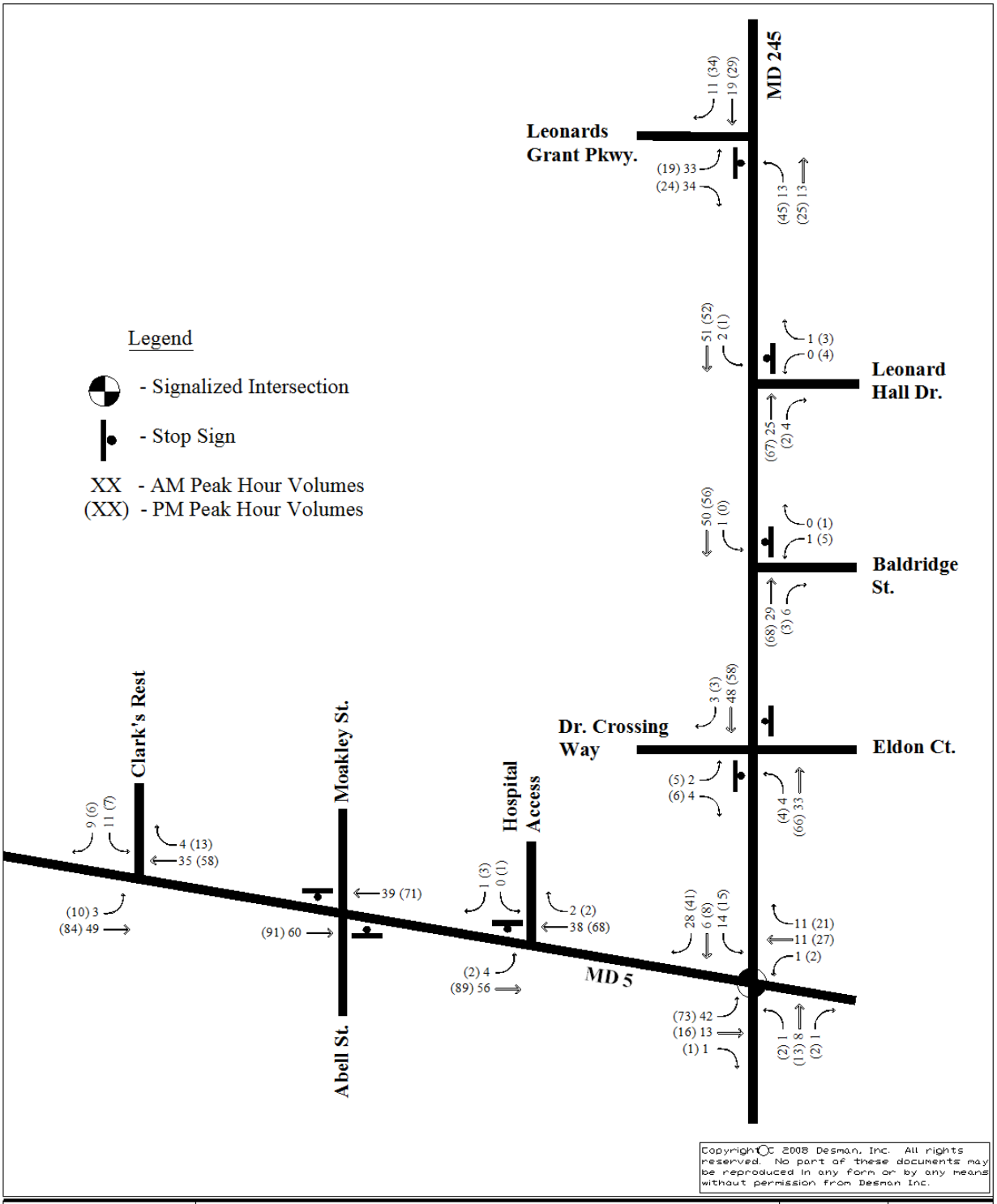
	Figure 7: 2012 Total Base Traffic Volumes	PROJECT NO. 30-10105.00	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Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Clark's Rest
Moakley St.
Hospital Access
MD 5
Abell St.
Legend
- Signalized Intersection
- Stop Sign
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(XX) - PM Peak Hour Volumes
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Figure 8: 2012 Trip Generation
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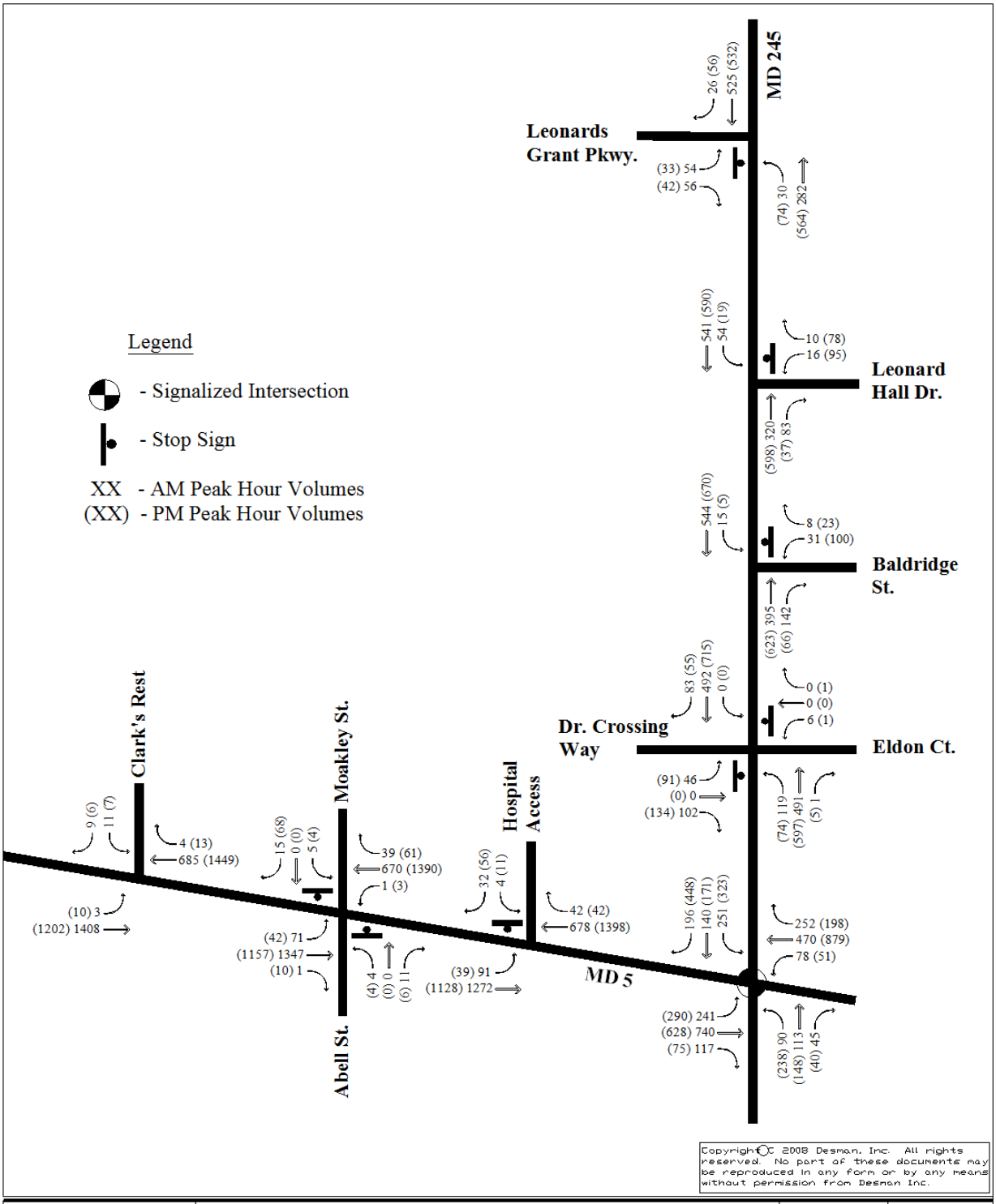
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(XX) - PM Peak Hour Volumes
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Moakley St.
Hospital Access
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Figure 9: 2012 Total Future Traffic Volumes
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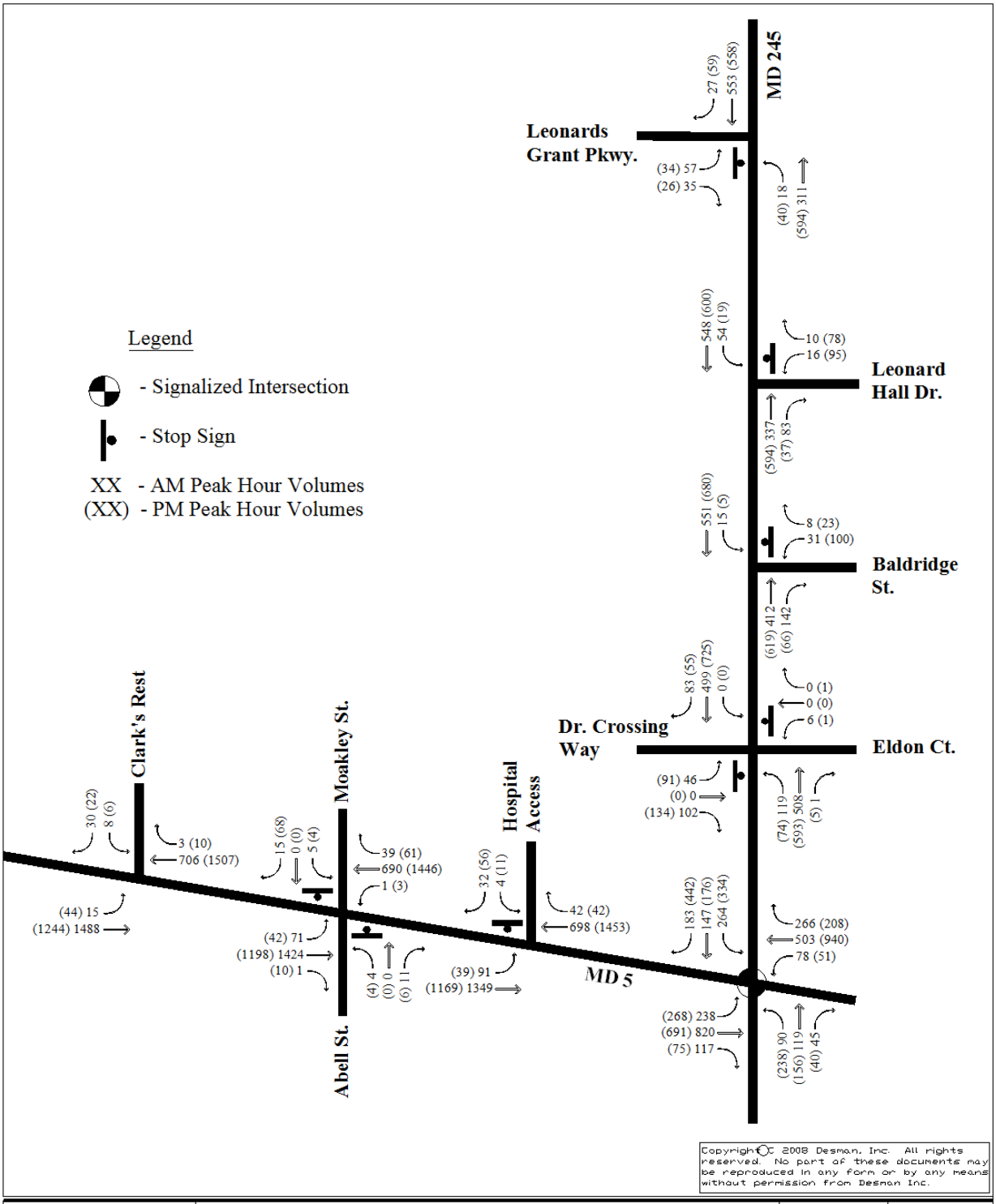
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(XX) - PM Peak Hour Volumes
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Hospital Access
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Figure 10: 2015 Total Base Traffic Volumes
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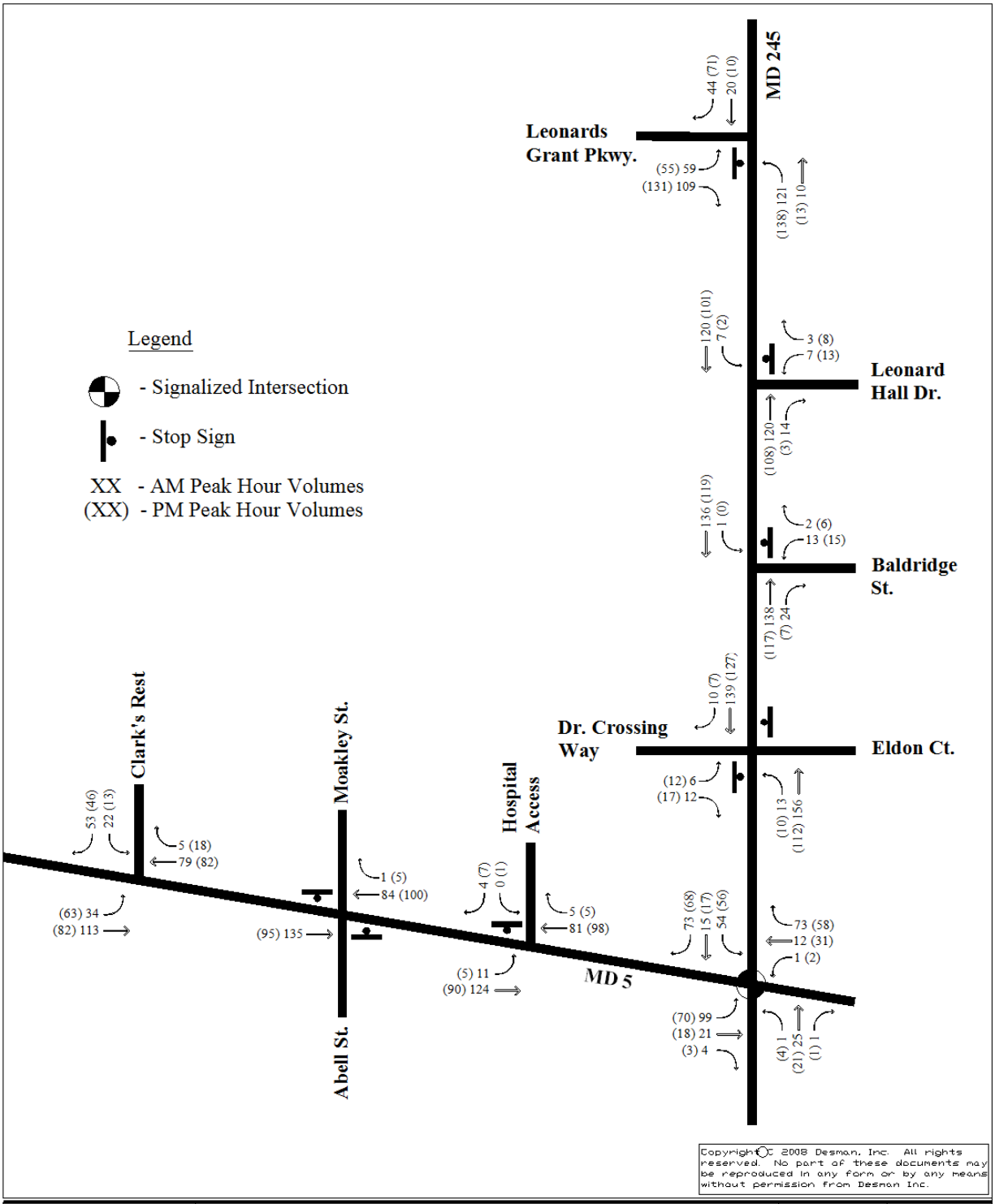

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Figure 11: 2015 Trip Generation

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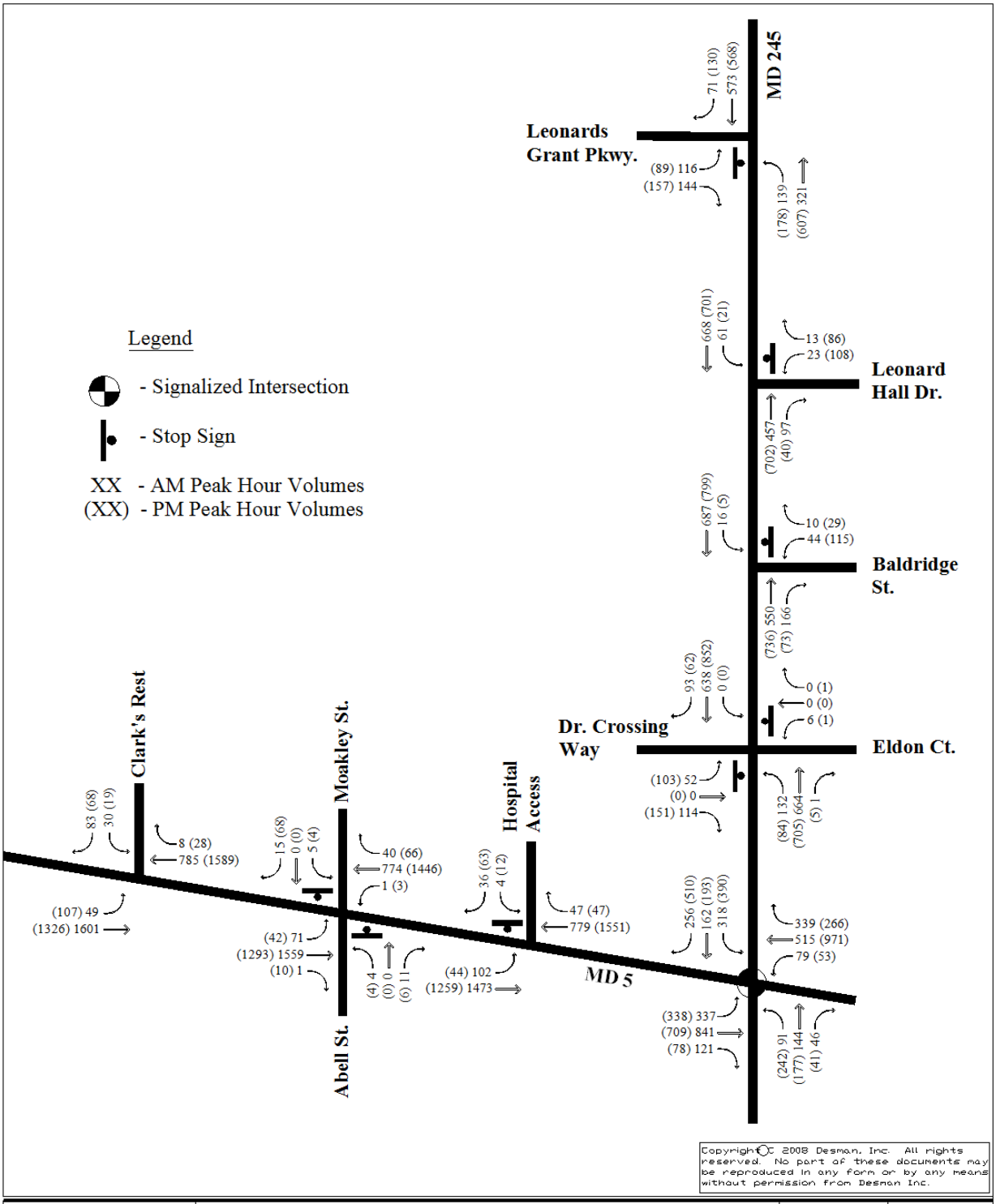
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XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes
MD 245
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Figure 12: 2015 Total Future Traffic Volumes
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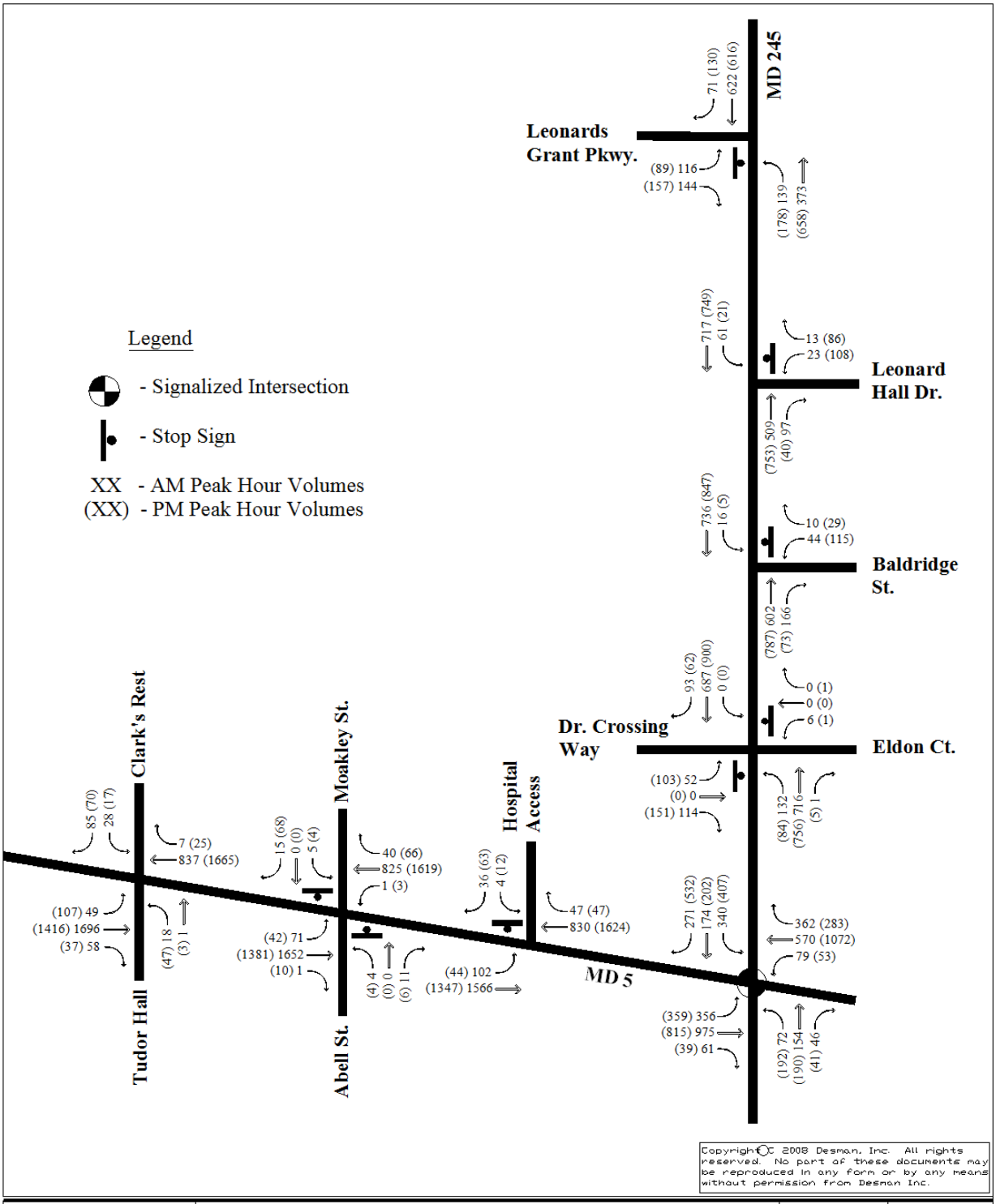

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Figure 13: 2020 Total Base Traffic Volumes

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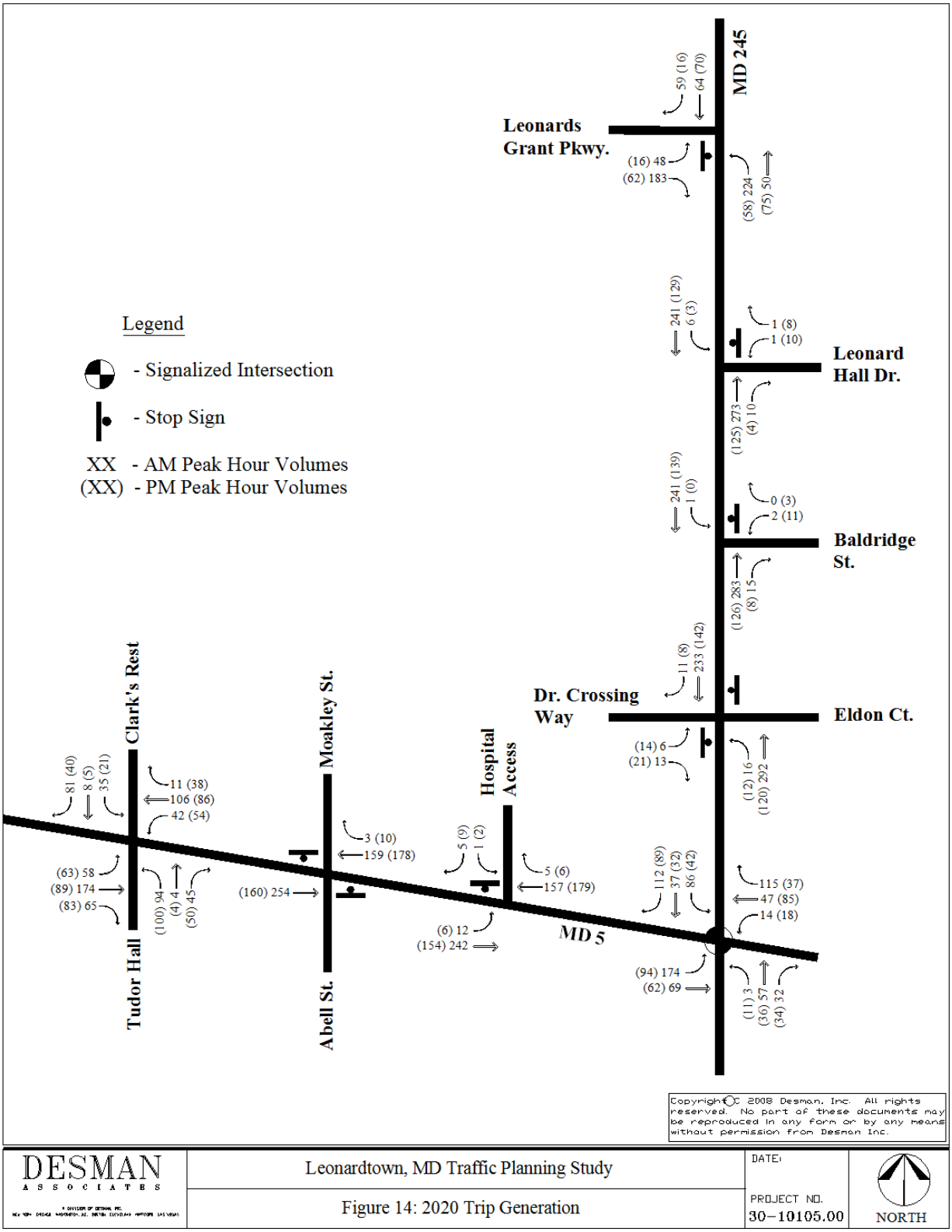
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Eldon Ct.
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Moakley St.
Hospital Access
Tudor Hall
Abell St.
MD 5
Legend
- Signalized Intersection
- Stop Sign
XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes
59 (16)
64 (70)
(16) 48
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241 (129)
6 (3)
1 (8)
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Figure 14: 2020 Trip Generation
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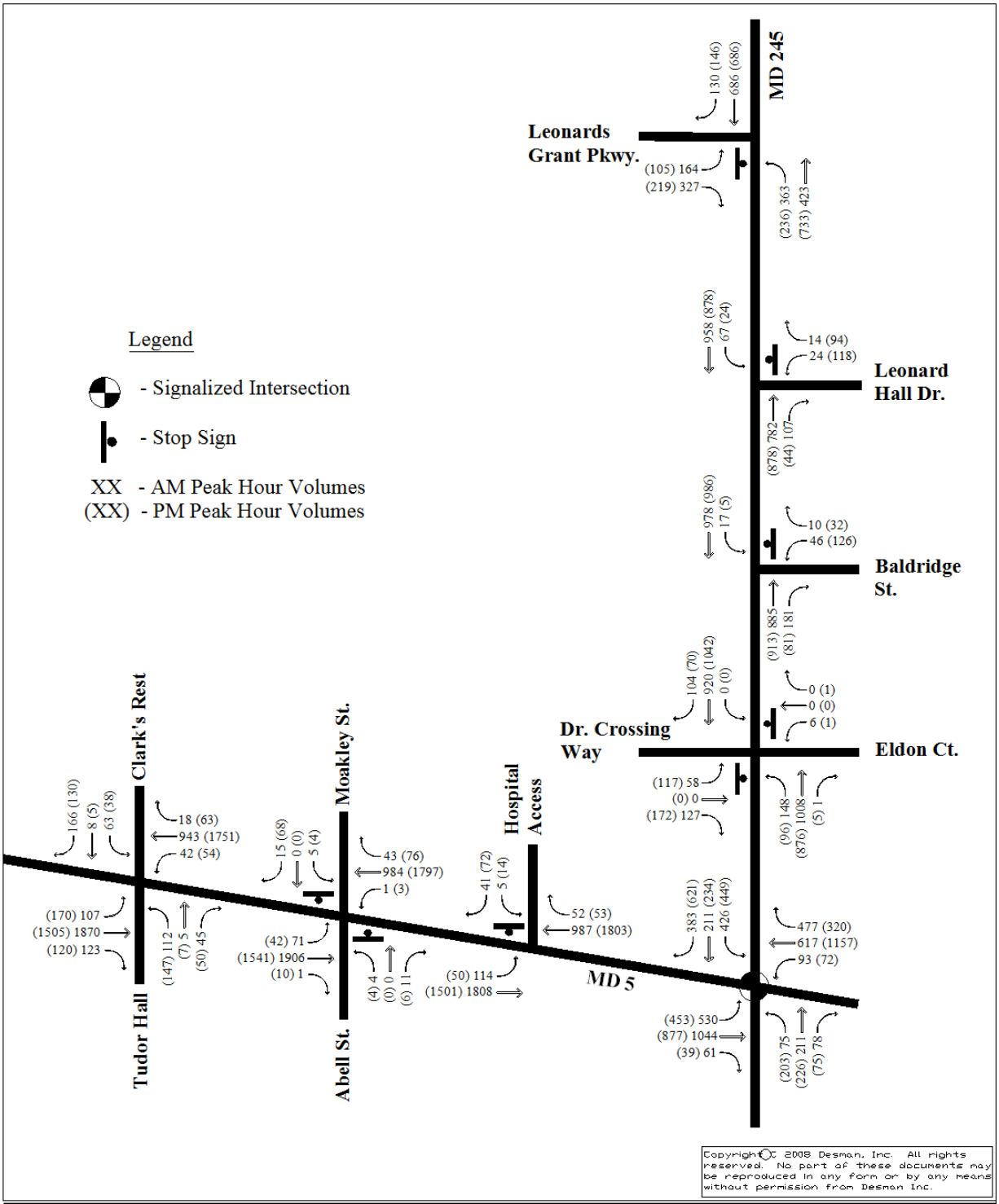

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Figure 15: 2020 Total Future Traffic Volumes

DATE:

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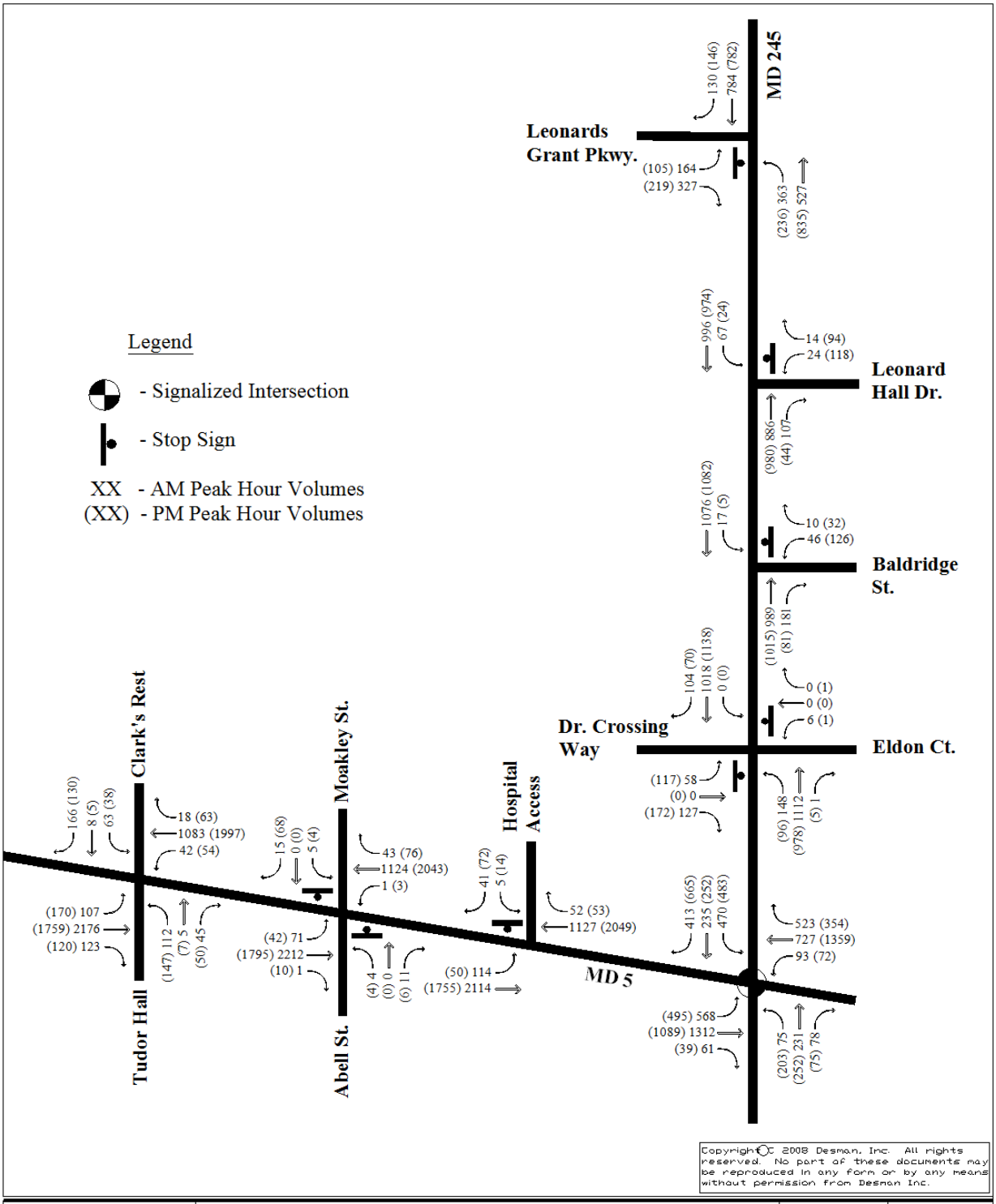

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Figure 16: 2030 Total Base Traffic Volumes

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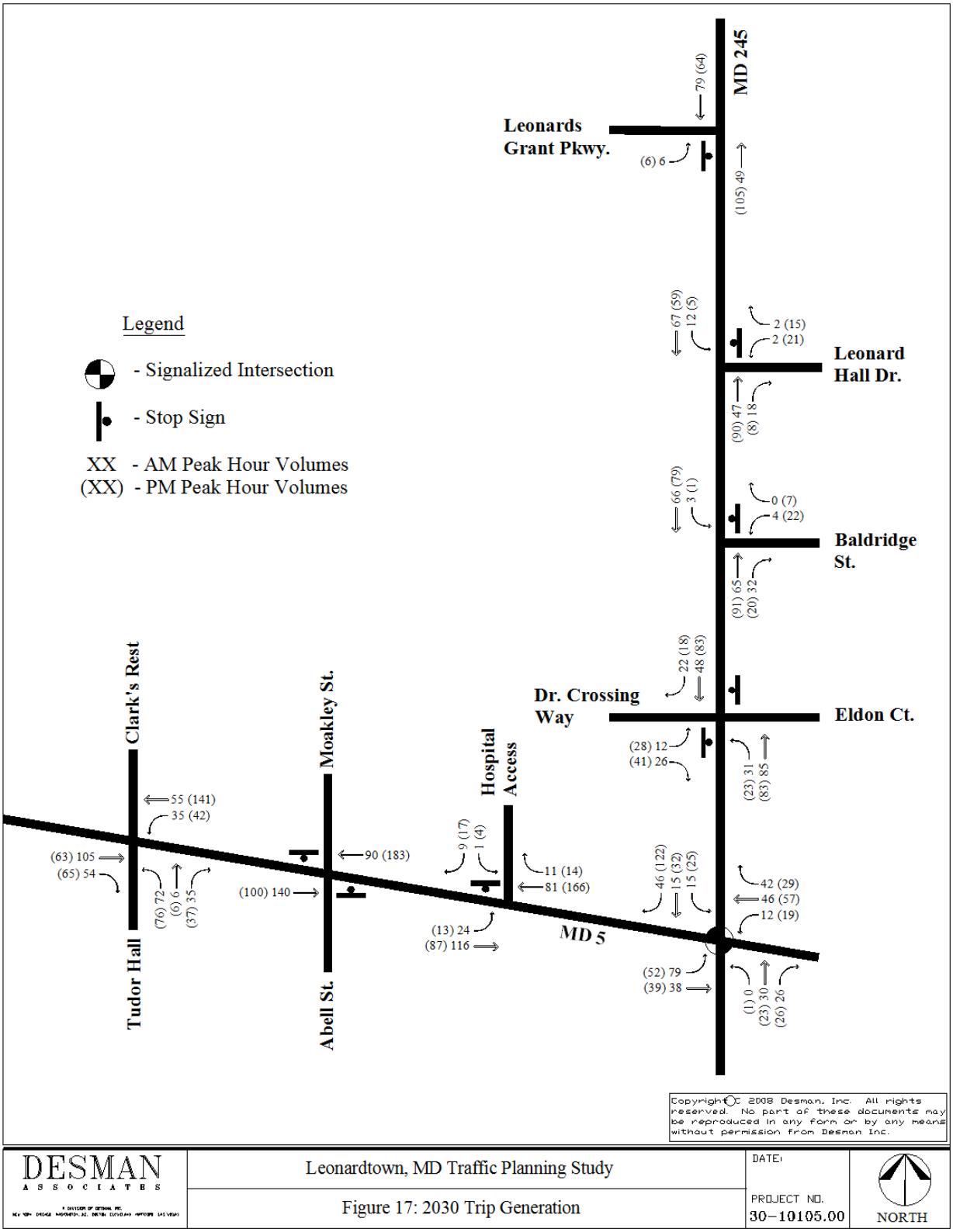
MD 245
Leonards Grant Pkwy.
Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Clark's Rest
Moakley St.
Hospital Access
Tudor Hall
Abell St.
MD 5
Legend
- Signalized Intersection
- Stop Sign
XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes
79 (64)
(6) 6
(105) 49
67 (59)
12 (5)
2 (15)
2 (21)
(90) 47
(8) 18
66 (79)
3 (1)
0 (7)
4 (22)
(91) 65
(20) 32
22 (18)
48 (83)
(28) 12
(41) 26
(23) 31
(83) 85
55 (141)
35 (42)
(63) 105
(65) 54
(76) 72
(6) 6
(37) 35
90 (183)
(100) 140
9 (17)
1 (4)
11 (14)
81 (166)
(13) 24
(87) 116
46 (122)
15 (32)
15 (25)
42 (29)
46 (57)
12 (19)
(52) 79
(39) 38
(1) 0
(23) 30
(26) 26
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Figure 17: 2030 Trip Generation
DATE:
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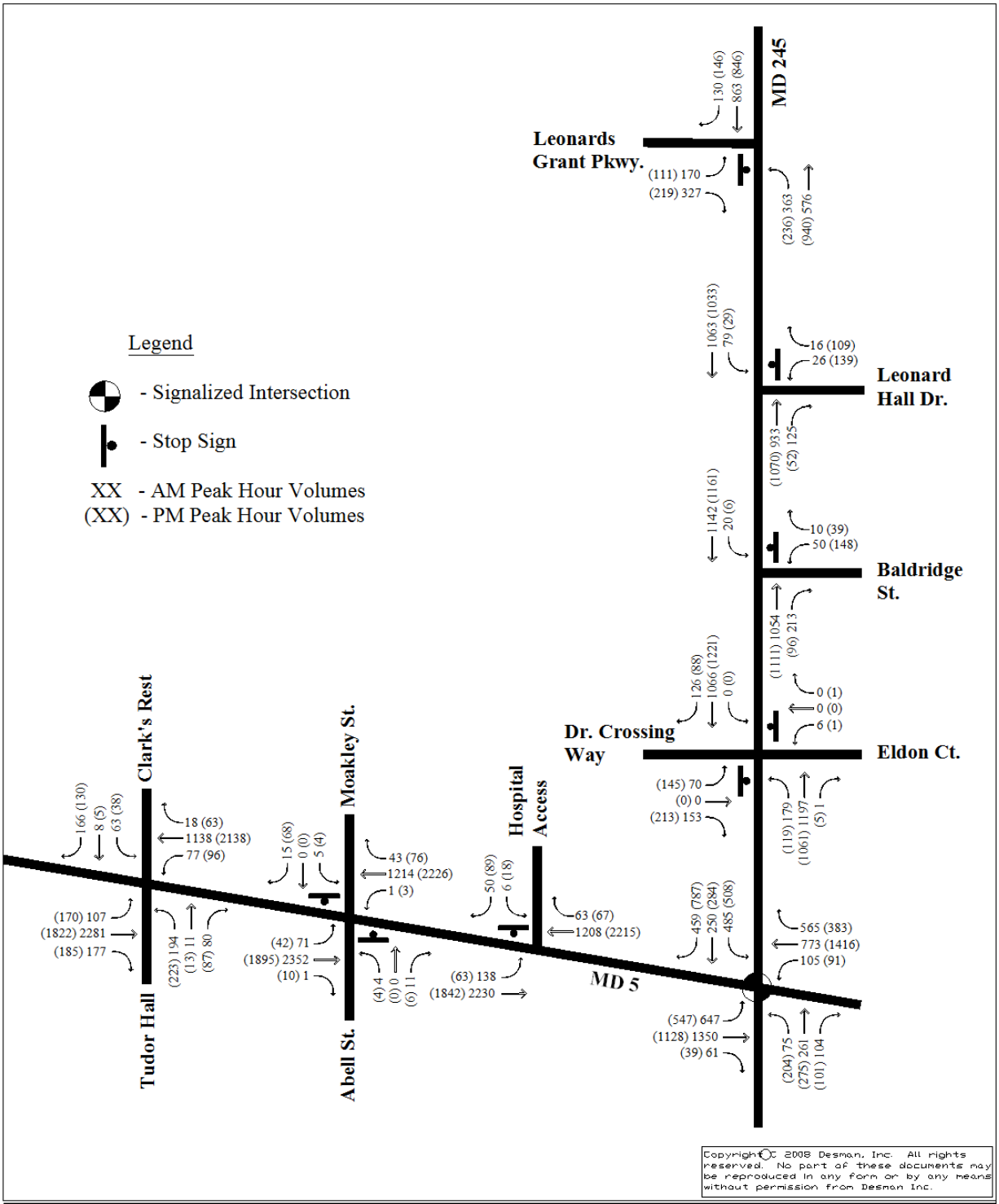
Legend
- Signalized Intersection
- Stop Sign
XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes
MD 245
Leonards Grant Pkwy.
Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Clark's Rest
Moakley St.
Hospital Access
Tudor Hall
Abell St.
MD 5
130 (146)
863 (846)
(111) 170
(219) 327
(236) 363
(940) 576
1063 (1033)
79 (29)
16 (109)
26 (139)
(1070) 933
(52) 125
1142 (1161)
20 (6)
10 (39)
50 (148)
(1111) 1054
(96) 213
126 (88)
1066 (1221)
0 (0)
0 (1)
0 (0)
6 (1)
(145) 70
(0) 0
(213) 153
(119) 179
(1061) 1197
(5) 1
166 (130)
8 (5)
63 (38)
18 (63)
1138 (2138)
77 (96)
15 (68)
0 (0)
5 (4)
43 (76)
1214 (2226)
1 (3)
50 (89)
6 (18)
63 (67)
1208 (2215)
459 (787)
250 (284)
485 (508)
565 (383)
773 (1416)
105 (91)
(170) 107
(1822) 2281
(185) 177
(223) 194
(13) 11
(87) 80
(42) 71
(1895) 2352
(10) 1
(4) 4
(0) 0
(6) 11
(63) 138
(1842) 2230
(547) 647
(1128) 1350
(39) 61
(204) 75
(275) 261
(101) 104
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Figure 18: 2030 Total Future Traffic Volumes
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Capacity Analyses

Traffic capacity analyses were conducted for all 7 intersections with existing traffic characteristics during both the morning and evening peak hours for the existing, 2012, 2015, 2020 and 2030 time periods. These analyses were performed using the Critical Lane Volume (CLV) methodology, as requested by the Maryland State Highway Administration. These analyses were performed as part of a planning effort to identify traffic concerns and determine future traffic mitigations needed to support existing and future traffic conditions.

The CLV analysis uses the traffic volumes to estimate the level of service (LOS) for the intersection. LOS values range from LOS 'A' through LOS 'F', with LOS 'A' being the most desirable traffic condition. A LOS of 'A' through 'D' is considered acceptable for peak-hour operations, while LOS 'E' and 'F' are considered unacceptable.

Existing Traffic Conditions

The results of the capacity analyses for the existing traffic conditions are provided in **Table 7**. Based on the CLV analysis results, each intersection currently operates at a satisfactory level of service during the morning and evening peak hours.

2012 Traffic Conditions

The results of the capacity analyses for the 2012 traffic conditions are provided in **Table 8**. The intersection of MD 5 and Clark's Rest has been included in the analysis. Based on the CLV analysis results, each intersection will operate at a satisfactory level of service during the morning and evening peak hours.

2015 Traffic Conditions

The results of the capacity analyses for the 2015 traffic conditions are provided in **Table 9**. Based on the CLV analysis results, the only intersection which will operate at a poor level of service is MD 245 and MD 5.

2020 Traffic Conditions

The results of the capacity analyses for the 2020 traffic conditions are provided in **Table 10**. Based on the CLV analysis results, MD 5/MD 245 and MD 245/Leonards Grant Parkway intersections will operate at an insufficient level of service.

2030 Traffic Conditions

The results of the capacity analyses for the 2030 traffic conditions are provided in **Table 11**. Based on the CLV analysis results, the intersections of MD 245/MD 5, MD 245/Dr. Crossing Way, MD 245/Leonards Grant Parkway and MD 5/Clark's Rest/Tudor Hall will operate at poor levels of service.

Table 7 – Existing Conditions Capacity Analyses Results

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	101	1.00	101	229	1	229	330	924	A
		SB	129	1.00	129	236	1	236	365		
		EB	790	0.55	435	77	1	77	512		
		WB	669	0.55	368	191	1	191	559		
	Evening	NB	130	1.00	130	302	1	302	432	1,181	C
		SB	159	1.00	159	236	1	236	395		
		EB	643	0.55	354	170	1	170	524		
		WB	981	0.55	540	209	1	209	749		
MD 5 and Moakley St./Abell St.	Morning	NB	15	1.00	15	5	1	5	20	696	A
		SB	5	1.00	5	4	1	4	9		
		EB	1227	0.55	675	1	1	1	676		
		WB	642	0.55	353	71	1	71	424		
	Evening	NB	6	1.00	6	4	1	4	10	784	A
		SB	0	1.00	0	4	1	4	4		
		EB	1025	0.55	564	3	1	3	567		
		WB	1330	0.55	732	42	1	42	774		
MD 5 and Hospital Access	Morning	SB	31	1.00	31	0	1	0	31	666	A
		EB	1155	0.55	635	0	1	0	635		
		WB	652	0.55	359	87	1	87	446		
	Evening	SB	53	1.00	53	0	1	0	53	596	A
		EB	988	0.55	543	0	1	0	543		
		WB	1320	0.55	726	37	1	37	763		
MD 245 and Eldon Ct./Dr. Crossing Way	Morning	NB	438	1.00	438	0	1	0	438	724	A
		SB	505	1.00	505	115	1	115	620		
		EB	98	1.00	98	6	1	6	104		
		WB	6	1.00	6	44	1	44	50		
	Evening	NB	516	1.00	516	0	1	0	516	889	A
		SB	690	1.00	690	70	1	70	760		
		EB	128	1.00	128	1	1	1	129		
		WB	2	1.00	2	86	1	86	88		
MD 245 and Baldridge Street	Morning	NB	481	1.00	481	14	1	14	495	503	A
		SB	475	1.00	475	0	1	0	475		
		WB	8	1.00	8	0	1	0	8		
	Evening	NB	598	1.00	598	5	1	5	603	625	A
		SB	595	1.00	595	0	1	0	595		
		WB	22	1.00	22	0	1	0	22		
MD 245 and Leonard Hall Drive	Morning	NB	353	1.00	353	52	1	52	405	480	A
		SB	471	1.00	471	0	1	0	471		
		WB	9	1.00	9	0	1	0	9		
	Evening	NB	546	1.00	546	18	1	18	564	639	A
		SB	519	1.00	519	0	1	0	519		
		WB	75	1.00	75	0	1	0	75		
MD 245 and Leonards Grant Parkway	Morning	NB	248	1.00	248	0	1	0	248	547	A
		SB	487	1.00	487	17	1	17	504		
		EB	43	1.00	43	0	1	0	43		
	Evening	NB	519	1.00	519	0	1	0	519	551	A
		SB	484	1.00	484	29	1	29	513		
		EB	32	1.00	32	0	1	0	32		

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Table 8 – 2012 Traffic Condition Capacity Analyses Results

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	113	1.00	113	251	1	251	364	1,002	B
		SB	140	1.00	140	90	1	90	230		
		EB	857	0.55	471	78	1	78	549		
		WB	722	0.55	397	241	1	241	638		
	Evening	NB	148	1.00	148	323	1	323	471	1,353	D
		SB	171	1.00	171	238	1	238	409		
		EB	703	0.55	387	51	1	51	438		
		WB	1077	0.55	592	290	1	290	882		
MD 5 and Moakley St./Abell St.	Morning	NB	15	1.00	15	5	1	5	20	762	A
		SB	5	1.00	5	4	1	4	9		
		EB	1348	0.55	741	1	1	1	742		
		WB	709	0.55	390	71	1	71	461		
	Evening	NB	6	1.00	6	4	1	4	10	850	A
		SB	0	1.00	0	4	1	4	4		
		EB	1167	0.55	642	3	1	3	645		
		WB	1451	0.55	798	42	1	42	840		
MD 5 and Hospital Access	Morning	SB	32	1.00	32	0	1	0	32	732	A
		EB	1272	0.55	700	0	1	0	700		
		WB	720	0.55	396	91	1	91	487		
	Evening	SB	56	1.00	56	0	1	0	56	676	A
		EB	1128	0.55	620	0	1	0	620		
		WB	1440	0.55	792	39	1	39	831		
MD 245 and Eldon Ct./Dr. Crossing Way	Morning	NB	492	1.00	492	0	1	0	492	802	A
		SB	575	1.00	575	119	1	119	694		
		EB	102	1.00	102	6	1	6	108		
		WB	6	1.00	6	46	1	46	52		
	Evening	NB	602	1.00	602	0	1	0	602	979	A
		SB	770	1.00	770	74	1	74	844		
		EB	134	1.00	134	1	1	1	135		
		WB	2	1.00	2	91	1	91	93		
MD 245 and Baldridge Street	Morning	NB	537	1.00	537	15	1	15	552	560	A
		SB	544	1.00	544	0	1	0	544		
		WB	8	1.00	8	0	1	0	8		
	Evening	NB	689	1.00	689	5	1	5	694	717	A
		SB	670	1.00	670	0	1	0	670		
		WB	23	1.00	23	0	1	0	23		
MD 245 and Leonard Hall Drive	Morning	NB	403	1.00	403	54	1	54	457	551	A
		SB	541	1.00	541	0	1	0	541		
		WB	10	1.00	10	0	1	0	10		
	Evening	NB	635	1.00	635	19	1	19	654	732	A
		SB	590	1.00	590	0	1	0	590		
		WB	78	1.00	78	0	1	0	78		
MD 245 and Leonards Grant Parkway	Morning	NB	282	1.00	282	0	1	0	282	665	A
		SB	525	1.00	525	30	1	30	555		
		EB	110	1.00	110	0	1	0	110		
	Evening	NB	564	1.00	564	0	1	0	564	681	A
		SB	532	1.00	532	74	1	74	606		
		EB	75	1.00	75	0	1	0	75		
MD 5 and Clark's Rest	Morning	SB	11	1.00	11	0	1	0	11	785	A
		EB	1408	0.55	774	0	1	0	774		
		WB	689	0.55	379	3	1	3	382		
	Evening	SB	7	1.00	7	10	1	10	17	821	A
		EB	1202	0.55	661	7	1	7	668		
		WB	1462	0.55	804	0	1	0	804		

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Table 9 – 2015 Traffic Conditions Capacity Analyses Results

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	144	1.00	144	318	1	318	462	1,269	C
		SB	162	1.00	162	91	1	91	253		
		EB	962	0.55	529	79	1	79	608		
		WB	854	0.55	470	337	1	337	807		
	Evening	NB	177	1.00	177	390	1	390	567	1,585	E
		SB	193	1.00	193	242	1	242	435		
		EB	787	0.55	433	53	1	53	486		
		WB	1237	0.55	680	338	1	338	1018		
MD 5 and Moakley St./Abell St.	Morning	NB	15	1.00	15	5	1	5	20	879	A
		SB	5	1.00	5	4	1	4	9		
		EB	1560	0.55	858	1	1	1	859		
		WB	814	0.55	448	71	1	71	519		
	Evening	NB	6	1.00	6	4	1	4	10	884	A
		SB	0	1.00	0	4	1	4	4		
		EB	1303	0.55	717	3	1	3	720		
		WB	1512	0.55	832	42	1	42	874		
MD 5 and Hospital Access	Morning	SB	36	1.00	36	0	1	0	36	846	A
		EB	1473	0.55	810	0	1	0	810		
		WB	826	0.55	454	102	1	102	556		
	Evening	SB	63	1.00	63	0	1	0	63	755	A
		EB	1259	0.55	692	0	1	0	692		
		WB	1598	0.55	879	44	1	44	923		
MD 245 and Eldon Ct./Dr. Crossing Way	Morning	NB	665	1.00	665	0	1	0	665	983	A
		SB	731	1.00	731	132	1	132	863		
		EB	114	1.00	114	6	1	6	120		
		WB	6	1.00	6	52	1	52	58		
	Evening	NB	710	1.00	710	0	1	0	710	1,150	B
		SB	914	1.00	914	84	1	84	998		
		EB	151	1.00	151	1	1	1	152		
		WB	2	1.00	2	103	1	103	105		
MD 245 and Baldridge Street	Morning	NB	716	1.00	716	16	1	16	732	742	A
		SB	687	1.00	687	0	1	0	687		
		WB	10	1.00	10	0	1	0	10		
	Evening	NB	809	1.00	809	5	1	5	814	843	A
		SB	799	1.00	799	0	1	0	799		
		WB	29	1.00	29	0	1	0	29		
MD 245 and Leonard Hall Drive	Morning	NB	554	1.00	554	61	1	61	615	681	A
		SB	668	1.00	668	0	1	0	668		
		WB	13	1.00	13	0	1	0	13		
	Evening	NB	742	1.00	742	21	1	21	763	849	A
		SB	701	1.00	701	0	1	0	701		
		WB	86	1.00	86	0	1	0	86		
MD 245 and Leonards Grant Parkway	Morning	NB	321	1.00	321	0	1	0	321	972	A
		SB	573	1.00	573	139	1	139	712		
		EB	260	1.00	260	0	1	0	260		
	Evening	NB	607	1.00	607	0	1	0	607	992	A
		SB	568	1.00	568	178	1	178	746		
		EB	246	1.00	246	0	1	0	246		
MD 5 and Clark's Rest	Morning	SB	30	1.00	30	0	1	0	30	911	A
		EB	1601	0.55	881	0	1	0	881		
		WB	793	0.55	436	49	1	49	485		
	Evening	SB	19	1.00	19	107	1	107	126	1,015	B
		EB	1326	0.55	729	19	1	19	748		
		WB	1617	0.55	889	0	1	0	889		

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Table 10 – 2020 Traffic Conditions Capacity Analyses Results

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	211	1.00	211	426	1	426	637	1,769	F
		SB	211	1.00	211	75	1	75	286		
		EB	1105	0.55	608	93	1	93	701		
		WB	1094	0.55	602	530	1	530	1132		
	Evening	NB	226	1.00	226	449	1	449	675	1,940	F
		SB	234	1.00	234	203	1	203	437		
		EB	1083	0.55	596	72	1	72	668		
		WB	1477	0.55	812	453	1	453	1265		
MD 5 and Moakley St./Abell St.	Morning	NB	15	1.00	15	5	1	5	20	1,070	B
		SB	5	1.00	5	4	1	4	9		
		EB	1907	0.55	1049	1	1	1	1050		
		WB	1027	0.55	565	71	1	71	636		
	Evening	NB	6	1.00	6	4	1	4	10	1,082	B
		SB	0	1.00	0	4	1	4	4		
		EB	1551	0.55	853	3	1	3	856		
		WB	1873	0.55	1030	42	1	42	1072		
MD 5 and Hospital Access	Morning	SB	41	1.00	41	0	1	0	41	1,035	B
		EB	1808	0.55	994	0	1	0	994		
		WB	1039	0.55	571	114	1	114	685		
	Evening	SB	72	1.00	72	0	1	0	72	898	A
		EB	1501	0.55	826	0	1	0	826		
		WB	1856	0.55	1021	50	1	50	1071		
MD 245 and Eldon Ct./Dr. Crossing Way	Morning	NB	1009	1.00	1009	0	1	0	1009	1,305	D
		SB	1024	1.00	1024	148	1	148	1172		
		EB	127	1.00	127	6	1	6	133		
		WB	6	1.00	6	58	1	58	64		
	Evening	NB	881	1.00	881	0	1	0	881	1,381	D
		SB	1112	1.00	1112	96	1	96	1208		
		EB	172	1.00	172	1	1	1	173		
		WB	2	1.00	2	117	1	117	119		
MD 245 and Baldridge Street	Morning	NB	1066	1.00	1066	17	1	17	1083	1,093	B
		SB	978	1.00	978	0	1	0	978		
		WB	10	1.00	10	0	1	0	10		
	Evening	NB	994	1.00	994	5	1	5	999	1,031	B
		SB	986	1.00	986	0	1	0	986		
		WB	32	1.00	32	0	1	0	32		
MD 245 and Leonard Hall Drive	Morning	NB	889	1.00	889	67	1	67	956	972	A
		SB	958	1.00	958	0	1	0	958		
		WB	14	1.00	14	0	1	0	14		
	Evening	NB	922	1.00	922	24	1	24	946	1,040	B
		SB	878	1.00	878	0	1	0	878		
		WB	94	1.00	94	0	1	0	94		
MD 245 and Leonards Grant Parkway	Morning	NB	423	1.00	423	0	1	0	423	1,540	E
		SB	686	1.00	686	363	1	363	1049		
		EB	491	1.00	491	0	1	0	491		
	Evening	NB	733	1.00	733	0	1	0	733	1,246	C
		SB	686	1.00	686	236	1	236	922		
		EB	324	1.00	324	0	1	0	324		
MD 5 and Clark's Rest/Tudor Hall	Morning	NB	117	1.00	117	63	1	63	180	1,321	D
		SB	71	1.00	71	112	1	112	183		
		EB	1993	0.55	1096	42	1	42	1138		
		WB	961	0.55	529	107	1	107	636		
	Evening	NB	154	1.00	154	38	1	38	192	1,360	D
		SB	43	1.00	43	147	1	147	190		
		EB	1625	0.55	894	54	1	54	948		
		WB	1814	0.55	998	170	1	170	1168		

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Table 11 – 2030 Traffic Conditions Capacity Analyses Results

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	261	1.00	261	485	1	485	746	2,129	F
		SB	250	1.00	250	75	1	75	325		
		EB	1411	0.55	776	105	1	105	881		
		WB	1338	0.55	736	647	1	647	1383		
	Evening	NB	275	1.00	275	508	1	508	783	2,319	F
		SB	284	1.00	284	204	1	204	488		
		EB	1167	0.55	642	91	1	91	733		
		WB	1799	0.55	989	547	1	547	1536		
MD 5 and Moakley St./Abell St.	Morning	NB	15	1.00	15	5	1	5	20	1,315	D
		SB	5	1.00	5	4	1	4	9		
		EB	2353	0.55	1294	1	1	1	1295		
		WB	1257	0.55	691	71	1	71	762		
	Evening	NB	6	1.00	6	4	1	4	10	1,318	D
		SB	0	1.00	0	4	1	4	4		
		EB	1905	0.55	1048	3	1	3	1051		
		WB	2302	0.55	1266	42	1	42	1308		
MD 5 and Hospital Access	Morning	SB	50	1.00	50	0	1	0	50	1277	C
		EB	2230	0.55	1227	0	1	0	1227		
		WB	1271	0.55	699	138	1	138	837		
	Evening	SB	89	1.00	89	0	1	0	89	1102	B
		EB	1842	0.55	1013	0	1	0	1013		
		WB	2282	0.55	1255	63	1	63	1318		
MD 245 and Eldon Ct./Dr. Crossing Way	Morning	NB	1198	1.00	1198	0	1	0	1198	1,530	E
		SB	1192	1.00	1192	179	1	179	1371		
		EB	153	1.00	153	6	1	6	159		
		WB	6	1.00	6	70	1	70	76		
	Evening	NB	1066	1.00	1066	0	1	0	1066	1,642	F
		SB	1309	1.00	1309	119	1	119	1428		
		EB	213	1.00	213	1	1	1	214		
		WB	2	1.00	2	145	1	145	147		
MD 245 and Baldridge Street	Morning	NB	1267	1.00	1267	20	1	20	1287	1,297	C
		SB	1142	1.00	1142	0	1	0	1142		
		WB	10	1.00	10	0	1	0	10		
	Evening	NB	1207	1.00	1207	6	1	6	1213	1,252	C
		SB	1161	1.00	1161	0	1	0	1161		
		WB	39	1.00	39	0	1	0	39		
MD 245 and Leonard Hall Drive	Morning	NB	1058	1.00	1058	79	1	79	1137	1,153	C
		SB	1063	1.00	1063	0	1	0	1063		
		WB	16	1.00	16	0	1	0	16		
	Evening	NB	1122	1.00	1122	29	1	29	1151	1,260	C
		SB	1033	1.00	1033	0	1	0	1033		
		WB	109	1.00	109	0	1	0	109		
MD 245 and Leonards Grant Parkway	Morning	NB	576	1.00	576	0	1	0	576	1,723	F
		SB	863	1.00	863	363	1	363	1226		
		EB	497	1.00	497	0	1	0	497		
	Evening	NB	940	1.00	940	0	1	0	940	1,412	D
		SB	846	1.00	846	236	1	236	1082		
		EB	330	1.00	330	0	1	0	330		
MD 5 and Clark's Rest/Tudor Hall	Morning	NB	205	1.00	205	63	1	63	268	1,697	F
		SB	71	1.00	71	194	1	194	265		
		EB	2458	0.55	1352	77	1	77	1429		
		WB	1156	0.55	636	107	1	107	743		
	Evening	NB	236	1.00	236	38	1	38	274	1,655	F
		SB	43	1.00	43	223	1	223	266		
		EB	2007	0.55	1104	96	1	96	1200		
		WB	2201	0.55	1211	170	1	170	1381		

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Traffic Mitigation Improvements

The CLV analyses performed above considered the existing traffic characteristics. Traffic mitigation improvements were developed during each time period analyzed (existing, 2012, 2015, 2020 and 2030) for any intersection that proved to operate at an insufficient level of service. The traffic mitigation improvements suggested are based on all the developments considered in the study area being constructed. Based on the CLV analyses, no traffic mitigation improvements are required to support existing and 2012 traffic conditions. In 2012 it was assumed that the first phase of the Clark's Rest development would come online. The traffic characteristics of the Clark's Rest access street should be stop sign controlled for southbound traffic and should provide a right-turn lane and left-turn lane to support exiting traffic from the development activity in 2012.

The 2015 traffic conditions cause the intersection of MD 5 and MD 245 to operate at a LOS of 'F' during the evening peak hour. It is recommended that a right-turn lane for westbound traffic and double left-turn lanes for eastbound traffic be constructed to allow the intersection to operate at a sufficient level of service. The intersection of MD 245 and Leonard's Grant Parkway currently only has one lane to support eastbound traffic. It is suggested that a right-turn only lane be implemented for eastbound traffic along Leonard's Grant Parkway. Since the eastbound lane along Leonard's Grant Parkway is currently 24 feet wide, the lane simply needs to be striped with a right-turn lane and a left-turn lane. Also, it is suggested that a traffic signal be installed at the intersection of MD 5 and Clark's Rest, which will support the substantial volume of traffic entering and existing the Clark's Rest development. This traffic signal should be installed once Phase 2 of the Clark's Rest development has been completed and the traffic network between Clark's Rest and Leonard's Grant development is connected. The results of the CLV analyses at the intersection of MD 5 and MD 245 are provided in **Table 12**. **Figure 19** shows the suggested traffic characteristics to support 2015 traffic conditions.

Table 12 – 2015 Traffic Conditions CLV Analyses Results with Traffic Improvements

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	144	1.00	144	318	1	318	462	1,070	B
		SB	162	1.00	162	91	1	91	253		
		EB	962	0.55	529	79	1	79	608		
		WB	339	0.55	186	337	0.55	185	372		
	Evening	NB	177	1.00	177	390	1	390	567	1,053	B
		SB	193	1.00	193	242	1	242	435		
		EB	787	0.55	433	53	1	53	486		
		WB	266	0.55	146	338	0.55	186	332		

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The 2020 traffic conditions result in the intersections of MD 5/MD 245 and MD 245/Leonards Grant Parkway to operate poorly during peak traffic periods. It is suggested that the traffic improvements recommended to support the 2015 traffic conditions be implemented at the

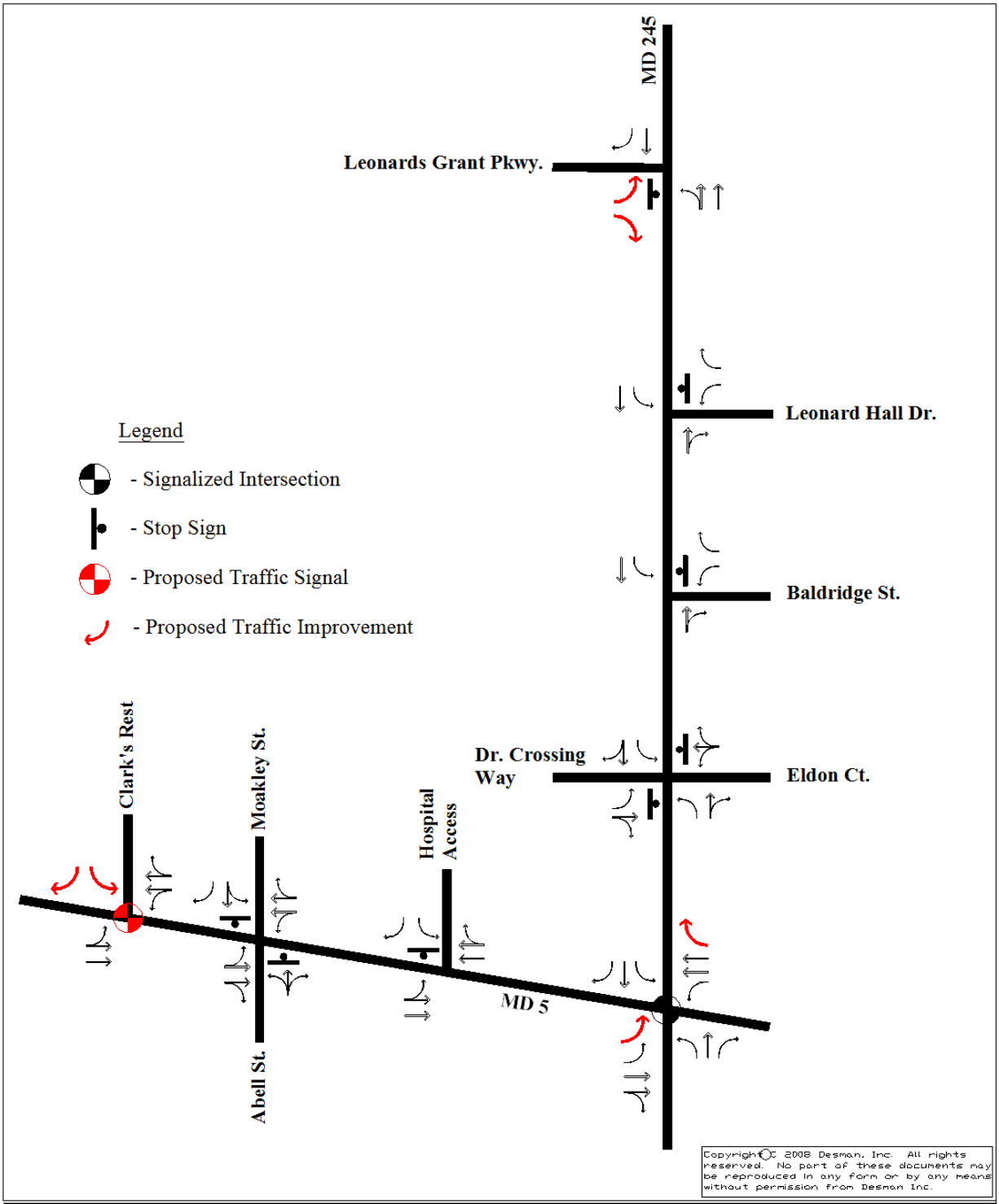
MD 245
Leonards Grant Pkwy.
Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Legend
- Signalized Intersection
- Stop Sign
- Proposed Traffic Signal
- Proposed Traffic Improvement
Clark's Rest
Moakley St.
Hospital Access
MD 5
Abell St.
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Figure 19: 2015 Suggested Traffic Characteristics
DATE:
PROJECT NO.
30-10105.00
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intersection of MD 5 and MD 245, along with double left-turn lanes along MD 245 for southbound traffic. A portion of the Tudor Hall development is planned to come online by 2020. It is suggested that the traffic characteristics for the northbound exiting lane at Tudor Hall include a left-turn only lane and thru/right-turn lane. The Clark's Rest development southbound exiting lanes, located across from the Tudor Hall access lane, should be mitigated to mirror the traffic characteristics of the Tudor Hall exiting lanes (left-turn only land and thru/right-turn lane). The CLV analyses results at the intersections of MD 245/MD 5, MD 245/Leonards Grant Parkway and MD 5/Tudor Hall/Clark's Rest with the suggested traffic mitigations are provided in **Table 13**. **Figure 20** shows the suggested traffic characteristics to support 2020 traffic conditions.

Based on the amount of traffic projected to enter and exit the Leonard's Grant Parkway and MD 245 intersection it is more than likely that a signal is going to be needed at this intersection. This recommendation is not based on a signal warrant analysis, but simply on the projected traffic volumes and our professional experience. However, it is suggested that the need for a traffic signal be further analyzed in the planning process for the Hayden Farm Development.

Table 13 – 2020 Traffic Conditions CLV Analyses Results with Traffic Improvements

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	211	1.00	211	426	0.55	234	445	1,146	B
		SB	211	1.00	211	75	1	75	286		
		EB	1105	0.55	608	93	1	93	701		
		WB	617	0.55	339	530	0.55	292	631		
	Evening	NB	226	1.00	226	449	0.55	247	473	1,358	D
		SB	234	1.00	234	203	1	203	437		
		EB	1083	0.55	596	72	1	72	668		
		WB	1157	0.55	636	453	0.55	249	886		
MD 245 and Leonards Grant Parkway	Morning	NB	423	1.00	423	0	1	0	423	1,213	C
		SB	686	1.00	686	363	1	363	1049		
		EB	164	1.00	164	0	1	0	164		
	Evening	NB	733	1.00	733	0	1	0	733	1,027	B
		SB	686	1.00	686	236	1	236	922		
		EB	105	1.00	105	0	1	0	105		
MD 5 and Clark's Rest/Tudor Hall	Morning	NB	117	1.00	117	63	1	63	180	1,321	D
		SB	71	1.00	71	112	1	112	183		
		EB	1993	0.55	1096	42	1	42	1138		
		WB	961	0.55	529	107	1	107	636		
	Evening	NB	154	1.00	154	38	1	38	192	1,360	D
		SB	43	1.00	43	147	1	147	190		
		EB	1625	0.55	894	54	1	54	948		
		WB	1814	0.55	998	170	1	170	1168		

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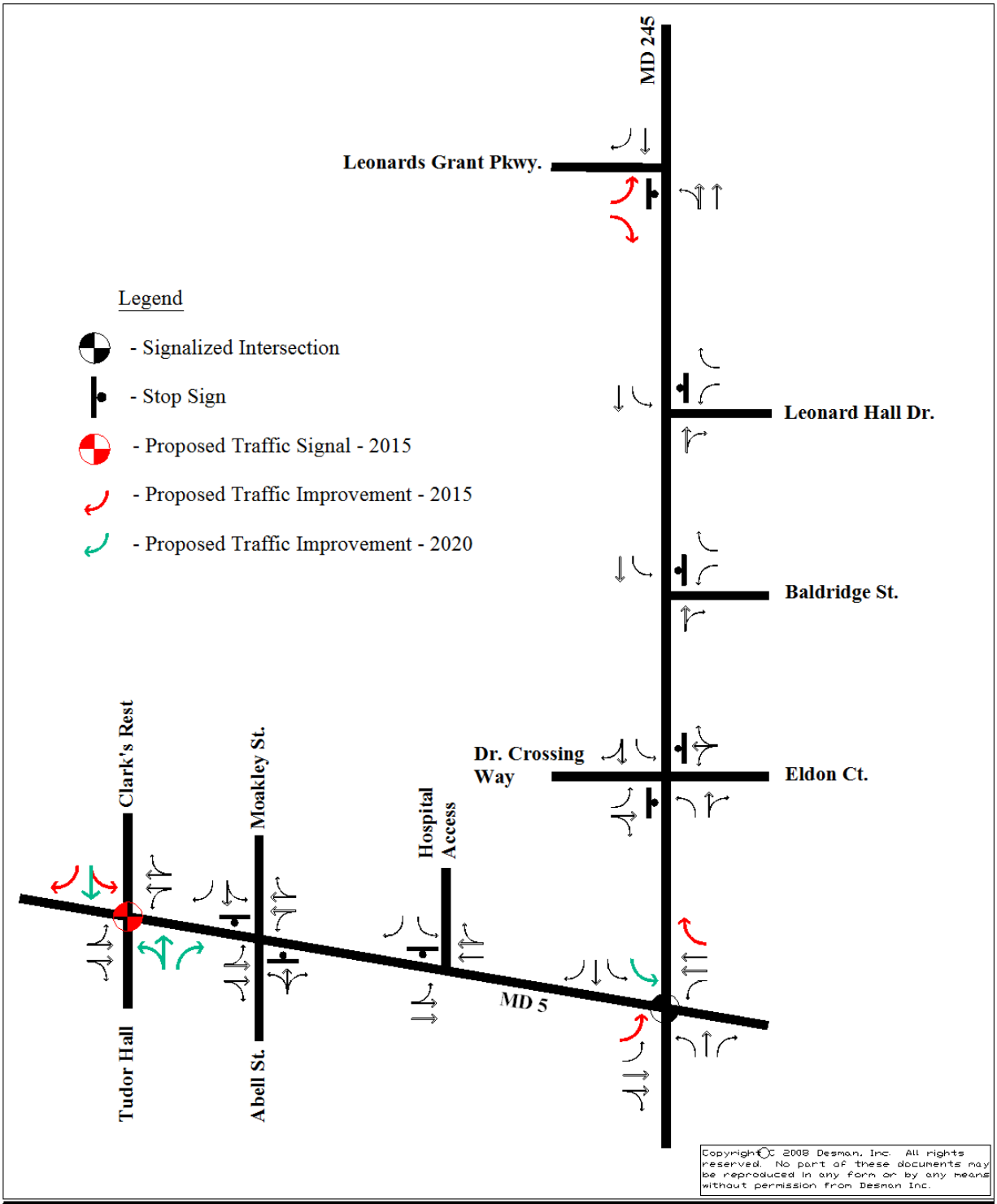
The 2030 traffic conditions cause the following intersections to operate at unacceptable levels of service: MD 5/MD 245, MD 245/Dr. Crossing Way/Eldon Ct., MD 245/Leonards Grant Parkway and MD 5/Clark's Rest/Tudor Hall. At the intersection of MD 5/MD 245 it is suggested that the traffic improvements recommended to support the 2020 traffic conditions be implemented, along with additional eastbound and westbound thru lanes along MD 5. This traffic improvement of


MD 245
Leonards Grant Pkwy.
Legend
- Signalized Intersection
- Stop Sign
- Proposed Traffic Signal - 2015
- Proposed Traffic Improvement - 2015
- Proposed Traffic Improvement - 2020
Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Clark's Rest
Moakley St.
Hospital Access
MD 5
Tudor Hall
Abell St.
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Leonardtown, MD Traffic Planning Study
Figure 20: 2020 Suggested Traffic Characteristics
DATE:
PROJECT NO.
30-10105.00
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providing additional eastbound and westbound thru lanes along MD 5 will also allow the intersection of MD 5/Clark's Rest/Tudor Hall to operate at an acceptable level of service. In order to improve the traffic operation at the intersections of MD 245/Dr. Crossing Way/Eldon Ct. and MD 245/Leonards Grant Parkway it is suggested that an additional southbound thru lane be constructed along MD 245. The CLV analyses results at the intersections of MD 5/MD 245, MD 245/Dr. Crossing Way/Eldon Ct., MD 245/Leonards Grant Parkway and MD 5/Clark'Rest/Tudor Hall with the suggested traffic mitigations are provided in **Table 14**. **Figure 21** shows the suggested traffic characteristics to support 2030 traffic conditions.

Table 14 – 2030 Traffic Conditions CLV Analyses Results with Traffic Improvements

			Thru Volumes			Opposing Lefts					
Intersection	Peak Hour	Direction	Volumes	Lane Use Factor	Total	Volumes	Lane Use Factor	Total	Critical Lane Volume	CLV Total	LOS
MD 245 and MD 5	Morning	NB	261	1.00	261	485	0.55	267	528	1,197	C
		SB	250	0.55	138	75	1	75	213		
		EB	1411	0.40	564	105	1	105	669		
		WB	773	0.40	309	647	0.55	356	665		
	Evening	NB	275	0.55	151	508	0.55	279	431	1,298	C
		SB	284	0.55	156	204	1	204	360		
		EB	1167	0.40	467	91	1	91	558		
		WB	1416	0.40	566	547	0.55	301	867		
MD 245 and Eldon Ct./Dr. Crossing Way	Morning	NB	1198	1.00	1198	0	1	0	1198	1,357	D
		SB	1192	0.55	656	179	1	179	835		
		EB	153	1.00	153	6	1	6	159		
		WB	6	1.00	6	70	1	70	76		
	Evening	NB	1066	1.00	1066	0	1	0	1066	1,280	C
		SB	1309	0.55	720	119	1	119	839		
		EB	213	1.00	213	1	1	1	214		
		WB	2	1.00	2	145	1	145	147		
MD 245 and Leonards Grant Parkway	Morning	NB	576	1.00	576	0	1	0	576	1,008	B
		SB	863	0.55	475	363	1	363	838		
		EB	170	1.00	170	0	1	0	170		
	Evening	NB	940	1.00	940	0	1	0	940	1,051	B
		SB	846	0.55	465	236	1	236	701		
		EB	111	1.00	111	0	1	0	111		
MD 5 and Clark's Rest/Tudor Hall	Morning	NB	205	1.00	205	63	1	63	268	1,328	D
		SB	71	1.00	71	194	1	194	265		
		EB	2458	0.40	983	77	1	77	1060		
		WB	1156	0.40	462	107	1	107	569		
	Evening	NB	236	1.00	236	38	1	38	274	1,324	D
		SB	43	1.00	43	223	1	223	266		
		EB	2007	0.40	803	96	1	96	899		
		WB	2201	0.40	880	170	1	170	1050		

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This analysis includes recommendations to widen MD 5 with additional lanes at multiple intersections, including MD 5/MD 245. This recommendation will increase the difficulty for pedestrians and bicyclists to cross MD 5 into the Downtown area. These recommendations are simply a solution for supporting projected future traffic volumes in Leonardtown. If these recommendations along MD 5 are implemented it is important to continue to support pedestrian traffic with marked and lighted crosswalks, pedestrian refuges, landscaping, and informative signage.

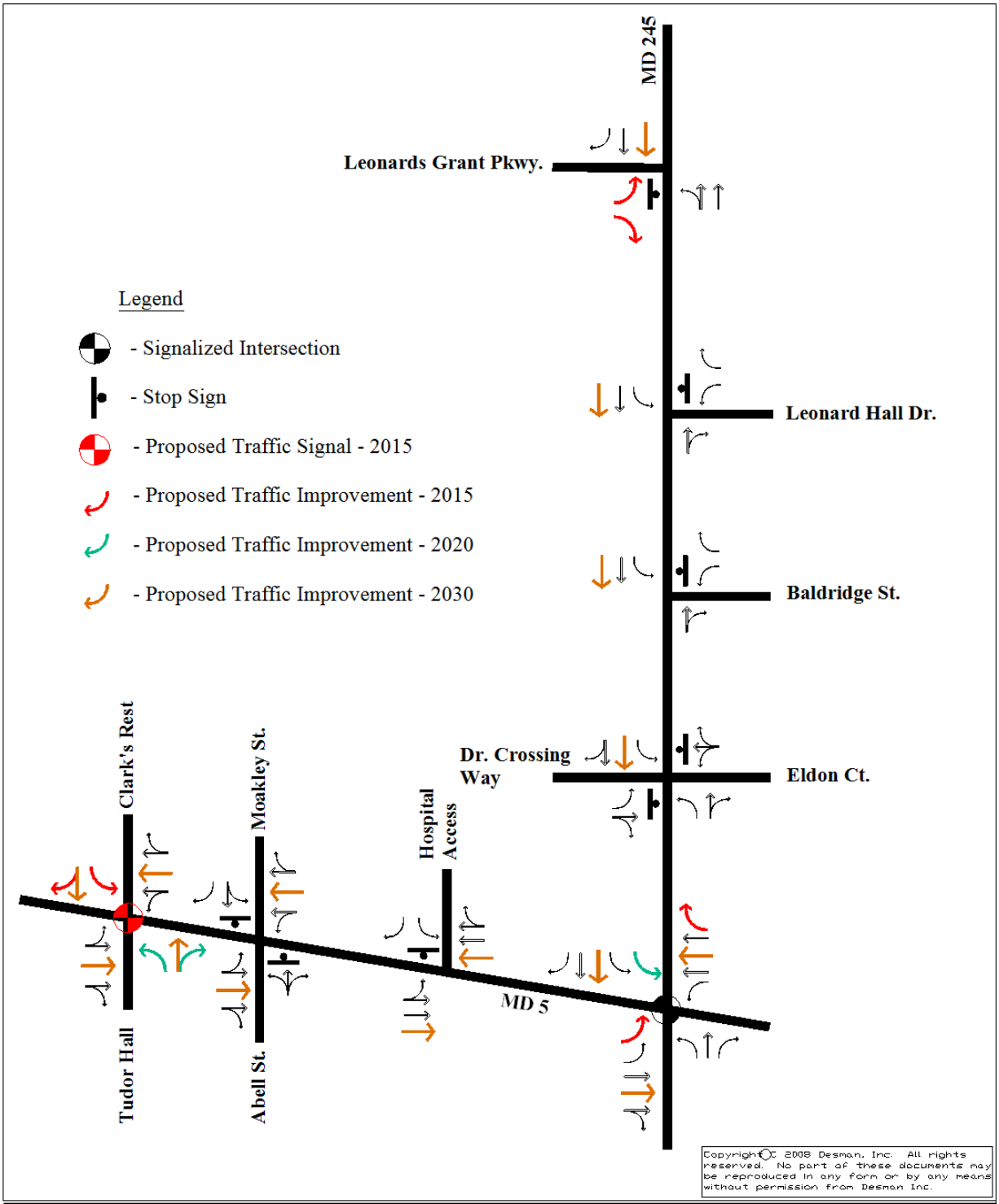
MD 245
Leonards Grant Pkwy.
Legend
- Signalized Intersection
- Stop Sign
- Proposed Traffic Signal - 2015
- Proposed Traffic Improvement - 2015
- Proposed Traffic Improvement - 2020
- Proposed Traffic Improvement - 2030
Leonard Hall Dr.
Baldridge St.
Dr. Crossing Way
Eldon Ct.
Clark's Rest
Moakley St.
Hospital Access
MD 5
Tudor Hall
Abell St.
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Figure 21: 2030 Suggested Traffic Characteristics
DATE:
PROJECT NO.
30-10105.00
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As discussed prior, the SHA conducted a study to improve the portion of MD 5 between MD 243 and MD 245 and had developed four potential alternatives. Based on the analysis of the 2030 traffic conditions, which shows the need for additional westbound and eastbound thru lanes along MD 5, it is suggested that either Alternative 3 or 4 be implemented. Both Alternative 3 and Alternative 4 provide added capacity with left-turn lanes along MD 5.

Cost Estimates

Table 15 lists the cost estimates for each recommended traffic mitigation improvement. These cost estimates simply consider the amount of roadway to be constructed and any traffic signal upgrades or installations, but do not include land costs or utility replacement costs. Cost estimates were not provided for future road additions planned to serve planned developments and links between existing institutions. The cost estimates provided show that some traffic improvements are a substantial financial investment.

In order to avoid the need for an extra left-turn lane along the west approach of MD 5 at the intersection of MD 5 and MD 245 the following other traffic improvements would be needed: construct left-turn lanes at major intersections along MD 5, including MD 5 and Moakley Street, install a traffic signal with left-turn lane at the future intersection of MD 5 and Clark's Rest and provide a roadway link between the Clark's Rest Development and Leonard's Grant Development. The construction of left-turn lanes along MD 5 has been considered

Table 16 shows the percentage of new traffic generated to each intersection by each development for the 2030 traffic condition. This information will be helpful in determining how to allocate the costs required for future traffic mitigation improvements. This analysis includes the amount of background traffic generated, which is approximately half the new traffic projected along MD 5.

Table 15 – Cost Estimates for Traffic Mitigation Improvements

Year	Intersection/Street	Mitigation	Improvements	Cost per Unit	Total Cost
2015 Traffic Improvements	MD 5 and MD 245	Extra Left-Turn Lane on MD 5 for EB Traffic	13,000 sf Update Traffic Light	$50 $70,000	**$720,000**
	MD 5 and MD 245	Right-Turn Lane on MD 5 for WB Traffic	1,920 sf	$45	**$86,400**
	MD 5 and Clark's Rest	Install Traffic Signal	Traffic Signal	$250,000	**$250,000**
	MD 245 and Leonard's Grant Parkway	Stripe Right-Turn and Left-Turn Lanes	150 ft	$1	**$150**
2020 Traffic Improvements	MD 5 and MD 245	Extra Left-Turn Lane on MD 245 for SB Traffic	2640 sf Update Traffic Light	$50 $70,000	**$202,000**
2030 Traffic Improvements	MD 5	Eeastbound Thru Lane	54,000 sf Update Traffic Light	$40 $45,000	**$2,205,000**
	MD 5	Westbound Thru Lane	56,400 sf Update Traffic Light	$40 $45,000	**$2,301,000**
	MD 245	Southbound Thru Lane	67,200 sf Update Traffic Light	$40 $45,000	**$2,733,000**

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Table 16 – Percentage of Traffic Generated per Development to Each Intersection

	Intersections															
	MD 5 and Clark's Rest		MD 5 and Moakley St./Abell St.		MD 5 and St. Mary's Hospital Access		MD 5 and MD 245		MD 245 and Dr. Crossing Way/Eldon Ct.		MD 245 and Baldridge St.		MD 245 and Leonard Hall Dr.		MD 245 and Leonard's Grant Parkway	
Developments	**Vehicles**	**%**	**Vehicles**	**%**	**Vehicles**	**%**	**Vehicles**	**%**	**Vehicles**	**%**	**Vehicles**	**%**	**Vehicles**	**%**	**Vehicles**	**%**
Leonard's Grant Development	78	3%	50	2%	50	2%	113	4%	113	8%	113	9%	113	9%	221	14%
Clark's Rest Development	247	10%	125	6%	125	6%	125	5%	19	1%	19	1%	19	2%	52	3%
Hayden Farm	175	7%	107	5%	107	5%	249	9%	249	18%	249	19%	249	20%	437	29%
Tudor Hall Development	517	20%	183	9%	183	9%	327	12%	119	8%	119	9%	119	9%	129	8%
College of Southern Maryland	336	13%	336	17%	336	16%	396	14%	135	10%	135	10%	135	11%	135	9%
St. Mary's Hospital	105	4%	105	5%	140	7%	169	6%	229	16%	95	7%	95	8%	95	6%
Government Center Complex	87	3%	87	4%	87	4%	156	6%	156	11%	169	13%	128	10%	63	4%
Background Growth	1022	40%	1022	51%	1022	50%	1228	44%	397	28%	397	31%	397	32%	397	26%
TOTALS	**2567**	**100%**	**2015**	**100%**	**2050**	**100%**	**2763**	**100%**	**1417**	**100%**	**1296**	**100%**	**1255**	**100%**	**1529**	**100%**

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CONCLUSION

This traffic planning study has considered an analysis of existing and future traffic, proposed street network additions, stakeholder input, and site observations in developing recommendations to improve existing traffic conditions and address future traffic issues. Provided below is a summary of the recommendations provided in the 'Existing and Future Traffic Issues' section and the 'Technical Analysis' section.

Existing and Future Traffic Issues Recommendations

Inter-Connectivity of Institutions

- Providing links between institutions enhances accessibility, convenience and reduces traffic accessing MD 5 and MD 245, but they will not eliminate the need for future traffic mitigation improvements.
- A traffic link between CSM and the County Government Complex will provide greater ingress/egress options for students and County employees/visitors, divert traffic from the intersection of MD 5/MD 245, and provide a shared parking opportunity between the two institutions.

Future Road Additions

- The existing design of Leonard's Grant Parkway street network will deter cut-through traffic.
- Even-though this analysis assumed a high percentage of traffic would by-pass the intersection of MD 5 and MD 245, there is still a need for aggressive traffic mitigation improvements at that intersection.
- Future road additions that connect MD 5 and MD 245 or MD 5 and MD 5 Business (Washington Street) should be designed to support medium level traffic conditions and pedestrian/bike trips, which will help deter cut-through traffic of non-local vehicles and divert local traffic from the intersection of MD 5/MD 245. This includes street widths of 24 feet or greater, dashed center line markings, speed limits of 25 or 30 mph, pedestrian paths, limited on-street parking, driveways and signage informing motorists these are shared roadways.

Site Plan Review

- It is suggested that a pedestrian crosswalk with signage be provided across College Circle Road between the proposed lot and Wellness Center/Recreational Center.
- It is suggested that if additional parking is needed at CSM that a shared parking agreement with shuttle parking be arranged at the County Government Complex, until a permanent solution is determined.
- The addition of a traffic signal at the future intersection of Clark's Rest and MD 5 will support vehicles turning left onto MD 5 and help prevent any Hospital cut-through traffic.

- Future residential connector roads should be designed to deter cut-through traffic from people traversing Leonardtown along MD 5 or MD 245, but permit local traffic to distribute and not be funneled to one intersection.
- To support future traffic from the Leonard's Grant and Hayden Farm Developments, Leonard's Grant Parkway should be striped with dashed centerline markings. It is also suggested that a signal warrant study be performed at the intersection of Leonard's Grant Parkway and MD 245 to determine the need for a traffic signal.

Traffic Network Design Goals

- To avoid traffic mitigation improvements at the intersection of MD 5/MD 245 a series of traffic improvements can be implemented which will divert local traffic from the intersection of MD 5/MD 245. These mitigation improvements include constructing a link between CSM and the County Government Complex, constructing left-turn lanes along MD 5 at Moakley Street and the Hospital access, designing future residential roads to support medium levels of traffic and installing left-turn lanes and traffic signals at the future intersection of MD 5 and Clark's Rest/Tudor Hall.
- A study should be performed to determine the need to implement speed reduction measures along MD 5.
- Slower traffic speeds can be achieved along MD 5 by posting speed reduction signage, heightening enforcement, installing Automated Speed Enforcement (ASE) and adding a traffic signal at an intersection west of MD 245 along MD 5.
- Constructing more links between residential streets will promote walking, biking and reduce vehicle trips along MD 5 and MD 245.
- The major employers of Leonardtown should implement TDM plans.

Technical Traffic Analysis Recommendations

Existing Traffic Conditions

- To eliminate the 10 foot offset between the southbound thru lane along MD 245 and receiving lane on MD 5 Business, re-stripe the northbound left-turn and thru lanes along MD 5 Business.
- To slow traffic along MD 5 it is suggested that the speed limit be lowered to 35 mph and traffic enforcement is enhanced.
- If the SHA plans on improving MD 5 between MD 243 and MD 245 it is suggested that either Alternative 3 or Alternative 4 be implemented, which include an additional left-turn lane.

2012 Traffic Conditions

- The Clark's Rest Access Street should be stop sign controlled and provide a right-turn lane and left-turn lane for southbound traffic.

2015 Traffic Conditions

- It is recommended that along MD 5, a westbound right-turn lane and eastbound double left-turn lanes be constructed.
- A traffic signal should be installed at the intersection of MD 5 and Clark's Rest.
- A right-turn lane and left-turn lane should be striped along Leonard's Grant Parkway for eastbound traffic.

2020 Traffic Conditions

- It is suggested that double left-turn lanes for southbound traffic along MD 245 be constructed at the intersection of MD 5 and MD 245.
- The construction of a traffic signal may be necessary at the intersection of MD 245 and Leonard's Grant Parkway. This should be explored further as part of the planning effort for the Hayden Farm development.
- The northbound exiting lanes at Tudor Hall and the southbound exiting lanes at Clark's Rest should have the following characteristics: left-turn only lane and thru/right-turn lane.

2030 Traffic Conditions

- Additional eastbound and westbound thru lanes along MD 5 should be constructed.
- An additional southbound thru lane along MD 245 should be constructed.