Chapter 527 Submittal for Fairfax County Comprehensive Plan Amendment

TYSONS CORNER URBAN CENTER

submitted to:

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prepared by:

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December 22, 2009

1.0 Introduction and Background

Tysons Corner is a 1,700 acre area located in northeastern Fairfax County, about halfway between downtown Washington, D.C. and Dulles International Airport. It is located at the confluence of Interstate 495 (the Capital Beltway) with the Dulles Airport Access and Toll Roads, Route 7 and Route 123. Tysons Corner is roughly triangular in shape and contains the highest natural elevations n Fairfax County. It is bounded on the southeastern side by Magarity Road and on the southwestern side generally by the limit of commercial development along Gallows and Old Courthouse Roads and the natural areas of Old Courthouse Stream Branch. The residential areas on the western side of Gosnell Road flanking Old Courthouse Road are also part of the Tysons Corner area. The Dulles Airport Access and Toll Roads form the northern boundary of Tysons. The map below shows the boundaries of the Tysons Corner study area, the boundaries of eight individual districts as defined in the proposed Comprehensive Plan Amendment, and the location of the four new Metrorail stations.

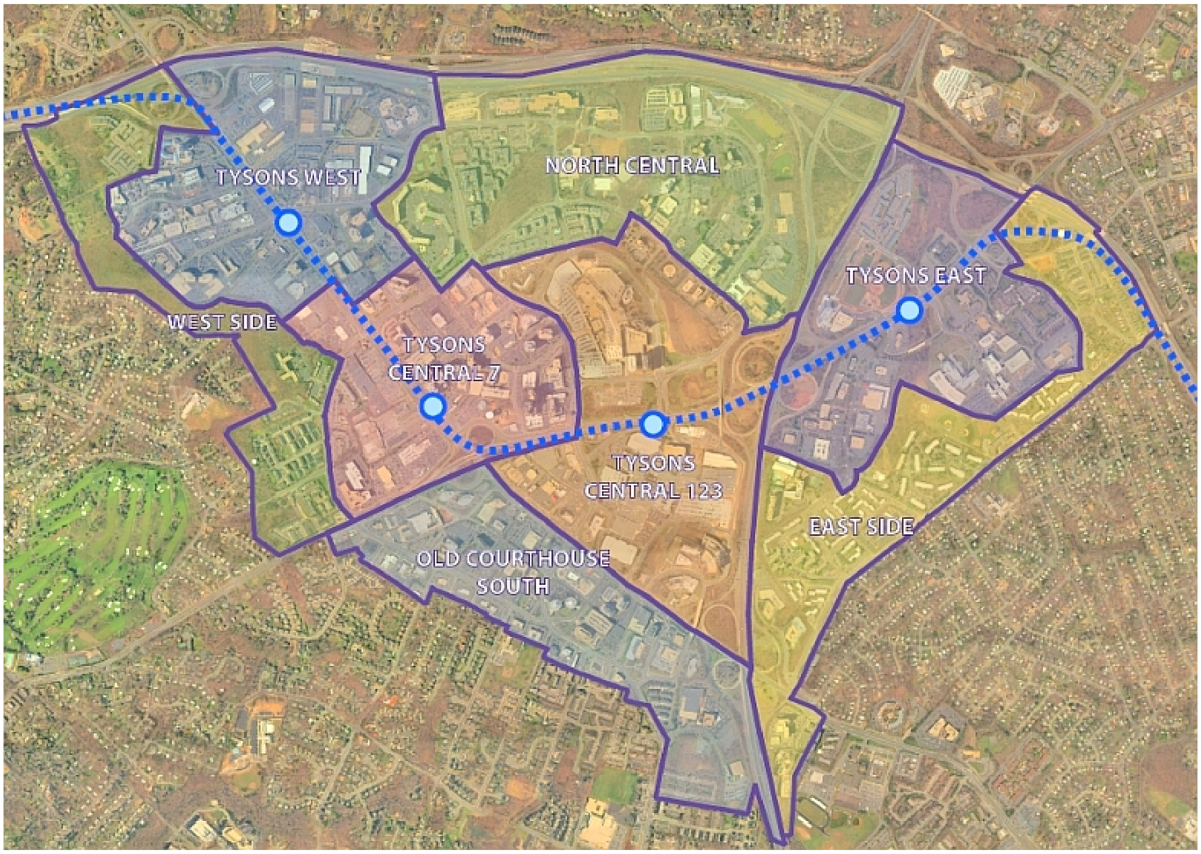


Figure 1.1 The Tysons Corner Study Area

The residential communities surrounding Tysons Corner, which include McLean, Vienna and Falls Church, help to make Tysons Corner a good business location. These communities provide a wide range of housing types and a relatively large supply of housing near Tysons' employers. The communities surrounding Tysons also have many outstanding features, such as excellent public schools and one of the best educated and highly trained labor pools in the nation.

As Tysons Corner has grown and evolved, Fairfax County has from time to time updated the County's Comprehensive Plan to articulate the vision for the area. The first Tysons Corner plan resulting from a special study of the area was adopted in 1978. A major revision of this plan was adopted in 1994, after multi-year planning effort. A key feature of the 1994 Plan was the location of three Metrorail stations in Tysons Corner. Over the course of the next decade, many worked tirelessly to advance the Metrorail project. The Dulles Metrorail Project, with four Metrorail stations in Tysons Corner, is currently under construction.

In order to prepare for the opening of the stations in Tysons, the Fairfax County Board of Supervisors established the Tysons Land Use Task Force in May of 2005. Consisting of 36 members, representing a wide range of community interests, the Board described the Task Force's mission to update the 1994 Comprehensive Plan as follows:

1. Better facilitate transit-oriented development (TOD);
2. Enhance pedestrian connections throughout Tysons;
3. Increase the residential component of the density mix;
4. Improve the functionality of Tysons; and
5. Provide for amenities and aesthetics in Tysons, such as public spaces, public art, parks, etc.

The Board also directed the Task Force to engage in extensive public outreach to involve and incorporate the views and concerns of surrounding communities, citizen groups, smart growth advocates, businesses, employees, environmentalists and other special interests, in addition to landowners and developers. The Task Force addressed these directives with the production of the Transforming Tysons Vision and Area Wide Recommendations which were presented to the Board of Supervisors in September of 2008. The Board received the Task Force's Area Wide Recommendations report and referred it to the Planning Commission and county staff for the development of detailed Comprehensive Plan text.

Over the course of the last 14 months County staff has worked with the Planning Commission Tysons Committee and others to produce new Plan text. As directed by the Board, the Plan text is being guided by the Task Force's recommendations. However, the Board also asked that the Plan be informed by a thorough analysis of transportation impacts, public facility needs, anticipated costs and revenues, and population and employment forecasts. In addition, the Plan is being guided by comments from the Planning Commission's Tysons Committee, the Task Force's Draft Review Committee, and members of the community at large. An initial draft of the Plan text was produced in February 2009, and a second draft was released in September 2009. The second draft is attached to this Chapter 527 submission, but will be replaced by the final draft in mid-January 2010.

Highlights of the Proposed Comprehensive Plan for Tysons are below:

- **Urban, Mixed-Used Development –** The Plan envisions Tysons Corner as Fairfax County's "downtown." High-density development is focused within ½ mile around the four future Metro stations.
- **High-Density Development in Walking Distance to Metro –** Within 1/2 mile of the four Metro stations, the Plan calls for an overall level of intensity that is 70% higher than what is currently built in the Rosslyn-Ballston corridor and 25% higher than the future plans for that area. About three-quarters of Tysons' development will be within a ten minute walk of a Metro station.
- **Pedestrian and Bicycle Friendly Streets –** The Plan calls for an urban street grid throughout Tysons, breaking up the existing super-blocks into dozens of smaller blocks. This "grid of streets" will allow pedestrians and bicyclists to easily make their way across the area, as well as move some vehicle traffic off of the major streets. The Plan also removes three road interchanges from the 1994 Tysons Plan that would hinder pedestrian accessibility.
- **Increasing Transit Trips, Decreasing Car Trips –** The Plan greatly reduces car trips and greatly increases transit trips.
- **Substantial Reduction in Vehicle Trips –** Due to the urban nature of the vision for Tysons, the Plan aims to reduce the number of vehicle trips typically generated by new development by as much as 65% for developments closest to the rail stations. This will be accomplished by encouraging the transit, bicycles, walking, and carpools and by using a variety of transportation demand management techniques, including a significant reduction in available parking.
- **Multiple Public Transit Options –** The Plan incorporates a robust transit system that includes Metrorail, express buses, circulators, local and feeder buses, and multimodal transportation hubs. It aims to increase transit ridership from 3% of today's work trips to 31%, a level that is higher than what is being achieved in the Rosslyn-Ballston corridor.
- **Affordable Housing, Green Buildings, and Open Space –** The Plan provides more housing, including affordable housing, green building, and a network of parks and open space.
- **Affordable and Workforce Housing** – The Plan provides incentives to achieve 20% affordable and workforce housing near Metro stations. This is significantly higher than the current countywide goal of 12%.
- **Green Buildings –** The Plan requires all new buildings to achieve LEED Silver certification. Incentives also are offered to encourage achievement of LEED Gold and Platinum levels.
- **Urban Parks and Open Space –** The Plan calls for a diversity of urban parks, plazas, open spaces, and recreational facilities. These will be connected by a "greenway," a network of paths for pedestrians and bicyclists.
- **Gradual Development Over the Next 40 Years –** Tysons won't change overnight. The transformation from a suburban edge city to a series of walkable urban neighborhoods is expected to take 40 years to occur.

- **Building Infrastructure in Tandem with Development –** The Plan incorporates measures to ensure that needed public facilities and transportation improvements are constructed concurrently with new development.
- **New Public Facilities and Infrastructure –** A number of public facilities and infrastructure improvements will be necessary to accommodate the growth planned for Tysons. These include schools, parks, fire stations, arts facilities, a library, and transportation improvements that better connect Tysons to the rest of the region, such as increases in Metrorail capacity and additional access points to the Dulles Toll Road.

Analytical Framework for the Plan

In order to interpret this submission, it is important to understand how this Plan is structured. Although the Plan describes a vision for Tysons Corner that is only possible to occur over a lengthy time horizon (approximately 40 years), the primary transportation analysis for this submission is based on the forecasted 2030 land use. This is consistent with other regional planning and forecasting and provides a more reasonable planning framework than a longer term forecast.

In order to evaluate the longer term transportation needs for this Plan, a 2050 Analysis was conducted. The purpose of the 2050 Analysis was to estimate the level of demand and the corresponding mode shares required assuming that the road network assumed in the 2030 analysis could not be further expanded. These forecasts were used to inform the Plan text and to develop the required mode shift for Tysons Corner to grow beyond the 2030 forecasted levels. This analysis is included as an attachment to this submission.

Other attachments to this report supplement it and provide additional background:

Attachment A: Proposed Comprehensive Plan Amendment for Tysons (Transportation Chapter)
Attachment B: Modeling Methodology
Attachment C: Neighborhood Traffic Impact Analysis

2.0 Land Use Inputs

This section describes the philosophy of the proposed land use plan and the land use inputs for the transportation analysis of the proposed Comprehensive Plan Amendment.

2.1 Land Use Concept in Proposed Plan

The recommended pattern of land use in Tysons Corner focuses growth within walking distance of Metrorail stations. Intensities will be highest in areas with the closest proximity to the stations tapering down to transition to mid and lower density areas in the Non-TOD Districts. Most areas within Tysons will include a mix of uses, with most of the retail and office uses concentrated within 1/4 mile from the stations. The Conceptual Land Use Pattern is shown in the map below.

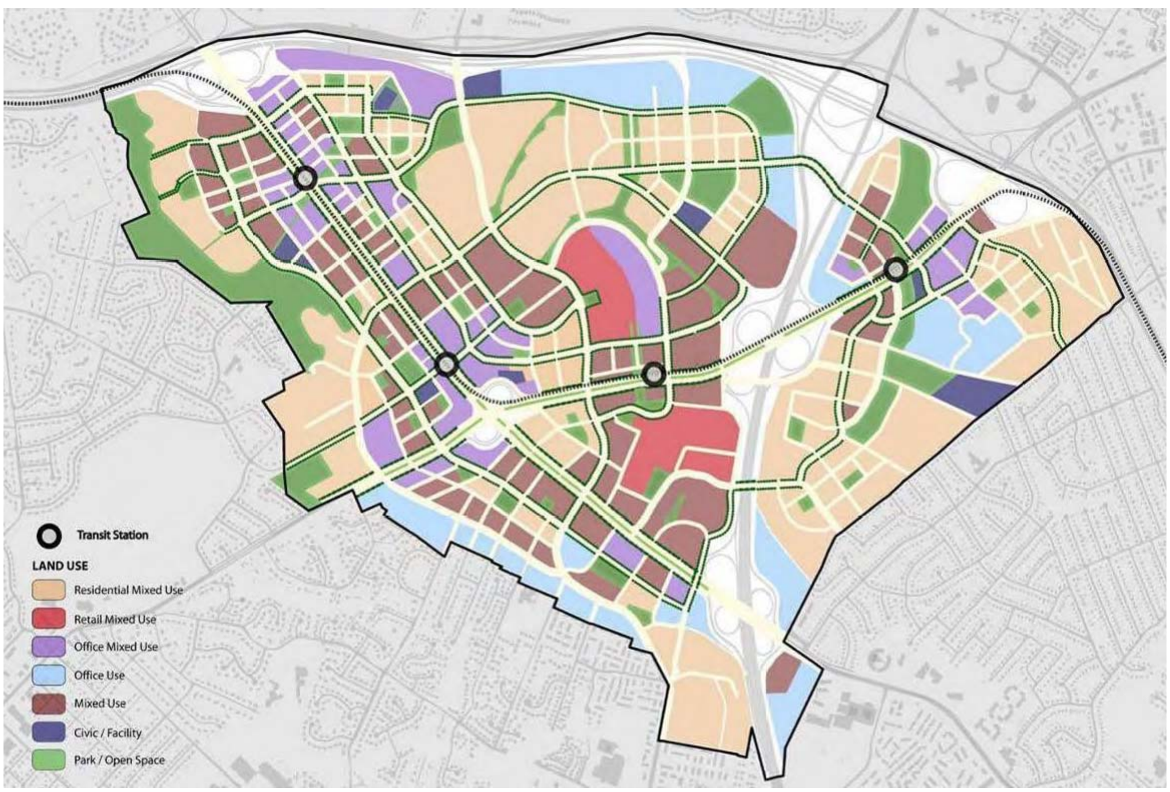


Figure 2.1 Conceptual Land Use Patterns

The four TOD Districts, encompassing the areas within 1/2 mile of each Metrorail station, are planned for about 75% of all development in Tysons. The four Non-TOD Districts include some areas planned to redevelop as walkable urban neighborhoods, though at a lower intensity than the areas closer to the stations. The Non-TOD Districts also contain areas at their edges that should maintain their existing characters, uses, and intensities due to their proximity to stable residential neighborhoods outside of Tysons. The urban grid of streets and the parks and open space network will be integrated into the land use fabric. Recommended civic uses, public gathering places, and public facilities will be located throughout Tysons to create a full service community.

In the future, most areas of Tysons should have a mix of land uses. This mix will include many of the same land uses that existed in Tysons in 2009, such as residences, offices, retail stores, hotels, and public facilities. However, the land use concept promotes the redevelopment of uses such as car dealerships and strip retail centers into more efficient, higher intensity land uses. It is envisioned that retail and service uses, car dealerships, and compatible industrial businesses would be incorporated into new mixed use buildings.

Providing a mix of uses, either vertically (in the same building) or horizontally (within a distance of two to three blocks), will reduce the separation among residents, workers, and services, encouraging people to walk rather than drive to fulfill many of their daily needs. People will be able to engage in routine errands, and find restaurants, entertainment, and shopping all within walking distance of their homes, offices and transit. Ground floor retail and convenience services will be essential for residential neighborhoods.

A key ingredient for transforming Tysons is to use intensity strategically to maximize the benefits of Metrorail and transit and create sustainable, walkable urban environments. This is consistent with the County's policy on transit-oriented developments. Intensity can also be an important economic tool by allowing sufficient incentive to encourage the redevelopment of auto-dependent uses, thereby strengthening Tysons' status as Fairfax County's Urban Center.

The land use concept for Tysons links intensity to transit accessibility based on how far most people are willing to walk to and from transit. Expressed as floor area ratio (FAR), the proposed levels of intensity are primarily based on distance from Metrorail stations. Development is planned to be most intense in the areas nearest the stations and least intense at the edges.

In the four TOD Districts, the highest intensities will be allowed in areas within 1/8 mile of a Metro station entrance, a distance roughly equivalent to one or two city blocks or a three minute walk. Intensities then decrease at distances of 1/4 and 1/2 mile from each station. This reflects the fact that transit ridership decreases as the walking distance to the station increases. In order to achieve the recommended intensity, a pedestrian-friendly environment should be established from the closest station entrance to the buildings within a development proposal. The recommended intensity is also contingent on achieving the land use mix planned for a project's site. The table below shows the recommended intensities allowed under the redevelopment option for each distance tier in the TOD Districts.

Table 2.1 Intensity Recommendations for TOD Districts

Distance from Metro	Recommended FAR
0 - 1/8 mile	4.75
1/8 - 1/4 mile	2.75
1/4 - 1/2 mile	2.0

Non-TOD District Intensity

Large portions of the Non-TOD Districts are planned for increased intensity to encourage the creation of urban residential neighborhoods. Some portions of Non-TOD Districts, including neighborhoods at the edge of Tysons and stable residential developments like the Rotonda, are not planned for redevelopment. Specific guidance for these areas can be found in the District Recommendations.

2.2 Inputs to Transportation Model

For the transportation analysis, the land use concepts in the proposed Comprehensive Plan Amendment have been converted into population and employment figures by Traffic Analysis subzones. In the Comprehensive Plan scenario, the 2030 MWCOG Round 7.1 land use was used within Tysons Corner. For the scenario representing the Comprehensive Plan amendment in 2030, the 2030 GMU High Forecast land use was used. The 2030 GMU High Forecast scenario is a picture of what land use could be in place in Tysons Corner by the year 2030 based on the vision presented by the Task Force and GMU's assessment of market absorption. GMU developed forecasts for Tysons Corner at a low, intermediate, and high level and incorporated the extension of Metrorail through Tysons Corner. The high-level forecast was selected for this analysis to be conservative in comparison against the current Comprehensive Plan for 2030.

The GMU High scenario focuses development in transit-oriented development (TOD) areas surrounding the Metrorail stations. Tables 2.2 through 2.4 present summary information for each set of land use assumptions. Figures 2.2 through 2.7 show the population and employment density in 2030 GMU High scenario and 2030 Comp Plan scenario and the differences in density by Traffic Analysis sub-zones.

Table 2.2 Population and Employment within Tysons Corner for Land Use Scenarios

Scenario	Population	Employment
2005	16,000	103,000
Current Comprehensive Plan	41,000	139,000
2030 GMU High (Proposed Comprehensive Plan)	54,000	159,000

Table 2.3 Employment within Tysons Corner – TOD, Non-TOD Areas

Scenario	TOD		Non-TOD	
	Employment	Percent	Employment	Percent
2005	53,000	51%	50,000	49%
Current Comprehensive Plan	61,000	44%	78,000	56%
2030 GMU High (Proposed Comprehensive Plan)	105,000	66%	54,000	34%

Table 2.4 Population within Tysons Corner – TOD, Non-TOD Areas

Scenario	TOD		Non-TOD	
	Population	Percent	Population	Percent
2005	2,000	12%	14,000	88%
Current Comprehensive Plan	16,000	39%	25,000	61%
2030 GMU High (Proposed Comprehensive Plan)	29,000	54%	25,000	46%

Figure 2.2 2030 Comp Plan Population Density

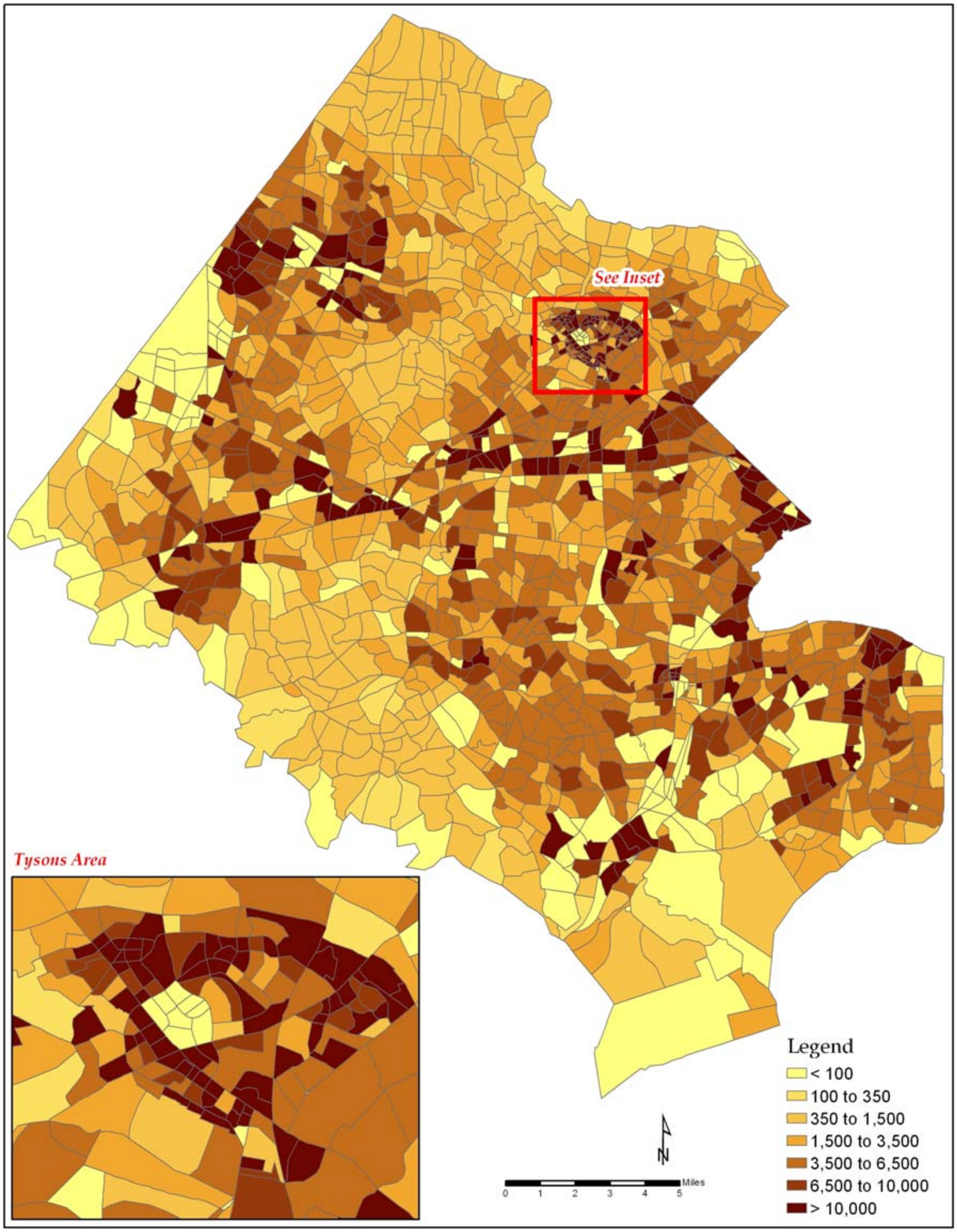


Figure 2.3 2030 Comp Plan Employment Density

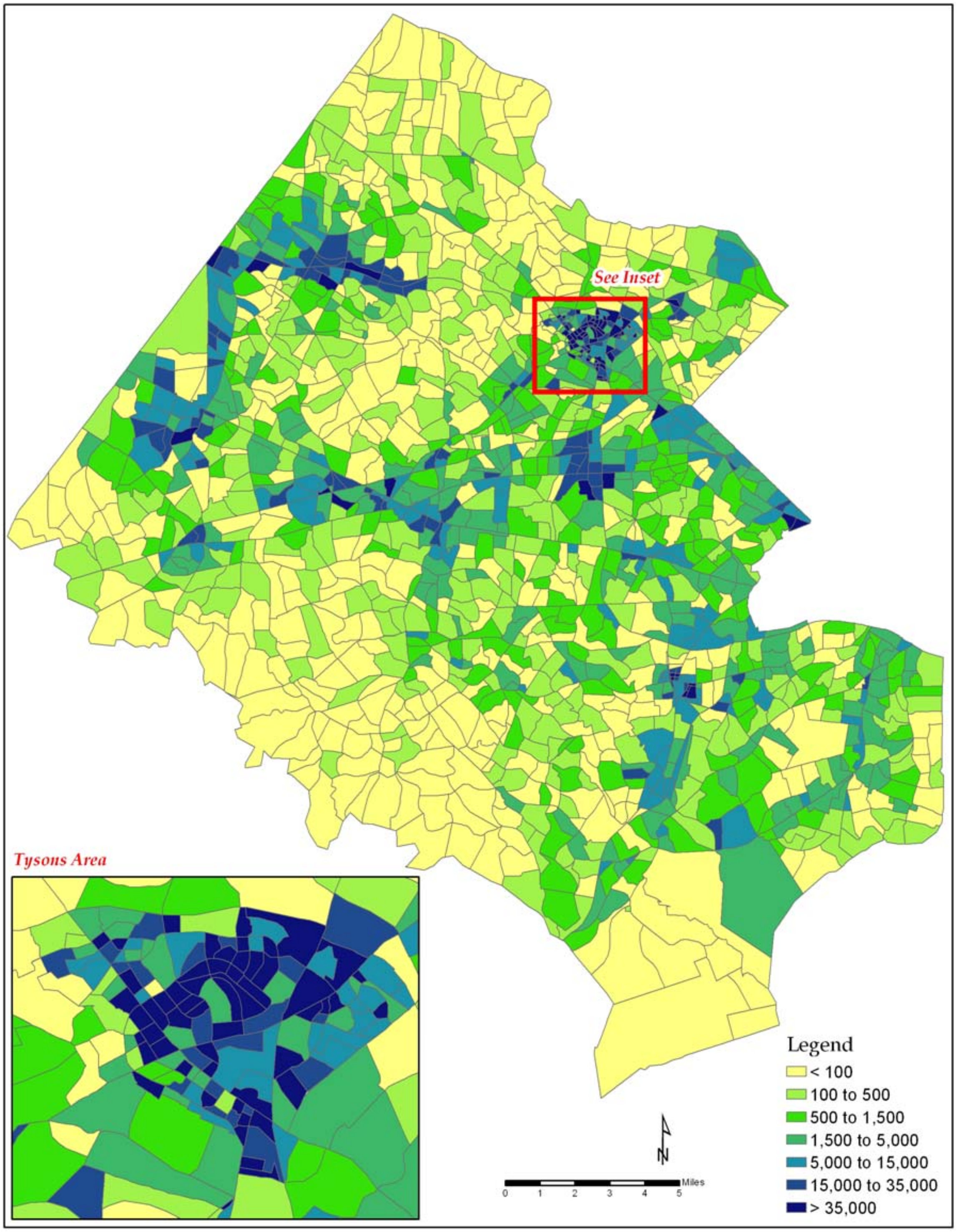


Figure 2.4 2030 GMU High Population Density

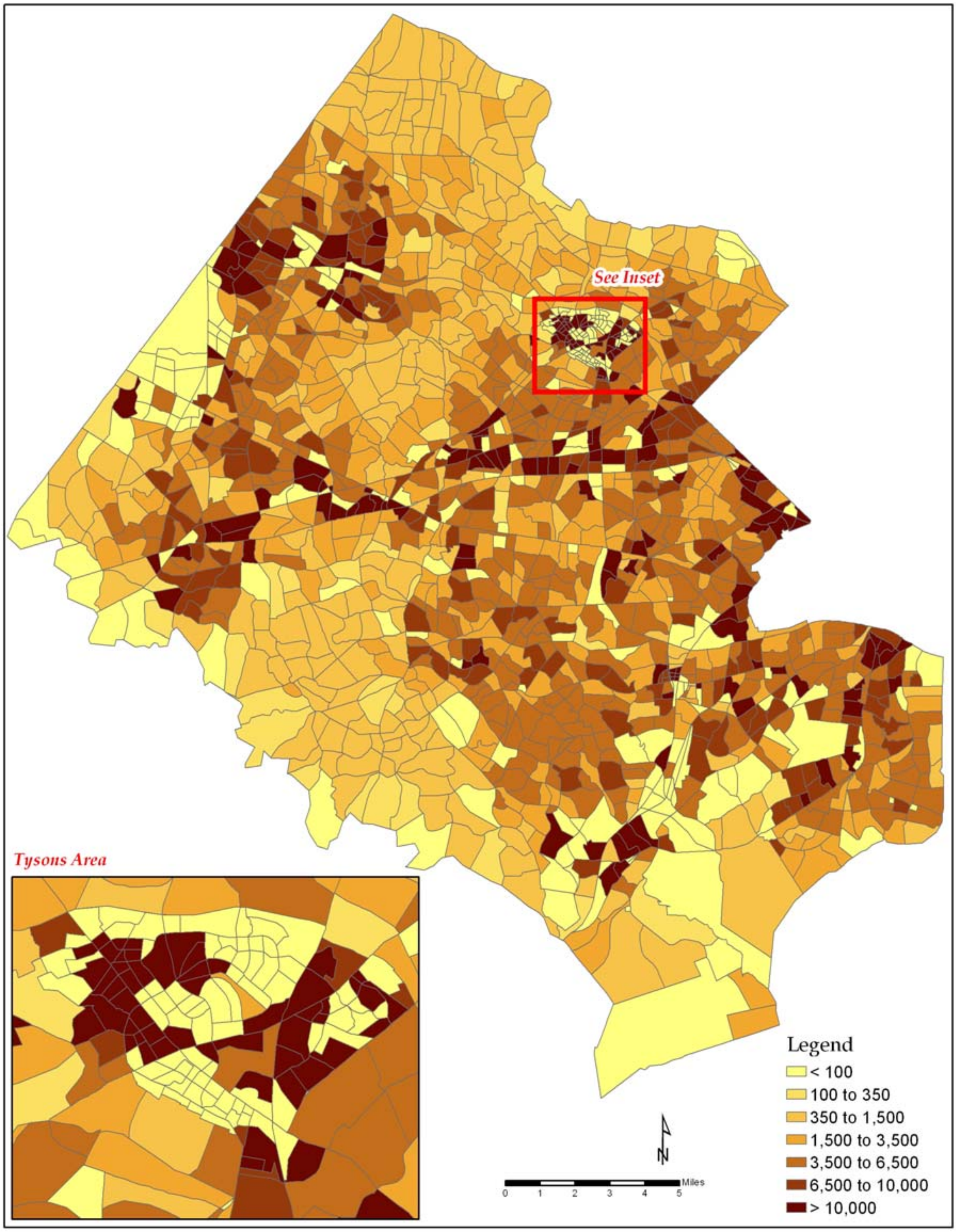


Figure 2.5 2030 GMU High Employment Density

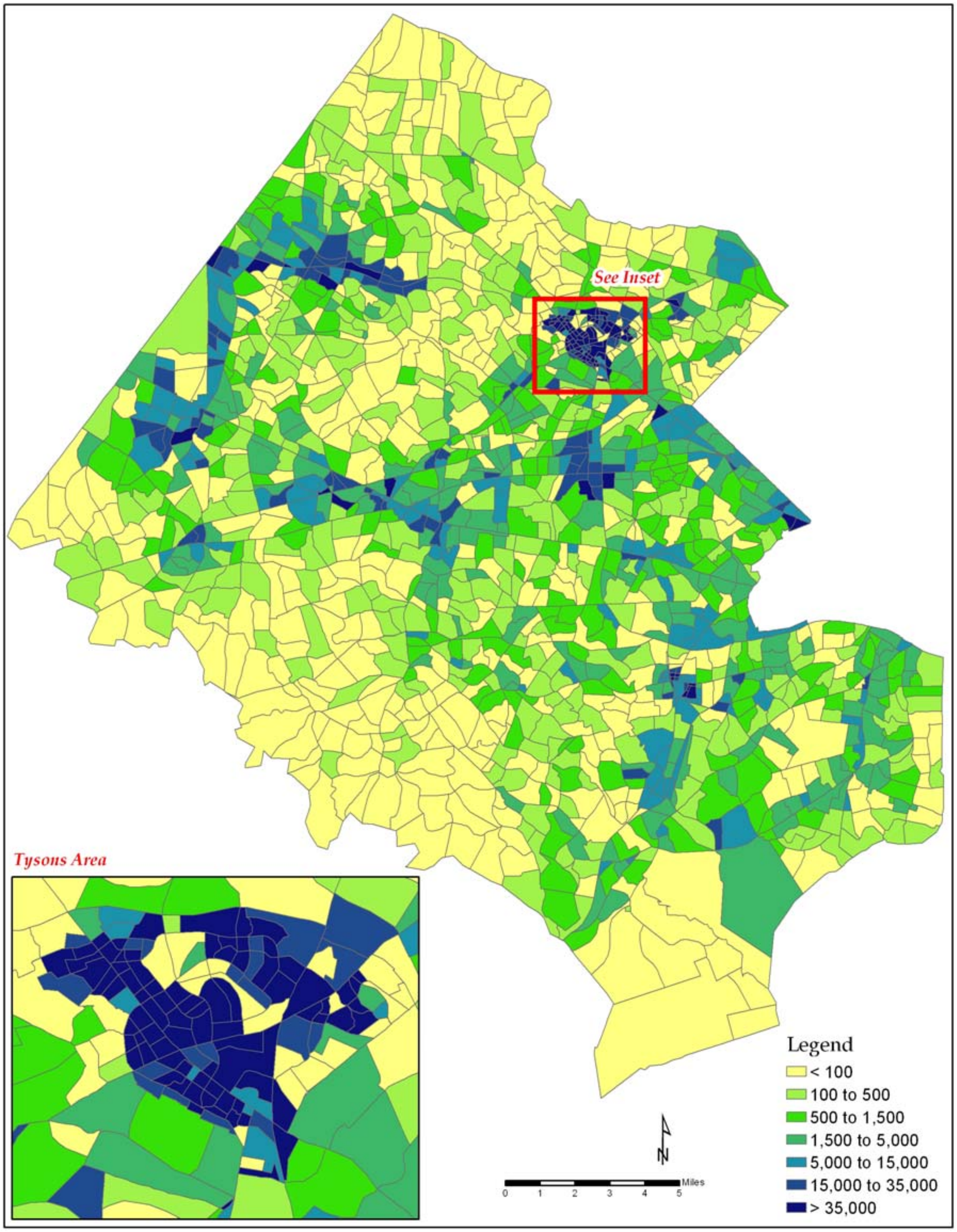


Figure 2.6 Difference between Comp Plan and GMU High Population Density

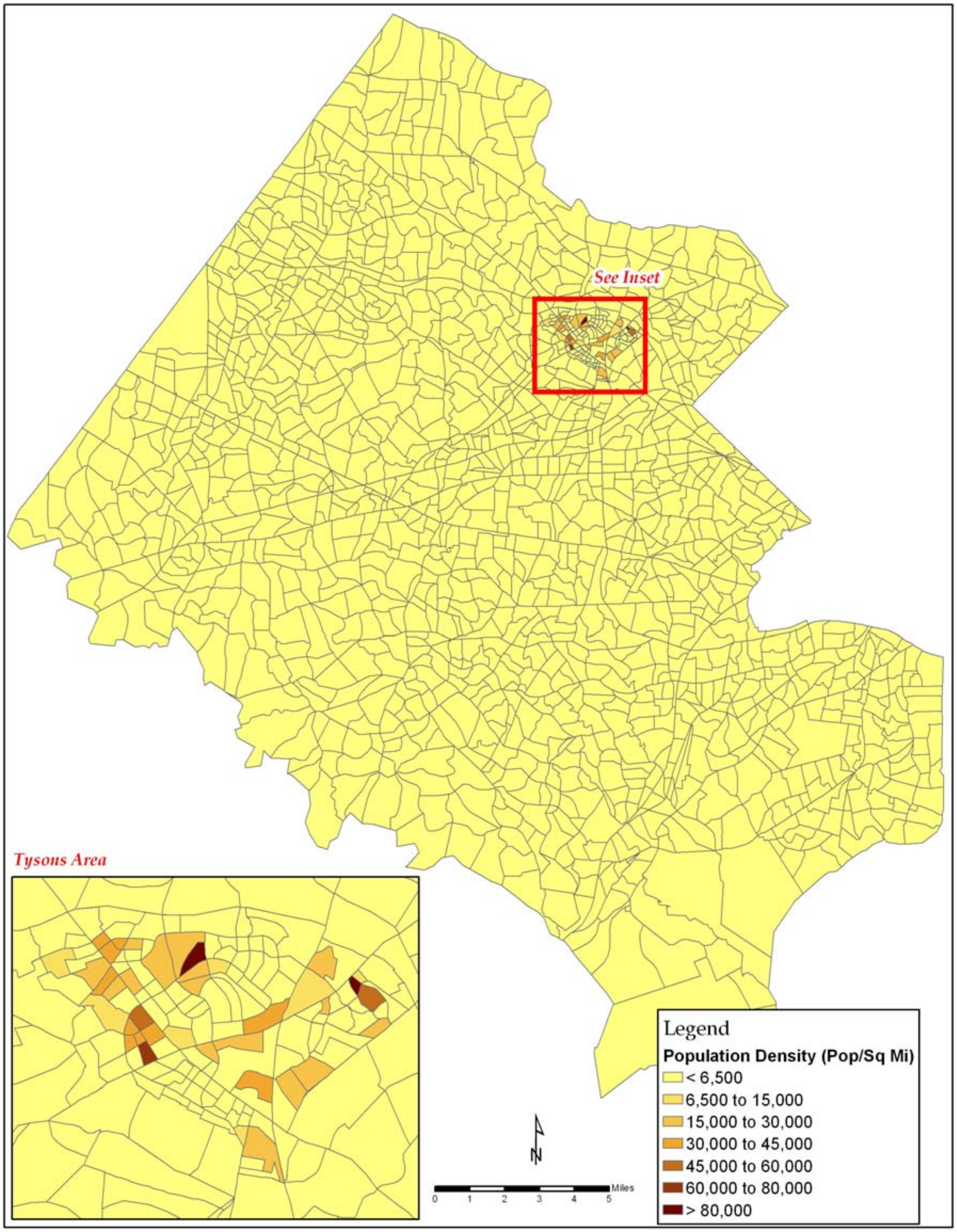
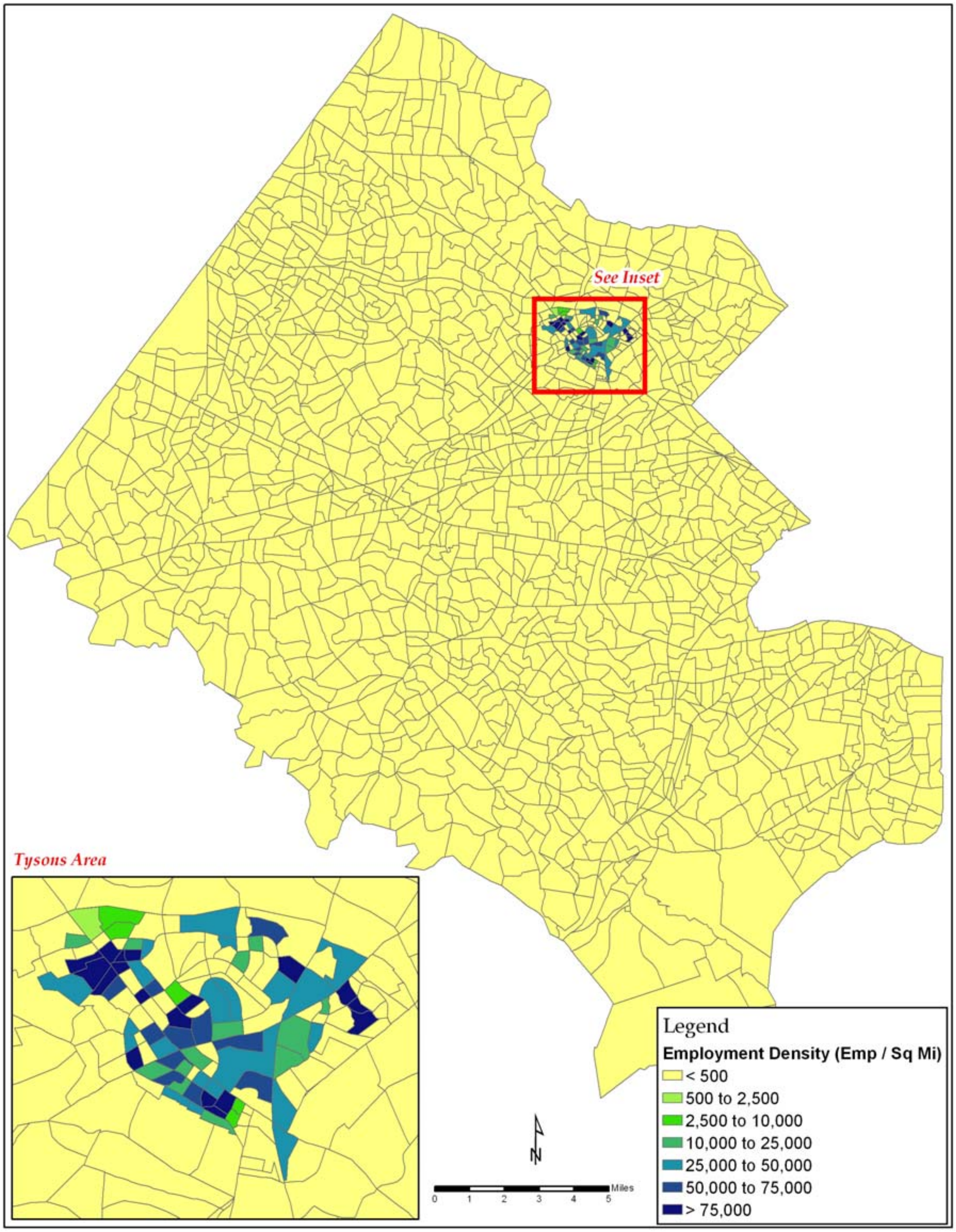


Figure 2.7 Difference between Comp Plan and GMU High Employment Density



Chapter 3: Urban Design

3.1 Urban Design Strategy

Urban design is the discipline that guides the appearance, arrangement, and functional elements of the physical environment, with a particular emphasis on public spaces. An urban environment is comprised of many elements; including streets, blocks, open spaces, pedestrian areas, and buildings. The urban design strategy of the proposed Comprehensive Plan Amendment provides guidance for each of these elements, with a particular emphasis on creating a high-quality urban environment that is walkable and pedestrian-friendly. It contains guidance for these key transportation elements: the pedestrian realm, the bicycle network and the grid of streets.

The pedestrian realm consists of publicly accessible places where people circulate on foot. Sidewalks connect pedestrians to parks, plazas, trails, and other public places. The pedestrian realm is the most visible space within the urban environment. It should be continuous but can vary in its character depending upon adjacent uses and the scale of the street.

The pedestrian realm also includes building facades, areas that can offer shelter from sun and rain through canopies and awnings, outdoor seating areas, commercial displays, and landscaping. Color, texture, signage, and variations in activity can provide visual interest for both pedestrians and motorists. Other elements that enhance the aesthetics and functionality of the pedestrian realm include bicycle racks, benches, bus shelters, and lighting.

The Tysons Corner Urban Center Plan affords an opportunity to make Tysons Corner a bicycle friendly community through strategic urban design. New streets will be designed and older streets retro-fitted to better accommodate bicycles. Transit options will become bike friendly with the addition of buses equipped with bicycle racks. Ample safe, secure, and convenient bicycle parking will be installed. Comprehensive wayfinding signage will provide guidance and information about destinations and paths, while a network of interconnected shared use paths, interfacing with an on-road bike network, will establish a cohesive and connected transportation environment conducive to bicycling.

Tysons currently consists of large superblocks with a relatively small number of streets. This places excessive reliance on the street network to move vehicle traffic while the large block sizes inhibit transit use, pedestrian and bicycle movement. Research and experience indicates that in areas with a fine grid of streets and a mix of land uses, people use transit more and make fewer auto trips than their neighbors in typical suburbs. A grid of streets disperses vehicle traffic and improves mobility for pedestrians and bicyclists. Smaller block sizes improve walkability by creating convenient and short walk distances. A perfect grid is unlikely in Tysons Corner due to the alignment of existing roads and topographical constraints. However, where possible, a grid of streets is being planned. The following text and accompanying cross sections describe the different types of street classifications that will form a grid in Tysons.

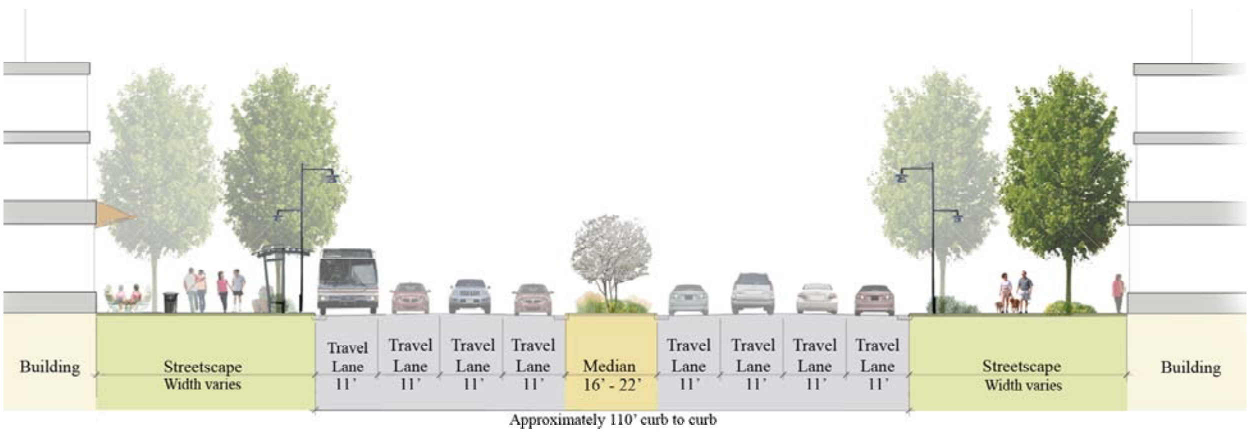
3.2 Street Cross Sections

Boulevards (Primary Arterials)

Boulevards will be the most important multi-modal connectors and thoroughfares within Tysons. In addition to carrying the largest volume of automobile traffic, they also have the ability to accommodate the Metrorail, circulator, bus, bicycle, and pedestrian modes within their rights-of-way. Route 7 and Route 123 are both boulevards (major arterials).

Boulevards may have three to four travel lanes in each direction. Medians are necessary to provide a pedestrian refuge, rights-of-way for turn lanes and/or to accommodate Metrorail on portions of Routes 7 and 123. In addition, boulevards will have wide sidewalks with street trees on each side. Some portions of boulevards may include shared or dedicated lanes for the circulator system.

Figure 3.1
Boulevard Section with Landscaped Median



Note: The outside lane in the Boulevard Street Section may be used for on-street parking where applicable.

Boulevard cross section dimensions:

- The desirable width of the median is 20 feet to allow safe pedestrian refuge.
- 24 foot median (36 feet at stops) to accommodate the Circulator.
- 3 to 4 lanes per direction (11 feet for each lane).
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Avenues (Minor Arterials)

Avenues within Tysons can play a role in taking the pressure off the boulevards by diverting vehicular traffic from the boulevards to the avenues. Portions of avenues may also accommodate circulators and provide desirable addresses to new business and residential development. Boone Boulevard, Greensboro Drive and Westpark Drive are examples of avenues. These streets may generally have two travel lanes in each direction, on-street parking, wide sidewalks, and bike lanes. Medians are not preferred but may be necessary depending on design, safety, operation, and capacity considerations.

Additionally, avenues extend into the interior of Tysons, connecting residential and employment areas. Uses and character of avenues will range from transit oriented mixed-use with street level retail within the station areas, to neighborhood residential within non-station areas like East Side and North Central. Many portions of the avenues could also accommodate circulators on shared or dedicated lanes.

Figure 3.2
Avenue Section with Landscaped Median

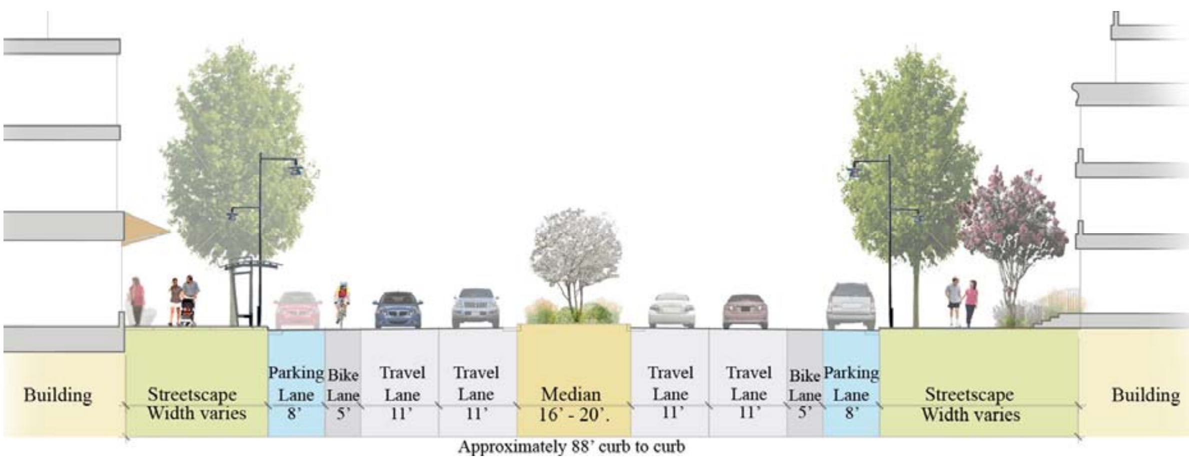


Figure 3.3
Avenue Section with Circulator

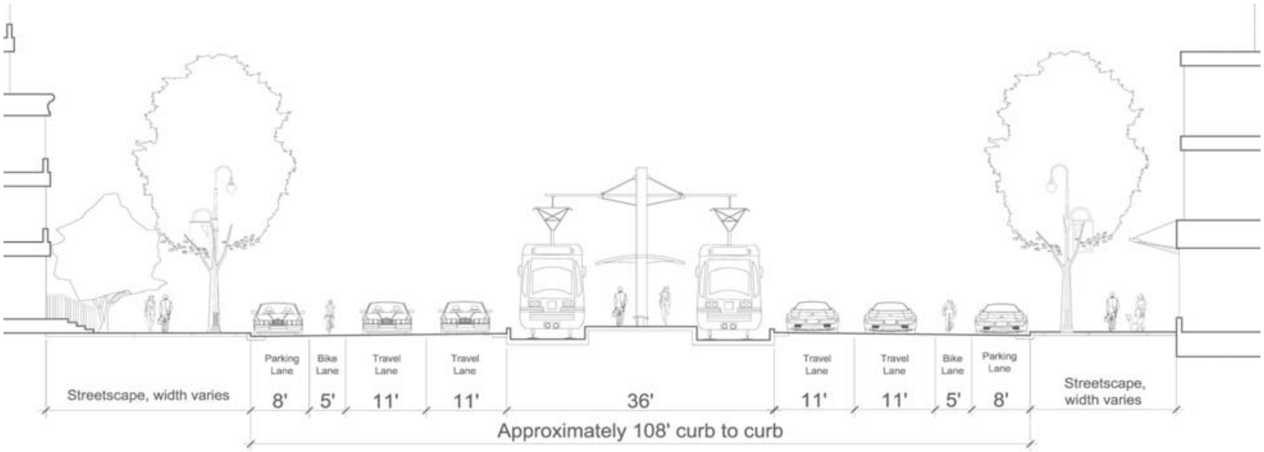
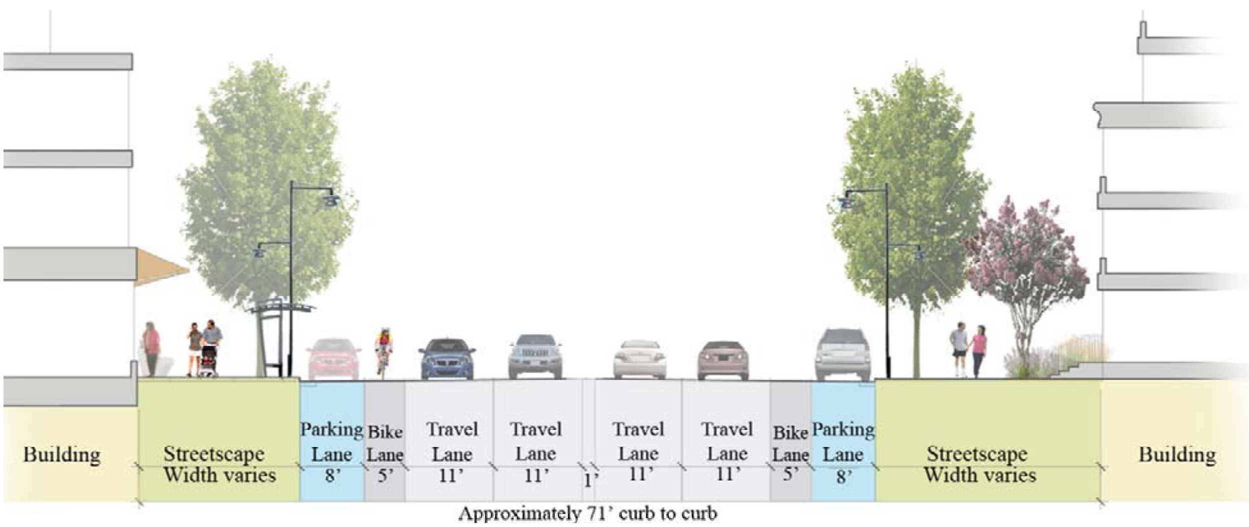


Figure 3.4
Avenue Section with No Median



Avenue cross section dimensions:

- The desirable width of the median, if provided, is 20 feet to allow safe pedestrian refuge.
- 24 foot median (36 feet at stops) to accommodate the Circulator where applicable.
- 2 or 3 travel lanes per direction (11 feet minimum for each lane).
- On-street parallel parking is recommended. This parking may be prohibited during peak periods to address traffic capacity needs on some streets.
- 8 feet for on-street parallel parking per direction.
- 5 foot on-road dedicated bike lane per direction.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Collector Streets (Collector)

Collector streets within Tysons will connect local streets, with slow-moving traffic, to higher speed facilities like avenues and boulevards. Collector streets typically have one or two travel lanes in each direction. They are slow-moving lanes with traffic calming elements such as bulbouts at intersections, frequent pedestrian crossings, parallel on-street parking, bike lanes and wide sidewalks to maximize walkability. Medians are not preferred but may be necessary to provide pedestrian refuge, turn lanes or rights-of-way for the circulator.

Figure 3.5
Collector Street Section with Landscaped Median

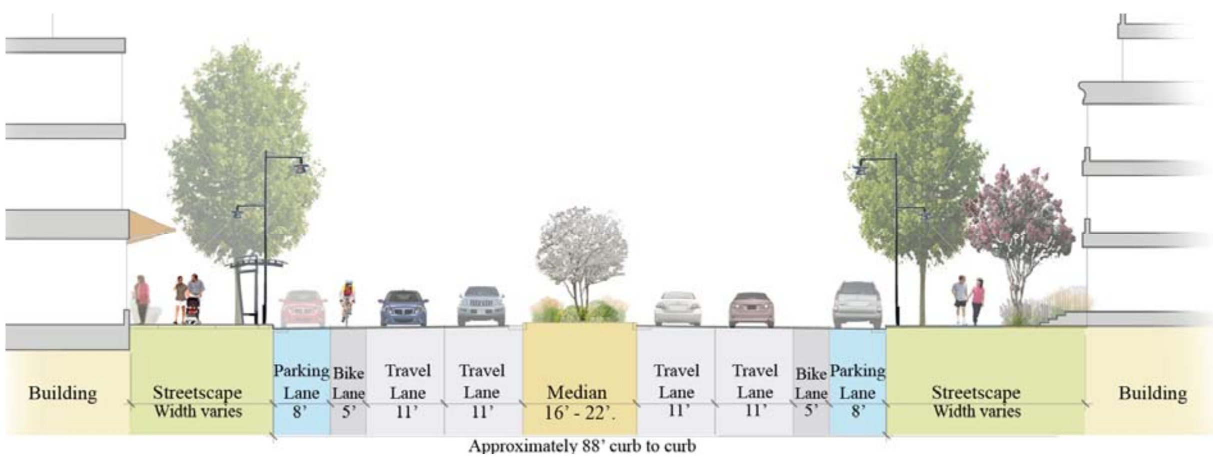


Figure 3.6
Collector Street Section with Circulator

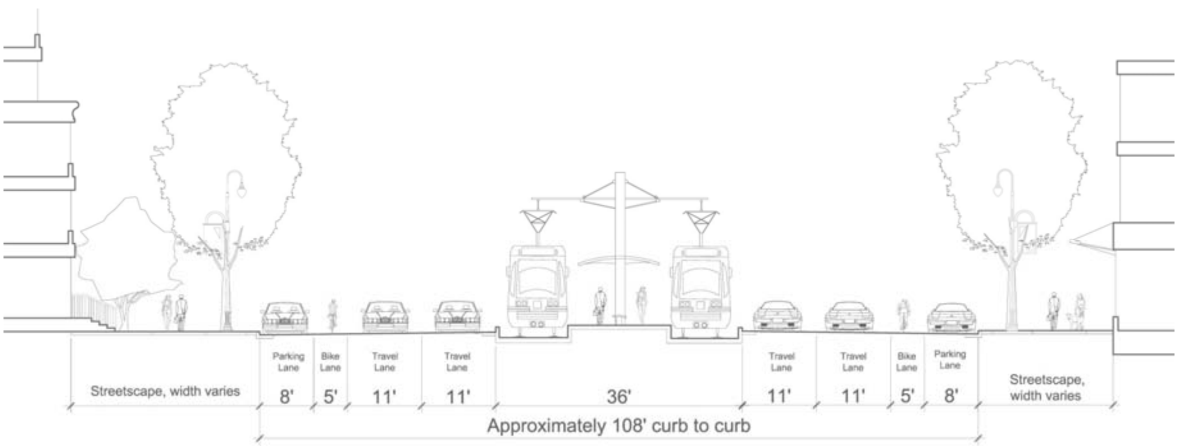
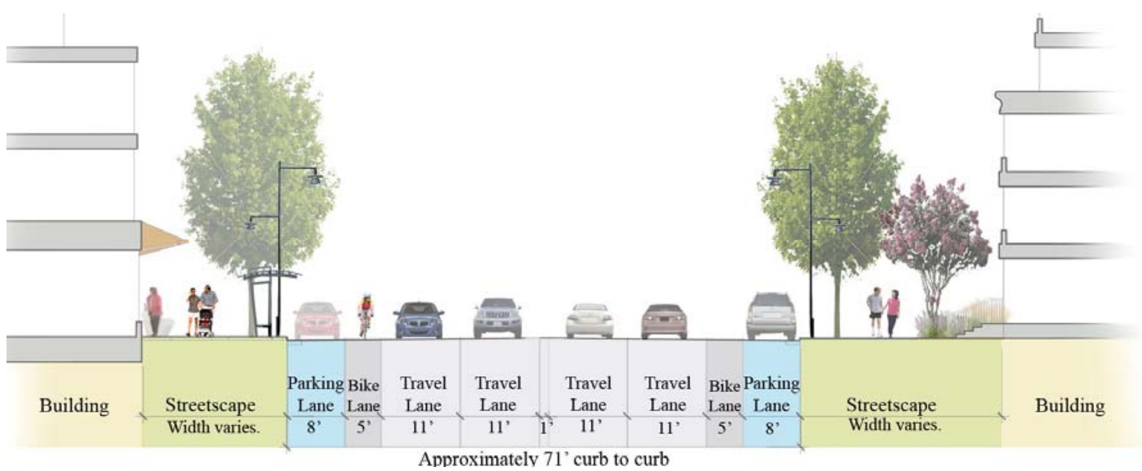


Figure 3.7
Collector Street Section with No Median



Collector Street cross section dimensions:

- The desirable width of the median, if provided, is 20 feet to allow safe pedestrian refuge.
- 24 foot median (36 feet for stops) to accommodate the Circulator where applicable.
- 2 travel lanes per direction (11 feet minimum for each lane); 1 travel lane per direction under certain circumstances.
- 8 feet for on-street parallel parking per direction.
- 5 foot on-road dedicated bike lane per direction.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

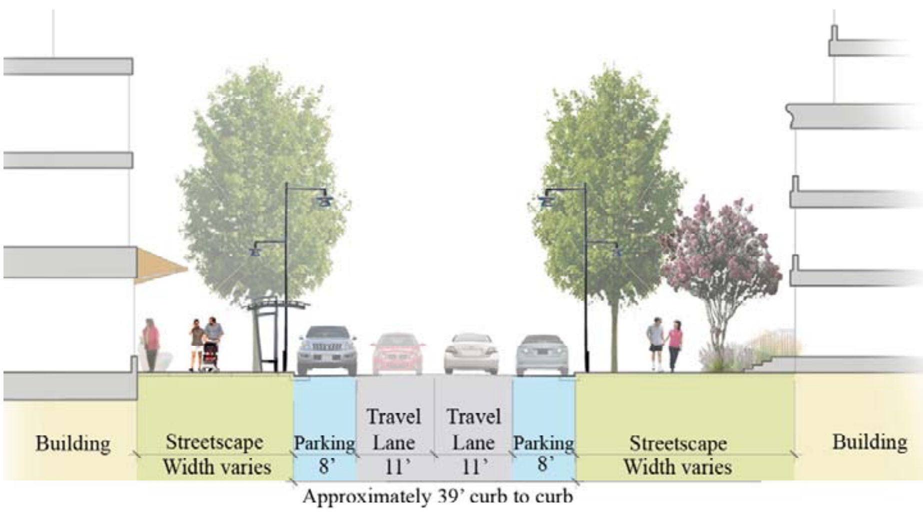
Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Local Streets (Local)

Local streets will generally be the lowest volume streets within Tysons and will carry slow-moving traffic. Medians should not be considered. They will serve residential and/or employment uses on either side with entrances and windows opening on the sidewalks.

Local street sections are generally narrow, with one lane in either direction, and are flanked by on-street parking on both sides. Due to low vehicle speeds, bicycles may be accommodated in the travel lane rather than in a dedicated bicycle lane.

Figure 3.8
Local Street Section



Local Street cross section dimensions:

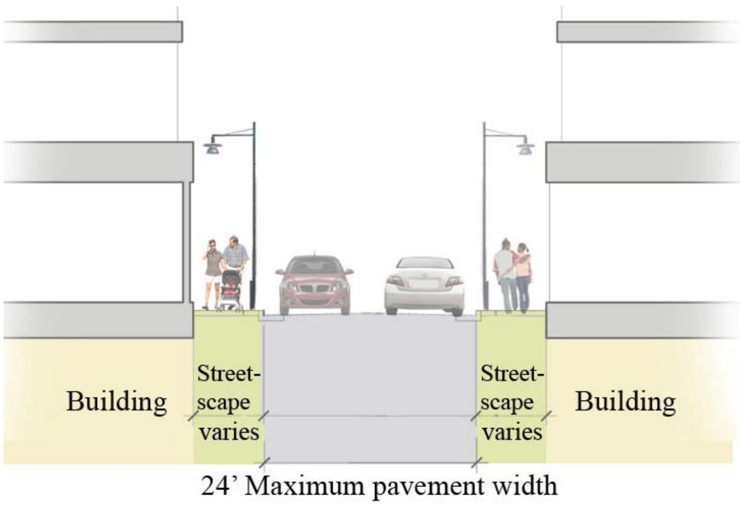
- No medians should be considered.
- 1 travel lane per direction.
- 10 feet lane widths may be considered for residential streets.
- 8 foot on-street parking per direction.
- Local streets are low speed facilities that may not require bike lanes.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Service Streets (No Functional Classification)

Service streets are very low speed, generally privately maintained facilities that typically run between buildings to provide access to parking garage entrances, loading and refuse containment areas. Connections to local streets and collectors are encouraged. Service alleys should be designed to maximize functionality for service vehicles. Allowances should be made for pedestrian access as needed.

Figure 3.9
Service Street Section



Service Street cross section dimensions:

- No medians should be considered.
- 1 travel lane per direction.
- Street widths should accommodate expected service vehicles.
- Parking and bus access is not anticipated.
- Landscaping should not conflict with large vehicle movements.
- Mountable curbs should be considered.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Chapter 4: Transportation System Inputs

4.1 Road Network

4.1.1 2005 Road Network

Figure 4.1 shows the 2005 Tysons Corner road network as representative of the existing transportation network. Metrorail service is not available to the study area, but Fairfax Connector and Metrobus services provide regional transit connectivity. Particularly noteworthy is frequent peak-period bus service available to a large portion of the Study Area from park-and-ride facilities along the Dulles Toll Road Corridor to the West Park Transit Center and from the West Fall Church Metrorail station.

Figure 4.1 2005 Tysons Corner Road Network

Note:
This figure depicts the modeled network for 2005 and does not include all streets within Tysons Corner. The modeled network includes all expressways, major and minor arterials, collectors, and some local streets, as shown in the figure.

4.1.2 Current Comprehensive Plan Network

The current Comprehensive Plan road network is shown in Figure 4.2. New roadway elements added over the 2005 network are depicted in red, roadway widening projects are shown in green and the HOT lanes project is shown in pink. This depiction of the network includes all elements which are included in the 2030 MWCOG CLRP, as well as additional elements not found in the CLRP.

Elements from the CLRP include:

- Constructing High-Occupancy/Toll Lanes (HOT) lanes on I-495;
- Widening the Dulles Airport Access Road from four to six lanes;
- Widening VA Route 7 between the Dulles Toll Road and I-495 from six to eight lanes, and from four to six lanes between the Dulles Toll Road and the Loudoun County Line;
- Widening VA Route 123 between Old Courthouse Road and VA Route 7 from four to six lanes and between VA Route 7 and I-495 from six lanes to eight lanes;
- Widening International Drive between VA Route 7 and VA Route 123 from four to six lanes;
- Widening Spring Hill Road between VA Route 7 and International Drive from two lanes to four lanes;
- Widening Magarity Road between VA Route 7 and Great Falls Street from two lanes to four lanes;
- Improving intersections throughout Tysons Corner (including VA Route 7 at Westpark Drive and International Drive at VA Route 7 and VA Route 123);
- Reconstructing the interchange of I-66 and I-495; and
- Improving interchange of VA Route 123 and Dulles Airport Access Road.

Elements in the current Comprehensive Plan network that are beyond the current CLRP include the extensions of Boone Boulevard and Greensboro Drive.

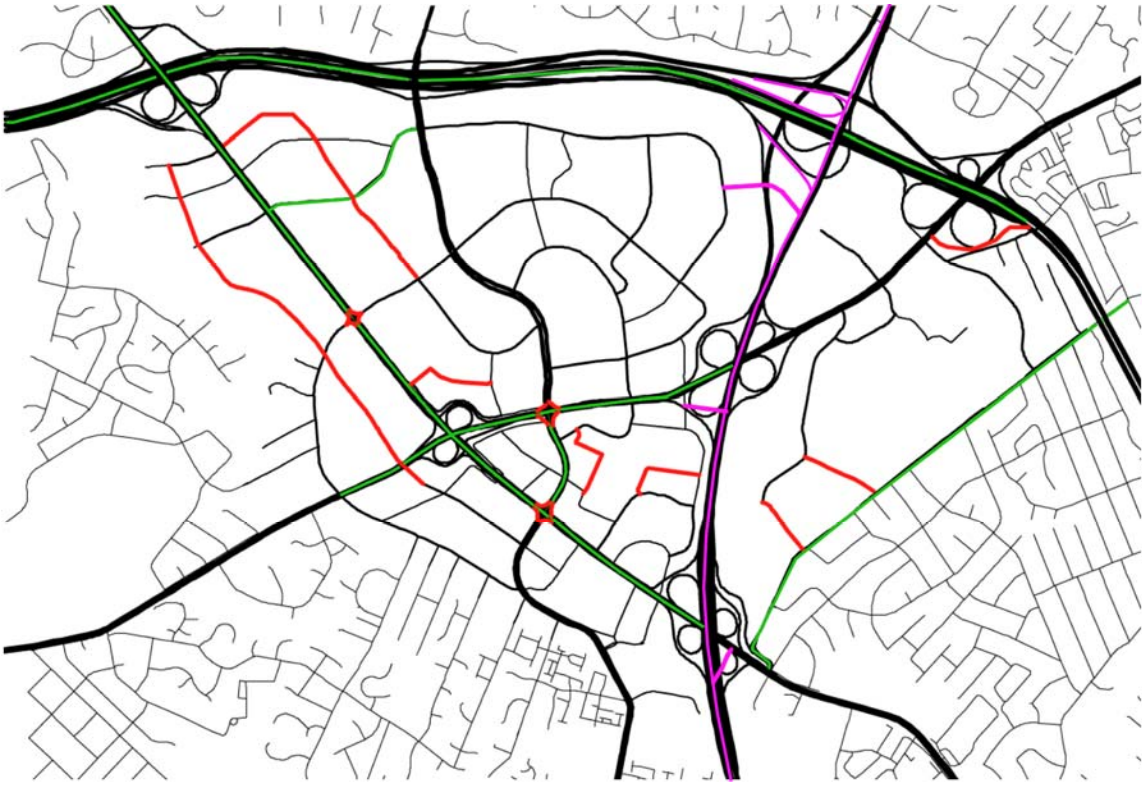


Figure 4.2 Current Comprehensive Plan Tysons Corner Road Network

Note:
This figure depicts the modeled network and does not include all streets within Tysons Corner. The added capacity that is created by adding lanes to existing roadways is shown in green. New roadway elements are shown in red and the HOT lanes project is shown in pink.

4.1.3 Recommended 2030 Comprehensive Plan Network

Transportation modeling analysis of land use scenarios prior to the detailed (Phase III) analysis (see section 5.3) provided the following results:

- Entrances to Tysons are limited and therefore have capacity problems, and;
- More internal streets (a grid where possible) effectively distributes traffic within Tysons.

The Phase III transportation modeling analysis tested a network that contained a grid of streets, additional entrances to and from Tysons and additional grade separations on Virginia Route 123 and Virginia Route 7 within Tysons. This analysis provided the following results:

- Additional entrances assisted in accommodating traffic to and from Tysons.
- Internal streets (a grid where possible) continued to effectively distribute traffic within Tysons.
- Grade separations on Virginia Route 123 and Virginia Route 7 resulted in limited improvement in traffic flow and increased through traffic.

The Recommended 2030 Comprehensive Plan Network is shown in Figure 4.3. This network contains the following improvements not included in the existing ("old") Comprehensive Plan network:

- Ramps connecting the Boone Blvd Extension to westbound Dulles Toll Road and eastbound Dulles Toll Road to Boone Blvd Extension;
- Ramp connecting the Greensboro Drive Extension to westbound Dulles Toll Road;
- Ramps connecting Jones Branch Drive to westbound Dulles Toll Road and eastbound Dulles Toll Road to Jones Branch Drive;
- Widen I-495 (Outer Loop) between Rt.7 and I-66 by one lane;
- Grid west of Westpark Drive;
- Grid bounded by Gosnell Rd, Rt.7 and Rt.123;
- Grid connections to Greensboro Drive;
- Grid of streets east of I495, including connection across I-495 to Jones Branch Drive;
- Collector-distributor roads along the Dulles Toll Road from the Greensboro Drive extension to Hunter Mill Rd.

The Recommended 2030 Comprehensive Plan Network excludes the following elements contained in the existing Comprehensive Plan Network:

- An interchange at Virginia Route 123 and International Drive.
- An interchange at Virginia Route 7 and International Drive.
- An interchange at Virginia Route 7 and Westpark Dr/Gosnell Rd.

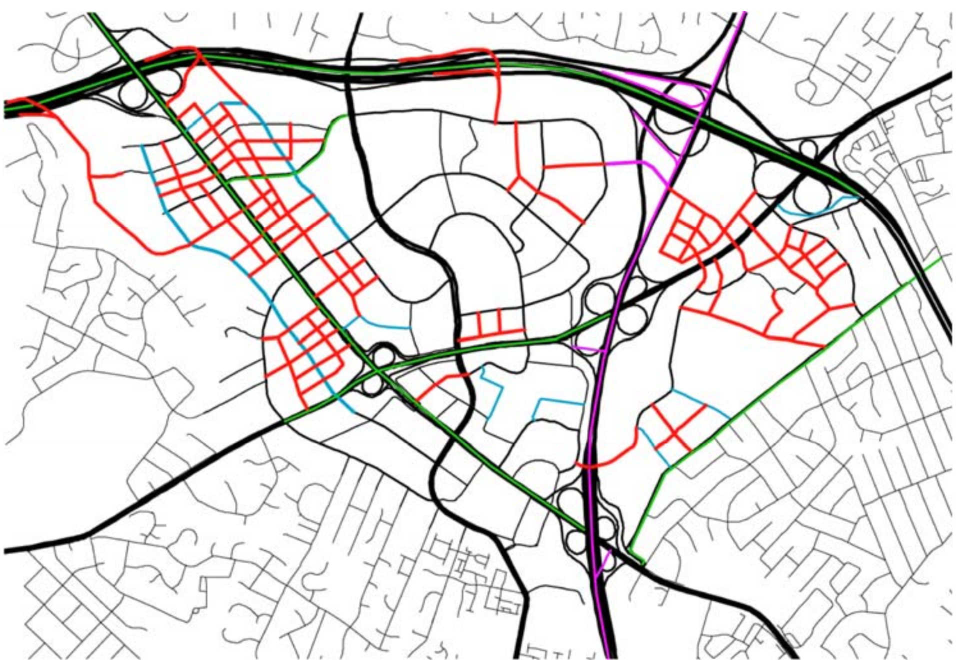


Figure 4.3 Recommended 2030 Comprehensive Plan Network

Note:
This figure depicts the modeled network and does not include all streets within Tysons Corner. The added capacity that is created by adding lanes to existing roadways is shown in green. Roadway elements shown in blue are improvements included in the Comprehensive Plan beyond the 2005 network and roadway elements shown in red are Recommended 2030 network improvements.

4.1.4 Network Assumptions

Speeds:
Network speeds are a function of the demand. An equation similar to the BPR curves is used to calculate the speed as the demand changes.

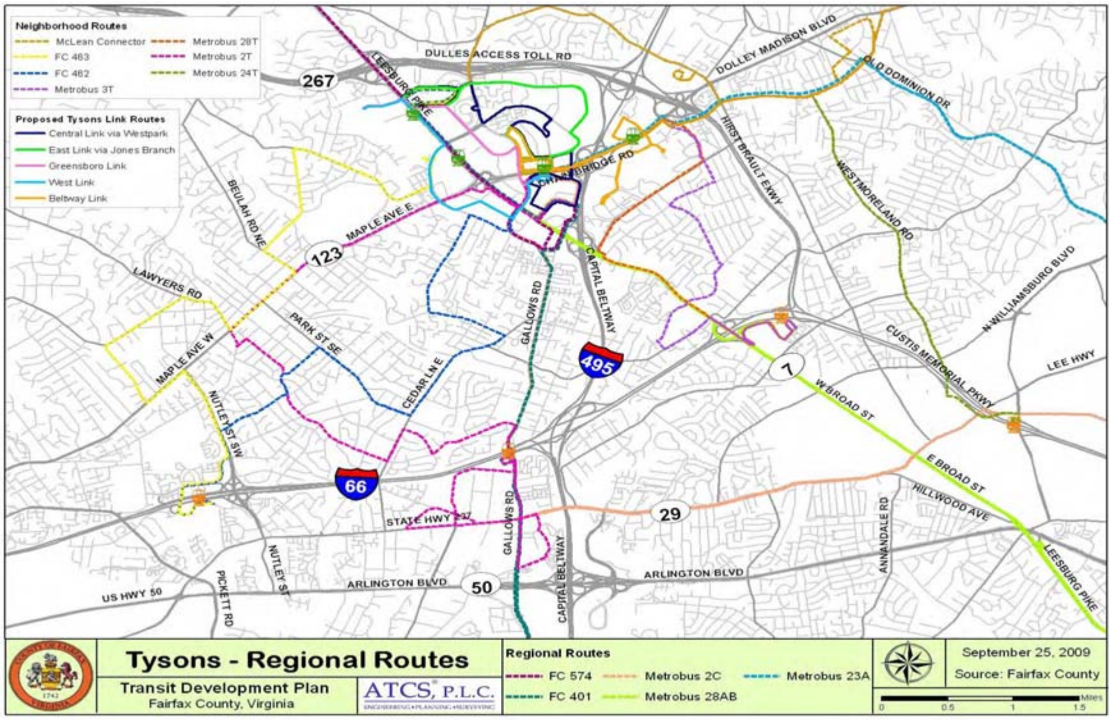
Capacity:
The Fairfax County assignment on the subzone network works off of intersection delay. This feature has an advantage over the MWCOG assignment. Therefore all non-freeway links in the network that are located inside Fairfax County are coded with a maximum capacity of 1,800 vphpl per hour of green. The approach links directly into the intersection node are then recalculated for a capacity based on the demand on all the links entering the node. This only effects links directly attached to the intersection node. The delay and corresponding capacities are based on calculations from the HCM.

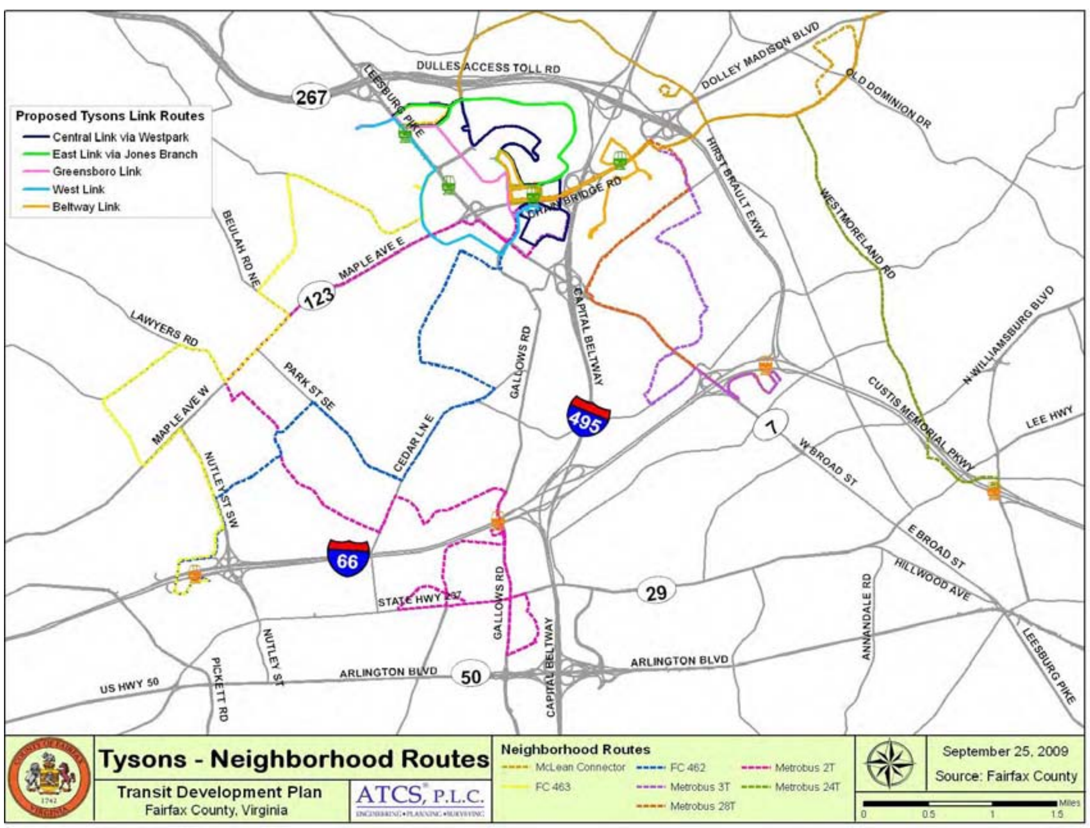
4.2 Transit Network

4.2.1 Current Comprehensive Plan

The transit network used in the MWCOG regional Constrained Long-Range Plan (CLRP) served as the basis for the transit network tested for the current Comprehensive Plan. This transit network is a reasonable view of what is currently expected to be in place in the Tysons Corner area and the region by the year 2030. Clearly the most significant transit improvement in the CLRP is the construction of the Dulles Metrorail Project (Silver Line), including the four Metrorail stations in Tysons Corner. The CLRP includes bus routes connecting Tysons Corner to the surrounding areas, such as McLean, Vienna, Dunn-Loring, and Falls Church, as well regional buses. The regional and neighborhood bus routes provide connectivity to many destinations in the region, along with the Silver Metrorail line.

In order to plan future bus service in a strategic manner, the County has developed a 10-year Transit Development Plan, which is currently in draft form for public review. This TDP represents a comprehensive and focused examination of future bus service needs in Fairfax County. In order to plan for the opening of the Metrorail Silver line, the TDP includes more in-depth service planning for bus routes serving Tysons Corner. Although the specific routes may vary from those coded in the CLRP bus network, an extensive review of the differences between the transit service in the CLRP and the draft TDP revealed that the overall amount of transit service is approximately the same. Bus service recommendations for regional routes and neighborhood routes from the draft TDP are shown on the next page.

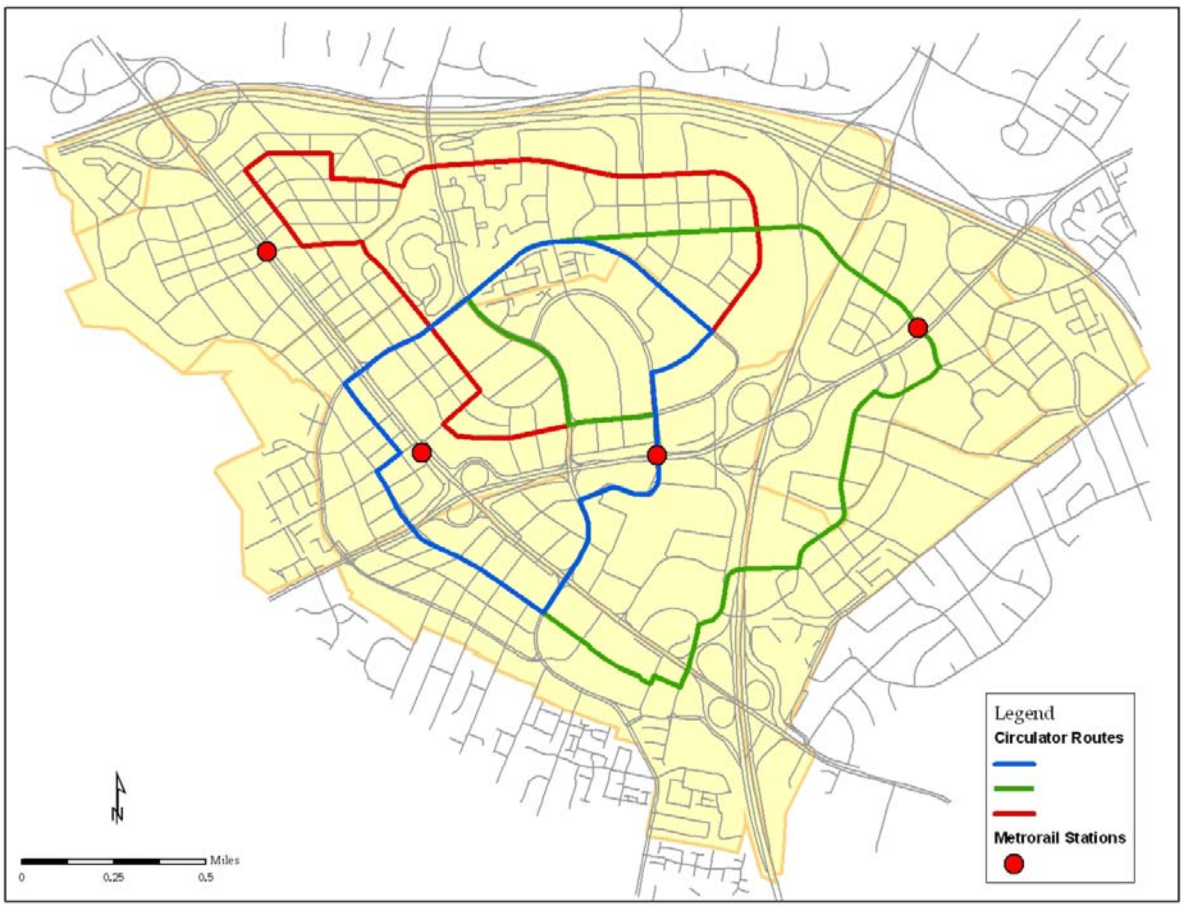

Neighborhood Routes
McLean Connector
Metrobus 28T
FC 463
Metrobus 2T
FC 462
Metrobus 24T
Metrobus 3T
Proposed Tysons Link Routes
Central Link via Westpark
East Link via Jones Branch
Greensboro Link
West Link
Beltway Link
Tysons - Regional Routes
Transit Development Plan
Fairfax County, Virginia
ATCS, P.L.C.
Regional Routes
FC 574
Metrobus 2C
Metrobus 23A
FC 401
Metrobus 28AB
September 25, 2009
Source: Fairfax County


Proposed Tysons Link Routes
Central Link via Westpark
East Link via Jones Branch
Greensboro Link
West Link
Beltway Link
Tysons - Neighborhood Routes
Transit Development Plan
Fairfax County, Virginia
ATCS, P.L.C.
Neighborhood Routes
McLean Connector
FC 462
Metrobus 2T
FC 463
Metrobus 3T
Metrobus 24T
Metrobus 28T
September 25, 2009
Source: Fairfax County

4.2.2 Proposed Comprehensive Plan

The transit network evaluated for the proposed Comprehensive Plan Amendment includes all services included in the Constrained Long Range Plan. In addition, it includes transit circulator routes within Tysons Corner to facilitate internal transit use, as shown in Figure 4.4. The transit circulators were coded with preferential characteristics, which included a speed that assumed traveling on its own right-of-way for half of the route and bus stops every quarter mile. The transit circulator frequency was six-minute headways, which is a high enough level of service that riders do not need to rely on a bus schedule. The transit circulator routes are preliminary to support the travel demand forecasting and have not undergone a thorough analysis of future transit demand, operational effectiveness, or other necessary analyses which would lead to designation of specific alignments.

Figure 4.4 Preliminary Circulator Routes



Note: Routes are preliminary and have not undergone operational analyses. Operational characteristics modeled included transit priority, quarter-mile bus stop spacing, and a six-minute service frequency.

Chapter 5: Transportation Impact Analysis and Needs Assessment

5.1 Overview of Technical Analysis

5.2.1 Background to Overview of Technical Analysis

The backbone of the transportation impact analysis and associated needs assessment is the transportation modeling analysis. The modeling analysis is a traditional 4-step process of trip generation, trip distribution, modal split, and assignment. The modeling analysis was used to:

- test the performance of alternative land us strategies;
- determine how alternative transportation highway and transit networks and associated transportation demand management programs performed, and identify problem locations (needs);
- provide input for the following additional analyses: the 2050 Sketch Planning Analysis; the analysis of the traffic impact on surrounding neighborhoods (the Neighborhood Study); the Phasing Analysis which was conducted to determine the priority order of transportation infrastructure and program needs over time.

5.2.2 Transportation Modeling Analysis

The analysis of land use and transportation network alternatives has been undertaken in three phases. The three phases have each been comprised of a scenario analysis, involving community workshops for the first two phases. In the first phase, a round of community workshops in July 2007 looked at three land use scenarios, one focusing on employment, one focusing on housing, and one increasing both employment and housing. Transportation network elements included the Metrorail extension, additional transit, a grid of streets, HOT lanes connections and an additional Dulles Toll Road Ramp, and Beltway crossings. In this first analysis phase, it was determined that the grid of streets performed an important function, access into and out of Tysons Corner needed to be improved, the housing-focused scenario resulted in the least amount of congestion increase, and the mixed scenario focusing on both housing and employment had 60 percent more congestion than the existing Comprehensive Plan as measured by hours of LOS "F" travel in the Tysons Corner area.

The second analysis phase, with community workshops in February 2008, included two land use scenarios, which were similar to those in the first phase, and two transportation networks. The first network included more roadway elements such as grade separations and highway ramps, and the second network included a circulator in a dedicated right-of-way. From this phase of the analysis, it was learned that the residential component captured a substantial amount of trips, reducing trips from outside of Tysons Corner, the network which included more roadway elements drew more vehicle trips into Tysons, and both scenarios resulted in a higher level of transit use than the existing Comprehensive Plan. Using the findings from this analysis phase, the Tysons Corner Task Force developed a preferred land use scenario and transportation network, presented in the PB Placemaking report prepared for the Tysons Corner Task Force, "Transforming Tysons Vision and Areawide Recommendations."

The third analysis phase (2030 Land Use Scenario Analysis) evaluated seven different combinations of land use and transportation networks, which incorporated the work of the previous analysis phases. The results from the third analysis phase inform the development of the Tysons amendment of the Fairfax County Comprehensive Plan. The results of this analysis are presented in section 5.3 of this report.

5.2 Modeling Process

Appendix B of this report provides a description of the transportation modeling framework used for this work. In summary, the travel demand forecasting utilized the Fairfax County subarea highway assignment model, which currently incorporates the regionally adopted MWCOG model version at the time the study began (Version 2.1D#50). To better model the transit and mode choice options the WMATA Post-Processor Mode Choice Model, which includes a nested logit mode choice model to provide transit submode and mode of access information, was used and the resulting trip tables applied in the highway assignment.

5.3 2030 Land Use Scenario Analysis (Phase III Analysis)

5.3.1 Land Use Inputs

The seven tested scenarios include use of the following six land use inputs combined with appropriate transportation networks: 1) 2005, 2) 2030 Comprehensive Plan, 3) 2030 George Mason University (GMU) High Forecast, 4) 2040 (Prototype A), 5) 2050 (Prototype B), and 6) Task Force Preferred (TFP). The scenarios that were tested represented a range of land use and transportation changes that could happen over time.

The 2005 and 2030 Comprehensive Plan scenarios utilized the MWCOG Round 7.1 land use forecasts to capture the existing and baseline conditions. For the scenarios testing alternative futures, the starting point was the Tysons Corner TFP land use, developed after the previous analysis phase. Analyses performed by GMU suggest that the TFP land use inputs represent a potential time horizon beyond 2050, representing long term potential in Tysons Corner. The Prototype A and B scenarios which were analyzed in the second analysis phase were deemed indicative of land use development that could occur in the 2040 and 2050 timeframes, respectively. It was, therefore, desired to carry these forward for the third analysis phase.

5.3.2 2030 Impact and Needs Assessment – Regional Highways

This section details the evaluation of the transportation system's current and projected performance and conditions. The regional impact analysis task of the Tysons Corner Transportation and Urban Design Study used selected prior model runs to analyze the impacts of the proposed Tysons Corner Comprehensive Plan proposals on state-owned highways around Tysons Corner. This analysis is intended to also support VDOT's review of comprehensive plan changes for the Tysons Corner Study Area. The regional impact analysis focused on facilities of regional significance that provide access in, out, and around Tysons Corner, as shown in Figure 5.1. In addition to the gateway points, two points on VA Route 7 and VA Route 123 inside Tysons Corner were analyzed to determine the impact within Tysons Corner. Additional analysis was done within Tysons Corner, to ensure that the internal transportation system would support the additional land use. This includes many mitigation efforts including the grid of streets, additional ramps, and other elements. Additionally, the analysis presented in this document does not take into account new travel demand management (TDM) strategies, which have the potential to further reduce vehicle trips generated by development in Tysons Corner.

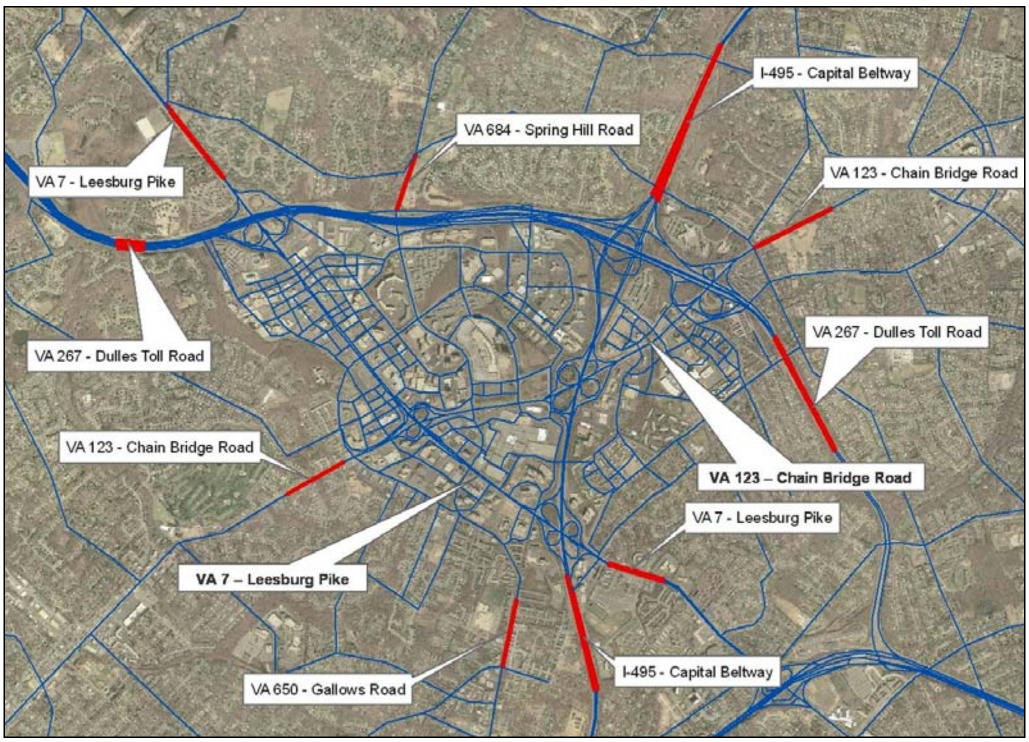


Figure 5.1 Key Locations for Impact Analysis of Highways

The results from the current Comprehensive Plan scenario were reviewed to determine the performance of the highway network at key locations shown in Figure 5.1 to verify the need for the improvements identified in the Recommended 2030 Network. These improvements were tested through the process of exploring differences in utilization among the subject facilities.

The approach used for this analysis was to first identify key locations on the facilities to use for the analysis (highlighted in Figure 5.1). Next, measures of effectiveness (MOEs) at these key locations were identified. This was done by examining the full traffic assignment for the selected land use scenarios (current Comprehensive Plan at 2030 level and proposed Tysons Comprehensive Plan at 2030 level), as well as examining the use of the facilities with a select link analysis.

The Recommended 2030 Network represents the product of identifying problem locations in the Recommended 2030 network and incorporating possible mitigation measures. The following MOEs were developed in the regional impact analysis:

- Peak hour volume and volume per lane for the facilities for morning and evening by direction;
- Change in volume to capacity ratio and link LOS by morning and evening peak hour by direction;
- Change in model travel time by time period;
- Change in model vehicle hours of delay by time period;
- Mode split results for trips destined to Tysons Corner (work and non-work); and
- Percentage of traffic traveling to and from Tysons Corner versus elsewhere.

These MOEs demonstrate the effectiveness of the possible mitigation measures that are represented in the 2030 Recommended Network and tested in the scenario analysis, such as the introduction of a grid of streets and additional ramps.

Table 5.1 and Table 5.2 present the peak hour volumes for each facility for the morning and evening peak period, respectively. Table 5.3 and Table 5.4 present the peak hour volumes per lane for each facility for the morning and evening peak period, respectively. The counts were adjusted based on the growth of the peak period model assignments. Since the refinements were solely based on the peak period results of the model they may somewhat over- or understate the traffic on each facility.

With the proposed Comprehensive Plan at 2030 and the Recommended 2030 Network for the morning peak hour there is a two percent decrease in total traffic for the sum of the locations shown in Figure 5.1, and a one percent decrease for the evening peak hour. There are, of course, volume changes at the individual locations.

In the morning peak hour forecasts, the largest change is forecast at the Spring Hill Road location north of VA 267, which shows a 23 percent increase in vehicles in the southbound direction and a 10 percent increase in the northbound direction. At this location, this facility is only one lane in each direction. The increase in the northbound (off-peak) direction is only 30 vehicles over the current Comprehensive Plan forecast, and therefore no significant impact is concluded. In the southbound (peak) direction, the increase of 235 vehicles for could be considered significant. This link primarily serves the communities north of the study area and through traffic is limited.

Table 5.1 Forecast Morning Peak Hour Volumes by Facility (vph)

Facility	Direction	Counts	Current Comprehensive Plan (2030)	Proposed Comprehensive Plan (2030)	Percent Change
VA 7 - West of Tysons	EB	2,504	2,930	2,295	-22%
	WB	1,205	1,385	1,130	-18%
Spring Hill Road	NB	346	285	315	10%
	SB	723	765	1,000	23%
I-495 - North of Tysons (GP)	NB	8,217	7,870	7,660	-3%
	SB	7,315	7,010	6,820	-3%
VA 123 - East of Tysons	EB	2,162	2,185	2,140	-2%
	WB	1,654	1,960	2,100	7%
VA 267 - East of Tysons (GP)	EB	2,793	1,070	1,030	-3%
	WB	2,553	980	1,110	14%
VA 7 - East of Tysons	EB	1,444	1,960	2,045	4%
	WB	1,946	2,100	2,300	10%
I-495 - South of Tysons (GP)	NB	8,226	8,070	8,060	0%
	SB	6,355	6,810	6,670	-2%
Gallows Road	NB	2,384	3,460	3,475	0%
	SB	857	775	855	10%
VA 123 - West of Tysons	EB	1,938	1,695	1,750	3%
	WB	533	435	475	9%
VA 267 - West of Tysons (GP)	EB	6,538	6,040	6,750	12%
	WB	4,742	5,580	5,340	-4%
VA 7 – Within Tysons	EB	1,649	2,150	1,780	-17%
	WB	3,013	1,400	2,520	80%
VA 123 - Within Tysons	EB	1,705	1,620	670	-59%
	WB	2,748	2,310	1,240	-46%
Total		**73,549**	**84,610**	**82,670**	**-2%**

Table 5.2 Forecast Evening Peak Hour Volumes by Facility (vph)

Facility	Direction	Counts	Current Comprehensive Plan (2030)	Proposed Comprehensive Plan (2030)	Percent Change
VA 7 - West of Tysons	EB	1,529	1,675	1,220	-27%
	WB	2,495	2,750	2,465	-10%
Spring Hill Road	NB	869	860	1,000	16%
	SB	413	270	470	74%
I-495 - North of Tysons (GP)	NB	6,626	6,310	6,340	0%
	SB	5,532	5,110	4,810	-6%
VA 123 - East of Tysons	EB	2,346	2,390	2,540	6%
	WB	2,198	2,220	2,170	-2%
VA 267 - East of Tysons (GP)	EB	1,094	1,057	1,150	9%
	WB	1,904	2,175	2,210	2%
VA 7 - East of Tysons	EB	2,658	3,560	3,155	-11%
	WB	1,654	2,190	2,165	-1%
I-495 - South of Tysons (GP)	NB	6,619	6,620	7,030	6%
	SB	7,385	7,240	7,180	-1%
Gallows Road	NB	1,239	1,780	1,795	1%
	SB	2,148	1,810	2,030	12%
VA 123 - West of Tysons	EB	1,010	580	750	29%
	WB	1,573	1,510	1,580	5%
VA 267 - West of Tysons (GP)	EB	4,758	5,210	5,260	1%
	WB	6,369	6,370	7,190	13%
VA 7 – Within Tysons	EB	2,399	1,800	2,810	56%
	WB	2,109	1,130	1,900	69%
VA 123 - Within Tysons	EB	2,443	2,540	1,050	-59%
	WB	2,857	2,500	720	-71%
Total		**70,226**	**69,640**	**68,990**	**-1%**

Table 5.3 Forecast Morning Peak Hour Volumes per Lane by Facility (vphpl)

Facility	Direction	Counts	Current Comprehensive Plan (2030)	Proposed Comprehensive Plan (2030)	Absolute Change
VA 7 - West of Tysons	EB	1,252	1,465	1,150	-315
	WB	402	460	380	-80
Spring Hill Road	NB	346	285	315	30
	SB	723	765	1000	235
I-495 - North of Tysons (GP)	NB	2,054	1,970	1,910	-60
	SB	1,829	1,750	1,700	-50
VA 123 - East of Tysons	EB	1,081	1,090	1,070	-20
	WB	827	980	1,050	70
VA 267 - East of Tysons (GP)	EB	1,397	530	520	-10
	WB	1,277	490	560	70
VA 7 - East of Tysons	EB	481	650	680	30
	WB	649	700	770	70
I-495 - South of Tysons (GP)	NB	2,057	2,020	2,020	0
	SB	1,589	1,700	1,670	-30
Gallows Road	NB	795	1,150	1,160	10
	SB	286	260	290	30
VA 123 - West of Tysons	EB	969	850	875	25
	WB	267	220	240	20
VA 267 - West of Tysons (GP)	EB	1,634	1,510	1,690	180
	WB	1,581	1,860	1,780	-80
VA 7 – Within Tysons	EB	412	540	450	-90
	WB	753	350	630	280
VA 123 - Within Tysons	EB	426	410	170	-240
	WB	687	580	310	-270

Table 5.4 Forecast Evening Peak Hour Volumes per Lane by Facility (vphpl)

Facility	Direction	Counts	Current Comprehensive Plan (2030)	Proposed Comprehensive Plan (2030)	Absolute Change
VA 7 - West of Tysons	EB	765	840	610	-230
	WB	832	920	820	-100
Spring Hill Road	NB	869	860	1,000	140
	SB	413	270	470	200
I-495 - North of Tysons (GP)	NB	1,657	1,580	1,580	0
	SB	1,383	1,280	1,200	-80
VA 123 - East of Tysons	EB	1,173	1,200	1,270	70
	WB	1,099	1,110	1,090	-20
VA 267 - East of Tysons (GP)	EB	547	530	580	50
	WB	952	1,090	1,100	10
VA 7 - East of Tysons	EB	886	1,190	1,050	-140
	WB	551	730	720	-10
I-495 - South of Tysons (GP)	NB	1,655	1,650	1,760	110
	SB	1,846	1,810	1,800	-10
Gallows Road	NB	413	590	600	10
	SB	716	600	680	80
VA 123 - West of Tysons	EB	505	290	380	90
	WB	787	760	790	30
VA 267 - West of Tysons (GP)	EB	1,586	1,740	1,760	20
	WB	1,592	1,590	1,800	210
VA 7 – Within Tysons	EB	600	450	700	250
	WB	527	280	480	200
VA 123 - Within Tysons	EB	611	640	260	-380
	WB	714	620	180	-440

VA 267 inside the Beltway shows a 14 percent increase over the current Comprehensive Plan in the westbound direction in the morning peak hour (approximately 70 vehicles per hour per lane). Given the high capacity of this highway facility the additional vehicles should not have a significant impact. Moreover, the forecast volume is lower than the count today; clearly, directly related to the extension of Metrorail through Tysons Corner.

Gallows Road shows a 10 percent increase over the current Comprehensive Plan forecast in the southbound direction for the morning peak hour. This is the off peak direction at this time of day and the additional 27 vehicles per hour per lane is not significant. The forecast for this link under the GMU High scenario is equivalent to the existing count.

VA 267 west of Tysons Corner shows an increase of 12 percent over the current Comprehensive Plan Forecast for the morning peak hour. This is in the peak direction and results in approximately 175 vehicles per hour per lane. Given the capacity of this facility it should not have a significant impact as compared to the current Comprehensive Plan forecasted volume.

The forecasts for the evening peak hour show similar patterns. For Spring Hill Road north of VA 267 there is an increase of approximately 200 vehicles per hour but in the off-peak direction and the total volume is well under capacity. This increase is reflective of the change in land use under the proposed Comprehensive Plan scenario and the mix and intensity of households, retail, and jobs. There is a 16 percent increase in the peak direction for the evening peak hour, which results in additional 140 vehicles per hour. Again, as in the morning peak, this is facility serves the surrounding communities and local traffic. The cordon analysis confirms there are other gateways and approaches that improve under the proposed Comprehensive Plan scenario that might help mitigate the congestion on this approach.

In the evening peak hour VA 267 west of Tysons Corner shows an increase of 13 percent in the peak direction, but this results in only an additional approximately 200 vehicles per lane per hour. The facility is approaching capacity at this link with approximately 1,800 vehicles per hour per lane. Some of the issue here is the loss of a lane for HOV operations in the peak direction during the peak period, but the importance of the HOV facility may balance the added non-HOV demand.

Overall, the analysis shows that the 2030 Recommended Network adequately serves the proposed 2030 Comprehensive Plan land use. None of the facilities show an overwhelming need for additional lanes based on the change in vehicles per hour per lane between the proposed 2030 Comprehensive Plan scenario (which includes the Recommended 2030 Network) and the current Comprehensive Plan scenario.

A number of factors explain the relatively small change in traffic flow forecast between the current Comprehensive Plan and the proposed Comprehensive Plan land use, including:

- The additional transit infrastructure and services provided to and within Tysons Corner under the proposed Comprehensive Plan scenario encourage transit usage;
- The TOD focus of the proposed Comprehensive Plan land use better leverages the transit infrastructure and service improvements as compared with the existing Comprehensive Plan;
- There is a better balance of jobs versus households under the proposed Comprehensive Plan land use forecast which leads to more internal-to-internal commuting trips within Tysons Corner versus external-to-internal commuting trips; and
- There is improved roadway connectivity and additional roadway facilities present in the Recommended 2030 Network as compared with the current Comprehensive Plan roadway network.

Table 5.5 shows the change in the volume/capacity ratios and level of service (LOS) for the studied facilities. The LOS for each facility is calculated based on volume to capacity ratio and does not take into account intersection delay. Including intersection delay would decrease the LOS on the facilities shown.

Table 5.5 Change in V/C and LOS by Peak Hour

		Changes in V/C		Changes in LOS	
	Direction	**AM**	**PM**	**AM**	**PM**
VA 7 – West of Tysons	EB	-22%	-27%	D to C	B
	WB	-18%	-10%	B to A	C
Spring Hill Road	NB	-6%	12%	C	E
	SB	-7%	67%	E	C to D
I-495 – North of Tysons	NB	-3%	0%	E	D
	SB	-3%	-6%	E to D	C
VA 123 – East of Tysons	EB	-2%	6%	C	D
	WB	7%	-2%	C	C
VA 267 – East of Tysons	EB	-19%	-9%	C	B
	WB	-4%	-15%	C to B	C
VA 7 – East of Tysons	EB	4%	-11%	B	D
	WB	10%	-1%	B to C	B
I-495 – South of Tysons	NB	-12%	-7%	F	E
	SB	-2%	-1%	D	E
Gallows Road	NB	0%	1%	E	D
	SB	10%	12%	A to B	E
VA 123 – West of Tysons	EB	7%	34%	C	A
	WB	20%	15%	A	B to C
VA 267 – West of Tysons	EB	12%	1%	D	C
	WB	-4%	13%	C	D to E
VA 7 – Within Tysons	EB	-17%	56%	A to B	B to C
	WB	80%	69%	B to C	A to B
VA 123 - Within Tysons	EB	-58%	-58%	B to C	C to B
	WB	-56%	-76%	B	C to A

Differences in travel times from the model along the selected facilities can be found in Table 5.6. These travel times represent the differences in modeled travel time from a point on one side of Tysons Corner to a point on the other side of Tysons Corner (both outside of Tysons Corner itself). These travel times do not represent actual travel times through Tysons Corner, as the model is not calibrated for travel time, and therefore should only be examined on the basis of change. The maximum change in travel time over all the facilities was approximately five minutes while the minimum was no change. I-495 is the only facility which shows an improvement in travel time, with widely varying increases in travel times across the other facilities.

Table 5.6 Change in Travel Time through Tysons Corner by Facility (Percentage and Absolute Minutes)

	Morning		**Evening**		**Off-Peak**	
	Percent Change	Time Change	Percent Change	Time Change	Percent Change	Time Change
VA 7 – Westbound	29%	4 min	10%	2 min	15%	2 min
VA 7 – Eastbound	18%	3 min	25%	4 min	21%	3 min
Spring Hill Road to Gallows Road	28%	3 min	14%	2 min	19%	2 min
Gallows Road to Spring Hill Road	25%	3 min	19%	3 min	23%	3 min
I-495 – Southbound	-19%	-2 min	-5%	-1 min	-12%	-1 min
I-495 – Northbound	-17%	-3 min	-5%	-1 min	-27%	-3 min
VA 123 – Westbound	9%	1 min	12%	1 min	15%	1 min
VA 123 – Eastbound	11%	1 min	16%	2 min	13%	1 min
VA 267 – Westbound	0%	0 min	46%	2 min	6%	< 1 min
VA 267 – Eastbound	9%	< 1 min	11%	1 min	0%	0 min

Table 5.7 shows the change in vehicle hours of delay by facility, from the current 2030 Comprehensive Plan to the proposed 2030 Comprehensive Plan scenario. This measures the increase in time to travel that specific link over the free-flow time which is then multiplied by the total number of vehicles traveling the link. Most of the facilities did not have a large increase in delay, or a decrease, as in the case of I-495 and VA 267 east of Tysons Corner. Spring Hill Road, VA 123, and VA 267 west of Tysons Corner are the facilities which experience the greatest increases in vehicle hours of delay.

Table 5.7 Percent and Absolute Change in Vehicle Hours of Delay for the Peak Hour by Facility (current 2030 Comprehensive Plan to the proposed 2030 Comprehensive Plan scenario)

	Percent Change	**Absolute Change**
VA 7 – West of Tysons	-26%	-3.8 hours
Spring Hill Road	79%	5.9 hours
I-495 – North of Tysons	-25%	-113.7 hours
VA 123 – East of Tysons	6%	4.9 hours
VA 267 – East of Tysons	-51%	-0.5 hours
VA 7 – East of Tysons	13%	3.3 hours
I-495 – South of Tysons	-14%	-96.3 hours
Gallows Road	65%	51.5 hours
VA 123 – West of Tysons	79%	14.7 hours
VA 267 – West of Tysons	99%	12.9 hours

Table 5.8 details the percentages of trips that are within Tysons Corner, originate in Tysons Corner, or are destined for Tysons Corner. From this table it can be seen that the proposed 2030 Comprehensive Plan has higher proportions of traffic generated internally and destined elsewhere. In contrast, the current Comprehensive Plan attracts more traffic to Tysons Corner.

Table 5.8 Total Daily Motorized (Automobile and Transit) Person Trips with Origin And/Or Destination in Tysons Corner for All Trip Purposes

	Current Comprehensive Plan (2030)	**Proposed Comprehensive Plan (2030)**
Within Tysons	13%	17%
Originating in Tysons	22%	28%
Destined for Tysons	65%	56%

Merge Analysis of Ramps Connecting Tysons to the Dulles Toll Road and I-495

Inside Tysons, the grid of streets provides alternative vehicle paths which divert traffic away from Rt. 7 and to a lesser degree, away from Rt. 123. Because of this and other diversions, the roads inside Tysons perform relatively well as indicated in the previous section of this report. However, the number of entrance and exit points to and from Tysons are limited by:

- the Dulles Toll Road (DTR) and I-495 (the Beltway) both of which serve as a barrier;
- the difficulty and severe limitations associated with expanding the capacity of existing major arterials (Rt. 7 and Rt. 123) beyond improvements already included in the County's Comprehensive Plan prior to this plan amendment.

Because of this limitation, entry and exit points to and from Tysons have an elevated level of importance and a requirement for these points to function as effectively as possible. The existing DTR interchanges at Rt. 7 and Spring Hill Road will not be able to accommodate the 2030 estimated traffic volumes. For this reason, additional ramp locations were included in the 2030 Comp Plan network by extending Boone Blvd. and Greensboro Drive to the DTR.

In and around Tysons the evening peak period is more congested than the morning peak period. A merge capacity analysis was therefore performed for the evening peak at the on-ramps to westbound Dulles Toll Road (the peak direction) and the on-ramps to the Outer Loop of I-495 (the peak direction). The application of the HCM freeway merge analysis shows that merging failed at two locations. Table 5.9 below shows the relevant volumes for the merge analysis at the two ramp merges that fail.

Table 5.9 2030 Merge Analysis of Ramps Connecting Tysons to the Dulles Toll Road and I-495

Location	2030 Ramp Volume for Proposed Comp Plan	2030 Freeway Volume for Proposed Comp Plan	Freeway Number of Lanes	2030 LOS at Merge	2030 LOS at Merge After Mitigation
On-ramp from proposed Boone Blvd. extension to WB DTR	1,040	6,390	3	F	D
On-ramp from Rt. 7 to SB I-495	2,430	6,450	4	F	C

Both locations fail. Because of the importance of these ramps operating as effectively as possible, it is necessary to mitigate the problem merges. Because of the close spacing of the on-ramps on the DTR, it is recommended that collector-distributor (CD) lanes be added in both the WB and EB directions. Further capacity analysis shows that the CD lanes need to continue to a point west of the Hunter Mill Rd interchange. At this location the merge of the CD traffic into the general purpose lanes of the DTR will operate at LOS D as indicated in Table 5.9.

A similar analysis and mitigation process was performed for the on-ramps from Rt. 123 and the Outer Loop of I-495. At this location, the merge failed as indicated in Table 5.9. It is recommended that a CD lane be added to the Outer Loop between the Rt. 7 interchange and I-66. With the addition of this CD lane, the merge improves to LOS C as indicated in Table 5.9.

5.3.3 2030 Impact and Needs Assessment – Highways Within Tysons

For the congested vehicle miles of travel, the proposed Comprehensive Plan Land Use (the 2030 GMU High Modified scenario) has the same amount of congested vehicle miles as the current Comprehensive Plan. The congested vehicle miles of travel for these two scenarios are 18 percent higher when compared to the 2005 vehicle miles of travel as shown in Figure 5.2 below.

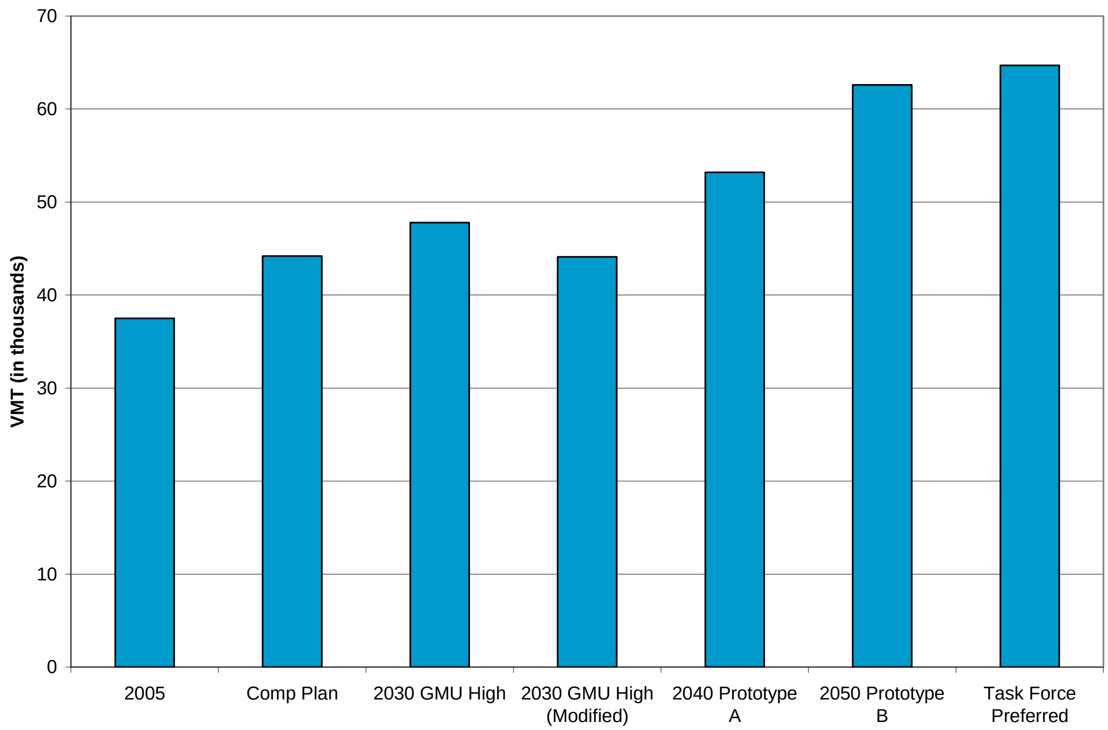


Figure 5.2 Congested Vehicle Miles of Travel Within Tysons Corner (LOS F)

5.3.4 2030 Impact and Needs Assessment – Impact on Surrounding Communities

An assessment of the traffic impact of the proposed Comprehensive Plan on neighborhoods along the periphery of Tysons was conducted. Working with the elected representative's local communities, FCDOT selected nineteen (19) intersections for assessment in this study. The major corridors in the study area are Leesburg Pike (Route 7, Lewinsville Road/Great Falls Road, Gallows Road, Maple Avenue/Chain Bridge Road/Dolley Madison Blvd (Route 123), and Georgetown Pike.

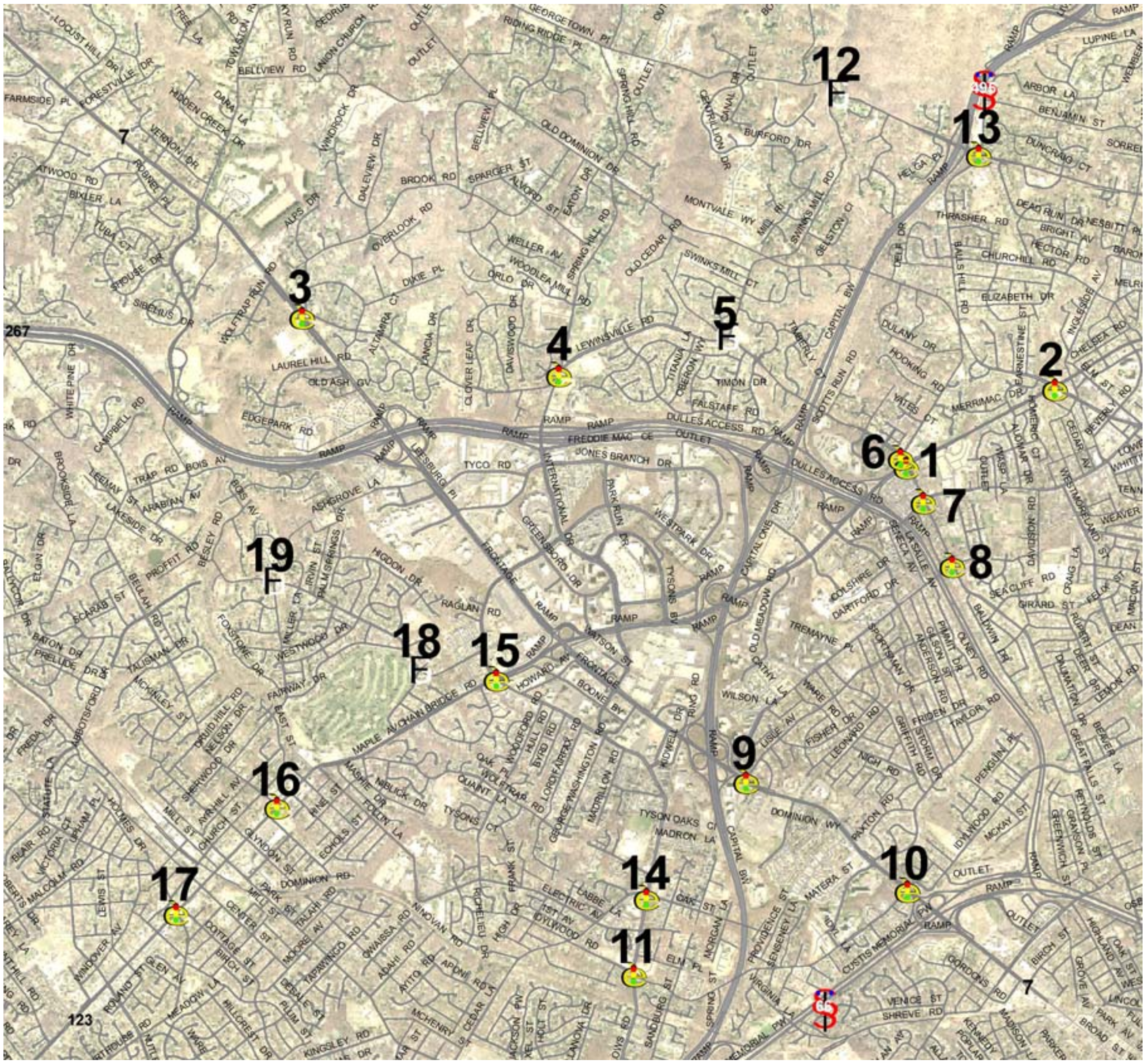


Figure 5.3 Location of intersections analyzed as part of the Neighborhood Impact Analysis

Two study scenarios were considered for this project: the current Comprehensive Plan and the proposed Comprehensive Plan for Tysons. Using growth rates obtained from the modeling analysis, the average growth rates for each roadway link was obtained by applying the NCHRP refinement method. The volumes were derived using WinTurns software program to achieve year 2030 turning movement counts at all the intersections under both study scenarios. Currently, eight (8) intersections in the study area operate at acceptable levels of service (defined in this report as LOS D or better) under existing year 2008 conditions (AM and/or PM peak hours). Under future conditions, five (5) existing intersections are projected to operate at acceptable levels of service under both current Comp Plan and proposed Comp Plan scenarios.

For the failing intersections (operating at LOS E and LOS F), mitigation measures such as changes in lane configurations and signal timing /traffic control to achieve acceptable levels of service, were identified for each applicable scenario. The results of the analysis are presented in Table 5.10 below.

Table 5.10 Summary of Intersection Capacity Analyses

Intersection	2008 Existing		2030 Comp Plan - No Imp.		2030 Comp Plan - Pro. Imp.		2030 GMU High Plan - No Imp.		2030 GMU High Plan - Pro. Imp	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Int 1: Great Falls & Dolley Madison Blvd	D	E	D	E	D	D	D	E	D	D
Int 2: Old Dominion Dr & Dolley Madison Blvd	E	D	E	D	E	D	E	D	E	D
Int 3: Leesburg Pike & Lewinsville Road	C	E	C	F	C	D	D	F	C	D
Int 4: Spring Hill Rd & Lewinsville Road	D	E	F	F	D	D	E	F	D	D
Int 5: Swinks Mill Rd & Lewinsville Road *	-	-	-	-	-	-	-	-	-	-
Int 6: Great Falls St & Balls Hill Road	B	A	B	A	-	-	B	A	-	-
Int 7: Great Falls St & Chain Bridge Road	D	E	D	F	C	D	D	E	C	D
Int 8: Great Falls St & Magarity Road	B	C	B	B	-	-	B	C	-	-
Int 9: Leesburg Pike & Lisle Avenue	D	D	E	F	D	D	F	F	D	D
Int 10: Leesburg Pike & Idylwood Rd	E	D	F	F	D	D	F	F	D	D
Int 11: Gallows Rd & Idylwood Rd	D	C	F	D	D	D	F	E	D	D
Int 12: Georgetown Pk & Swinks Mill Rd *	-	F	F	F	D	D	F	F	C	D
Int 13: Georgetown Pk & Balls Hill Rd	C	C	C	C	-	-	C	C	-	-
Int 14: Gallows Rd & Cedar Lane	D	C	F	C	D	C	F	C	D	C
Int 15: Old Courthouse Rd & Chain Bridge Rd	F	E	E	F	E	E	F	F	E	D
Int 16: Beulah Rd & Maple Ave	C	F	C	F	C	D	C	F	C	D
Int 17: Lawyers Rd & Maple Ave	F	F	F	F	E	D	F	F	E	E
Int 18: Westbriar Dr & Old Courthouse Rd *	-	F	F	F	C	D	-	F	B	B
Int 19: Creek Crossing Rd & Old Courthouse Rd *	-	-	-	-			-	-		
Operating at LOS E or F	4	9	10	11	3	1	9	12	3	1
Operating at LOS E or F during AM and/or PM Peak	11		14		3		14		3	
Operating at LOS D during both AM and PM Peak	8		5		16		5		16	
Total No. of Intersections	19		19		19		19		19	

The cost involved in implementing the improvements necessary to mitigate the proposed Tysons Comprehensive Plan land use traffic was estimated to be $14 million.

5.4 Transit Needs Assessment

5.4.1 Transit Development Plan Overview

Recommendations for bus service for Tysons Corner are contained in the County's Transit Development Plan (TDP), currently in draft form for public review. The TDP is a 10 year plan to improve bus service Countywide. Conducted over the course of the last two years, the TDP is a comprehensive review of bus service in the County with detailed recommendations for new and modified routes. A particular focus of the study was for bus service within Tysons Corner.

These recommendations are based the opening of the Metrorail Silver line and on projected employment and residential patterns and are designed to be implemented between the opening of Phase 1 of the Metrorail Silver line and 2020. There are several types of recommended service changes described below: express bus; restructured regional routes; neighborhood/local routes; and internal circulators.

5.4.2 Express Bus Recommendations

The construction of the new HOT Lanes along the Capital Beltway (I-495) between Springfield and the Dulles Toll Road and on I-95 and I-395 provides an opportunity to establish cross county express BRT services connecting South County and North County communities. The 14-mile long I-495 HOT Lanes are currently under construction with an expected completion in 2013 and will provide two lanes in each direction. The construction of the I-95/I-395 HOT lanes is due to begin in 2010 and will provide two reversible lanes to serve peak HOV traffic.

Three routes are recommended to operate peak periods at 15 minute headways as follows:

Lorton – Tysons: This route would provide peak period express service connecting Lorton with Tysons Corner via the Franconia-Springfield Metro Station. Lorton is a fast growing area that should generate significant ridership for commuting to growing employment opportunities in Tysons. This route would begin at the Sydenstricker Park and Ride and follow the alignment of the proposed new route 309 until the I-95 entrance ramp. Reverse peak trips which otherwise would deadhead on this route would provide revenue service to the Engineering Proving Ground (EPG), providing access to the new NGA campus for people who currently reside in northern Fairfax County and the Tysons Corner area. Upon serving the NGA, this route would continue to the Sydenstricker Park & Ride via Rolling Road and the Fairfax County Parkway. The route would also complement Fairfax Connector 401, which would continue to provide local service.

Tysons – Ft. Belvoir: This route would provide an opportunity for easy access to Springfield and Ft. Belvoir by providing a direct and fast transit option for North County residents that work at Fort Belvoir. Secondarily, it would provide additional capacity for Springfield area residents traveling to the Tysons area supplementing the Lorton route.

Burke Center – Tysons: This route would provide express bus service from the Braddock District to Tysons connecting the Braddock residential communities with the Tyson area employment opportunities. Burke Centre is a residential area with many employees forecast to work in the Tysons area. There is no current transit connection between these parts of the county. This route would also serve a proposed park and ride lot to be constructed on Braddock Road between Rolling Road and Burke Lake Road. This route would provide weekday service from Burke Centre Park-and-Ride to the future Tysons Central station via Guinea Road, Braddock Road and I-495 HOT Lanes.

5.4.3 Restructured Regional Routes

The Metrorail extension from West Falls Church to Dulles Airport via Tysons Corner and the Dulles Toll Road is one of the largest infrastructure projects in Fairfax County. The new line, to be built in two phases, will have far-reaching implications for bus service in the northern part of Fairfax County. Restructuring of bus service in the Silver Line corridor is necessary to accommodate and complement the rail extension. Routes recommended for restructuring are listed below. Details can be found in the TDP.

Metrobus Route 2C
Metrobus Route 2T
Metrobus Route 3T
Metrobus Route 5A
Metrobus Route 15KL
Metrobus Route 23A
Metrobus Route 24T
Metrobus Route 28AB
Metrobus Route 28T
Fairfax Connector 462
Fairfax Connector 463
Fairfax Connector 574

5.4.4 Neighborhood/Local Routes

Several of the restructured routes above will result in shorter routes that connect Tysons Corner to adjoining communities. One new neighborhood/local route is recommended: the McLean Connector.

Two separate alignments for this route are envisioned, one for peak periods and one for midday/evening service and possible weekend service. The peak service would link the CIA facility to central McLean, Tysons East Metrorail station, Lewinsville Road, and Tysons West Metrorail. The off-peak service would be more limited in coverage, linking central McLean to Tysons Corner, with a western terminal at Tysons Center 123 station.

During the morning peak period, the route would begin at Tysons East Metrorail and head eastbound on Chain Bridge Road. Joining VA-123, the eastbound trip would terminate at the CIA facility. The bus would then turn around and retrace its route to Tysons East. Next, it would follow Lewinsville Road around Tysons Corner to Spring Hill Rd, terminating at Tysons West in order to cover the territory not served by the new streamlined 24T. In the afternoon peak, the pattern would be reversed. This proposed routing of the McLean Connector would be instead of the F4 shuttle listed in the Tysons TMP.

During off-peak periods, an alignment similar to that recommended in the Tysons TMP would be operated. The route would begin at Tysons Corner Center or Tysons Central 123 Metrorail (to be determined in the Tysons planning task of the TDP). It would follow Chain Bridge Road to the east, serving central McLean and then turn left on Fleetwood. The route would follow Fleetwood to Elm Street and turn left and then right on Beverly. At the end of Beverly, the route would turn left on Ingleside and then right on Chain Bridge to return to Tysons Corner. For both peak and off-peak service, an enhanced bus shelter, with excellent pedestrian access, bicycle parking and possibly commuter parking oriented to McLean residents should be located along the route, likely along Chain Bridge Road, to serve as a focus of bus service in downtown McLean.

5.4.5 Internal Circulators

To complement the rail service, an initial service concept for internal circulation routes in Tysons Corner has been developed. In order to keep the routes short and as direct as possible, the "Tysons Link" service consists of five routes, described below. Previous circulation plans for Tysons had used one or two routes with a loop structure to cover the many trip generators in the area. To explore the longer term concept of a Circulator within dedicated right-of-way. Possibly on a fixed-guide way, developed by the Tysons Task Force, the County will conduct a separate Circulator study

Each of these five routes was designed to connect areas of employment and residences with two Silver Line stations and shopping and eating establishments. All routes serve the Tysons Central 123 station, four of them also serve Tysons West, and one also serves Tysons East.

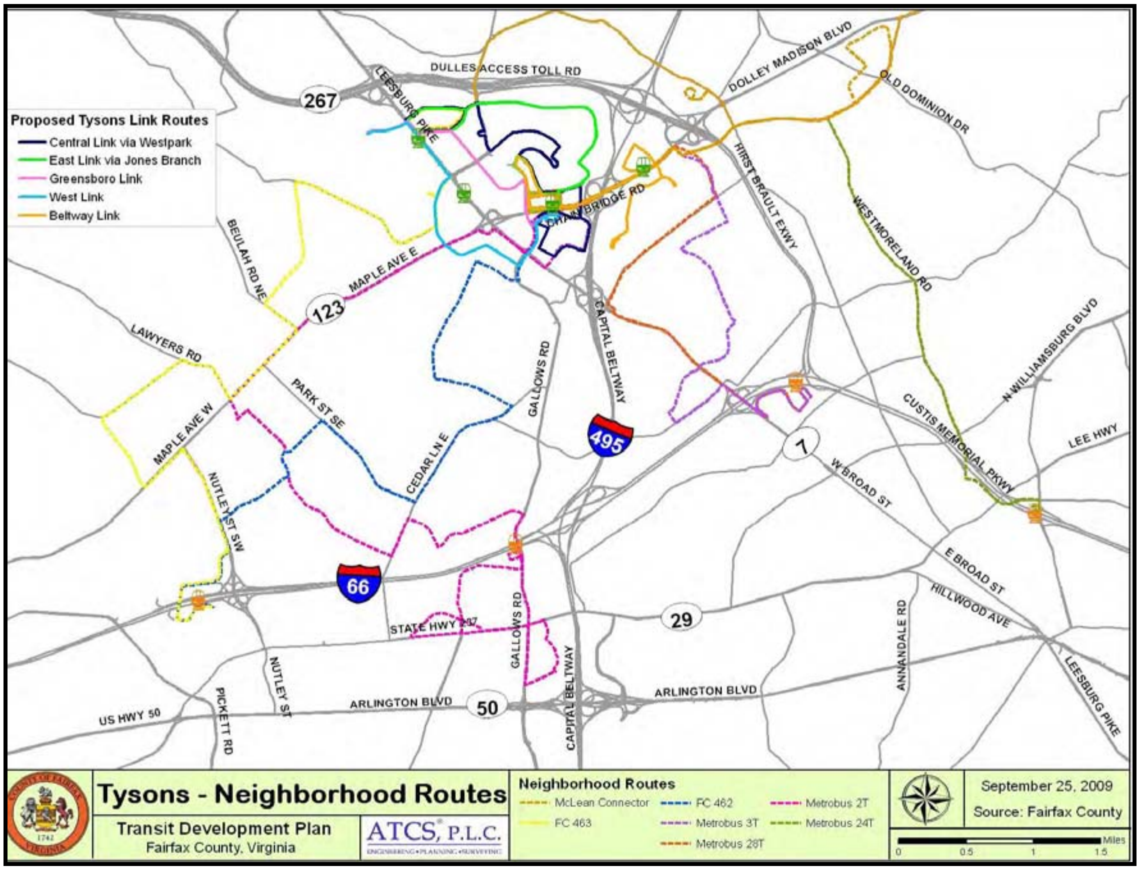
The Beltway Link (orange on maps) serves the area inside the Capital Beltway, including the Capital One complex, Old Meadow Road, Colshire, and Tysons East station. It links these areas to Tysons Central 123 via Dolley Madison Drive and during lunchtime will circulate through the Galleria at Tysons II.

The East Link (green on maps) serves Jones Branch and the eastern edge of Westpark Drive, connecting employment and the Hilton hotel with the Galleria at Tysons II. It runs between Tysons West and Tysons Central 123, and also would make the lunchtime loop through the Galleria.

The Central Link (navy blue on maps) serves residential areas such as the Rotonda and housing along Westpark Drive and then operates through the heart of the Galleria (using the mall road as the current Tysons Connector (free Lunch Shuttle) does and then a loop through Tysons Corner Center.

The Greensboro Link (pink on maps) operates between Tysons West and Tysons Central 123, and connects the employment along Greensboro Drive to Tysons Corner Center and Westwood Center Drive.

Finally, the West Link (aqua blue on maps) operates along VA 7, Gosnell, Old Courthouse, Boone, and Gallows to provide access to buildings along VA 7 and areas to the west. It connects Tysons West and Tysons Central 123, and also serves Westwood Center Drive.



5.4.6 2020 to 2030 Transit Recommendations

From 2020 to 2030, the bus services described above would be improved by operating more frequently and with improved spans of service. In particular, the express bus routes operating on the HOT lanes would be improved by expanding service to off-peak periods and by operating more frequent service if warranted by demand. Additional express bus service would be added in the I-66 corridor.

5.5 2050 Land Use Scenario Analysis (Sketch Planning Analysis)

5.5.1 Background to the Sketch Planning Analysis

The results of the 2030 proposed Comprehensive Plan Scenario Analysis show that the problem locations on the highway network can be found at traffic merge points at the Dulles Toll Road (DTR) and I-495 during the evening peak. Recommended mitigation measures for these problem locations are the addition of collector-distributor (CD) lanes along the Dulles Toll Road west of the Virginia Route 7 interchange and the provision of an additional CD lane along the Outer Loop between the Virginia Route 7 interchange and the I-66 interchange. With these improvements, the DTR corridor (including the Dulles Access Road) will have a total of 16 or 18 lanes depending if one or two CD lanes per direction is provided. The provision of the CD lanes will be a challenge because of right-of-way issues. Considering this, further expansion of the DTR is unlikely. The I-495 corridor will have 13 lanes with the provision of the additional lane on the Outer Loop. Right-of-way for this additional lane is also a challenge and therefore it is reasonable to assume that the provision of further lanes along I-495 in the vicinity of Tysons will be unlikely beyond the additional HOT lanes and the CD lane.

There are also limitations applicable to the arterials serving Tysons. The proposed 2030 Comprehensive Plan Network contains capacity improvements (additional lanes) for nearly all the arterials. There are significant limitations to the available right-of-way along these arterials and further expansion beyond those already included in the proposed 2030 Comprehensive Plan Network does not seem possible.

Considering the limitations in providing additional highway capacity beyond what is included in the Recommended 2030 Comprehensive Plan Network, the transportation infrastructure and programs that are required to accommodate the 113 million square feet of development for Tysons by 2050 are therefore assumed to focus on the provision of additional transit infrastructure as well as additional TDM measures. These measures are required to keep vehicle trips reasonably constant at the 2030 level.

5.5.1 The Required Transit Modal Split

The process that was applied for this analysis was to hold the cordon vehicle volumes at the demand level associated with the proposed 2030 Comprehensive Plan land use intensity, and shift the additional single-occupancy vehicle (SOV) person trips to transit. Given the assumption that the proposed 2030 Comprehensive Plan Network can handle the demand generated from the proposed 2030 Comprehensive Plan land use intensity, the required transit mode share was determined for the proposed 2050 Comprehensive Plan land use intensity.

It was assumed that the number of high occupancy vehicle (HOV) trips would stay constant, and that additional transit trips would need to shift from SOV. The projected transit modal share for

2030 and the required modal share for 2050 are shown in Table 5.11 for the evening peak. The required model share is based on the evening peak because it is the most congested period.

Table 5.11 Required Evening Peak Period Transit Modal Share

Land Use Alternative	Intensity (total GFA, sq. ft.)	Projected Transit Modal Share	Required Transit Modal Share
Proposed Comprehensive Plan , 2030 Land Use Intensity	84 million	22%	N/A
Proposed Comprehensive Plan , 2050 Land Use Intensity	113 million	23%	35%

5.5.2 Measures to Increase Transit Modal Split to the Required 2050 Level

Strategy 1: Enhanced TDM

With the enhanced TDM strategies (enhanced over and above what was assumed for the 2030 analysis) an additional reduction of four percent of vehicle trips can be expected. The reduction was taken from the SOV trips because most of the enhanced TDM strategies encourage shared ride and transit use. Because the TDM trip reductions were taken off of the SOV trips, the HOV mode share increased relative to the original modes share, despite the number of HOV trips being held constant. This is a conservative assumption, as TDM strategies encourage HOV use, and so the number of HOV trips could actually increase resulting in an even higher mode share figure.

The mode shifts that result from the enhanced TDM measures can be found in Table 5.12. As can be seen from Table 5.12, the required transit modal split for 2050 has decreased to 31% due to the enhanced TDM measures. The specific TDM measures can be found in Table 5.13.

Table 5.12 Evening Peak Period Transit Modal Share With Enhanced TDM Measures

Land Use Alternative	Intensity (total GFA, sq. ft.)	Projected Transit Modal Share	Required Transit Modal Share
Proposed Comprehensive Plan , 2030 Land Use Intensity	84 million	22%	N/A
Proposed Comprehensive Plan , 2050 Land Use Intensity	113 million	23%	31%

Table 5.13 Tysons Corner Enhanced Travel Demand Management Strategies

Strategy	Variable	Four Station Districts, North Central, and Old Courthouse	Northwest and Eastside
Carpool	Current Program Level	Low = Carpool information activities (tied in with areawide matching), and a 1/4 time transportation coordinator.	Low = Carpool information activities (tied in with areawide matching), and a 1/4 time transportation coordinator.
	Enhanced Program Level	Medium/High = In-house carpool matching and information services, plus preferential parking for carpools, and a 1/2 time coordinator.	Medium/High = In-house carpool matching and information services, plus preferential parking for carpools, and a 1/2 time coordinator.
	Employer Participation	Mandatory for new development	Voluntary
Vanpool	Current Program Level	Low = Vanpool information activities (tied in with areawide vanpool matching and/or third-party vanpool programs), plus 1/4 time transportation coordinator.	Low = Vanpool information activities (tied in with areawide vanpool matching and/or third-party vanpool programs), plus 1/4 time transportation coordinator.
	Enhanced Program Level	Medium/High = In-house vanpool matching services, vanpool development and operating assistance, plus a 1/2 time coordinator.	Medium/High = In-house vanpool matching services, vanpool development and operating assistance, plus a 1/2 time coordinator.
	Employer Participation	Mandatory for new development	Voluntary
Transit	Current Program Level	Low = Transit information center plus 1/4 time transportation coordinator.	Low = Transit information center plus 1/4 time transportation coordinator.
	Enhanced Program Level	Medium/High = Transit information center and a policy of work hours flexibility, on-site bus pass sales, plus a 1/2 time transportation coordinator.	Medium/High = Transit information center and a policy of work hours flexibility, on-site bus pass sales, plus a 1/2 time transportation coordinator.
	Employer Participation	Mandatory for new development	Voluntary
Vanpool Preferential Parking – Enhanced Program Level	Walk Time Reduction	1 minute	1 minute
	Employer Participation	Mandatory for new development	Voluntary
Telecommuting – Enhanced Program Level	% Eligible	17% of total office employment	17% of total office employment
	Employer Participation	Mandatory for new development	Voluntary
	Ave # of days/week	1	1
Alt. Work Schedules (9/80 work week and flextime) – Enhanced Program Level	% Eligible	17% of total office employment	17% of total office employment
	Employer Participation	Mandatory for new development	Voluntary
	Max % of trips shifted from peak	14% (from COMMUTER model)	14% (from COMMUTER model)

Strategy 2: Additional Lower Cost Transit Services

To determine the best markets for transit service to and from Tysons Corner, a review of the origins of all daily vehicle trips destined for and originating in Tysons Corner was performed. Figures 5.4 and 5.6 show the trip densities for person trips using SOV or HOV produced in and attracted to Tysons Corner for the proposed Comprehensive Plan. Figures 5.5 and 5.7 show all transit trips (including bus and rail) produced in and attracted to Tysons Corner, to determine current transit markets that could be improved and to help identify possible markets not served.

Figures 5.4 and 5.5 provide data to support identification of where potential transit markets to serve trips produced in Tysons Corner could be located. Figure 5.4 shows the location of attractions for proposed Comprehensive Plan automobile trips (SOV and HOV) that are produced in Tysons Corner, with the blue-shaded areas showing zones that have enough vehicle trips to potentially support bus improvements, additional bus service, and rail service.

Figure 5.5 shows the proposed Comprehensive Plan transit trips, which indicates areas that could support bus or rail service improvements. The strongest existing transit markets are shown to be in the Tysons Corner study area itself and areas served by Metrorail, including the Rosslyn-Ballston corridor, the Reston-Herndon area, and the D.C. core. Looking at Figure 5.5 along with Figure 5.4 suggests that Dunn Loring/Merrifield, Falls Church, McLean, and Springfield are possible under-served markets for transit service from Tysons Corner.

The location of productions for trips attracted to Tysons Corner are shown in Figures 5.6 and 5.7 (automobile trips and transit trips, respectively). These origins are the most desirable to capture with transit as they are most directly related to the transit capture shares provided in Table 5.12. However, it is apparent from a review of Figure 5.6 that they are more dispersed than the secondary employment centers are. Comparing Figure 5.6 with Figure 5.7 suggests that there is some potential to improve transit capture to Tysons Corner through additional service from the areas of Annandale, Dunn Loring/Merrifield, Fair Oaks, Herndon, McLean, Reston, and Vienna.

The analysis identified some apparent potential markets for enhanced transit service. Increased levels of congestion and aggressive parking management coupled with improved direct transit service and transit-supportive policies could result in additional transit capture beyond that in the original model runs for the proposed Comprehensive Plan.

In summary, the following additional transit services and facilities supporting transit services are recommended as lower cost elements that will increase transit modal split by an average of 3% based on available data:

- Neighborhood feeder buses (Dulles Toll Road)
- Enhanced express buses, BRT (I-66, Beltway)
- Additional park-and-ride capacity (various locations)

The mode shifts that result from the enhanced lower cost transit services can be found in Table 5.14. As can be seen, the new projected transit modal share is not at the required level of 31%.

Figure 5.4 Trip Attractions for the proposed Comprehensive Plan Automobile-Based Person Trips Produced in Tysons Corner per Square Mile (SOV and HOV)

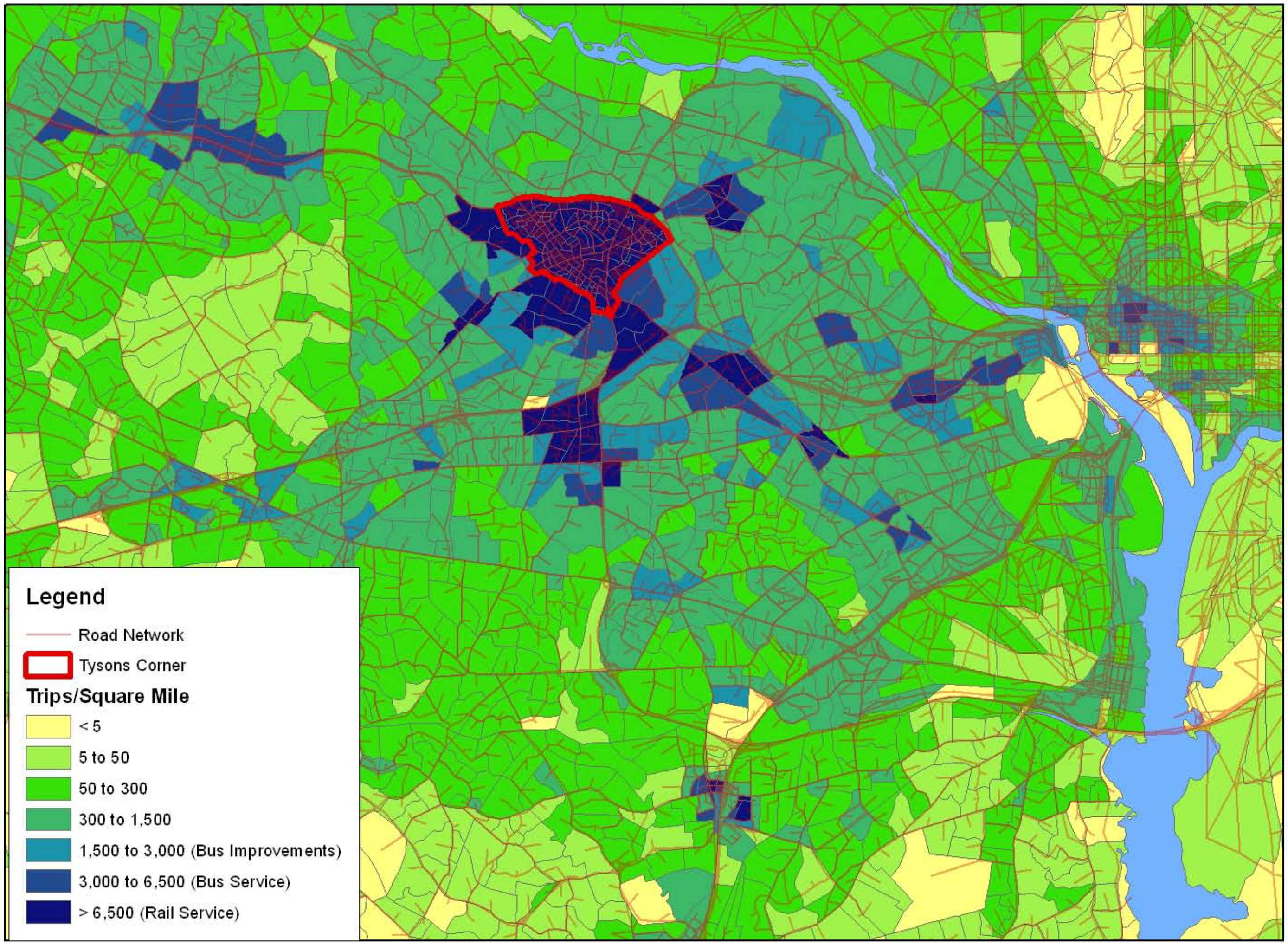


Figure 5.5 Trip Attractions for proposed Comprehensive Plan Transit Person Trips Produced in Tysons Corner per Square Mile (Bus and Rail)

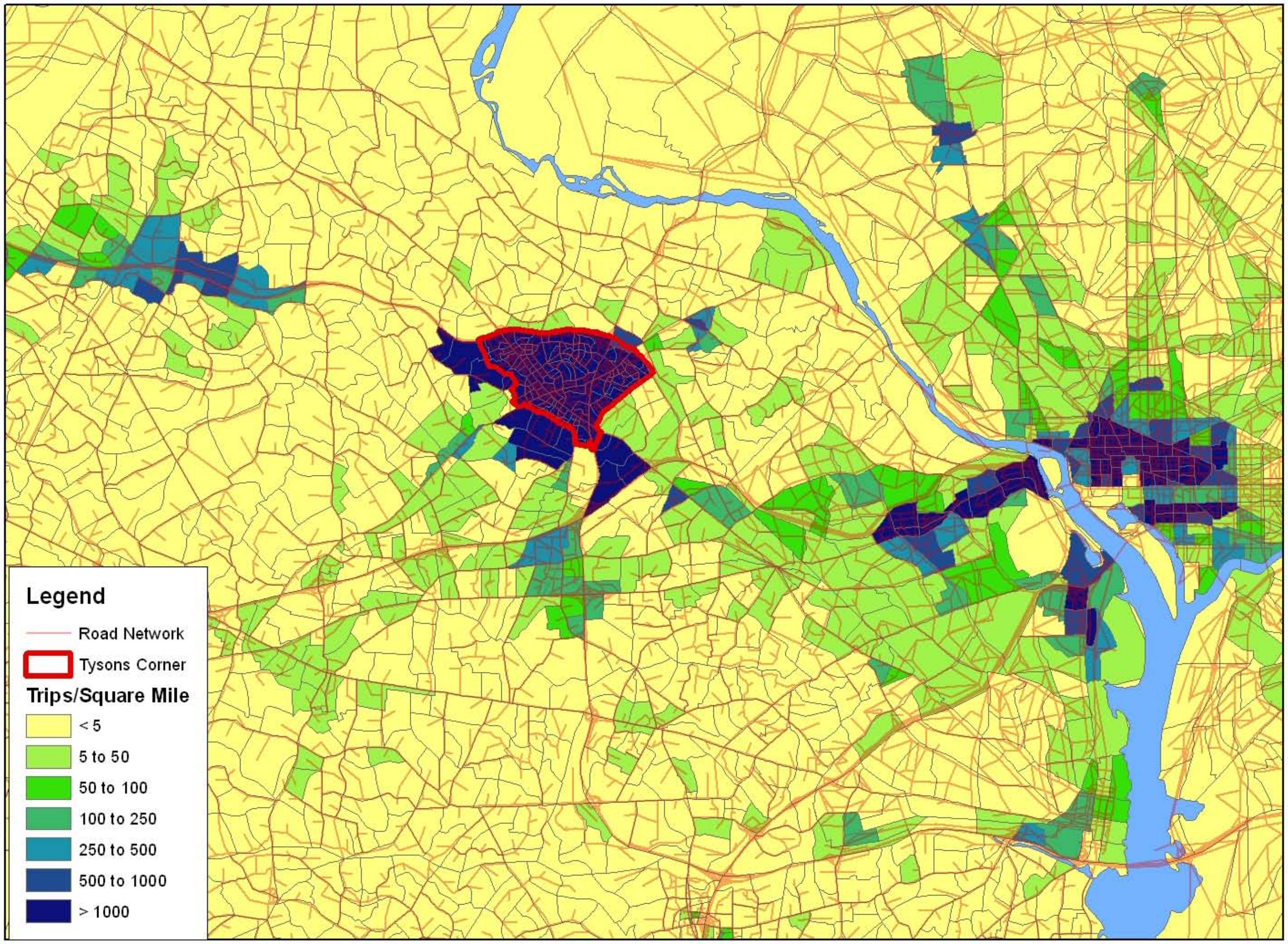


Figure 5.6 Trip Productions for proposed Comprehensive Plan Automobile-Based Person Trips Attracted to Tysons Corner per Square Mile (SOV and HOV)

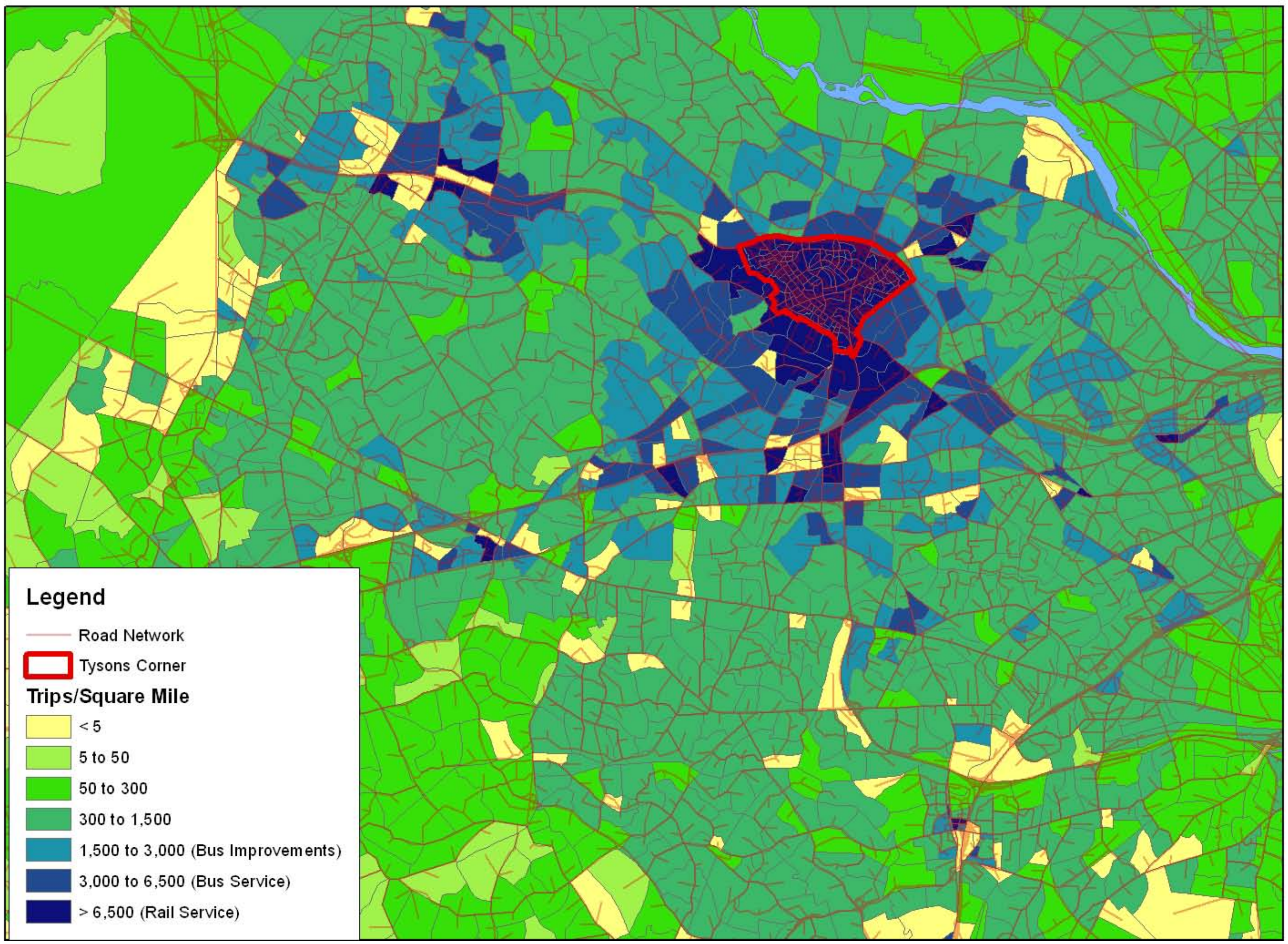


Figure 5.7 Trip Productions for proposed Comprehensive Plan Transit Person Trips Attracted to Tysons Corner per Square Mile (Bus and Rail)

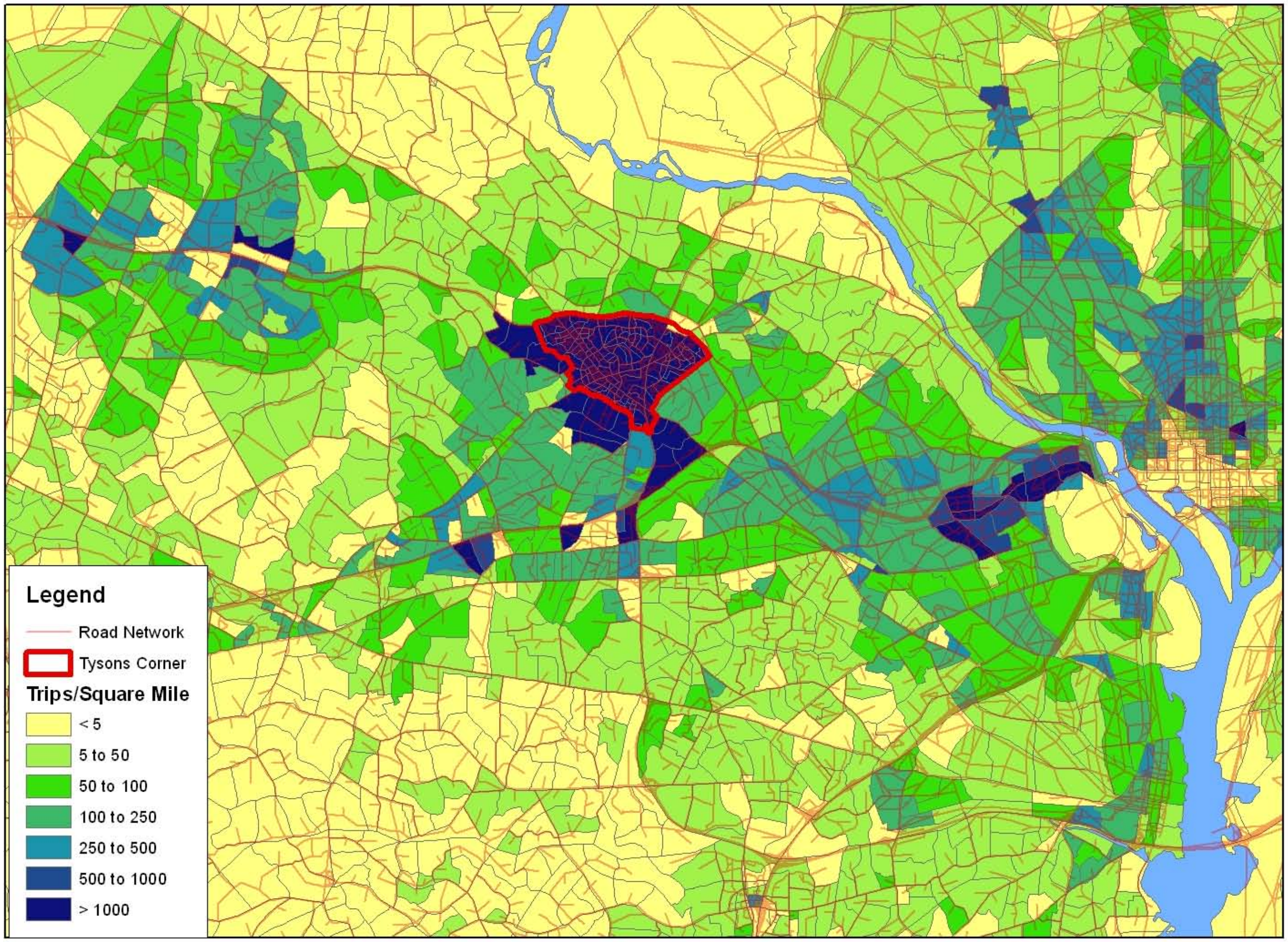


Table 5.14 Evening Peak Period Transit Modal Share With Enhanced TDM Measures and With Lower Cost Transit Improvements

Land Use Alternative	Intensity (total GFA, sq. ft.)	Projected Transit Modal Share	Required Transit Modal Share
Proposed Comprehensive Plan , 2030 Land Use Intensity	84 million	22%	N/A
Proposed Comprehensive Plan , 2050 Land Use Intensity	113 million	25%	31%

Strategy 3: Additional High Quality Transit Services

The previous section (Strategy 2) provided information on where the most effective locations are for improved transit services. These locations will all be served by local bus or express bus or BRT, as well as additional feeder services to Metrorail stations and increased park-and-ride facilities. However, the transit modal share needs to increase by at least 6% to meet to required meet the required level of modal split.

To be able to increase the modal split beyond the 25% in Table 5.14 higher quality transit that results in additional TOD with increased TOD to TOD commuting is a probable strategy. Experience has shown that Metrorail stations can attract significant TOD development with resulting modal shares that are higher than those achieved by express bus and BRT. The following is an example:

The first comparison area reviewed was Bethesda, Maryland, which contained three corridors of interest. As shown in Figure A.1, the three corridors were selected: MD-185 Connecticut Avenue, MD-190 River Road, and MD-355 Wisconsin Avenue. The transit service intensity is different in each corridor: MD-185 corridor has robust bus service, the MD-355 corridor is paralleled by the Metrorail Red Line, and MD 190 has limited bus service. Similarly, the development intensity in each corridor varies in a similar manner: MD-355 has the highest intensity, followed by MD-185 and then MD-190. For each corridor, the 2000 CTPP mode share for daily home-based work trips and the modeled 2030 Comprehensive Plan daily all trip purpose mode share were summarized and these are shown on Figure 5.8.

The MD 355 corridor has the highest transit mode share, with 20 percent for 2000 home-based work trips and 23 percent for 2030 all-purpose trips. The 2030 daily all trip purpose mode share was approximately five percentage points higher for the MD-355 corridor as compared with the MD-185 corridor, suggesting the influence of higher quality transit service and intensified development density. Similarly, the 2030 daily all trip purpose mode share was much higher for the MD-185 corridor as compared with the MD-190 corridor.

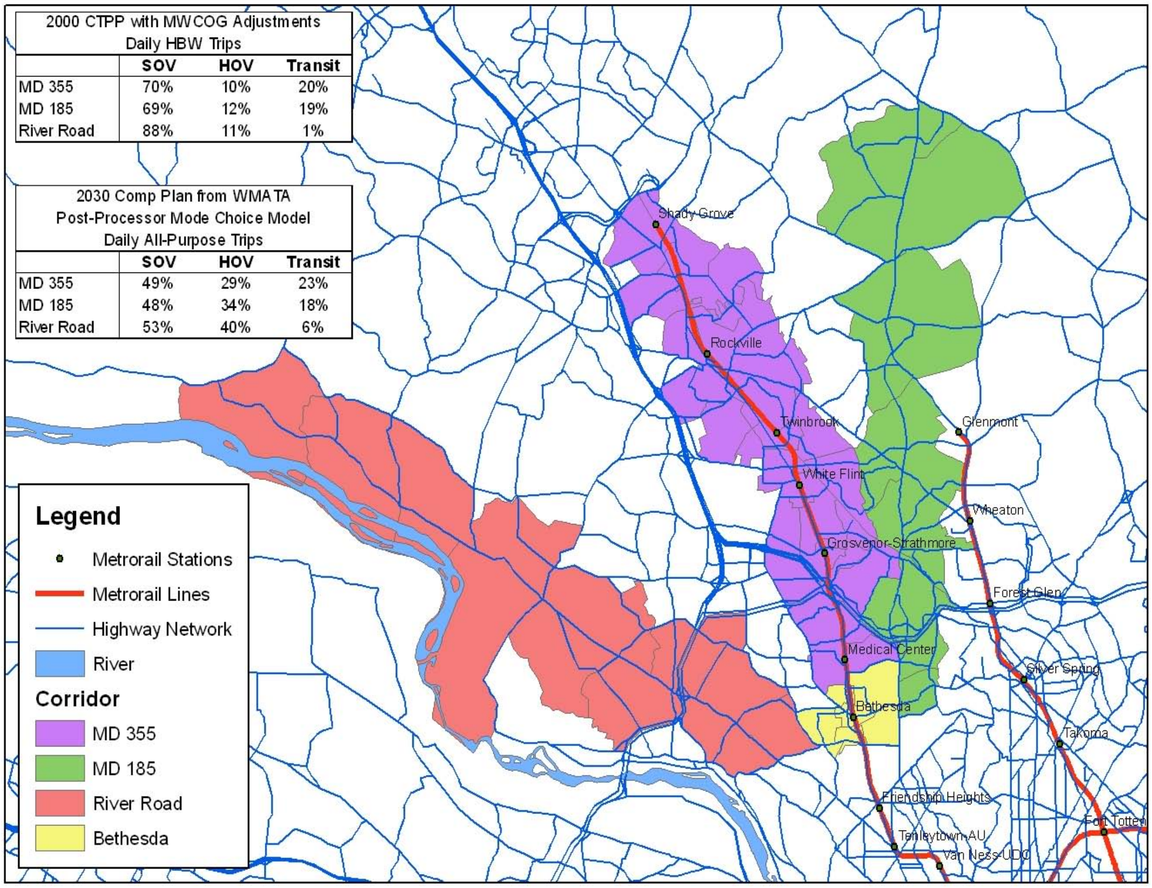


Figure 5.8 Comparison Corridors

The second comparison area reviewed was the Rosslyn-Ballston corridor. The primary interest was in looking at the potential for transit-oriented development (TOD) to lead to increased transit mode shares. A case study developed for TCRP Report 95, Chapter 17, Traveler Response to Transit-Oriented Development, examined Metrorail station entries at three major TOD stations, Rosslyn, Court House, and Ballston at two points in time. Over the 16 years from 1990 to 2006, station boardings at these three locations grew 28.5 percent over 16 years, from 28,400 to 36,500. Over this same period, the station boardings at the 34 Metrorail stations which were open as of 1980 grew 10 percent. Thus, the transit ridership for these three TOD stations grew more than twice as quickly.

These are two local examples of the benefit of a combination of Metrorail and TOD development and the resulting higher level of transit use. Therefore to achieve the required level of transit service in Table 5.14, it is recommended that at least two additional high quality transit corridors with TOD development should serve Tysons. Considering the location of productions and attraction of trips, a possible corridor could be the extension of the Orange Metrorail line along I-66.

5.6 Phasing Analysis

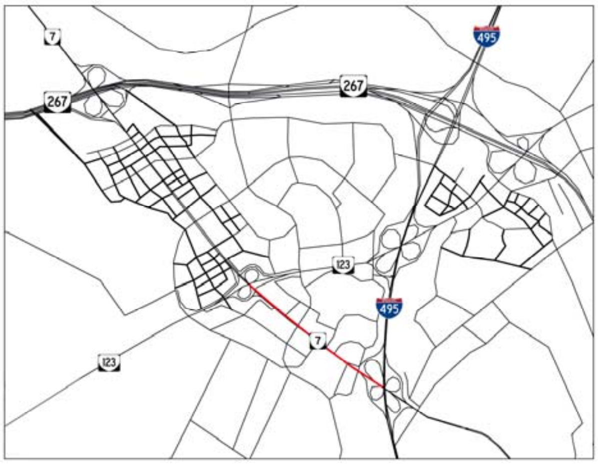
5.6.1 Introduction and Background

To maintain a balance between land use and transportation over time, a phasing analysis was performed to determine when specific improvements are required. In general terms, the estimated 2020 intensity of land use for Tysons was applied to the base (2005 updated to 2009) network. Improvements were identified and added to the base network then the proposed 2030 Comprehensive Plan Land Use was applied to the modified base network to determine further improvements.

5.6.2 Results of the Phasing Analysis: Improvements from 2010 to 2020

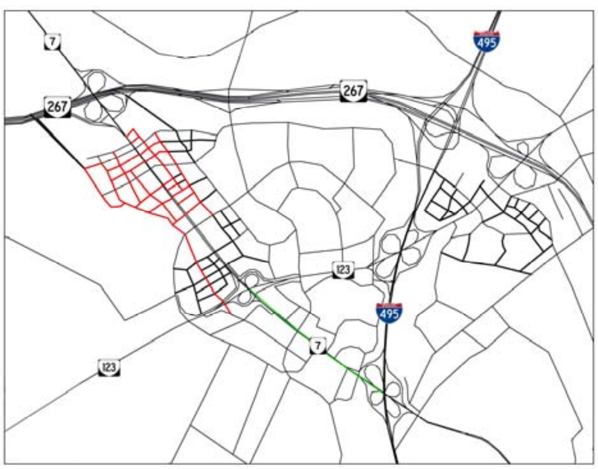
Note: in the graphics below, red indicates a new improvement and green a prior improvement. Improvements are shown in order of priority.

Rt.7 Widening from Rt.123 to I-495



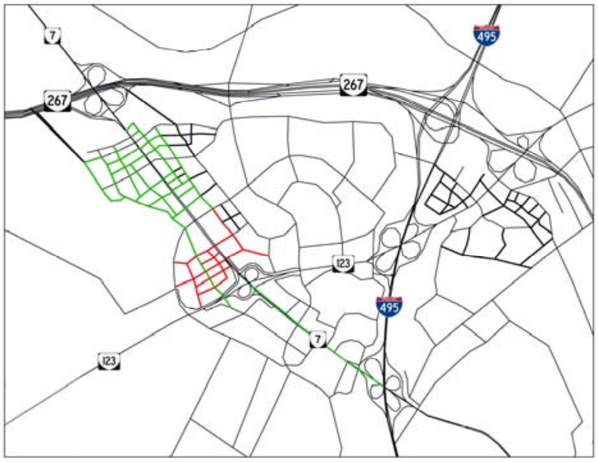
- Improves automobile and non-rail transit access into the study area from the east and from I-495.

Boone Blvd Extension and Grid West of Westpark Drive



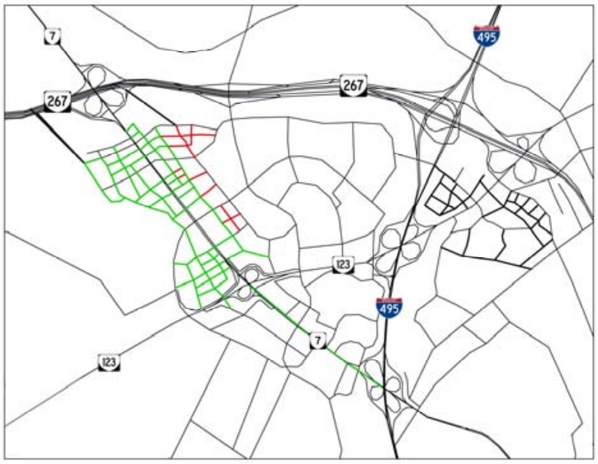
- Provides alternatives to Rt.7.
- Supports the land use intensities and proposed densities around two Metro stations.
- Increases automobile, pedestrian and bicycle connectivity.

Grid East of Westpark Drive



- Expands on the connectivity between Boone Blvd and other major arterials like Rt.7 and Rt.123.
- A key element required to accommodate more mixed-use, urban densities.
- Improves pedestrian and bicycle connectivity and safety.

Greensboro Drive Extension and Grid

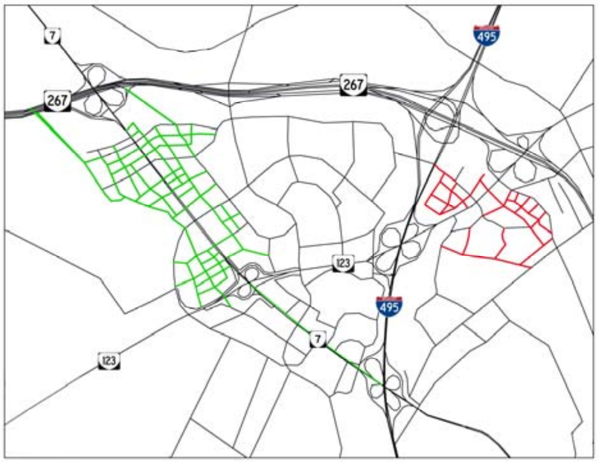


- Provides alternatives to Rt.7.
- Supports the land use intensities and proposed densities around two Metro stations.
- Increases automobile, pedestrian and bicycle connectivity.

Ramps to Boone Blvd and Greensboro Drive

- Provides greatest improvements to automobile and non-rail transit accessibility into the study area.
- Provides additional access to the internal grid of streets.

Grid of Streets Along Rt.123, Connection Across I-495



- Relieves I-495 crossings.
- Provides alternatives to Rt.123.
- Supports land use intensities and proposed densities around a Metro station.
- Improves pedestrian and bicycle connectivity and safety.

5.6.2 Results of the Phasing Analysis: Improvements from 2020 to 2030

Rt.123 Widening from Old Courthouse Road to I-495

- Eases traffic flow to and from I-495 to the core of the study area.
- Allows additional capacity to access the grid.

Widen Magarity Road

- Improves automobile and non-rail transit access for residents into core areas.

Widen Gallows Road

- Provides additional capacity to serve as an alternative to parallel routes like I-495.
- Increases automobile and non-rail transit capacity between Tysons and Merrifield.
- Provides a bike lane for improved bicycle access to Tysons.

Additional Beltway Lane from Rt.7 to I-66

- Mitigates congestion at the merge of traffic from Rt.7 (eastbound) to the I-495 (Outer Loop).

Chapter 6: Recommendations

6.1 Recommended Highway, Transit and Other Improvements

In order to maintain an acceptable level of accessibility in and around Tysons Corner as development occurs over time, it is essential to keep a balance between land use and transportation. To maintain this balance, the increase in development in Tysons should be coordinated with the provision of transportation infrastructure and programs to reduce vehicular trips. Considerable analysis was conducted to determine the need for specific transportation programs and infrastructure for a specific level of development in Tysons Corner. Table 6.1 provides the proposed transportation infrastructure and programs as they relate to the level of development in Tysons Corner.

Table 6.1 Transportation Infrastructure and Programs as they Relate to the Level of Development in Tysons Corner

Type of Transportation Program or Infrastructure Project	Description of Transportation Program or Infrastructure Project	Area Served by Improvement
Required Transportation Improvements at the Opening of a Metrorail Line to Wiehle Avenue and HOT Lanes on the Beltway (2013) to Accommodate More than 44 Million sq. ft. of Development		
Rail Transit Routes	Complete Phase I of Metrorail Silver Line Phase I	Tysons-wide/Countywide
Bus transit routes	Neighborhood bus routes; circulator bus routes serving Metrorail stations; express bus routes on I-66 and I-95/I-495	Tysons-wide/Countywide
Sidewalks	Sidewalks to provide connections to developments within walking distance of rail stations	District
Roads – Arterials Widening	Complete widening of Rt. 7 to 8 lanes from the Dulles Toll Road to Rt. 123	Tysons-wide
Roads – Freeway Widening	Widen I-495 from 8 to 12 lanes to provide 4 HOT lanes between the Springfield Interchange and the American Legion Bridge	Tysons-wide/Countywide
Roads – Freeway Ramp	HOT ramp connecting to Jones Branch Drive	Tysons-wide
Roads – Freeway Ramp	HOT ramp connecting to the Westpark Bridge	Tysons-wide
Roads – Freeway Ramp	HOT ramp connecting to Rt. 7	Tysons-wide
TDM	Application of aggressive TDM measures (e.g. 45% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District
Required Additional Transportation Improvements to Accommodate 60 Million sq. ft. of Development (2013 - 2020)		
Rail Transit Routes	Completion of Phase II of Metrorail Silver Line (from Wiehle Avenue to West of Dulles Airport with three stations in Fairfax County)	Tysons-wide/Countywide
Bus Transit Routes	Further improvements to neighborhood bus routes; circulator bus routes serving Metrorail stations; express bus routes on I-66 and I-95/I-495	Tysons-wide/Countywide
Roads – Arterial Widening	Widen Rt. 7 from Rt. 123 to I-495	Tysons-wide
Roads – Arterial Extension	Extend Boone Boulevard from Boone Boulevard to Northern Neck Drive	Tysons-wide

Roads – Grid of Streets	Grid west of Westpark Drive	District
Roads – Grid of Streets	Grid bounded by Gosnell Rd., Rt. 7, and Rt. 123	District
Roads – Arterial Extension	Extend Greensboro Drive from Spring Hill Road to Tyco Road	District
Roads – Grid of Streets	Grid connections to Greensboro Drive	District
Roads – Freeway Ramp	Ramp connecting Greensboro Drive extension to westbound Dulles Toll Road	Tysons-wide
Roads – Freeway Ramps	Ramps connecting Boone Blvd. extension to westbound Dulles Toll Road and eastbound Dulles Toll Road to Boone Blvd. extension.	Tysons-wide
Roads – Freeway Widening	Collector – distributor roads along the Dulles Toll Road from Greensboro Drive extension to Hunter Mill Rd.	Tysons-wide
Roads – Grid of Streets	Grid of streets east of I-495	District
Roads – Connecting Ramp	Ramp connecting Jones Branch Drive to Scotts Crossing Road	Tysons-wide
TDM	Application of aggressive TDM measures (e.g. 45% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District
Required Additional Transportation Improvements to Accommodate 84 Million sq. ft. of Development (2020 - 2030)		
Bus Transit Routes	Further improvements to neighborhood bus routes; circulator bus routes serving Metrorail stations; BRT routes on I-66 and I-95/I-495	Tysons-wide/Countywide
Roads – Grid of Streets	Substantial sections of the grid of streets	District
Roads – Arterials Widening	Widen VA 123 to 8 lanes from Rt. 7 to I-495	Tysons-wide
Roads – Arterial Widening	Widen VA 123 from 4 to 6 lanes between Rt. 7 and Old Courthouse Road	Tysons-wide
Roads – Arterial Widening	Widen Rt 7 from 4 to 6 lanes between I-495 and the City of Falls Church	Tysons-wide
Roads – Collector Safety Improvement	Improve and enhance the safety of Old Courthouse Road from the Town of Vienna to Gosnell Road	District
Roads – Collector Widening	Widen Magarity Road from 2 to 4 lanes from Great Falls Street to Rt. 7	Tysons-wide
Roads – Arterials Widening	Widen Gallows Road from 4 to 6 lanes from Rt. 7 to I-495	Tysons-wide
Roads – Interchange Improvements	Rt. 7 at the Dulles Toll Road	Tysons-wide
Roads – Connecting Road	Beltway crossing connecting the Tysons Corner Center area to Old Meadow (limited to transit, pedestrians and bicyclists)	Tysons-wide
Roads – Freeway Ramps	Ramps connecting Jones Branch Drive to westbound Dulles Toll Road and eastbound Dulles Toll Road to Jones Branch Drive.	Tysons-wide
Roads – Freeway Widening	Widen I-495 (Outer Loop) between Rt. 7 and I-66 by one lane	Tysons-wide
TDM	Application of aggressive TDM measures (e.g. 55% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District
Required Additional Transportation Improvements to Accommodate 113 Million sq. ft. of Development (2030 - 2050)		
Improved Transit	Additional BRT routes, other supporting services including park-and-ride, feeder bus routes to rail stations	Tysons-wide/Countywide
High Speed Transit Corridors	At least two additional high speed transit corridors with substantial TOD development: Orange Line Metrorail extension and an additional rail extension	Tysons-wide/Countywide
Roads – Grid of Streets	Completion of the grid of streets	District
TDM	Application of more aggressive TDM measures (e.g. 65% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District

6.2 Cost Estimates

Cost estimates have been prepared for the roadway and transit improvements recommended in the current Comprehensive Plan and in this proposed Comprehensive Plan Amendment and are shown below. For roadways, these costs are estimated at $1.48 billion over the next 20 years consisting of:

- In Current and Proposed Comprehensive Plan	$373,000,000
- Grid of Streets (by 2030)	$742,000,000
- Additional Roadways in Proposed Plan	$369,000,000
TOTAL	$1,484,000,000

There are some important items to keep in mind in interpreting these cost estimates. Construction of the grid is expected to take place as redevelopment occurs in Tysons Corner. It is anticipated that the vast majority of the cost, including right-of-way cost, for constructing the future grid of streets in Tysons Corner will be provided by the private sector. Cost estimates include right-of-way, preliminary engineering and design and are in 2009 dollars. A major component, particularly for the grid, of the total cost is the cost of right-of-way.

6.2.1 Current Comprehensive Plan

Table 6.2 Current Comprehensive Plan (Roadways)

Extend Boone Blvd west from Rt. 123 to Ashgrove Lane	$99,000,000
Extend Greensboro Drive west from Spring Hill Road to Rt. 7	$46,000,000
Widen Gallows Road from 4-6 lanes from Rt. 7 to Prosperity Avenue (2.56 miles)	$68,000,000
Widen Leesburg Pike (Route 7) to 6 lanes between the Capital Beltway and I-66	$43,000,000
Widen Chain Bridge Road (Route 123) to 6 lanes from Old Courthouse Road to Route 7	$21,000,000
Widen Chain Bridge Road (Route 123) to 8 lanes between Route 7 and the Capital Beltway	$27,000,000
Widen Magarity Road to 4 lanes between Lisle/Route 7 and Great Falls Street	$40,000,000
Widen Leesburg Pike (Route 7) to 8 lanes between Chain Bridge Road (Route 123) and I-495 (0.91 miles)	$29,000,000
New interchange at Rt. 7 and Westpark Drive/Gosnell Road (REMOVED)	($80,000,000)
New interchange at Rt. 7 and Gallows Road/International Drive (REMOVED)	($80,000,000)
New interchange at Rt. 123 and International Drive (REMOVED)	($80,000,000)
Total Adjusted Comprehensive Plan Road Costs	**$373,000,000**

6.2.2 Proposed Comprehensive Plan

Grid of Streets: $742,000,000

Table 6.3 Additional Projects Beyond Current Comprehensive Plan

5C-I-495 Overpass at Tysons Corner Center	$16,000,000
Extension of HOT ramp to inside I-495	$16,000,000
1D-Dulles Toll Road to Boone Blvd Extension	$59,000,000
3B-Dulles Toll Road to Jones Branch Drive	$33,000,000
2B-Dulles Toll Road to Greensboro Drive	$24,000,000
I-495 Additional Lane (Outer Loop between Rt. 7 and I-66)	$63,000,000
Dulles Toll Road Westbound Collector/Distributor	$105,000,000
Dulles Toll Road Eastbound Collector/Distributor	$53,000,000
Total	**$369,000,000**

6.2.3 Transit Projects

The cost of the bus service recommendations in the draft Transit Development Plan for Tysons Corner was estimated and an estimate was made of the current transit operating cost for bus services related to Tysons Corner. Based on these estimates, the net additional annual operating cost for Tysons bus service is estimated at approximately $12 million per year.

6.3 Recommended Transportation Strategy for Tysons

6.3.1 Background

There is a desire to transform Tysons into a higher density, more livable, walkable center while maintaining a high level of accessibility. In order to do this, there is a need to provide a balanced transportation system that:

- provides attractive public transportation connections;
- moves people within Tysons via an enhanced connected network of walkable streets, bike lanes, and a robust transit network, and
- moves automobile traffic more efficiently to, from, and within Tysons.

In order for Tysons to develop successfully while maintaining a balance between land use and transportation, a number of strategies have been developed to make this possible. These strategies have been developed through a significant amount of analysis and are described in the next sections.

6.3.2 Transit Goals

To support the level of development at the Comprehensive plan level for Tysons Corner, it is necessary for transit to achieve a 31% mode share (mode share is defined as the percentage of person trips that use a specific mode of transportation) of all person trips to, from and within Tysons Corner during peak periods. As the level of development in Tysons increases, the transit mode share should increase, as shown in Table 6.4, so that a 31% transit mode share can be achieved at the Comprehensive Plan level.

Table 6.4 Transit Mode Share at Increasing Levels of Development

Development Levels (total GFA, sq. ft.) and forecast timeframe	**Required Transit Mode Share During Peak Periods (person trips, all trip purposes, to and from Tysons Corner)**		
	TOD Areas	Non-TOD Areas	All of Tysons
84 million (2030)	25%	13%	22%
96 million (2040)	29%	15%	25%
113 million (2050)(Comprehensive Plan Level)	36%	18%	31%

Note: The required transit mode shares specified in this table are included as a strategy to meet a target automobile trip reduction level to be achieved through transportation demand management.

To be able to achieve the increase in transit use as indicated in Table 6.4, the following transit services should be provided for Tysons Corner. The projected timing of these improvements is listed in Table 6.1.

a. The extension of Metrorail to the Dulles Corridor with four stations located in Tysons Corner
b. Express bus/BRT routes on I-66, I-95/I-495 and Leesburg Pike
c. A circulator system serving Tysons
d. Expanded local bus service
e. Additional BRT routes and other supporting services including park-and-ride and feeder bus routes to rail stations.
f. At least two additional high speed transit corridors with substantial TOD development; for example, a more direct connection to a future Orange Line extension and a Beltway rail line to Montgomery County, both having TOD at their stations.

6.3.3 Circulator System

In order to increase the use of Metrorail for trips to, from and within Tysons, it is essential to provide a system of transit circulators. The circulators therefore will have two main functions:

1. To provide quick and convenient access for Metrorail passengers to and from locations within Tysons that are beyond walking distance from the Metrorail stations.
2. To provide a quick and convenient way to travel within Tysons.

A system of circulator routes is proposed to connect most of Tysons, specifically the North Central, East Side and Old Courthouse Districts, with the four Metrorail stations and other districts in Tysons. To facilitate use of the circulator system, it must be integrated with all other transit serving the greater Tysons area and be accessible, frequent, and convenient for users. In order to accomplish this goal, the circulators should operate in their own, dedicated right-of-way. The first phase of the circulator system, serving the Metrorail stations immediately after opening, will likely be bus service operating in mixed traffic on existing rights-of-way.

Over the long term the circulator system may evolve through several phases, transitioning from buses operating in mixed traffic to buses operating on exclusive rights-of-way to, when feasible, a fixed guideway operating on exclusive rights-of-way. A storage and maintenance facility within Tysons will be necessary to support a fixed-guideway system. The ultimate alignment will likely change based upon the results of the Circulator Study and other factors, such as the availability of the necessary rights-of-way.

6.3.4 Multimodal Transportation Hubs

Multimodal Transportation Hubs, strategically placed close to Metrorail and circulator stations and/or other retail, employment and residential centers, are needed to allow flexibility in trip making within Tysons. These hubs should provide the following:

- Alternative modes for transit users to reach final destinations that are beyond walking distance from transit stations.
- The ability of Tysons residents and workers to travel within Tysons and beyond without the need to own or use a private vehicle.

A multimodal transportation hub is envisioned to be a retail service providing alternative modes of transportation and transportation services including:

- Transit (rail and/or bus)
- Bike sharing
- Car sharing
- Other personal transportation devices
- Taxis

6.3.5 The Grid of Streets

Tysons currently consists of large superblocks with a relatively small number of streets. This places excessive reliance on the street system to move vehicle traffic, and the large block size inhibits transit use, pedestrian and bicycle movement. A grid of streets with smaller block sizes is typical in urban areas. It disperses vehicle traffic and improves mobility for pedestrians and bicyclists. A smaller block size will make a more walkable Tysons by creating convenient and short walk distances. A grid of streets concept is shown in Figure 6.1. A perfect grid is unlikely in Tysons Corner due to the alignment of existing roads and topographical constraints. However, where possible, a grid of streets should be planned.

In planning the grid of streets, the following will be taken into consideration:

- Maximize continuity within the grid of streets.
- Avoid intersections with an acute angle, awkward dog legs, and intersections with more than four legs.
- Provide good pedestrian access to Metro stations.
- Block sizes should generally be within a 400 foot to 600 foot range with a maximum perimeter length of 2,000 feet.
- Any block longer than 600 feet should contain a mid-block pedestrian connection.
- Block faces along Route 7 and Route 123 should ideally be 600 feet.
- Where possible, even spacing between intersections should be maintained.

With the provisions described above, the street network in Tysons Corner will be enhanced and will provide for greater network density and more direct connections between various locations, as well as better accommodating both cars and pedestrians. This network will contain more secondary (i.e., local and collector) streets, providing more choices for connectivity than the existing arterial network. Research and experience indicates that in areas with a fine grid of streets and a mix of land uses, people use transit more and make fewer auto trips than their neighbors in typical suburbs.

The grid of streets will be supported by a street hierarchy that allows different types of trips to use different streets. People wishing to travel across Tysons can choose to use a major arterial, such as Route 7. Others who only need to travel a couple of blocks will have a choice to travel on a smaller street within the grid of streets.

Although Fairfax County has in the past used the traditional nomenclature of major arterial, minor arterial, collector and local streets to functionally classify streets and highways, a parallel, urban design oriented nomenclature is also used for classification purposes in this text. Table 6.5 provides a cross-reference between the two classification schemes.

Table 6.5 Cross-Reference Between Traditional Highway Functional Classification Terms and Urban Design Oriented Functional Classification Terms

Highway Functional Classification	Urban Design Functional Classification
Primary Arterial	Boulevard
Minor Arterial	Avenue
Collector	Collector
Local	Local Street

Note: The cross-references shown in the table above are general in nature. Some variations may occur.

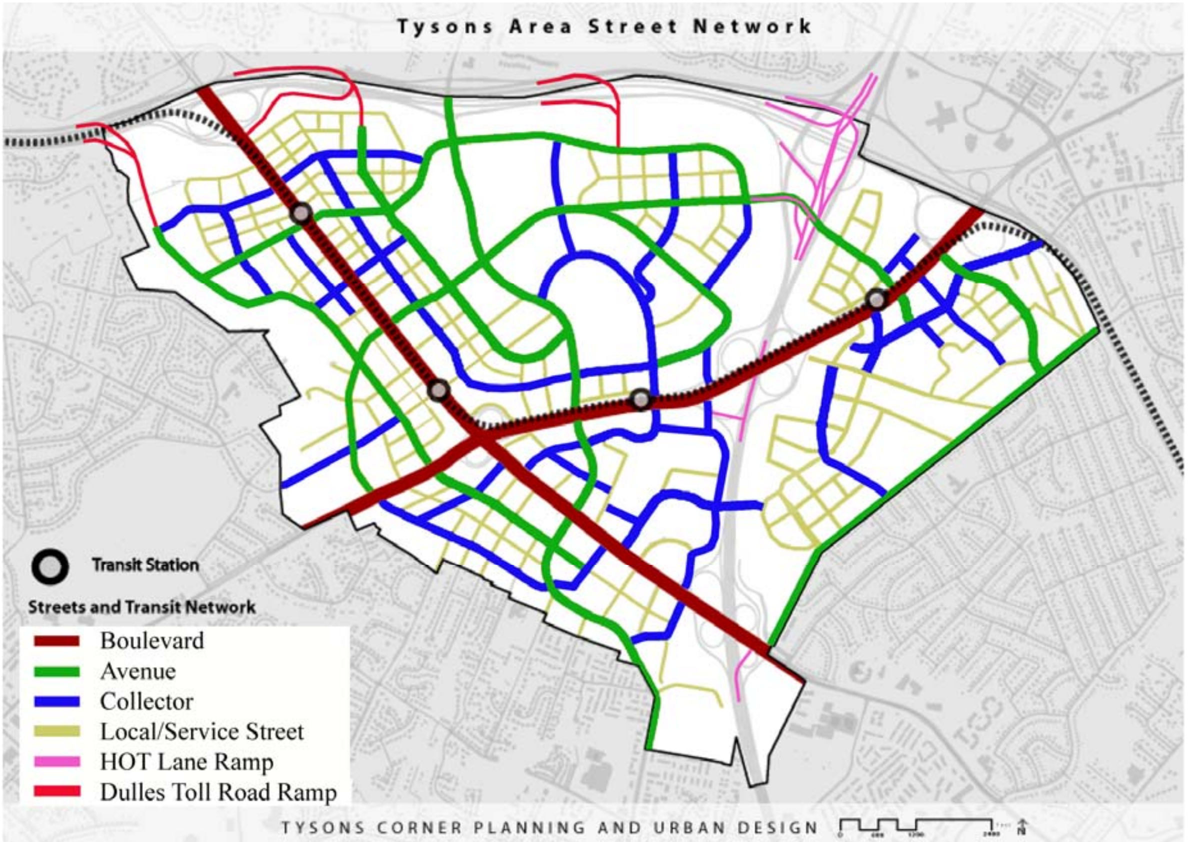


Figure 6.1 The Conceptual Grid of Streets

6.3.6 Road Improvements

The road improvements as provided in Table 6.1 are an important component of the overall transportation strategy for Tysons.

6.3.7 Transportation Demand Management

Transportation Demand Management (TDM) refers to a variety of strategies aimed at reducing the demand on the transportation system, particularly to reducing single occupant vehicles during peak periods, and expanding the choices available to residents, employees, shoppers and visitors, The result is more efficient use of the existing transportation system. Transportation Demand Management is proposed to be a critical component of this Plan. Traffic must be minimized to decrease congestion within Tysons, to create livable and walkable spaces, and to minimize the effects of traffic on neighboring communities.

When the four Metrorail stations open in Tysons and denser mixed-use transit-oriented development is constructed surrounding the stations, a substantial percentage of travelers are expected to commute via Metrorail without any TDM programs in place. This development pattern will also reduce the need for driving trips because jobs, housing, shopping, recreational and cultural opportunities will be close at hand and accessible by walking or a short transit ride.

A broad, systematic, and integrated program of TDM strategies throughout Tysons can further reduce peak period single occupancy vehicle trips, as well as increase the percentage of travelers using transit and non-vehicular modes of transportation. TDM programs are proposed to embrace the latest information technology techniques to encourage teleworking, provide sufficient information to enable commuters and other trip makers to choose travel modes and travel times, or decide if travel is actually necessary at that time.

1. TDM implementation plans which would include at least the following:
    a. evaluations of potential TDM measures
    b. listing of TDM measures to be provided
    c. listing of alternate TDM measures which may be provided
    d. phased trip reduction goals
    e. implementation budgets
    f. monitoring arrangements and associated remedial and contingency funds. The remedial fund is to be used if TDM goals are not met and the contingency fund is used if unanticipated changes in travel behavior (Tysons-wide) result in an increase in the TDM trip reduction goals. Please see the TDM Monitoring section.

2. Commitments to ensure Transportation Demand Management efforts are successful. These may include parking plans that reduce parking ratios before latter phases are constructed, phasing plans that tie future development to recording successful vehicle trip reductions, remedy funds to improve TDM program delivery, and penalties to deter non-compliance.

The recommended TDM trip reductions of traffic generation estimates provided by the Institute of Transportation Engineers (ITE) are shown in Table 6.6.

Table 6.6 Recommended TDM Vehicle Trip Reduction Goals

Development levels in total square feet (with corresponding forecast year)	TDM Vehicle Trip Reduction Goals, Commercial and Residential Development (Percentage Reduction from ITE Rates)			
	TOD Locations			Non-TOD Locations (more than 1/2 mile from station)
	0 to 1/8 Mile from Station	1/8 to 1/4 Mile from Station	1/4 to 1/2 Mile from Station	
2010 to 2020	45%	35%	30%	25%
84 million (2030)	55%	45%	40%	35%
96 million (2040)	60%	50%	45%	40%
113 million (2050) (Comprehensive Plan Level)	65%	55%	50%	45%

TDM programs will only work where parking is not over-supplied, and will be most effective where parking costs are charged directly to users. TDM programs are expected to be coordinated with parking reductions and/or management programs.

6.3.8 Parking Management

A change in philosophy of regulating parking is needed to put Tysons on the forefront of sustainable growth. Parking in the TOD Districts will follow the experience of successful TOD areas around the country by limiting the amount of parking required near rail stations. In the Non-TOD Districts, reductions from conventional parking ratios are required to achieve Tysons-wide trip reduction goals.

Proposed changes to parking requirements include elimination of minimum parking requirements for all non-residential uses within 1/2 mile of rail stations and reduction of minimum parking requirements all uses outside of TOD Districts. To ensure that adequate parking is provided, a parking plan will be required with all development applications in TOD Districts. To avoid oversupply of parking, maximum parking requirements are proposed for all areas and shared parking will be encouraged. Proposed parking rates are indicated in Table 6.7.

Table 6.7 Parking Ratios for Tysons Corner

Parking Spaces Per Unit or Spaces Per 1,000 sq. ft.									
Use	Previous (2009)	< 1/8 mile Metro Station		1/8 - 1/4 mile Metro Station		1/4 - 1/2 mile Metro Station		Non-TOD	
	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Townhouse	2.7	1.75	2.2	1.75	2.2	2.0	2.5	2.0	2.7
Multifamily:									
0-1 bedroom	1.6	1.0	1.3	1.0	1.3	1.1	1.4	1.1	1.4
2 bedroom	1.6	1.0	1.6	1.0	1.6	1.35	1.7	1.35	1.7
3+ bedroom	1.6	1.0	1.9	1.0	1.9	1.6	2.0	1.6	2.0
Office	2.6	none	1.6	none	2.0	none	2.2	2.0	2.4

As the Tysons Corner area is developed, and the land use and transportation infrastructure matures, parking requirements are expected to be re-examined to determine if they are adequate for the changing conditions. Rather than supplying parking for each individual use, parking is proposed to be treated as a common resource for multiple uses. Implementing this practice will reap many advantages in creating a more walkable environment. Providing transit service, an effective mix of uses, and an appropriate network of sidewalks will reduce automobile use and, consequently, the need to provide parking.

6.3.9 Information and Communications Technology and Intelligent Transportation Systems

The application of Information and Communications Technology (ICT) in Tysons Corner has the potential to decrease congestion, increase safety, make trip making more convenient, reduce emissions and improve trip-making decisions. More specifically the following are examples of goals for the application of ICT at Tysons:

- Electronic information infrastructure that works in concert with physical infrastructure to maximize the efficiency and utility of the system, encouraging modal integration and consumer choice.
- Real-time information for operators and users of the transportation system to help contain congestion and increase the effective capacity of the system while reducing the need for new construction.
- Facilities, technology and information that help reduce energy consumption and negative environmental impact.

ICT can be used not only to monitor and mitigate traffic congestion, but also to enhance emergency services in Tysons Corner. Through the use of street sensors, signal control transmitters and video surveillance cameras, real-time traffic management can take place. GPS and other technology can also help public safety personnel respond to incidents in a timely manner.

As part of ICT, intelligent transportation systems (ITS) will be applied to the fullest extent possible. Main components of ITS include:

- Traffic management systems. These systems make use of information collected by traffic surveillance devices to smooth the flow of traffic along travel corridors. They also disseminate important information about travel conditions to travelers.
- Crash prevention and safety systems detect unsafe conditions and provide warnings to travelers to take action to avoid crashes.
- Roadway operations and maintenance focus on integrated management of maintenance fleets, specialized service vehicles, hazardous road conditions remediation, and work zone mobility and safety.
- Transit ITS services include surveillance and communications, such as automated vehicle location (AVL) systems, computer-aided dispatch (CAD) systems, and remote vehicle and facility surveillance cameras, which enable increases in operational efficiency, safety, and security.

- Emergency management applications include hazardous materials management, the deployment of emergency medical services, and large and small-scale emergency response and evacuation operations.
- Electronic payment and pricing systems employ various communication and electronic technologies to facilitate commerce between travelers and transportation agencies.
- Traveler information applications use a variety of technologies to allow users to make more informed decisions regarding trip departures, routes, and mode of travel.

New developments should contain the necessary ICT infrastructure to enhance the following activities to the fullest extent:

- Telework, teleconferencing, and related strategies to reduce vehicular trips.
- Advanced traveler information to increase the efficiency and effectiveness of decisions on when to travel, how to travel, where to travel, and whether to travel at all.

To ensure a high level of safety, to minimize breakdowns, to maintain a clean and attractive environment and to monitor systems to optimize efficiency and effectiveness, a traffic management maintenance entity should be established for Tysons Corner. Such an entity should be responsible for at least the following:

- Traffic monitoring and incident management.
- Streetscape monitoring and maintenance where necessary.

6.3.10 Monitoring System

Vehicle Trips and Delay (demand)

Maintaining a balance between land use and transportation is dependent on a number of factors as indicated above. The necessary transportation infrastructure, modal split levels, and vehicle trip reduction levels to maintain this balance have been determined by means of extensive analyses. Analyses are based on known conditions at the time of writing this document. However, these conditions include human behavior and a number of exogenous factors. These conditions might change in the future which could result in unforeseen changes in trip-making behavior. For this reason, it is considered essential to monitor the amount of vehicles entering Tysons over time as well as the associated delay due to congestion. The growth in vehicle trips over time will determine if there is a deviation from the estimated growth in vehicle trips on which the strategies listed above are based. Monitoring should therefore include the following:

1. Vehicles entering Tysons will be counted at a number of locations to enable the accurate detection of deviations from vehicle growth estimates.
2. Delay at a sample number of intersections and at traffic merge locations to determine if there is a significant increase in over time.

Transportation Infrastructure and Programs (supply)

The provision of transportation infrastructure and programs should be provided according to the schedule in Table 6.1. Due to unforeseen circumstances, the provision of transportation infrastructure and/or programs might differ from the schedule in Table 6.1. The funding of transportation infrastructure and programs should be assessed to update the schedule.

The monitoring of the demand side and supply side should provide an assessment of conditions and an updated projection of future conditions in terms of maintaining a balance between land use and transportation. The early identification of future deviations from the planned schedule provides an opportunity to react in a timely manner to allow the necessary adjustments to be made to avoid a significant imbalance between land use and transportation. Possible corrective measures are:

- The use of a TDM Remedial and Contingency Fund to increase TDM activities.
- An increase and/or new transportation facility user charges.
- Congestion pricing.

It might be desirable to establish a monitoring agency to conduct the continuous monitoring and reporting of vehicle trips.

6.3.11 Residential Development

The proposed Comprehensive Plan for Tysons provides for the residential population to increase from 16,000 to 54,000 by 2030. This increase was assumed in the transportation modeling analysis. Considering that residents in Tysons will reduce the number of external-internal vehicle trips during the morning peak and internal-external trips during the evening peak, it is essential that the residential development takes place as planned.

The growth in the residential population is an important transportation strategy for Tysons.

Attachment A

Proposed Comprehensive Plan Amendment for Tysons Corner (Transportation Section)

TRANSPORTATION

Today, the vast majority of people traveling to, from, within and through Tysons do so using private automobiles. While still accommodating automobiles, the transportation system in the future must give people choices for making these trips. Providing choices requires a balanced transportation system that: a) provides attractive public transportation connections between Tysons and other activity centers; b) moves people within Tysons via an enhanced connected network of walkable streets, bike lanes, and a robust transit network; and c) moves automobile traffic more efficiently to, from, and within Tysons. The planned extension of the Metrorail system, with four Metrorail stations in Tysons, offers an opportunity to create a well-balanced, interlinked, multimodal transportation network in Tysons.

Creating a livable and walkable place will require that the needs of pedestrians, bicyclists, and an effective circulation system be given preference in many circumstances over the need to move people exclusively by automobile. Streets help define the quality of the public realm in addition to accommodating vehicular traffic. Remaking Tysons into a great transit-oriented urban center will require a balance among safety, mobility, community and environmental goals in all transportation planning for Tysons.

In order to be successful, a fundamental transformation of Tysons' transportation system will be required. Several transportation elements must be created and/or enhanced. They include the following:

- Transform the current superblock street network into a system of smaller connected streets to direct local traffic onto local streets and create morepathways for traffic flow as well as a safe, accessible pedestrian and bicycle environment.Streets should become complete streets, designed to create a sense of place and promote walking.

- The transit system will serve regional trips with Metrorail and buses to Tysons.

- For trips within Tysons, a circulator system that allows frequent, quick and inexpensive movement as well as easy connections to regional transit systems is needed.

- A neighborhood feeder bus network should connect nearby communities to Tysons.

- Enhancements to the automobile network, such as improved Beltway crossings, additional connections to the Dulles Toll Road, a grid of streets, and state of the art traffic management systems will move vehicular traffic more efficiently around Tysons.

Tysons Corner is located at the intersection of two major regional freeways (I-495 and the Dulles Toll Road) and at the intersection of two major arterials (Leesburg Pike – Route 7 and Chain Bridge Road - Route 123. These major highways as well as other arterials have historically served the vast majority of trips to, from, and through the Tysons area. Although extensive, this highway network has become increasingly strained as the Washington, D.C. region has grown and Tysons has become one of the largest office and retail markets in the country. Although planned road improvements will reduce the increase in traffic congestion in and around Tysons, this strategy is not sustainable in the long term because of right-of-way limitations, the high cost of adding highway capacity, and limits in the accommodation of vehicle traffic in a dense urban environment such as what is planned for Tysons Corner.

In order to maintain a balance between land use and transportation, as well as create a healthier more sustainable environment, alternatives to automobile travel, especially transit, will become increasingly important. For this reason, alternatives to automobile travel should meet increasingly higher targets over time. In order to achieve this, it is essential to successfully implement the following strategies:

- The provision of the necessary transit infrastructure and services to increase transit use over time.

- The achievement of higher vehicle trip reduction levels over time through transportation demand management programs including an increase in carpooling, telework, the application of variable working hours, and reducing the ratio of parking spaces to floor area.

- The increase of residential development in Tysons over time to replace automobile trips to and from Tysons with walking or transit trips within Tysons.A monitoring system to verify these requirements are realized as planned and the ability to make adjustments if there are deviations from the recommendations on how a balance will be maintained.

The successful transformation of Tysons is highly dependent on the provision of transportation infrastructure, services, and programs in a timely manner. These programs are in turn dependent on measured development growth, an optimum mix of land use, excellent urban design, and the successful integration of development with transportation infrastructure and services. Several significant transportation analyses were done to inform the Comprehensive Plan guidance on this balance between land use and transportation. The Scenario Analysis compared the impacts of different levels of growth. This analysis was done throughout the multi-year planning process. The Beyond 2030 Sketch Planning Analysis provided the target non-SOV mode shares that would be necessary beyond 2030. A Countywide Transportation Demand Management (TDM) study conducted to provide the County with the information necessary institute robust TDM programs was used to establish the TDM trip reduction goals and the new parking rates for Tysons Corner. To insure that the impacts on the areas surrounding Tysons were taken into consideration, a Neighborhood Traffic Impact Study was conducted. Finally, a Phasing Study provided insight into how the recommended transportation improvements should be prioritized.

TRANSPORTATION INFRASTRUCTURE AND SERVICES

Public Transportation

In order for Tysons to develop into a great urban center, public transportation needs to serve an increasingly higher percentage of trips over time. Specific goals for the percentage of trips served by public transportation at specified development levels are listed below. These goals account for people who work in Tysons but live outside Tysons, people who live in Tysons and work elsewhere, and those who live and work within Tysons. Metrorail is the most significant public transportation improvement and is expected to carry the majority of public transportation trips in the near term. Metrorail will serve passengers travelling to Tysons from the Dulles Corridor to the west and from Arlington and the District of Columbia to the east; both directions contain significant residential centers. It will also serve residents of Tysons travelling to these areas, which are also major employment areas.

While Metrorail is necessary for Tysons to develop into an urban center, it is not sufficient to support development at the Comprehensive Plan level. Other regional high quality public transportation services, such as express bus routes serving Tysons from the regional network of HOV and HOT lanes, are needed. In addition, two high speed rail transit corridors, with significant residential centers, need to connect to Tysons. A system of circulators is necessary to connect other areas of Tysons to the Metrorail stations and to provide a robust internal transit system within Tysons.

Finally, local bus routes will continue to serve Tysons and these routes connect nearby communities to Tysons for trips that are generally shorter than the trips served by the regional rail and bus network. All of these public transportation services are described in more detail below.

Public Transportation Goals

1. To support the level of development at the Comprehensive plan level for Tysons Corner, it is necessary for transit to achieve a 31% mode share (mode share is defined as the percentage of person trips that use a specific mode of transportation) of all person trips to, from and within Tysons Corner during peak periods. As the level of development in Tysons increases, the transit mode share should increase, as shown in Table 3, so that a 31% transit mode share can be achieved at the Comprehensive Plan level.

Table 3
Transit Mode Share at Increasing Levels of Development

Development Levels (total GFA, sq. ft.) and forecast timeframe	Required Transit Mode Share During Peak Periods (person trips, all trip purposes, to and from Tysons Corner)		
	TOD Areas	**Non-TOD Areas**	**All of Tysons**
84 million (2030)	**25%**	**13%**	**22%**
96 million (2040)	**29%**	**15%**	**25%**
113 million (2050) (Comprehensive Plan Level)	**36%**	**18%**	**31%**

Note: The required transit mode shares specified in this table are included as a strategy to meet a target automobile trip reduction level to be achieved through transportation demand management. Please refer to Tables 5 and 6 for recommended transportation demand management goals.

2. To be able to achieve the increase in transit use as indicated in Table 3, the following transit services should be provided for Tysons Corner. The projected timing of these improvements is listed in Table 8.
    a. The extension of Metrorail to the Dulles Corridor with four stations located in Tysons Corner
    b. Express bus/BRT routes on I-66, I-95/I-495 and Leesburg Pike
    c. A circulator system serving Tysons
    d. Expanded local bus service
    e. Additional BRT routes and other supporting services including park-and-ride and feeder bus routes to rail stations.
    f. At least two additional high speed transit corridors with substantial TOD development; for example, a more direct connection to a future Orange Line extension and a Beltway rail line to Montgomery County, both having TOD at their stations.

3. Regardless of mode type, transit improvements should be planned in accordance to estimated trip-making characteristics and should contain the following characteristics:
   a. Directness of travel
   b. Simplicity, connectivity, and ease of transfers
   c. Operating flexibility
   d. Efficient and effective integration with other modes
   e. Efficient and effective placement of stops and operational facilities

Metrorail

The extension of Metrorail into the Dulles Corridor, with four stations located within Tysons, will offer mobility and accessibility from many portions of the region to Tysons. More importantly, Metrorail will provide a necessary alternative to the automobile in order for Tysons to retain its economic viability and achieve its full potential. The Metrorail service will also provide greater opportunities for people to reside in Tysons and use transit for much of their daily travel. Map 5 shows the locations of the four Tysons Metrorail Stations.

Map 5:
Metrorail Station Map

Metrorail service is anticipated to operate seven days a week from early morning until at least 12 midnight. During rush periods, trains will operate seven minutes apart to provide frequent and reliable service to commuters and the Tysons workforce. During the midday, nights, and weekends, off-peak service will be provided, with trains operating every 12 minutes. Metrorail stations in Tysons will also serve as transportation hubs allowing for convenient intermodal transfers, the provision of bicycle storage and rental facilities, and short term rental car spaces.

Express Bus Service/Bus Rapid Transit (BRT)

Express bus service is a high-speed limited-stop service generally operating within transportation corridors oriented to a principal destination. It consists of longer trips, especially to major activity centers during peak commuting hours, and operates long distances without stopping.

Bus Rapid Transit (BRT) is a limited-stop service developed in the 1990s that relies on technology to help speed up the service. It combines the quality of rail transit and the flexibility of buses. Bus Rapid Transit can operate on exclusive rights-of-way, within high-occupancy-vehicle (HOV) lanes, on expressways, or on ordinary streets.

The opening of the Beltway High Occupancy Toll (HOT) lanes with three new connections to Tysons provides an opportunity to serve Tysons with a significant express bus network extending on the regional HOV/HOT network to destinations such as the I-95 corridor and the I-66 corridor. These corridors are identified as “Enhanced Public Transportation Corridors” in the Fairfax County Transportation Plan. This designation indicates that major public transportation facilities could be added to these corridors based on a comprehensive alternatives analysis at some point in the future.

Along with Metrorail and light rail, Bus Rapid Transit and express bus services are potential options. Serving Tysons with robust express bus service is needed to complement Metrorail. These express buses are likely to use the Metrorail stations as terminal points and having passengers transfer there to an internal Tysons circulation system just like Metrorail passengers.

System of Circulators

In order to increase the use of Metrorail for trips to, from and within Tysons, it is essential to provide a system of transit circulators. The circulators therefore will have two main functions:

1. To provide quick and convenient access for Metrorail passengers to and from locations within Tysons that are beyond walking distance from the Metrorail stations.
2. To provide a quick and convenient way to travel within Tysons.

A system of circulator routes is proposed to connect most of Tysons, specifically the North Central, East Side and Old Courthouse Districts, with the four Metrorail stations and other districts in Tysons. To facilitate use of the circulator system, it must be integrated with all other transit serving the greater Tysons area and be accessible, frequent, and convenient for users. In order to accomplish this goal, the circulators should operate in their own, dedicated right-of-way. The first phase of the circulator system, serving the Metrorail stations immediately after opening, will likely be bus service operating in mixed traffic on existing rights-of-way.

Over the long term the circulator system may evolve through several phases, transitioning from buses operating in mixed traffic to buses operating on exclusive rights-of-way to, when feasible, a fixed guideway operating on exclusive rights-of-way. A storage and maintenance facility within Tysons will be necessary to support a fixed-guideway system. Map 6 shows a conceptual system of circulator routes that could serve Tysons once the grid and two new Beltway crossings are constructed. The ultimate alignment will likely change based upon the results of the Circulator Study and other factors, such as the availability of the necessary rights-of-way.
The following objectives should guide the implementation of the Circulator System:

- The circulators should extend the reach of the Metrorail System and connect the various districts within Tysons.

- The connection with the Metrorail station should be as close as possible to the station entrance. If the circulator route cannot be adjacent to the station entrance, a clear visual connection should be maintained for the convenience and perceptions of users.

- The circulator system should decrease auto-based trips. In addition to increasing transit mode share and decreasing vehicle use by making travel to, from and within Tysons more attractive, the circulator should be convenient enough to serve as a substitute for long walking trips within Tysons.

- The circulator routes should include service to locations with higher existing concentrations of trip origins (e.g. Freddie Mac, Gannett) and future high concentrations of residential and employment areas.

- Some overlap of circulator routes will be desirable to facilitate car maintenance if a fixed guideway system is implemented.

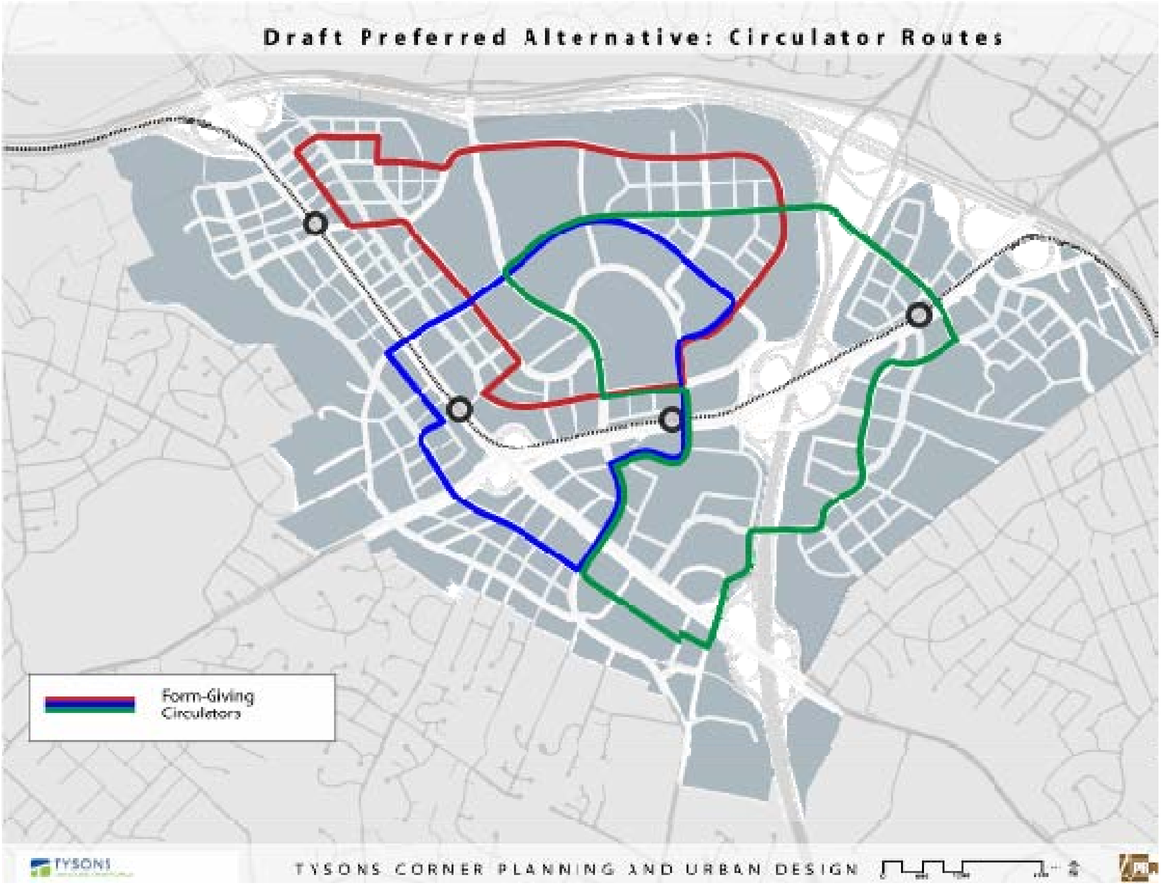
- The circulators should reflect industry best practices including the provision of real-time arrival information at station locations.

- Signal priority should be provided to circulators and to selected bus routes that overlap circulator routes.

- Circulator stops should be comfortable for passengers providing protection from the weather and real-time schedule information.

- The circulators should preferably travel in both directions on each of the proposed circulator routes to maximize accessibility to the four Metrorail stations.

Map 6
Potential Circulator Routes



Map 6 shows the routes for a conceptual Circulator System. The Circulator System study will refine these alignments and a new system map will be developed.

Local Bus Service

Over one dozen bus routes currently serve the Tysons area, with about two-thirds of these routes being operated by WMATA and the others by the Fairfax Connector. These routes connect Tysons to the Metrorail system and directly to various parts of northern Virginia, including McLean, Falls Church, Vienna and Arlington. Most of the routes stop at the Tysons Corner Center and some routes provide connections to various parts of Tysons. Overall, though, these bus routes do not provide an effective circulation function within Tysons.

When the Metrorail extension opens, these routes are expected to be realigned to provide better service to the new Metrorail stations, while other existing routes may be eliminated or replaced by modified routes or the extended Metrorail service. Bus service frequencies will also be modified for other routes to achieve consistency with new transit service in the corridor, to better coincide with Metrorail headways and to reduce duplication of service where it exists.

Multimodal Transportation Hubs

Multimodal Transportation Hubs, strategically placed close to Metrorail and circulator stations and/or other retail, employment and residential centers, are needed to allow flexibility in trip making within Tysons. These hubs should provide the following:

- Alternative modes for transit users to reach final destinations that are beyond walking distance from transit stations.
- The ability of Tysons residents and workers to travel within Tysons and beyond without the need to own or use a private vehicle.

A multimodal transportation hub is envisioned to be a retail service providing alternative modes of transportation and transportation services including:

- Transit (rail and/or bus)
- Bike sharing
- Car sharing
- Other personal transportation devices
- Taxis

The Road Network

Overview

The following principles are adapted from the document "Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, " published by the Institute of Transportation Engineers (2008). They describe an approach to the planning and design of urban street networks that should be followed in Tysons:

- Street network planning should address mobility and access needs associated with passenger travel, goods movement, utilities placement and emergency services.
- The reservation of rights-of-way for the ultimate width of streets should be based on long term needs defined by objectives for community character and mobility.
- Street network planning should be refined and updated to define alignments and establish the role of streets as more detailed planning and development occurs.
- Street networks should provide a high level of connectivity so that drivers, pedestrians and transit users can choose the most direct routes and access urban properties. Connectivity should support the desired development patterns. Street networks should provide intermodal connectivity to easily transfer between modes.
- Street network capacity and redundancy should be provided through a dense, connected network (a grid) rather than through an emphasis on high levels of vehicle capacity on individual arterial facilities. This approach ensures that the street network can support other objectives such as pedestrian activity, multimodal safety, access to rail stations, and support for adjacent development.

Context Sensitive Solutions

Context Sensitive Solutions (CSS) should be applied in the planning and design of transportation projects in Tysons. CSS is a process of balancing the competing needs of many stakeholders starting in the earliest stages of project development. It also includes flexibility in the application of design controls, guidelines and standards to design a facility that is safe for all users regardless of the mode of travel they choose. CSS aims to achieve the following:

- Balance safety, mobility, community and environmental goals in all projects.
- Involve the public and stakeholders early and continuously throughout the planning and project development process.
- Use an interdisciplinary team tailored to project needs.
- Address all modes of travel.
- Apply flexibility inherent in design standards.
- Incorporate aesthetics as an integral part of good design.

Grid of Streets

Tysons currently consists of large superblocks with a relatively small number of streets. This places excessive reliance on the street system to move vehicle traffic, and the large block size inhibits transit use, pedestrian and bicycle movement. A grid of streets with smaller block sizes is typical in urban areas. It disperses vehicle traffic and improves mobility for pedestrians and bicyclists. A smaller block size will make a more walkable Tysons by creating convenient and short walk distances. A grid of streets concept is shown in Map 7. A perfect grid is unlikely in Tysons Corner due to the alignment of existing roads and topographical constraints. However, where possible, a grid of streets should be planned.

In planning the grid of streets, the following should be taken into consideration:

- Maximize continuity within the grid of streets.
- Avoid intersections with an acute angle, awkward dog legs, and intersections with more than four legs.
- Provide good pedestrian access to Metro stations.
- Block sizes should generally be within a 400 foot to 600 foot range with a maximum perimeter length of 2,000 feet.
- Any block longer than 600 feet should contain a mid-block pedestrian connection.
- Block faces along Route 7 and Route 123 should ideally be 600 feet.
- Where possible, even spacing between intersections should be maintained.

With the provisions described above, the street network in Tysons Corner will be enhanced and will provide for greater network density and more direct connections between various locations, as well as better accommodating both cars and pedestrians. This network will contain more secondary (i.e., local and collector) streets, providing more choices for connectivity than the existing arterial network. . Research and experience indicates that in areas with a fine grid of streets and a mix of land uses, people use transit more and make fewer auto trips than their neighbors in typical suburbs.

The grid of streets should be supported by a street hierarchy that allows different types of trips to use different streets. People wishing to travel across Tysons can choose to use a major arterial, such as Route 7. Others who only need to travel a couple of blocks will have a choice to travel on a smaller street within the grid of streets.

Although Fairfax County has in the past used the traditional nomenclature of major arterial, minor arterial, collector and local streets to functionally classify streets and highways, a parallel, urban design oriented nomenclature is also used for classification purposes in this text. Table 4 provides a cross-reference between the two classification schemes.

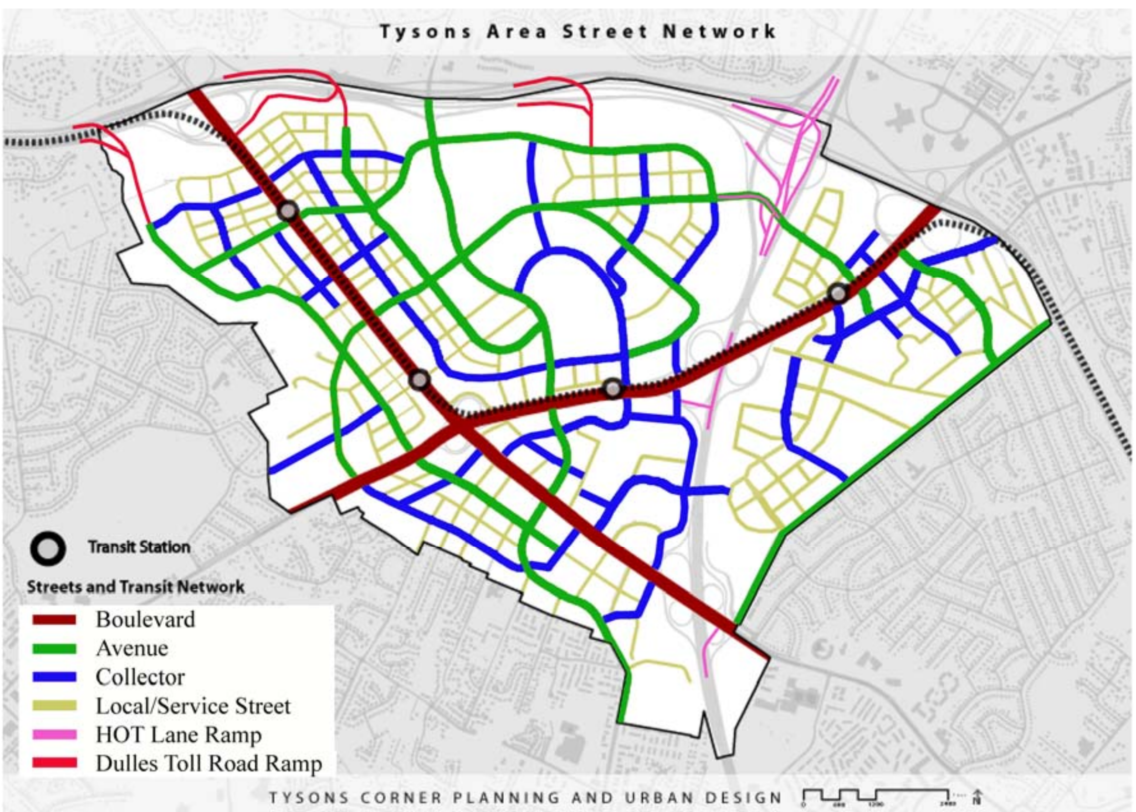
Table 4
Cross-Reference Between Traditional Highway Functional Classification Terms and Urban Design Oriented Functional Classification Terms

Highway Functional Classification	Urban Design Functional Classification
Primary Arterial	**Boulevard**
Minor Arterial	**Avenue**
Collector	**Collector**
Local	**Local Street**

Note: The cross-references shown in the table above are general in nature. Some variations may occur.

Map 7 shows a functional classification of the Tysons street network, including the grid of streets, HOT lane ramps and proposed ramps to the Dulles Toll Road. The functional classification of streets in Tysons should be updated as the results of further related studies become available.

Map 7
Conceptual Functional Classification of the Tysons Road Network



Map 7 shows the conceptual grid of streets for Tysons Corner, including service streets. Future engineering analyses will result in updated versions of this map.

Official Map of Public Streets in Tysons

The proposed "Grid of Streets" is critical to the future form and function of Tysons. The implementation of this network of arterials and local streets will be extremely challenging. Engineering studies will be done to refine the conceptual grid shown above. Consideration should be given to creating and adopting an "official map" of public streets in Tysons. An official map is a description of planned public streets. This map will establish the location and character of the public street network. It should be created with input and cooperation from local landowners, the Virginia Department of Transportation, and the Fairfax County Department of Transportation, and be adopted by the County.

The official map would be based on preliminary engineering and design, in order to determine what is feasible to implement in each district. Adoption of an official map would help in the review of development applications.

Street Types and Design Guidelines

Street types describe the street as an element of the comprehensive framework of Tysons. Street types respond to the needs of traffic from vehicles, bicycles and pedestrians. Street types in Tysons have been identified, with a conceptual overview of each type's functionality, cross-section, scale, modal mix, and character provided on the following pages. The cross-section for each street type contains flexibility to be able to respond to particular needs in different locations.

Within Tysons Corner, pavement cross-sections are to be designed to fit in an urban environment meeting the goals of Context Sensitive Solutions (CSS) while addressing safety, operations, and capacity needs. The following should be taken into consideration in the design of streets in Tysons Corner:

- Continuity of streets is desirable in order to achieve a more effective grid.

- Streets in Tysons Corner will be designed as complete streets, addressing the pedestrian experience and contributing to creating great places. By definition, complete streets are designed and operated to enable safe access and movement for pedestrians, bicyclists, motorists and transit riders of all ages and abilities.. Streets in TOD areas are expected to be attractive environments for walking, commerce, and casual interaction in addition to their function of moving traffic.

- Urban design guidelines for streets, including enhanced pedestrian elements such as sidewalks buffered from traffic by street trees, and bicycle enhancements such as separate bike lanes, address the elements of a complete street. Although typical street cross sections are included below, final street designs may include some variations, such as lane width, sidewalk width, or building setback to reflect the changing context of the street as it passes through the many neighborhoods and districts within Tysons.

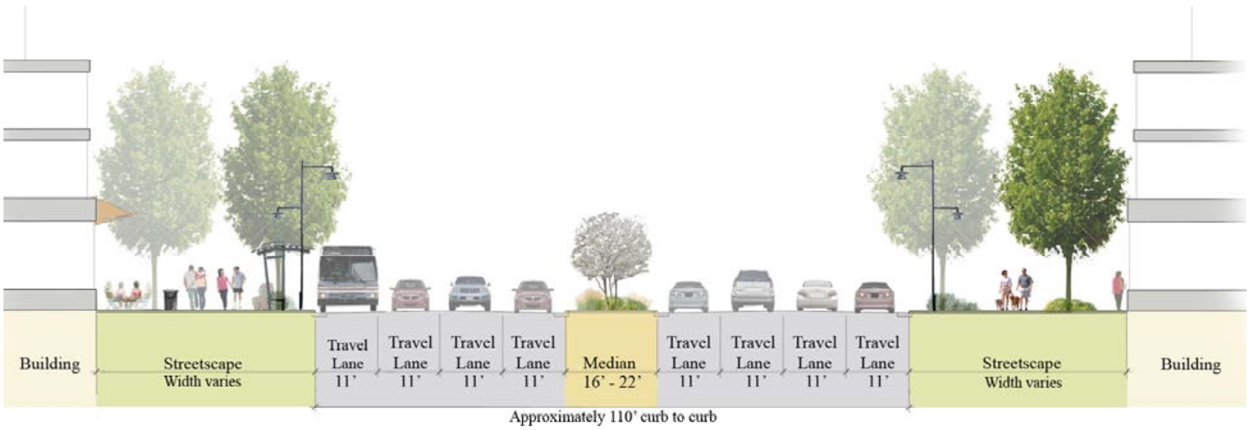
- Parking is expected to occur on avenues, collectors, and local streets. This parking may be prohibited during peak periods to address traffic capacity needs on some streets.

Boulevards (Major Arterials)

Boulevards will be the most important multi-modal connectors and thoroughfares within Tysons. In addition to carrying the largest volume of automobile traffic, they also have the ability to accommodate the Metrorail, circulator, bus, bicycle, and pedestrian modes within their rights-of-way. Route 7 and Route 123 are both boulevards (major arterials).

Boulevards may have three to four travel lanes in each direction. Medians are necessary to provide a pedestrian refuge, rights-of-way for turn lanes and/or to accommodate Metrorail on portions of Routes 7 and 123. In addition, boulevards will have wide sidewalks with street trees on each side. Some portions of boulevards may include shared or dedicated lanes for the circulator system.

Figure 1
Boulevard section with landscaped median



Note: The outside lane in the Boulevard Street Section may be used for on-street parking where applicable.

Boulevard cross section dimensions:

- The desirable width of the median is 20 feet to allow safe pedestrian refuge.
- 24 foot median (36 feet at stops) to accommodate the Circulator.
- 3 to 4 lanes per direction (11 feet for each lane).
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Avenues (Minor Arterials)

Avenues within Tysons can play a role in taking the pressure off the boulevards by diverting vehicular traffic from the boulevards to the avenues. Portions of avenues may also accommodate circulators and provide desirable addresses to new business and residential development. Boone Boulevard, Greensboro Drive and Westpark Drive are examples of avenues. These streets may generally have two travel lanes in each direction, on-street parking, wide sidewalks, and bike lanes. Medians are not preferred but may be necessary depending on design, safety, operation, and capacity considerations.

Additionally, avenues extend into the interior of Tysons, connecting residential and employment areas. Uses and character of avenues will range from transit oriented mixed-use with street level retail within the station areas, to neighborhood residential within non-station areas like East Side and North Central. Many portions of the avenues could also accommodate circulators on shared or dedicated lanes.

Figure 2
Avenue section with landscaped median

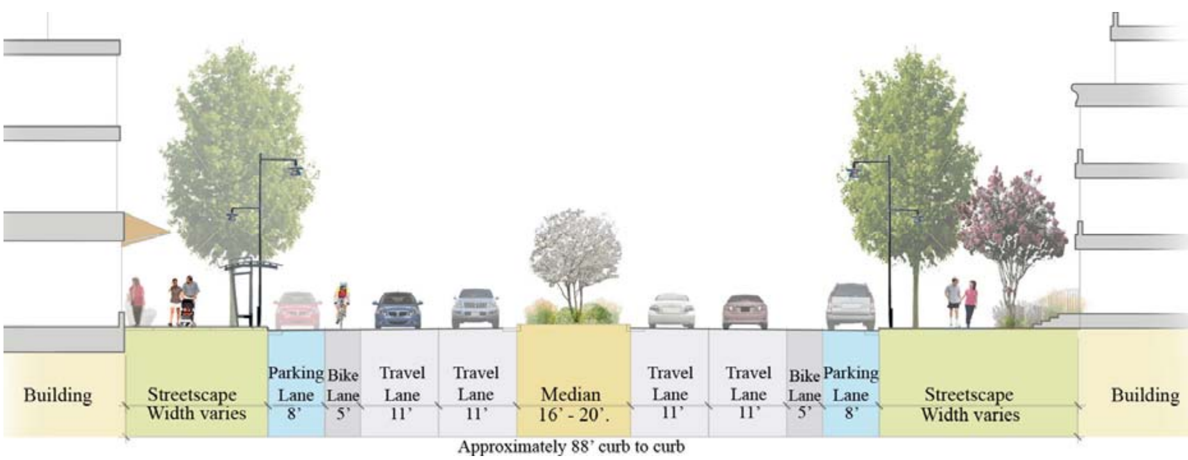


Figure 3
Avenue section with Circulator

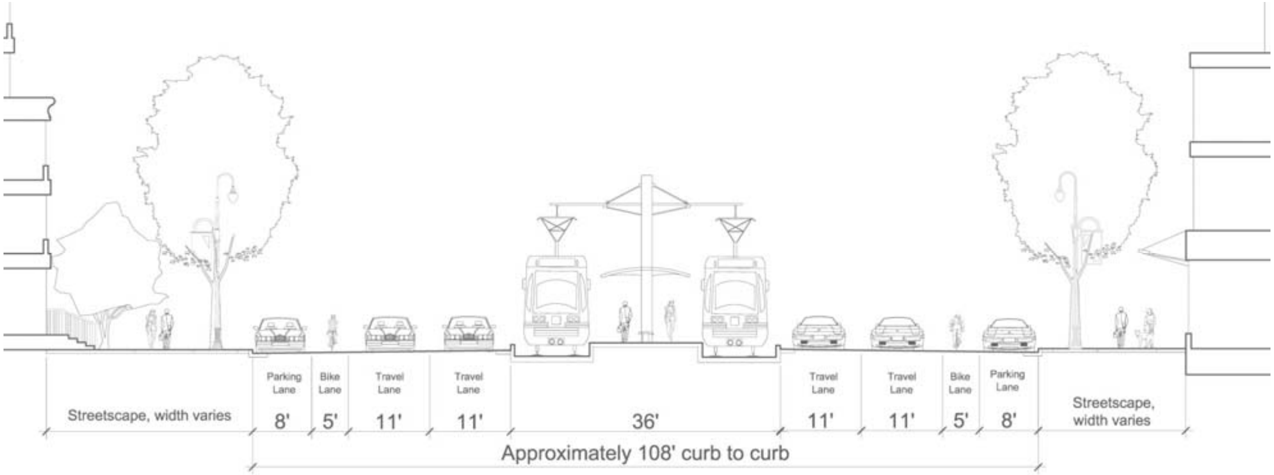
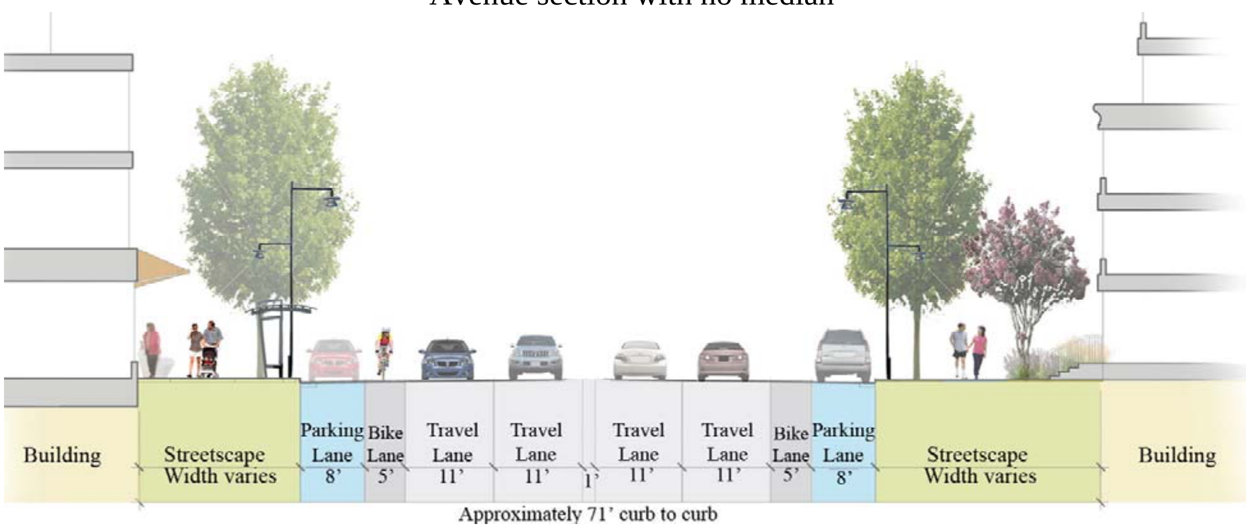


Figure 4
Avenue section with no median



Avenue cross section dimensions:

- The desirable width of the median, if provided, is 20 feet to allow safe pedestrian refuge.
- 24 foot median (36 feet at stops) to accommodate the Circulator where applicable.
- 2 or 3 travel lanes per direction (11 feet minimum for each lane).
- On-street parallel parking is recommended. This parking may be prohibited during peak periods to address traffic capacity needs on some streets.
- 8 feet for on-street parallel parking per direction.
- 5 foot on-road dedicated bike lane per direction.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Collector Streets (Collector)

Collector streets within Tysons will connect local streets, with slow-moving traffic, to higher speed facilities like avenues and boulevards. Collector streets typically have one or two travel lanes in each direction. They are slow-moving lanes with traffic calming elements such as bulbouts at intersections, frequent pedestrian crossings, parallel on-street parking, bike lanes and wide sidewalks to maximize walkability. Medians are not preferred but may be necessary to provide pedestrian refuge, turn lanes or rights-of-way for the circulator.

Figure 5
Collector Street section with landscaped median

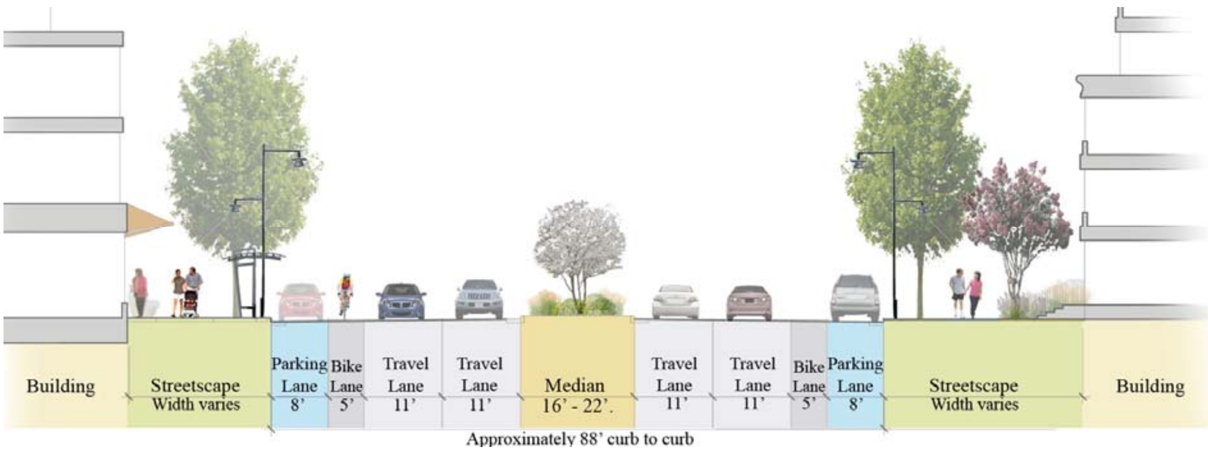


Figure 6
Collector Street section with Circulator

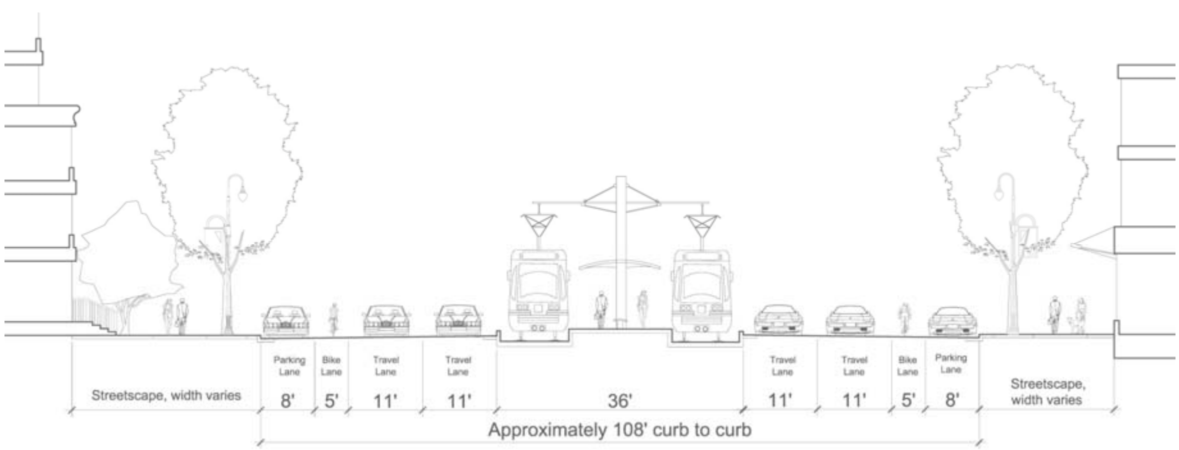
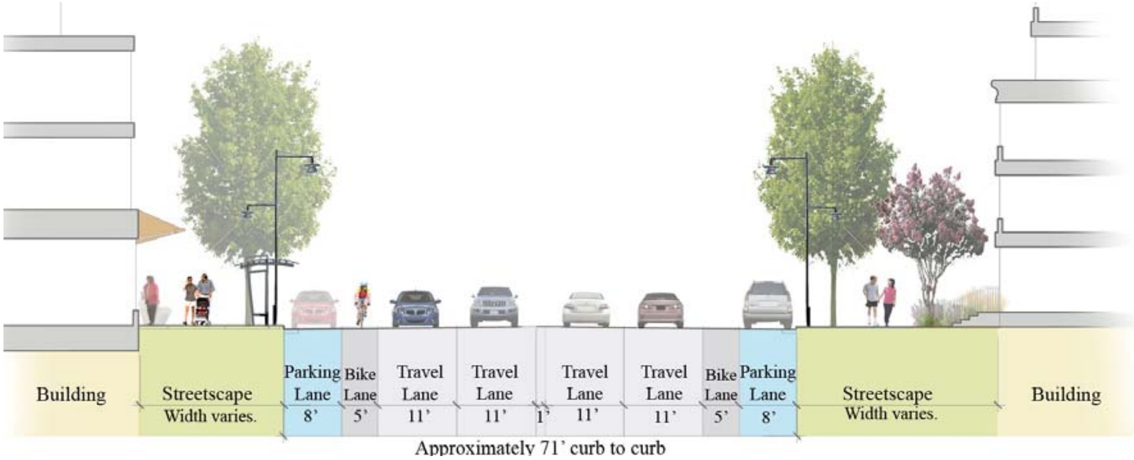


Figure 7
Collector Street section with no median



Collector Street cross section dimensions:

- The desirable width of the median, if provided, is 20 feet to allow safe pedestrian refuge.
- 24 foot median (36 feet for stops) to accommodate the Circulator where applicable.
- 2 travel lanes per direction (11 feet minimum for each lane); 1 travel lane per direction under certain circumstances.
- 8 feet for on-street parallel parking per direction.
- 5 foot on-road dedicated bike lane per direction.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

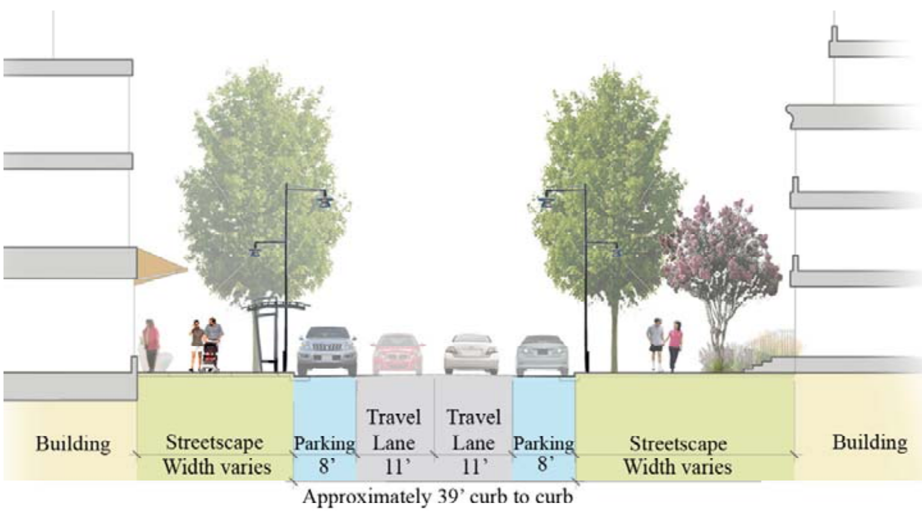
Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Local Streets (Local)

Local streets will generally be the lowest volume streets within Tysons and will carry slow-moving traffic. Medians should not be considered. They will serve residential and/or employment uses on either side with entrances and windows opening on the sidewalks.

Local street sections are generally narrow, with one lane in either direction, and are flanked by on-street parking on both sides. Due to low vehicle speeds, bicycles may be accommodated in the travel lane rather than in a dedicated bicycle lane.

Figure 8
Local Street section



Local Street cross section dimensions:

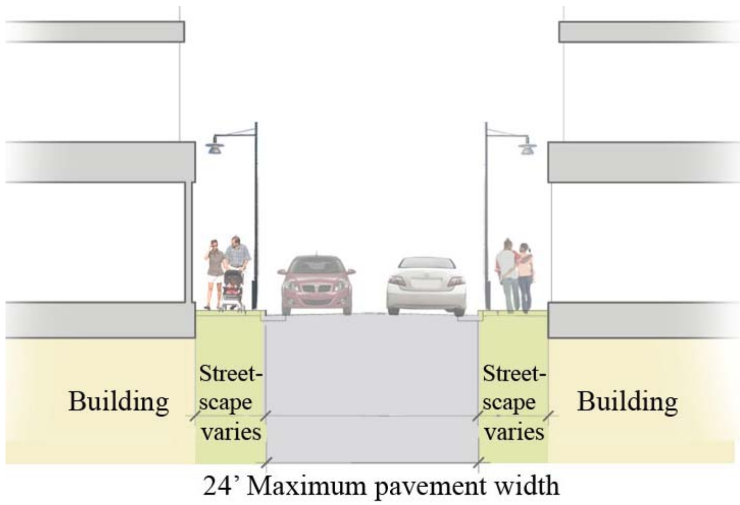
- No medians should be considered.
- 1 travel lane per direction
- 10 feet lane widths may be considered for residential streets.
- 8 foot on-street parking per direction.
- Local streets are low speed facilities that may not require bike lanes.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Service Streets (No Functional Classification)

Service streets are very low speed, generally privately maintained facilities that typically run between buildings to provide access to parking garage entrances, loading and refuse containment areas. Connections to local streets and collectors are encouraged. Service alleys should be designed to maximize functionality for service vehicles. Allowances should be made for pedestrian access as needed.

Figure 9
Service Street section



Service Street cross section dimensions:

- No medians should be considered.
- 1 travel lane per direction.
- Street widths should accommodate expected service vehicles.
- Parking and bus access is not anticipated.
- Landscaping should not conflict with large vehicle movements.
- Mountable curbs should be considered.
- Refer to the Urban Design Recommendations for guidance on the streetscape.

Typical street cross sections are depicted. Although dimensions are noted, final street design will require accommodation of all applicable road design infrastructure. Additionally, final street designs may vary as necessary to address other design and engineering goals and requirements.

Highway Connections and Beltway Crossings

Physical improvements to the roadway and transportation infrastructure are necessary to achieve critical access and egress for Tysons. In addition to the grid of streets, the following improvements should be constructed.

- A new Beltway crossing connecting Jones Branch Drive to Scotts Crossing Road (extension of High Occupancy Toll connection), including pedestrian and bicycle access.
- A new Beltway crossing connecting the Tysons Corner Center area to Old Meadow Road (limited to transit, pedestrians and bicyclists).
- Ramps connecting Greensboro Drive extension to westbound Dulles Toll Road.
- Ramps connecting Boone Boulevard extension to westbound Dulles Toll Road and eastbound Dulles Toll Road to the Boone Boulevard extension.
- Ramps connecting Jones Branch Drive to westbound Dulles Toll Road and eastbound Dulles Toll Road to Jones Branch Drive.
- A collector-distributor road system on the Dulles Toll Road between the Route 7 interchange area and the Hunter Mill interchange area.
- An additional lane on the Outer Loop of the Beltway (I-495) between the Route 7 on-ramp and I-66.
- Interchange improvements at Dulles Toll Road and Route 7; and
- Interchange improvements at Dulles Toll Road and Spring Hill Road.

These improvements need to be designed to fit into the new Tysons, sensitive to the context in which they will be implemented.

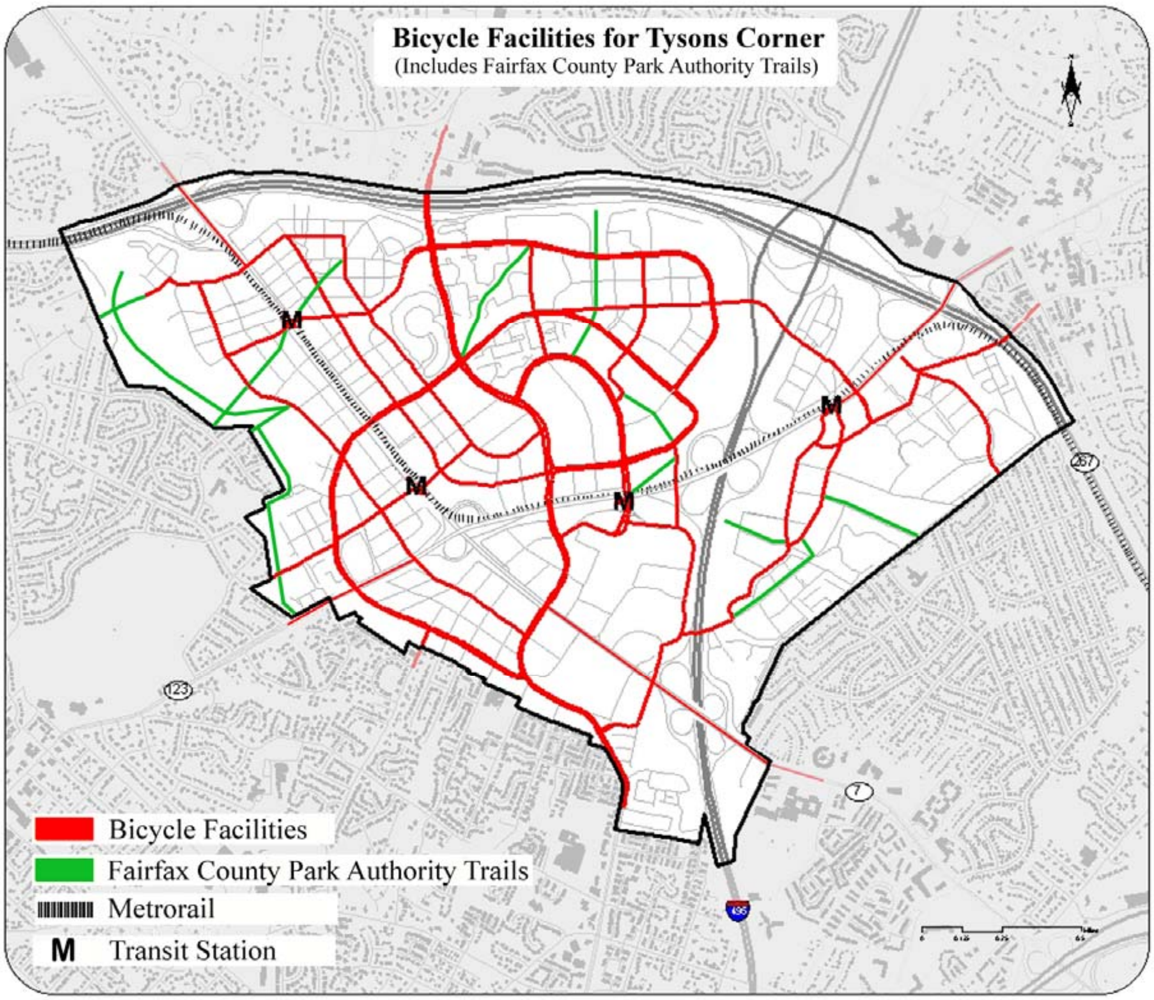
Bicycle Network

Tyson's existing transportation network, with its superblocks, suburban character, and auto-related land uses, makes bicycling a challenge. Despite these conditions, Tysons has significantly more bicycle trips in, around, and through than other areas of the County.

In 2006, the Board of Supervisors unanimously approved a comprehensive bicycle initiative, a program designed to encourage bicycling and make Fairfax County bicycle friendly and safe. New streets will be designed and older streets retro-fitted to better accommodate bicycles. Transit options will become bike friendly with the addition of buses equipped with bicycle racks. Ample safe, secure, and convenient bicycle parking will be installed countywide. Comprehensive wayfinding signage will provide guidance and information about destinations and paths, while a network of interconnected shared use paths, interfacing with an on-road bike network, will establish a cohesive and connected transportation environment conducive to bicycling. The Tysons Corner Urban Center plan affords an opportunity to incorporate these elements of bicycling, making Tysons Corner a bicycle friendly community.

A conceptual bicycle network is shown on Map 8. A bicycle master plan has been initiated for the greater Tysons area. Once completed, bicycle routes in, around, and through the urban center will be refined. Recommendations generated by this master plan will take precedence over this conceptual bicycle network. Bicycle facilities are graphically depicted in the previous section of this report: "Street Types and Design Guidelines", Figures 1 – 9.

MAP 8
Conceptual Bicycle Network for Tysons



Bicycle Parking

In an effort to encourage bicycling; safe, secure, and convenient bicycle parking should be provided in the Tysons Corner Urban Center. Bicycle parking is defined by two general categories: short-term and long-term parking.

Short-term bicycle parking emphasizes convenience and accessibility, providing parking for visitors, shoppers, and guests. These are the racks typically provided at the libraries, municipal buildings, schools, and retail centers and are intended for site users. Racks should be located within 100 feet of the primary entrance, preferably under cover, protected by the elements, and be highly visible. In most situations, the inverted "U" or hoop rack is the preferred bicycle rack. Variations of the inverted "U" rack are acceptable but these racks must be approved by the Fairfax County Department of Transportation.

Figure 10: Covered U Bicycle Racks

Long-term bicycle parking emphasizes not only convenience but security. This type of bicycle parking accommodates employees and residents where parking duration is typically longer. Parking amenities include bike lockers, bike cages, and bike rooms. These facilities should be conveniently located, offer fully enclosed and locked storage, and be accessible with a key, access code, or electronic card reader.

Figure 11: Bicycle Storage Room

Just as the case with automobile parking, an adequate number of bicycle parking spaces should be provided to serve users. This number should be in relation to the proposed land uses in the Tysons Corner Urban Center. Based on national trends, using a mode share of 1% to 5% for bicycle trips, the following table reflects bicycle parking standards to be used in calculating the number of parking spaces for bicycles.

Table 5, Bicycle Parking Ratios for Urban Mixed Use Centers*

Type of Use	**Requirement**
Multi-Family Residential (per unit)	1 space for every 5 residential units and 1 visitor space for every 25 residential units or to the satisfaction of the Director of Transportation. Minimum is 2 spaces.
Commercial-Retail (per 1,000 sq. ft.)	1 employee space per 10,000 sq. ft. and 1 visitor space per 5,000 sq. ft. or to the satisfaction of the Director of Transportation. Minimum is 2 spaces.
Office (per 1,000 sq. ft)	1 employee space per 7,500 sq. ft. and 1 visitor space per 20,000 sq. ft or to the satisfaction of the Director of Transportation. Minimum is 2 spaces.

**These ratios are subject to change. Final numbers and ratios will be developed and included in the "Fairfax County Policy and Guidelines for Bicycle Parking."*

Wayfinding

An effective wayfinding system is integral to urban design since it enhances the comprehension and use of the built environment. A wayfinding system should be provided at Metrorail stations to orient first-time passengers disembarking in Tysons Corner. Wayfinding signs should also be placed at primary vehicle entrance locations to Tysons.

The following should be considered:

- A wayfinding system should guide vehicular, bicycle and pedestrian traffic to primary public, cultural, and recreational locations while providing a unified design standard and expressing a sense of place.
- The delivery of information should take place at locations where it is most needed.
- At Metrorail stations the wayfinding system should guide passengers to main destinations within walking distance and to locations where feeder-distributor modes including the circulators can be accessed in order to reach destinations beyond walking distance.
- A wayfinding system should be coordinated to reduce clutter and confusing signs.
- Wayfinding signage for bicycles should not only identify bikeable routes but directional signage should provide route destinations and distance information. Signage should conform to the new revised bicycle wayfinding guidelines as defined in Chapter 9 of the Manual of Uniform Traffic Control Devices, 2009 (MUTCD).
- Signage should be consistent and attractive.
- Stakeholders should be actively involved in the design of a wayfinding system.
- Signs must be easy to maintain.
- Signs should be designed to easily accommodate changes in the venues listed on the signs.
- Where possible, real-time parking availability information at destinations should be integrated with a wayfinding system.

Level of Service

Impacts on Roads

An overall Level of Service (LOS) ‘E’ goal is expected for the street network in Tysons Corner. At locations where a LOS E standard cannot be attained or maintained with planned development, remedies should be proposed to offset impacts using the tiered approach described below.

In the development review process, mitigation of problem locations should follow the following sequence:

1. First, determine whether addition of capacity and/or increased operational efficiency is possible. The widening of roads by adding exclusive turn lanes and/or through lanes will in most cases not be desirable since it will increase street widths at intersections and therefore work against an attractive environment for pedestrians. In lieu of the addition of lanes, it is preferable to add links to the grid of streets where applicable and possible to promote the build out of the grid of streets and to create additional diversionary paths for vehicles.

2. Failing that, decrease future site-generated traffic by: changing the mix of land use within the parameters of the applicable land use guidelines for Tysons (e.g., replacing office or retail uses with residential use), increasing transit use through provision of additional and improved services, and/or optimizing the application of TDM measures which might include greater transit use, walking and bicycling.

3. If the previous measures do not provide adequate improvement of LOS, a development proposal or phase of development may need to be conditioned on completion of offsetting improvements. Non-creditable financial contributions of significant value dedicated to addressing deficiencies in the Tysons area may be considered as an offsetting improvement. **Impacts on Transit, Pedestrian, and Bicycle Facilities**

A high level of service should be maintained for transit users that minimizes delay, the need for transfers, and transfer delay. Where it is not possible to maintain a high level of transit service because of extraordinarily high costs, monetary contributions to a fund for the eventual improvement of transit service should be provided in lieu of the maintenance of a high quality transit service. An acceptable level of transit service nevertheless must be maintained.

A high level of service should be maintained for pedestrians and cyclists, including safety and security, direct pathways, reasonable grades, and minimized delays at intersections. Within TOD areas, preference should be given to the maintenance of a high level of service for transit, cyclists, and pedestrians. Impact studies within TOD areas should quantify the level of service for all applicable modes (vehicular, transit, pedestrians, and cyclists) by applying up-to-date, standard techniques.

TRANSPORTATION MANAGEMENT

Transportation Demand Management

Transportation Demand Management (TDM) refers to a variety of strategies aimed at reducing the demand on the transportation system, particularly to reducing single occupant vehicles during peak periods, and expanding the choices available to residents, employees, shoppers and visitors, The result is more efficient use of the existing transportation system. Transportation Demand Management is a critical component of this Plan. Traffic must be minimized to decrease congestion within Tysons, to create livable and walkable spaces, and to minimize the effects of traffic on neighboring communities.

When the four Metrorail stations open in Tysons and denser mixed-use transit-oriented development is constructed surrounding the stations, a substantial percentage of travelers are expected to commute via Metrorail without any TDM programs in place. This development pattern will also reduce the need for driving trips because jobs, housing, shopping, recreational and cultural opportunities will be close at hand and accessible by walking or a short transit ride.

A broad, systematic, and integrated program of TDM strategies throughout Tysons can further reduce peak period single occupancy vehicle trips, as well as increase the percentage of travelers using transit and non-vehicular modes of transportation. TDM programs should embrace the latest information technology techniques to encourage teleworking, provide sufficient information to enable commuters and other trip makers to choose travel modes and travel times, or decide if travel is actually necessary at that time.

A large component of TDM will be the promotion of the programs to the various stakeholders within Tysons. A Transportation Management Association should be established to coordinate TDM outreach.

At a minimum, development proposals should include the following elements associated with their TDM program:

1. Indicate the trip reduction goals over time (2050 and interim development levels) by using the values specified in Tables 5 and 6.

2. TDM implementation plans. TDM implementation plans should include at least the following:
   a. evaluations of potential TDM measures
   b. listing of TDM measures to be provided
   c. listing of alternate TDM measures which may be provided
   d. phased trip reduction goals
   e. implementation budgets

f. monitoring arrangements and associated remedial and contingency funds. The remedial fund is to be used if TDM goals are not met and the contingency fund is used if unanticipated changes in travel behavior (Tysonswide) result in an increase in the TDM trip reduction goals. Please see the TDM Monitoring section.

3. Commitments to ensure Transportation Demand Management efforts are successful. These may include parking plans that reduce parking ratios before latter phases are constructed, phasing plans that tie future development to recording successful vehicle trip reductions, remedy funds to improve TDM program delivery, and penalties to deter non-compliance.

Areas closest to the Metrorail stations should have higher transportation demand management requirements. Within 1/8 mile of the stations, development should provide the greatest incentives to reduce single-occupant vehicle commuting. The recommended TDM trip reductions of traffic generation estimates provided by the Institute of Transportation Engineers (ITE) are shown in Tables 5 and 6.

Table 5
Recommended TDM Vehicle Trip Reduction Goals
for Residential Development

Development levels in total square feet (with corresponding forecast year)	TDM Vehicle Trip Reduction Goals, Residential Development (Percentage Reduction from ITE Rates)			
	TOD Locations			Non-TOD Locations (more than 1/2 mile from station)
	0 to 1/8 Mile from Station	1/8 to 1/4 Mile from Station	1/4 to 1/2 Mile from Station	
2010 to 2020	45%	35%	30%	25%
84 million (2030)	55%	45%	40%	35%
96 million (2040)	60%	50%	45%	40%
113 million (2050) (Comprehensive Plan Level)	65%	55%	50%	45%

Note: TDM reductions include a reduction in vehicle trips due to transit. See Table 3 for transit modal split goals.

Table 6
Recommended TDM Vehicle Trip Reduction Goals
for Commercial Development

Development levels in total square feet (with corresponding forecast year)	TDM Vehicle Trip Reduction Goals, Commercial Development (Percentage Reduction from ITE Rates)			
	TOD Locations			Non-TOD Locations (more than 1/2 mile from station)
	0 to 1/8 Mile from Station	1/8 to 1/4 Mile from Station	1/4 to 1/2 Mile from Station	
2010 to 2020	45%	35%	30%	25%
84 million (2030)	55%	45%	40%	35%
96 million (2040)	60%	50%	45%	40%
113 million (2050) (Comprehensive Plan Level)	65%	55%	50%	45%

Note: TDM reductions include a reduction in vehicle trips due to transit. See Table 3 for transit modal split goals.

The TDM trip reductions in Tables 5 and 6 equate to total trip reductions for Tysons of over 30% in 2013; over 40% in 2030; and over 50% in 2050. These trip reductions include the transit mode shares indicated in Table 3. As the Tysons Corner area is developed, and the land use and transportation infrastructure matures, TDM trip reduction goals should be examined to determine if they are adequate for changing conditions.

Examples of TDM measures:

- Transit and vanpool subsidies
- Pre-tax deduction of transit and vanpool fares
- Carpool and vanpool matching service
- Shower and locker facilities for bicyclists and walkers
- Secure and weatherproof bicycle parking
- Carpool and vanpool preferential parking
- On-site car-sharing vehicle
- Employee shuttle
- Guaranteed Ride Home Program
- Commuter information center (bulletin board, web site, brochure table)
- Employee Transportation Coordinator (ETC)
- Flexible or alternative work hours
- Telework program
- TDM education programs directed at the public and employers

TDM programs will only work where parking is not over-supplied, and will be most effective where parking costs are charged directly to users. TDM programs must be coordinated with parking reductions and/or management programs.

Parking Management

In 2009 Tysons had more land devoted to cars than to people with approximately 167,000 parking spaces covering 40 million square feet. This amount of parking far exceeds what is necessary for adequate parking. Much of this has occurred because there is no convenient internal circulation system or adequate pedestrian-friendly street and sidewalk network in Tysons. Additionally, there is limited inter-parcel access and shared-use parking. Each development provides parking for its own peak demand, an approach that often leads to excess parking supply and a wasted use of resources.

A change in philosophy of regulating parking is needed to put Tysons on the forefront of sustainable growth. Parking in the TOD Districts should follow the experience of successful TOD areas around the country by limiting the amount of parking required near rail stations. In the Non-TOD Districts, reductions from conventional parking ratios are required to achieve Tysons-wide trip reduction goals.

For all non-residential uses, minimum parking requirements should be eliminated within 1/2 mile of rail stations. Minimum parking requirements should be reduced for all uses located outside of TOD Districts. To ensure that adequate parking is provided, a parking plan should be submitted along with all development applications in TOD Districts. To avoid oversupply of parking, maximum parking requirements should be set for all areas and shared parking should be encouraged. Recommended parking rates are indicated in Table 7.

Table 7
Parking Ratios for Tysons Corner

Parking Spaces Per Unit or Spaces Per 1,000 sq. ft.

Use	Previous (2009)	< 1/8 mile Metro Station		1/8 - 1/4 mile Metro Station		1/4 - 1/2 mile Metro Station		Non-TOD	
	Min.	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**
Townhouse	**2.7**	**1.75**	**2.2**	**1.75**	**2.2**	**2.0**	**2.5**	**2.0**	**2.7**
Multifamily:									
0-1 bedroom	**1.6**	**1.0**	**1.3**	**1.0**	**1.3**	**1.1**	**1.4**	**1.1**	**1.4**
2 bedroom	**1.6**	**1.0**	**1.6**	**1.0**	**1.6**	**1.35**	**1.7**	**1.35**	**1.7**
3+ bedroom	**1.6**	**1.0**	**1.9**	**1.0**	**1.9**	**1.6**	**2.0**	**1.6**	**2.0**
Hotel/Motel	**1.08**	**none**	**1.0**	**none**	**1.0**	**none**	**1.05**	**0.85**	**1.08**
Office	**2.6**	**none**	**1.6**	**none**	**2.0**	**none**	**2.2**	**2.0**	**2.4**
Retail/ Services[1,2]	**varies**	**none**	**previous min.**	**none**	**previous min**	**none**	**previous min.**	**85% of previous**	**110% of previous**

Notes:
[1.] For retail and service uses located in TOD areas not listed in Table 7, minimum parking requirements enumerated in the Section 11-104 of the Zoning Ordinance (as of December 2009) should be used as maximum parking requirements; in non-TOD Districts, the minimum required parking should be 85% of the minimum parking requirement in the Zoning Ordinance (as of December 2009) and the maximum should be 110% of the referenced minimum.

[2.] To encourage convenient retail and service uses within walking distance of office and residential development, the first 5,000 square feet of accessory retail and service uses in any such building should have no parking spaces allocated in the parking plan, nor should it be counted toward the maximum parking requirement.

For developments with long implementation horizons, maximum office parking requirements can be increased by approximately 0.4 spaces per 1,000 square feet for development phases scheduled for construction between 2020 and 2030 and by 0.8 spaces per 1,000 square feet for development phases scheduled for construction before 2020. Once all phases are constructed, the parking ratios for the total development will not exceed the maximum values in Table 7.

In TOD Districts, a parking study should be submitted along with a development application that shows the right amount of parking is provided. The parking study should demonstrate that parking is adequate for all uses on the site, subject to the vehicle trip reductions in Tables 5 and 6; and that parking is reduced as much as practical through techniques such as parking management, and shared parking.

In Non-TOD Districts, a parking study can be submitted along with a development application that justifies parking levels below the minimums indicated in Table 7. The parking study should indicate the techniques to be applied to justify a lower level of parking. These techniques can include shared parking.

Parking studies should, where applicable, also indicate a goods loading plan, which (if a planned development is expected not to meet the off-street loading requirements established in the Zoning Ordinance) demonstrates that the planned loading facilities are adequate for the planned uses. The loading plan may count new, on-street loading areas and synergies among planned uses, to limit the need for additional loading spaces.

As the Tysons Corner area is developed, and the land use and transportation infrastructure matures, parking requirements should be examined to determine if they are adequate for the changing conditions. Rather than supplying parking for each individual use, parking should be treated as a common resource for multiple uses. Implementing this practice will reap many advantages in creating a more walkable environment. Providing transit service, an effective mix of uses, and an appropriate network of sidewalks will reduce automobile use and, consequently, the need to provide parking.

Additional methods listed below should be pursued to ensure the appropriate amount of parking is provided.

- Encouraging shared parking arrangements across parcel lines.
- Creating a parking management entity to coordinate shared parking efforts, enforce parking regulations, apply parking pricing strategies where beneficial, and monitor parking demand and supply regularly.
- Securing parking management agreements such as parking pricing.
- Unbundling parking from commercial and residential leases and sales.

- Allowing on-street parking, where appropriate, and counting those spaces towards parking requirements.
- Implementing "Smart Parking" technology to maximize parking utilization.
- Providing preferential parking for carpools, vanpools, and car-sharing vehicles.
- Reductions for shared parking on mixed-use sites.

Information and Communications Technology and Intelligent Transportation Systems

The application of Information and Communications Technology (ICT) in Tysons Corner has the potential to decrease congestion, increase safety, make trip making more convenient, reduce emissions and improve trip-making decisions. More specifically the following are examples of goals for the application of ICT at Tysons:

- Electronic information infrastructure that works in concert with physical infrastructure to maximize the efficiency and utility of the system, encouraging modal integration and consumer choice.
- Real-time information for operators and users of the transportation system to help contain congestion and increase the effective capacity of the system while reducing the need for new construction.
- Facilities, technology and information that help reduce energy consumption and negative environmental impact.

ICT can be used to not only monitor and mitigate traffic congestion, but also to enhance emergency services in Tysons Corner. Through the use of street sensors, signal control transmitters and video surveillance cameras, real-time traffic management can take place. GPS and other technology can also help public safety personnel respond to incidents in a timely manner.

As part of ICT, intelligent transportation systems (ITS) should be applied to the fullest extent possible. Main components of ITS include:

- Traffic management systems. These systems make use of information collected by traffic surveillance devices to smooth the flow of traffic along travel corridors. They also disseminate important information about travel conditions to travelers.
- Crash prevention and safety systems detect unsafe conditions and provide warnings to travelers to take action to avoid crashes.
- Roadway operations and maintenance focus on integrated management of maintenance fleets, specialized service vehicles, hazardous road conditions remediation, and work zone mobility and safety.
- Transit ITS services include surveillance and communications, such as automated vehicle location (AVL) systems, computer-aided dispatch (CAD) systems, and remote vehicle and facility surveillance cameras, which enable increases in operational efficiency, safety, and security.
- Emergency management applications include hazardous materials management, the deployment of emergency medical services, and large and small-scale emergency response and evacuation operations.
- Electronic payment and pricing systems employ various communication and electronic technologies to facilitate commerce between travelers and transportation agencies.
- Traveler information applications use a variety of technologies to allow users to make more informed decisions regarding trip departures, routes, and mode of travel.

New developments should contain the necessary ICT infrastructure to enhance the following activities to the fullest extent:

- Telework, teleconferencing, and related strategies to reduce vehicular trips.
- Advanced traveler information to increase the efficiency and effectiveness of decisions on when to travel, how to travel, where to travel, and whether to travel at all.

Traffic Management and Maintenance

To ensure a high level of safety, to minimize breakdowns, to maintain a clean and attractive environment and to monitor systems to optimize efficiency and effectiveness, a traffic management maintenance entity should be established for Tysons Corner. Such an entity should be responsible for at least the following:

- Traffic monitoring and incident management.
- Streetscape monitoring and maintenance where necessary.

MAINTAINING A BALANCE BETWEEN LAND USE AND TRANSPORTATION

In order to maintain an acceptable level of accessibility in and around Tysons Corner as development occurs over time, it is essential to keep a balance between land use and transportation. To maintain this balance, the increase in development in Tysons should be coordinated with the provision of transportation infrastructure and programs to reduce vehicular trips. Considerable analysis was conducted to determine the need for specific transportation programs and infrastructure for a specific level of development in Tysons Corner. Table 8 provides the proposed transportation infrastructure and programs as they relate to the level of development in Tysons Corner.

The provision of the proposed transportation infrastructure and transportation programs by the opening of the Metrorail line to Wiehle Avenue as specified in Table 8 will provide the ability to accommodate development above 44 million sq. ft. for Tysons.

Recommendations for phasing development in Tysons to transportation improvements and objectives can be found in the Land Use Recommendations.

Table 8
Transportation Infrastructure and Programs
as they Relate to the Level of Development in Tysons Corner

Type of Transportation Program or Infrastructure Project	**Description of Transportation Program or Infrastructure Project**	**Area Served by Improvement**
Required Transportation Improvements at the Opening of a Metrorail Line to Wiehle Avenue and HOT Lanes on the Beltway (2013) to Accommodate More than 44 Million sq. ft. of Development		
Rail Transit Routes	Complete Phase I of Metrorail Silver Line Phase I	Tysons-wide/Countywide
Bus transit routes	Neighborhood bus routes; circulator bus routes serving Metrorail stations; express bus routes on I-66 and I-95/I-495	Tysons-wide/Countywide
Sidewalks	Sidewalks to provide connections to developments within walking distance of rail stations	District
Roads – Arterials Widening	Complete widening of Rt. 7 to 8 lanes from the Dulles Toll Road to Rt. 123	Tysons-wide
Roads – Freeway Widening	Widen I-495 from 8 to 12 lanes to provide 4 HOT lanes between the Springfield Interchange and the American Legion Bridge	Tysons-wide/Countywide
Roads – Freeway Ramp	HOT ramp connecting to Jones Branch Drive	Tysons-wide
Roads – Freeway Ramp	HOT ramp connecting to the Westpark Bridge	Tysons-wide
Roads – Freeway Ramp	HOT ramp connecting to Rt. 7	Tysons-wide
TDM	Application of aggressive TDM measures (e.g. 45% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District
Required Additional Transportation Improvements to Accommodate 60 Million sq. ft. of Development (2013 - 2020)		
Rail Transit Routes	Completion of Phase II of Metrorail Silver Line (from Wiehle Avenue to West of Dulles Airport with three stations in Fairfax County)	Tysons-wide/Countywide
Bus Transit Routes	Further improvements to neighborhood bus routes; circulator bus routes serving Metrorail stations; express bus routes on I-66 and I-95/I-495	Tysons-wide/Countywide
Roads – Arterial Widening	Widen Rt. 7 from Rt. 123 to I-495	Tysons-wide
Roads – Arterial Extension	Extend Boone Boulevard from Boone Boulevard to Northern Neck Drive	Tysons-wide
Roads – Grid of Streets	Grid west of Westpark Drive	District
Roads – Grid of Streets	Grid bounded by Gosnell Rd., Rt. 7, and Rt. 123	District
Roads – Arterial Extension	Extend Greensboro Drive from Spring Hill Road to Tyco Road	District
Roads – Grid of Streets	Grid connections to Greensboro Drive	District
Roads – Freeway Ramp	Ramp connecting Greensboro Drive extension to westbound Dulles Toll Road	Tysons-wide
Roads – Freeway Ramps	Ramps connecting Boone Blvd. extension to westbound Dulles Toll Road and eastbound Dulles Toll Road to Boone Blvd. extension.	Tysons-wide

Roads – Freeway Widening	Collector – distributor roads along the Dulles Toll Road from Greensboro Drive extension to Hunter Mill Rd.	Tysons-wide
Roads – Grid of Streets	Grid of streets east of I-495	District
Roads – Connecting Ramp	Ramp connecting Jones Branch Drive to Scotts Crossing Road	Tysons-wide
TDM	Application of aggressive TDM measures (e.g. 45% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District
Type of Transportation Program or Infrastructure Project	**Description of Transportation Program or Infrastructure Project**	**Area Served by Improvement**
Required Additional Transportation Improvements to Accommodate 84 Million sq. ft. of Development (2020 - 2030)		
Bus Transit Routes	Further improvements to neighborhood bus routes; circulator bus routes serving Metrorail stations; BRT routes on I-66 and I-95/I-495	Tysons-wide/Countywide
Roads – Grid of Streets	Substantial sections of the grid of streets	District
Roads – Arterials Widening	Widen VA 123 to 8 lanes from Rt. 7 to I-495	Tysons-wide
Roads – Arterial Widening	Widen VA 123 from 4 to 6 lanes between Rt. 7 and Old Courthouse Road	Tysons-wide
Roads – Arterial Widening	Widen Rt 7 from 4 to 6 lanes between I-495 and the City of Falls Church	Tysons-wide
Roads – Collector Safety Improvement	Improve and enhance the safety of Old Courthouse Road from the Town of Vienna to Gosnell Road	District
Roads – Collector Widening	Widen Magarity Road from 2 to 4 lanes from Great Falls Street to Rt. 7	Tysons-wide
Roads – Arterials Widening	Widen Gallows Road from 4 to 6 lanes from Rt. 7 to I-495	Tysons-wide
Roads – Interchange Improvements	Rt. 7 at the Dulles Toll Road	Tysons-wide
Roads – Connecting Road	Beltway crossing connecting the Tysons Corner Center area to Old Meadow (limited to transit, pedestrians and bicyclists)	Tysons-wide
Roads – Freeway Ramps	Ramps connecting Jones Branch Drive to westbound Dulles Toll Road and eastbound Dulles Toll Road to Jones Branch Drive.	Tysons-wide
Roads – Freeway Widening	Widen I-495 (Outer Loop) between Rt. 7 and I-66 by one lane	Tysons-wide
TDM	Application of aggressive TDM measures (e.g. 55% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District
Required Additional Transportation Improvements to Accommodate 113 Million sq. ft. of Development (2030 - 2050)		
Improved Transit	Additional BRT routes, other supporting services including park-and-ride, feeder bus routes to rail stations	Tysons-wide/Countywide
High Speed Transit Corridors	At least two additional high speed transit corridors with substantial TOD development: Orange Line Metrorail extension and an additional rail extension	Tysons-wide/Countywide
Roads – Grid of Streets	Completion of the grid of streets	District
TDM	Application of more aggressive TDM measures (e.g. 65% reduction in vehicle trips for an office development within 1/8 mile of a Metrorail station)	District

The five strategies that need to be successfully implemented to maintain a balance between land use and transportation in Tysons Corner are:

1. The phased provision of transportation infrastructure as specified in Table 8.
2. The achievement of transit modal split levels as specified in Table 3.
3. The achievement of vehicle trip reduction levels through transportation demand management as specified in Tables 5 and 6.
4. An increase in residential development over time as specified in the Land Use section.
5. Excellence in urban design, resulting in the successful integration of built approaches with the Metro entrances, and in the achievement of the mix of uses and the facilities which creates the largest possible internal trip capture.
6. A monitoring system (see “Monitoring System” below) to verify that these requirements are realized as planned and the ability to make adjustments if there are deviations from the recommendations on how a balance will be maintained.

The provision of transportation infrastructure within a specified period of time is uncertain. In addition, the achievement of vehicle trip reduction levels through transportation demand management is uncertain since it relies on individuals changing their trip-making behavior. Although achieving high levels of trip reduction will be challenging, it is essential to achieve the levels of development planned for Tysons.

1. Considering the importance of achieving success, property owners should commit to the following to be able to move from a prior phase to a subsequent phase of development:The required transportation infrastructure and programs must be in place as specified in Table 8.
2. The existing phase of development must achieve the applicable vehicle trip reduction levels as specified in Tables 5 and 6.

If a property owner participates in a Community Development Authority (CDA) that has committed to the provision of an acceptable level of funding to address the transportation improvement responsibilities of the CDA, the property owner can be exempt from having to phase their development to transportation infrastructure and programs being in place in order to move from a prior phase to a subsequent phase of development.

Monitoring System

Vehicle Trips and Delay (demand)

Maintaining a balance between land use and transportation is dependent on a number of factors as indicated above. The necessary transportation infrastructure, modal split levels, and vehicle trip reduction levels to maintain this balance have been determined by means of extensive analyses. Analyses are based on known conditions at the time of writing this plan text. However, these conditions include human behavior and a number of exogenous factors. These conditions might change in the future which could result in unforeseen changes in trip-making behavior. For this reason, it is considered essential to monitor the amount of vehicles entering Tysons over time as well as the associated delay due to congestion. The growth in vehicle trips over time will determine if there is a deviation from the estimated growth in vehicle trips on which the strategies listed above are based. Monitoring should therefore include the following:

1. Vehicles entering Tysons should be counted at a number of locations to enable the accurate detection of deviations from vehicle growth estimates.
2. Delay at a sample number of intersections and at traffic merge locations to determine if there is a significant increase in over time.

Transportation Infrastructure and Programs (supply)

The provision of transportation infrastructure and programs should be provided according to the schedule in Table 8. Due to unforeseen circumstances, the provision of transportation infrastructure and/or programs might differ from the schedule in Table 8. The funding of transportation infrastructure and programs should be assessed to update the schedule.

The monitoring of the demand side and supply side should provide an assessment of conditions and an updated projection of future conditions in terms of maintaining a balance between land use and transportation. The early identification of future deviations from the planned schedule provides an opportunity to react in a timely manner to allow the necessary adjustments to be made to avoid a significant imbalance between land use and transportation. Possible corrective measures are:

- The use of a TDM Remedial and Contingency Fund to increase TDM activities.
- An increase and/or new transportation facility user charges.
- Congestion pricing.

It might be desirable to establish a monitoring agency to conduct the continuous monitoring and reporting of vehicle trips.

Attachment B

Modeling Methodology

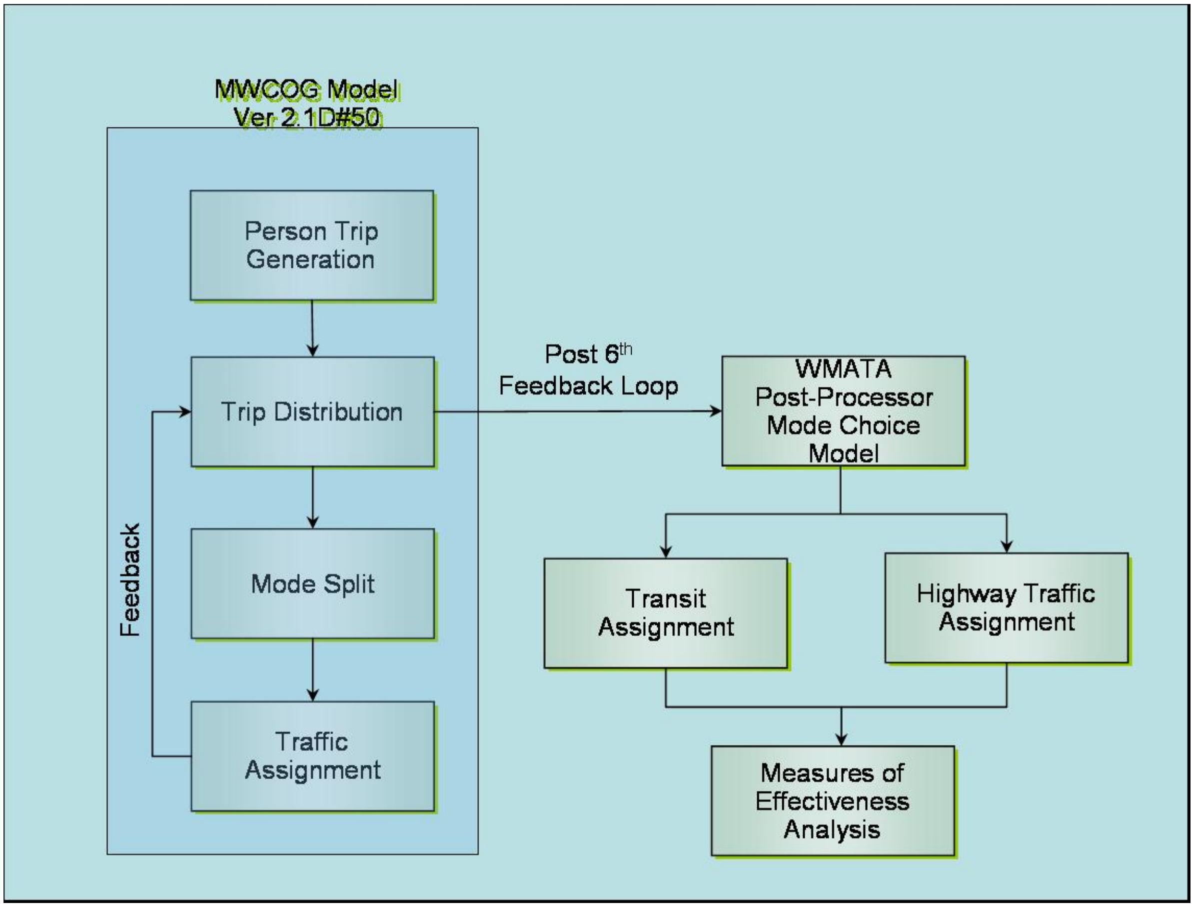
Framework for Evaluation

■ Model Methodology

Description

This section presents a brief overview of the travel demand forecasting methodology used for the Tysons Corner Transportation Analysis. Different types of models come into play with the different levels of transportation planning studies that are done. Regional models, such as the MWCOG model, are used for applications such as long term, travel demand forecasting type situations. For shorter-term, finer grain applications such as corridor, sector, or even site applications, model tools are used which produce results that are more broad-stroke type results, such as trends or shorter term forecasts. For this analysis, a combination of model tools was chosen to best match the modeling needs of the study. The model being used to evaluate the impacts of land use changes on the transportation network and scenarios to mitigate the potential impacts on the transportation network is the MWCOG/TPB Version 2.1D#50 model set with the addition of the Fairfax County subzone highway assignment and the WMATA Post-Processor Mode Choice Model. Figure 3.1 illustrates the structure of the model framework. The main inputs and outputs of the model set are listed in the Appendix.

Figure 3.1 Model Framework



The MWCOG/TPB Version 2.1D#50 was the regional model used for the analysis, as it was the model version adopted at the commencement of this project. The currently adopted version is the Version 2.2 model, which was adopted in November 2008. The WMATA Post-Processor Mode Choice Model is the mode choice model that is being integrated into the MWCOG/TPB Version 2.3 model set. The Version 2.3 model set is currently under development and will be the next model adopted for air quality conformity analysis, but is not yet ready for critical application use. The WMATA Post-Processor Mode Choice Model is not a traditional post-processor like ones used for highway link refinements or MOE calculations. Instead, it is a mode choice model that is applied at the end of the model chain rather than being applied after trip distribution. The WMATA Post-Processor Mode Choice Model represents a more-advanced tool as compared with the mode choice model imbedded in Version 2.1D#50 in that it provides mode shares at the sub-mode level. Specifically, the WMATA mode choice model predicts mode share for bus, bus to rail, rail, and commuter rail. It also predicts the mode share by access to transit including walk to transit, drive to transit, and kiss-and-ride.

Both the MWCOG/TPB Version 2.1D#50 model set and the WMATA Post-Processor Mode Choice Model cover the entire metropolitan region. To look closer at the Tysons

Corner region, the Fairfax County Subarea model used the WMATA Post-Processor Mode Choice Model output to assign traffic at a more detailed level within Fairfax County.

As a post-process, two additional exclusive steps were applied. The first additional post-processor was the FHWA TDM model, which analyzes travel demand management strategies, and secondly was the application of urban design elasticities. All of the model processes used are described in more detail below.

Regional Forecasting Tool Details

The MWCOG travel demand forecast model uses a series of sub-models or steps to produce potential travel demand given the future land use and transportation networks. The regional transportation options are represented in terms of a network. The network represents all of the transportation services and infrastructure. This network includes transit and highway facilities. The regional area is divided into traffic analysis zones (TAZs). For the Washington Metropolitan Area there are a total of 2191 TAZs. In the denser populated areas there are a greater number of TAZs and in less dense areas the TAZs are larger. At the boundaries of the modeled areas the TAZs are larger and the highway network is less detailed. In the primary modeled jurisdictions, the highway network is more detailed and the corresponding number of TAZs is greater.

The MWCOG model is a four step model. Trip generation answers the question of how much travel and for what purpose. The trip generation model produces trips by purpose by TAZ. The output from the trip generation model is the number of production trips and attraction trips by purpose at the origin end or destination end, as appropriate. In the MWCOG model process there are four primary purposes:

- Home-Based-Work (HBW) – home based work trips originate at home and travel to a place of work and back again.

- Home-Base-Shop (HBS) – home based shopping trips originate at home and travel to a place of shopping and return home again.

- Home-Based-Other (HBO) – home based other trips include all trips from a home not associated with work or shopping.

- Non-Home-Based (NHB) – non-home based trips are trips that do not originate or end at a home. These can include trips from the place of work which return to the place work or other similar type of trips.

The second step in the process is trip distribution. Trip distribution answers the question where do trips travel. The trip distribution model determines the origin and destination of the productions and attractions from the trip generation step. The trip distribution model looks at the distribution of trips based on travel time and applies that to match productions and attractions. As future congestion increases, the trip length tends to decrease, while the travel time distribution tends to remain constant.

The third step in the process is the mode choice model. This step answers the question of how travel will be done. The mode choice model produces the probability of a specific mode for a specific origin-destination pair. The model determines the probability based on elements such as in-vehicle travel time, out of vehicle wait time, the number of transfers, and other relevant choice criteria. The end product of the model choice model is a set of trip tables with origins and destinations by mode.

The fourth step in the process is the assignment. The assignment answers the question of what route a trip will travel given an origin and destination. There are two assignments – a highway assignment and a transit assignment. The highway assignment captures vehicle trips on the network, while the transit assignment captures person trips on transit modes through the network. The networks cover large geographic areas and therefore are less detailed representations of real world highway and transit facilities and services. Paths are determined based on weighted travel time cost. For highway assignment an equilibrium concept is used to route vehicles between their origins and destinations. Typically for transit assignment the shortest path through the network (based on the perceived travel time cost which is a weighted combination of in-vehicle, out-of-vehicle time, and cost elements) is taken.

The model set is calibrated for a base year data set. The base year data set is linked to survey data which captures the travel characteristics of the modeled region. The MWCOG model set is calibrated to the 1994 home travel survey. The traffic assignment is validated to 2002 traffic counts. A new household survey is being conducted through 2008 and will serve to update MWCOG's models in the future.

Subarea Forecasting Tool Details

The Fairfax County subarea model is a based upon, and is an extension of, the regional travel demand model developed by the Metropolitan Washington Council of Governments (MWCOG) for regional transportation planning and air quality conformity analysis. The subarea model disaggregates the Fairfax County portion of the regional trip table and assigns that trip table to a highway network that has much greater highway and traffic analysis zone (TAZ) detail in the Fairfax County portion of the region than does the regional model. This additional detail produces more accurate estimates of traffic volumes at a smaller scale of resolution than has been available previously. Specifically, the model should provide more useful information at the level of arterials and collector functional classifications. This is because the additional zone and network structure provide a more evenly distributed pattern of traffic loading points on the non-freeway components of the highway network, and because the additional detail provides route choice options more closely resembling those actually available to travelers in Fairfax County. Less detailed highway networks can easily produce too much traffic on major facilities in comparison to traffic counts, simply because of the lack of lower functional classification routes in the highway networks. The addition of lower functional classification routes can distribute traffic away from the primary routes for a significant portion of a traveler's route.

Post-Processor Tool Details

There are two post-processor trip reduction factors: travel demand management (TDM), and 4D elasticities to account for urban design.

The primary estimation tool used for the travel demand management analysis is the Federal Highway Administration (FHWA) Travel Demand Management model. This model calculates expected single occupancy vehicle (SOV) trip reduction and mode split for a sizeable range of TDM strategies, using a set of defined inputs and known starting trip and mode split conditions.

The FHWA TDM model used for the analysis predicts changes in travelers' likelihood to use various modes of travel when offered particular TDM strategies. The model uses a pivot-point logit approach that begins with known travel conditions and a known mode split and predicts a revised mode split when TDM strategies are applied. The model was developed using data from numerous metropolitan regions in the United States and is used with default assumptions set for metropolitan areas of various sizes and characteristics.

The model offers tools for analyzing both areawide and employer-based strategies. The model accommodates testing of strategies that provide a travel cost saving (e.g., financial incentives or parking charges) or time saving (e.g., transit frequency improvement or HOV lanes). Additionally, the model can be used to predict trip reduction from work hours arrangements (e.g., telework and compressed schedules) and from non-cost and non-time TDM support services that make use of non-SOV modes more convenient or more desirable, but do not change the time or cost to use the modes. Several of these analysis options were used in the Tysons Corner analysis.

The model also is designed to be used for a variety of situations, including a geographic subarea, a metropolitan area (with limitations), and an individual work site. The geographic subarea is most applicable to the Tysons Corner TDM analysis. The TDM model predicts change in vehicle trips from a set of starting travel conditions that include person, vehicle, and transit trips by origin-destination (O-D) pairs for home-based work (HBW) morning peak trips. The TDM model also is given inputs for the specific strategies to be tested.

Since the model internally uses a composite utility to evaluate changes in travel demand it is not possible or advisable to separately account for the contribution of each program element. Instead the impact of the package of strategies used is reported.

The 4D analysis is intended to capture the impact of urban design. This post-processor utilizes the EPA Smart Growth elasticities to calculate a mode shift from auto to walk trips due to the urban design, as shown in Table 3.2. The definition of the four elasticities is below:

$$\text{Density} = \text{Percent Change in [(Population + Employment) per Square Mile]}$$

$$\text{Diversity} = \text{Percent Change in} \left\{ 1 - \left[\frac{\text{ABS(b * Population - Employment)}}{\text{b * Population + Employment}} \right] \right\}$$

$$\text{where:} \quad \text{b = regional employment / regional population}$$

$$\text{Design} = \text{Percent Change in Design Index}$$

$$\text{Design Index} = 0.0195 * \text{street network density} + 1.18 * \frac{\text{length of sidewalk}}{\text{length of public street frontage}} + 3.63 * \frac{\text{length of street in miles}}{\text{area of neighborhood in square miles}}$$

$$\text{Destinations} = \text{Percent Change in Gravity Model denominator for study TAZs "i":} \sum_{\text{regional TAZs j}} \text{Attractions (j) * Travel Impedence (ij)}$$

Table 3.2 Urban Design Elasticities

	Vehicle Trips	Vehicle Miles Traveled
Density	-0.043	-0.035
Diversity	-0.051	-0.032
Design	-0.031	-0.039
Destinations	-0.036	-0.204

Assumptions

The following sections discuss special forecasting considerations with the model set being used for the study: capture of TDM program effects; capture of non-motorized trip making effects; and capture of parking costs effects.

Capture of TDM Program Effects

Travel demand management refers broadly to application of strategies and policies to reduce automobile travel demand. Several TDM elements are present in the Tysons

Corner Transportation and Urban Design Study. Some of the TDM elements being evaluated for this study can be tested in the travel demand forecasting model set. Elements such as carpool network priority treatments, parking pricing, development densities, and jobs-to-housing balancing are represented in the MWCOG model set. Existing levels of guaranteed ride home programs and shared ride subsidies are reflected in the model constants.

The post-processor used for this analysis, the FHWA TDM Model, is employed to reflect enhanced TDM policies as compared with what are presently available, but care must be taken to avoid double-counting. This is dealt with by only modeling programs that are not represented in the MWCOG model, such as alternate work schedules and employer-based programs encouraging carpooling, vanpooling, and transit use.

Capture of Non-Motorized Trip Making Effects

After the standard MWCOG trip generation model has completed running, there is a built-in process to reduce the number of motorized Home-Based-Work (HBW) trips to account for non-motorized trip generation. This process is applied at the traffic analysis zone (TAZ) level and impacts the productions and attractions trip ends for each TAZ. The attractions reduction for non-motorized trips is a function on the non-motorized productions. The reductions of the motorized trips represent an average share of HBW non-motorized productions out of total HBW productions. The reduction is based on the area type of each TAZ. The area type is determined based on the employment and population densities. There are seven area types and the corresponding reductions are aggregated to four factor levels. For area type one the reduction is 40.3 percent of the total productions. For area type two the reduction is 11.2 percent of the total productions. For area type three the reduction is 3.20 percent of the total productions and for area types four through seven it is 2.35 percent of total productions. Table 1 shows the area type definitions.

Table 3.3. Area Type Definitions

Population Density (Pop/Sq mile)	Employment Density (Emp/Sq mile) 0 – 100	101- 500	501 – 1,500	1,501 – 5,000	5,001 – 15,000	15,001 – 35,000	35,001+
0 – 100	7	7	5	5	2	2	2
101 – 350	7	5	5	5	2	2	2
351 – 1,500	6	6	5	5	2	2	2
1,501 – 3,500	6	6	4	3	2	2	2
3,501 – 6,500	4	4	3	3	2	2	1
6,501 – 10,000	4	3	3	3	2	2	1
10,001+	3	3	3	2	2	2	1

To permit discussion of non-motorized trips for the non-work trip purposes, the EPA Smart Growth Index methodology is used to calculate the impact of the land use on non-motorized trips. This process and the associated assumptions was described above in the Post-Process Tool Details section.

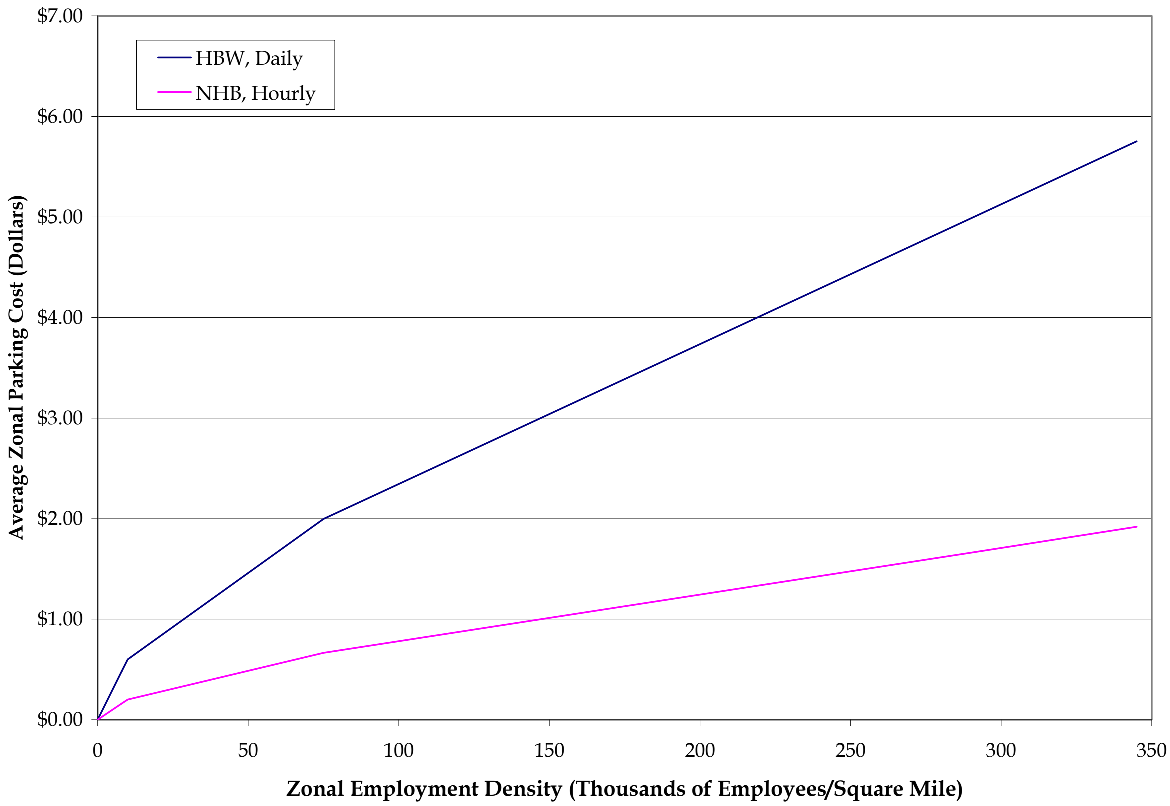
Capture of Parking Cost Effects

In the MWCOG model framework, parking costs are applied to zones based on the employment density at the attraction end. For HBW trips, the price is applied at a daily level and for non-home based work trips it is an hourly rate computed as a function of the daily level. Parking costs have some impact in the mode choice model, but the wait time for transit (including transfer, access, and out-of-vehicle time) has a much greater impact. As a result, it would not be expected to see large changes in mode share in the model as a result of modestly higher parking costs.

The daily cost of parking in 2005 model run for a zone in the K Street corridor in Washington, D.C. was $5.47 in 1994 dollars. For a zone in Tysons Corner, the cost was $0.94. In the year 2030 CLRP model run that cost increased by 17 percent for Tysons Corner based on the land use changes. These numbers should be evaluated based on the relative difference and not necessarily as an absolute exact cost of parking in the zone. For testing and evaluation of policies, the model permits altering and adjusting the price to evaluate impacts on mode share.

For areas with 250,000 employees per square mile the cost is represented to be approximately $5.00 per day. For areas with 50,000 employees per square mile the cost is approximately $1.50 per day. For non-HBW trips, the parking cost is only applied to areas with employment densities greater than 80,000 per square mile and is a fraction of the HBW related cost since it is not a daily cost.

Figure 3.2. MWCOG Parking Cost Model



In the Post-Processor Mode Choice Model the parking cost are included in vehicle operating cost. Operating costs are applied to four income groups. The coefficients on the cost are 10 times less than the coefficients on in-vehicle time. That is, the mode choice mode has greater sensitivity to travel time variables including access time, in-vehicle time, and wait time.

The mode choice model is applied to the MWCOG 2,191 zone structure. Since the Fairfax County subzone structure is finer, there is an opportunity to adjust some of the zones to better reflect the level and intensity of the development. Given the employment density in the Tysons Corner study area, Cambridge Systematics reviewed the parking cost inputs to make sure they accurately reflected the subzone network. For all but the Task Force Preferred scenario land use the parking cost assigned through the parking cost model process is accurate. There are some areas where a more conservative parking cost could be applied based on the employment density represented at the subzone level. In these cases under the Task Force Preferred scenario land use the average density does not accurately represent the subzone. Therefore for the MWCOG zones in the North Central district and the East Side district, the parking cost were modified. The result being that the parking cost for the MWCOG zones in these areas were adjusted to provide a more conservative parking cost (i.e., higher parking cost). Under the other land use scenarios the assigned parking cost correlated to the employment densities and did not require any adjustment.

The results of the parking sensitivity test showed little change in the mode share output. These results were not unexpected given that the mode choice model has higher sensitivity to both vehicle cost and fares. The mode choice model is designed to develop mode share based on many factors and service supplied and the corresponding components of travel time are more determinate to changes in the mode share. From this, it was concluded that the original model runs provided reasonable results without the manual manipulation of the parking cost for the subzones. Therefore the parking costs were not altered in the study area and were used in the mode choice model as they were produced directly from the parking cost model. Figures 3.3 and 3.4 show the parking costs for the MWCOG zones and the Fairfax County subzones, based on the formula shown in Figure 3.2.

Figure 3.3 Tysons Corner Daily HBW Parking Costs for MWCOG TAZs – Based on Task Force Preferred Land Use

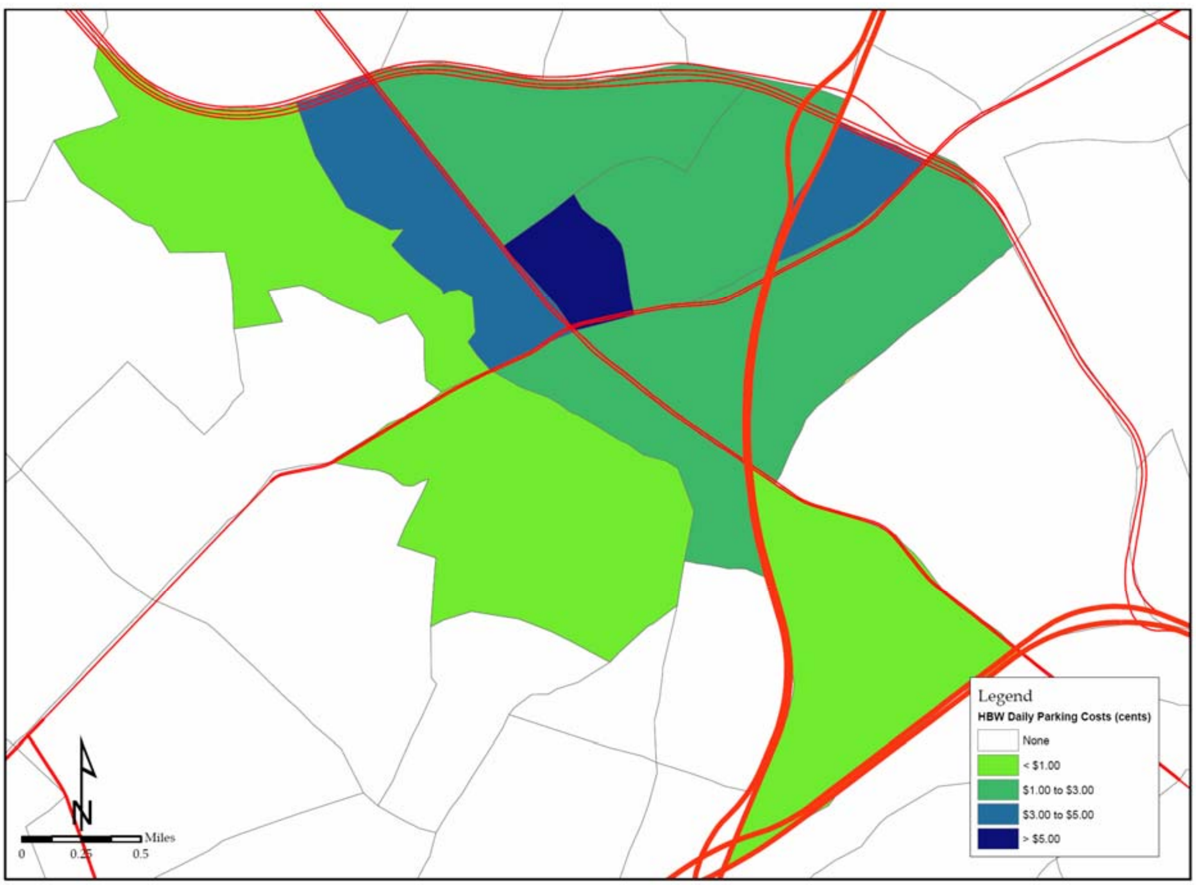
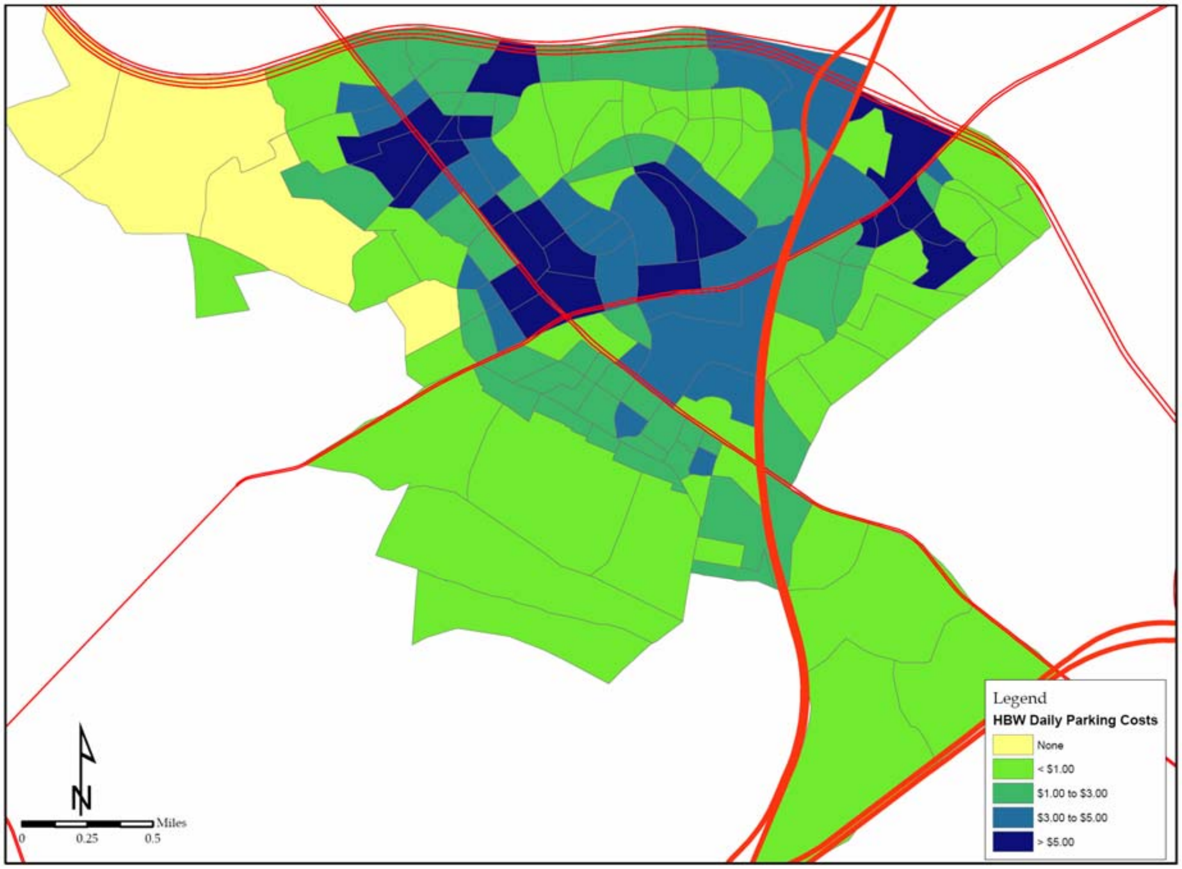


Figure 3.4 Tysons Corner Daily HBW Parking Costs for Fairfax County Subzones – Based on Task Force Preferred Land Use



Validation

The 2005 validation run was compared against counts in the Tysons Corner area to ensure that the model results were accurate. The counts available for the freeway links included two counts on I-66, three counts on the Dulles Toll Road, and four counts on I-495. For the non-freeway links there were four counts on VA Route 7, three counts on VA Route 123, three counts on Lewinsville Road, and one count each on Old Courthouse Road, Woodford Road, Gosnell Road, Magarity Road, and Gallows Road.

Figures 3.5 and 3.6 below show the estimated versus actual average daily traffic on the links for freeways and non-freeways, respectively. The RMSE for the freeway links was 15.7% and the RMSE for the non-freeway links was 40.3%, which was acceptable for the analysis.

Figure 3.5 Average Daily Traffic on Freeway Links – Tysons Corner Area

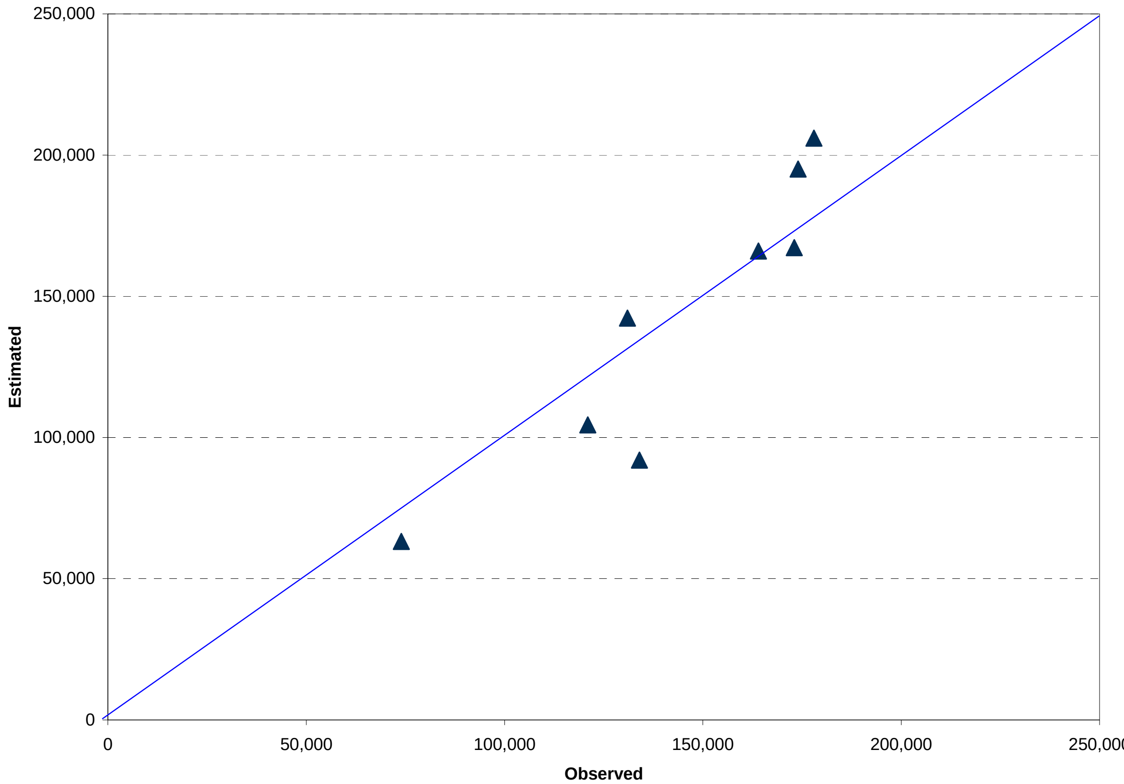
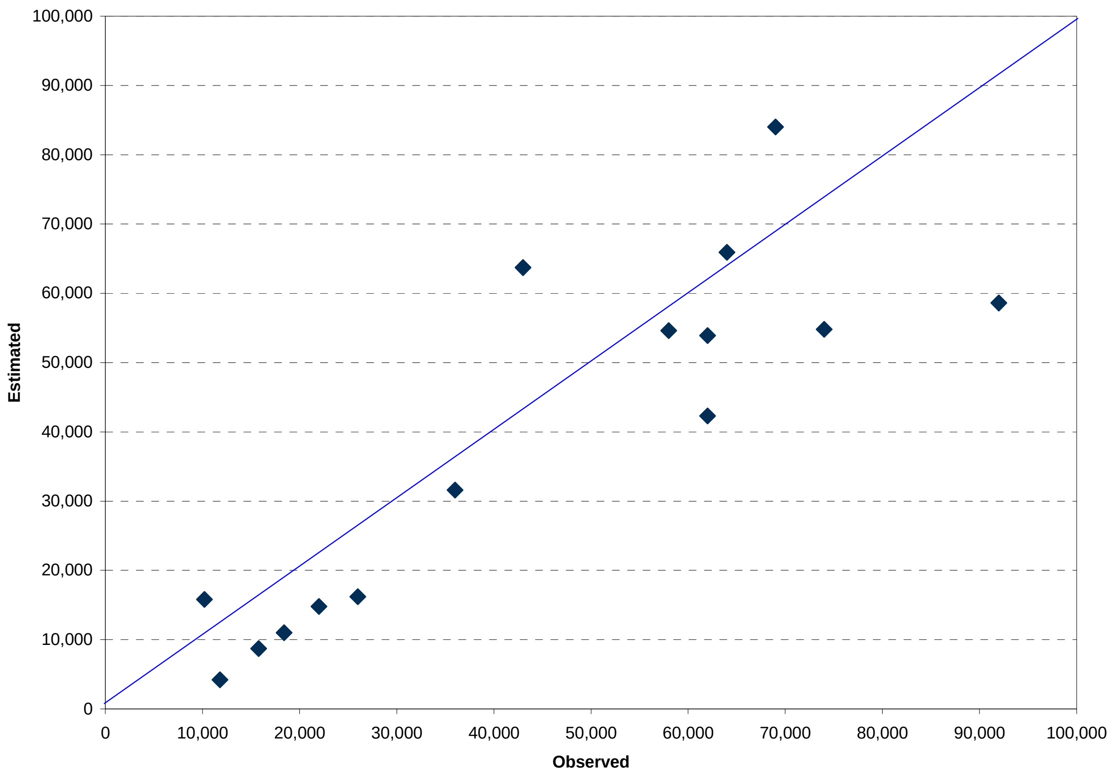


Figure 3.6 Average Daily Traffic on Non-Freeway Links – Tysons Corner Area



■ Measures of Effectiveness

The Measures of Effectiveness (MOEs) for Phase II of the Tysons Corner Transportation and Urban Design Study were developed to provide quantitative results that can be compared to previously presented material and help inform decision makers, professional staff, task force (or other steering committee) members, and citizens.

Definitions of Measures

The following MOEs were produced as part of the modeling effort for all scenarios:

- Minimum time highway path trees were produced as a quality control and quality assurance measure. These paths were produced for a select number of origin and destination pairs, including:
  - Reston/Herndon (TAZ 3183) to Tysons Corner (TAZ 3378);

- Reston/Herndon (TAZ 3183) to the Rosslyn TAZ (1238);
- Fairfax City (TAZ 2597) to Tysons Corner (TAZ 3378);
- Fairfax City (TAZ 2597) to Rosslyn (TAZ 1238);
- City of Alexandria (TAZ 1338) to Tysons Corner (TAZ 3378);
- Lorton (TAZ 2431) to Tysons Corner (TAZ 3378); and
- Chantilly (TAZ 3005) to Tysons Corner (TAZ 3378).

- The total number of peak period and daily trips by mode entering, exiting, and staying within the Tysons Corner Study area for each tested scenario, including the 2005 validation year model run.
- For each model run, the MWCOG model percentage reduction of motorized work trips due to household and employment density changes was produced for the home-based work trip purpose.
- For each model run, the mode share with respect to SOV (i.e., private car), transit, and HOV for the Tysons Corner study area was reported. With respect to transit, the total transit ridership for Tysons Corner was reported. These results came from the WMATA Post-Processor Mode Choice Model.
- The Home-Based Work mode share for destinations in Tysons Corner were also compared to Metro area high density work locations from the 2000 CTPP data.
- The number of daily vehicle trips entering and exiting the Tysons Corner Study area was produced. A cordon was defined at the edge of the study area and the number of trips by peak period and the capacity for the cordon line was produced. The peak period trips were raw results directly taken from the model and do not represent any post-processed refined forecast as would be needed in a project planning study.
- For the surrounding area impacts analysis, daily assignments were produced for the modeled scenarios on the same links as done for the Phase II study.
- The congested lane miles and vehicle miles of travel for the Tysons area were reported for each scenario.
- Through vehicle trips were calculated from the highway assignment to determine the impact on trips that drive through Tysons, but neither originate or are destined for Tysons Corner.

Attachment C

Neighborhood Traffic Impact Analysis

TYSONS CORNER

Neighborhood Traffic Impact Study

Traffic Analysis Report

Task Order No. 07-077-03

Prepared by:

RK&K

Prepared for:

FCDOT
Serving Fairfax County for 25 Years and More

DRAFT August 5, 2009

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SUMMARY

In the process of assessing the impacts of the four planned Metrorail stations, the Fairfax County Board of Supervisors, along with the Tysons Land Use Task Force are performing this neighborhood traffic impact study. RK&K is supporting the Fairfax County Department of Transportation (FCDOT) in assessing the operational differences between the Comprehensive Plan and the GMU High land use alternative for the year 2030, for neighborhoods on the periphery of the Tysons Corner area.

Working with the local communities, FCDOT selected nineteen (19) intersections for assessment in this study. The major corridors in the study area are Leesburg Pike (Route 7, Lewinsville Road/Great Falls Road, Gallows Road, Maple Avenue/Chain Bridge Road/Dolley Madison Blvd (Route 123), and Georgetown Pike. Data provided by FCDOT for each intersection included 2008 AM & PM turning movement counts, Synchro network files for the signalized intersections (13 total), aerial images, and 2005 and 2030 link volumes from the FCDOT traffic forecasting model for both the Comprehensive Plan land use and the GMU High land use.

Two study scenarios were considered for this project; Comprehensive (Comp) Plan Scenario and GMU High Plan Scenario. RK&K utilized both Comp Plan and GMU High Land Use traffic model volumes from FCDOT and determined the annual average growth rates for each roadway link, applied the NCHRP refinement method and processed the volumes using WinTurns software program to achieve year 2030 turning movement counts at all the intersections under both study scenarios. Overall, the GMU high plan projects 0 to 100 percent more traffic when compared to Comp Plan volumes. However, at a few locations during AM and/or PM peak hours, the Comp Plan volumes are between 0 and 100 percent higher than GMU high plan volumes.

Currently, eight (8) intersections in the study area operate at acceptable levels of service (defined in this report as LOS D or better) under existing year 2008 conditions (AM and/or PM peak hours). Under future conditions, five (5) existing intersections are projected to operate at acceptable levels of service under both Comp Plan and GMU High Scenarios. For the failing intersections (operating at LOS E and LOS F), the required mitigation measures such as changes in lane configurations and signal timing /traffic control to achieve acceptable levels of service, were identified for each applicable scenario.

The mitigation measures for the applicable intersections are presented graphically on intersection aerial images and a cost estimate was developed to present the cost involved in implementing the proposed improvements. Based on the results and proposed improvements presented in the previous sections, same set of intersections are failing (LOS E or LOS F) under both future Comp Plan and GMU High Plan scenarios. In addition, the proposed mitigation measures are very close for both scenarios.

The cost involved in implementing the Comp Plan proposed improvements was estimated to be $11,781,000.00 whereas; GMU High Plan proposed improvements were estimated to be $13,942,000.00.

In conclusion, revising the existing Comprehensive Plan by considering the GMU High Land Use Alternative will not cause any significant traffic impacts in the study area.

Table S-1 presents a comparison of results of existing and future intersection capacity analysis under both scenarios.

Table S-1 : Summary of Intersection Capacity Analyses - Synchro Results

Intersection	2008 Existing		2030 Comp Plan - No Imp.		2030 Comp Plan - Pro. Imp.		2030 GMU High Plan - No Imp.		2030 GMU High Plan - Pro. Imp	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Int 1: Great Falls & Dolley Madison Blvd	D	E	D	E	D	D	D	E	D	D
Int 2: Old Dominion Dr & Dolley Madison Blvd	E	D	E	D	E	D	E	D	E	D
Int 3: Leesburg Pike & Lewinsville Road	C	E	C	F	C	D	D	F	C	D
Int 4: Spring Hill Rd & Lewinsville Road	D	E	F	F	D	D	E	F	D	D
Int 5: Swinks Mill Rd & Lewinsville Road *	-	-	-	-	-	-	-	-	-	-
Int 6: Great Falls St & Balls Hill Road	B	A	B	A	-	-	B	A	-	-
Int 7: Great Falls St & Chain Bridge Road	D	E	D	F	C	D	D	E	C	D
Int 8: Great Falls St & Magarity Road	B	C	B	B	-	-	B	C	-	-
Int 9: Leesburg Pike & Lisle Avenue	D	D	E	F	D	D	F	F	D	D
Int 10: Leesburg Pike & Idylwood Rd	E	D	F	F	D	D	F	F	D	D
Int 11: Gallows Rd & Idylwood Rd	D	C	F	D	D	D	F	E	D	D
Int 12: Georgetown Pk & Swinks Mill Rd *	-	F	F	F	D	D	F	F	C	D
Int 13: Georgetown Pk & Balls Hill Rd	C	C	C	C	-	-	C	C	-	-
Int 14: Gallows Rd & Cedar Lane	D	C	F	C	D	C	F	C	D	C
Int 15: Old Courthouse Rd & Chain Bridge Rd	F	E	E	F	E	E	F	F	E	D
Int 16: Beulah Rd & Maple Ave	C	F	C	F	C	D	C	F	C	D
Int 17: Lawyers Rd & Maple Ave	F	F	F	F	E	D	F	F	E	E
Int 18: Westbriar Dr & Old Courthouse Rd *	-	F	F	F	C	D	-	F	B	B
Int 19: Creek Crossing Rd & Old Courthouse Rd *	-	-	-	-			-	-		
Operating at LOS E or F	4	9	10	11	3	1	9	12	3	1
Operating at LOS E or F during AM and/or PM Peak	11		14		3		14		3	
Operating at LOS D during both AM and PM Peak	8		5		16		5		16	
Total No. of Intersections	19		19		19		19		19	

Note: * - Existing Unsignalized Intersections. Due to limitations of Synchro software, overall intersection level of service for unsignalized intersections could not be determined. Intersection 12 and 18 were considered as failing intersections during the 2030 conditions due to high delays along one or more intersection approach.

INTRODUCTION

Background and Purpose of the Study

Fairfax County's current Comprehensive Plan provides a vision for substantial change in Tysons (becoming more pedestrian oriented with rail). County is considering revising the Plan to develop a cohesive pedestrian and mass transit system along with various mixed use development. GMU High Land Use Plan is considered as an alternative to the existing Comprehensive Plan. RK&K is supporting the Fairfax County Department of Transportation (FCDOT) in assessing the traffic operational differences between the Comprehensive Plan and the GMU High land use alternative for the year 2030, for areas on the periphery of Tysons Corner area.

Study Process

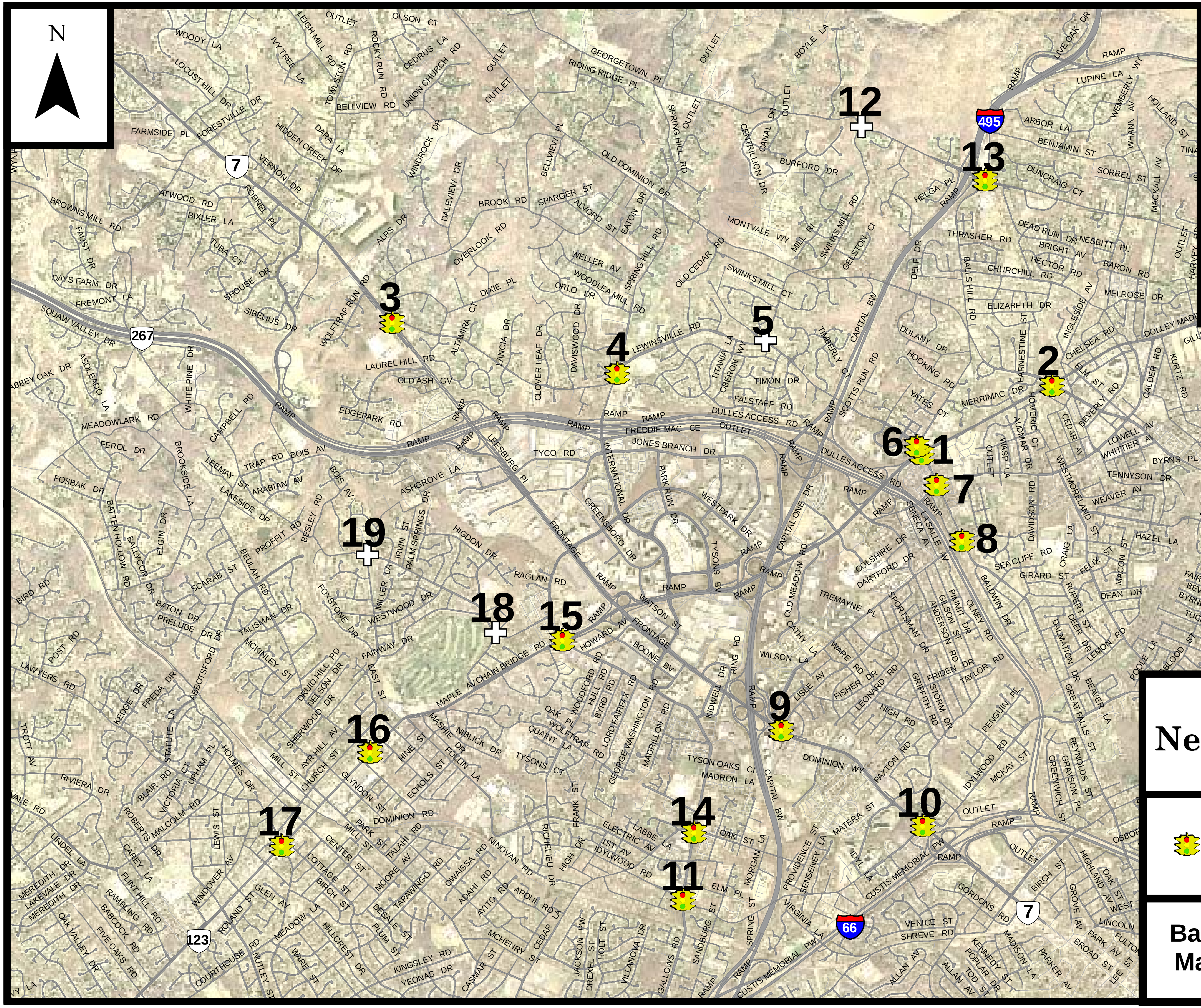
To evaluate the impacts of the two land use plans/ scenarios, nineteen (19) key intersections were considered. The existing traffic data provided by FCDOT was analyzed to determine the capacity. FCDOT provided the Fairfax County Sub-Area Model output which is based on the regional model developed by the Metropolitan Washington Council of Governments (COG). These model outputs under Comp Plan and GMU High Plan land use scenarios to project 2030 traffic at the study intersections and to determine the future capacity under no-build condition.

In each case, the intersections which are projected to operate unacceptably were identified and potential mitigation measures to improve the future intersection operations were developed. A cost estimate was also developed for each intersection to implement the proposed improvements.

This report details the existing conditions, traffic forecasts and analyses, and presents a comparison of projected traffic impacts under Comp plan and GMU high Plan scenarios. This report is intended to assist FCDOT and Tysons Land Use Task Force as they plan to revise the existing Comprehensive Plan.

Tysons Corner Neighborhood Traffic Study

Target Intersections



Target Intersections

1. Route 123 (Dolley Madison Boulevard) at Lewinsville Road/Great Falls Street
2. Route 123 (Dolley Madison Boulevard) at Old Dominion Drive
3. Lewinsville Road at Route 7
4. Lewinsville Road at Spring Hill Road
6. Lewinsville Road at Balls Hill Road
7. Great Falls Street at Chain Bridge Road
8. Great Falls Street at Magarity Road
9. Magarity Road at Route 7
10. Idylwood Road at Route 7
11. Idylwood Road at Gallows Road
13. Georgetown Pike at Balls Hill Road
14. Gallows Road at Cedar Lane/Oak Street
15. Route 123 at Old Courthouse Road
16. Maple Avenue at Beulah Road (Vienna)
17. Maple Avenue at Lawyers Road (Vienna)

5. Lewinsville Road at Swinks Mill Road (non-signalized)
12. Georgetown Pike at Swinks Mill Road (non-signalized)
18. Old Courthouse Road at Westbriar Drive (Vienna) (non-signalized)
19. Old Courthouse Road at Creek Crossing (Vienna) (non-signalized)

Signalized Intersection

Non-Signalized Intersection

Base Map

RK&K

FCDOT Serving Fairfax County for 30 Years and More

April 2009

EXISTING CONDITIONS

Data Collection

Nineteen (19) key intersections within the study area were selected by FCDOT for this analysis. RK&K was provided peak hour turning movement counts by FCDOT for these intersections between the hours of 7-9 AM and 4-6 PM, collected during the Spring and Fall of 2008. In addition, RK&K performed field reconnaissance at these intersections during the peak and off-peak hours from April 13th, 2009 to April 17th, 2009. Out of the nineteen (19) key intersections, fifteen (15) intersections are signalized and four (4) are unsignalized. The study intersections are listed below and Figure 1 presents the location map. The intersection field data is included in Appendix A.

- Intersection 1: Route 123 (Dolley Madison Boulevard) at Lewinsville Road/Great Falls Street
- Intersection 2: Route 123 (Dolley Madison Boulevard) at Old Dominion Drive
- Intersection 3: Lewinsville Road at Route 7
- Intersection 4: Lewinsville Road at Spring Hill Road
- Intersection 5: Lewinsville Road at Swinks Mill Road (Un-signalized)
- Intersection 6: Lewinsville Road at Balls Hill Road
- Intersection 7: Great Falls Street at Chain Bridge Road
- Intersection 8: Great Falls Street at Magarity Road
- Intersection 9: Magarity Road at Route 7
- Intersection 10: Idylwood Road at Route 7
- Intersection 11: Idylwood Road at Gallows Road
- Intersection 12: Georgetown Pike at Swinks Mill Road (Un-signalized)
- Intersection 13: Georgetown Pike at Balls Hill Road
- Intersection 14: Gallows Road at Cedar Lane/Oak Street
- Intersection 15: Route 123 (Chain Bridge Road) at Old Courthouse Road
- Intersection 16: Route 123 (Maple Avenue) at Beulah Road
- Intersection 17: Route 123 (Maple Avenue) at Lawyers Road
- Intersection 18: Old Courthouse Road at Westbriar Drive (Un-signalized)
- Intersection 19: Old Courthouse Road at Creek Crossing Road (Un-signalized)

Study Area Corridors

Leesburg Pike (Route 7)

The Leesburg Pike (Route 7) corridor within the study area is between Magarity Road and Idylwood Road, located just southwest of Tysons Corner. This area is located between the Capital Beltway (I-495) and I-66. The land use type of this area is primarily low-medium residential, although there is also some commercial presence as well. In addition, there are also two local high schools within the vicinity of the corridor. Because of these factors, this corridor experiences regular high traffic and congestion.

Lewinsville Road/Great Falls Road

The Lewinsville Road/Great Falls Road corridor within the study area is between Leesburg Pike (Route 7) and Magarity Road/Davis Court, located primarily north and east of Tysons Corner. This area is located on either side of the Capital Beltway (I-495). Lewinsville Road/Great Falls Road intersects with several major intersections including Spring Hill Road and Dolley Madison Blvd (Route 123). The land use type of this area is primarily low density residential, with some commercial presence as well. This corridor is used as a cut-through route around Tysons Corner.

Gallows Road

Gallows Road corridor within the study area is between Idylwood Road and Cedar Lane/Oak Street, located south of Tysons Corner. This area is located west of the Capital Beltway (I-495). The land use type of this area is primarily low-medium density residential, with some commercial presence as well.

Maple Avenue/Chain Bridge Road/Dolley Madison Blvd (Route 123)

Route 123 corridor within the study area is between Lawyers Road and Old Dominion Drive, located through Tysons Corner. This area is located on either side of the Capital Beltway (I-495). Route 123 intersects with several major intersections including Gosnell Road/Old Courthouse Road. The land use type of this area varies greatly. At the southern-end of the corridor through the Town of Vienna, Route 123 is a low-speed arterial with low-density commercial and residential within the vicinity. At the northern-end of the corridor, Route 123 is a high-speed arterial with low-medium density residential and commercial adjacent land use. This corridor is used heavily by commuters to access and pass-through Tysons Corner.

Georgetown Pike

Georgetown Pike corridor within the study area is between Swinks Mill Road and Balls Hill Road, located north of Tysons Corner. This area is located on either side of the Capital Beltway (I-495). The land use type of this area is low-density residential. This corridor is primarily a two-lane road through this section, and is often used by Commuters to access arterials outside of the corridor.

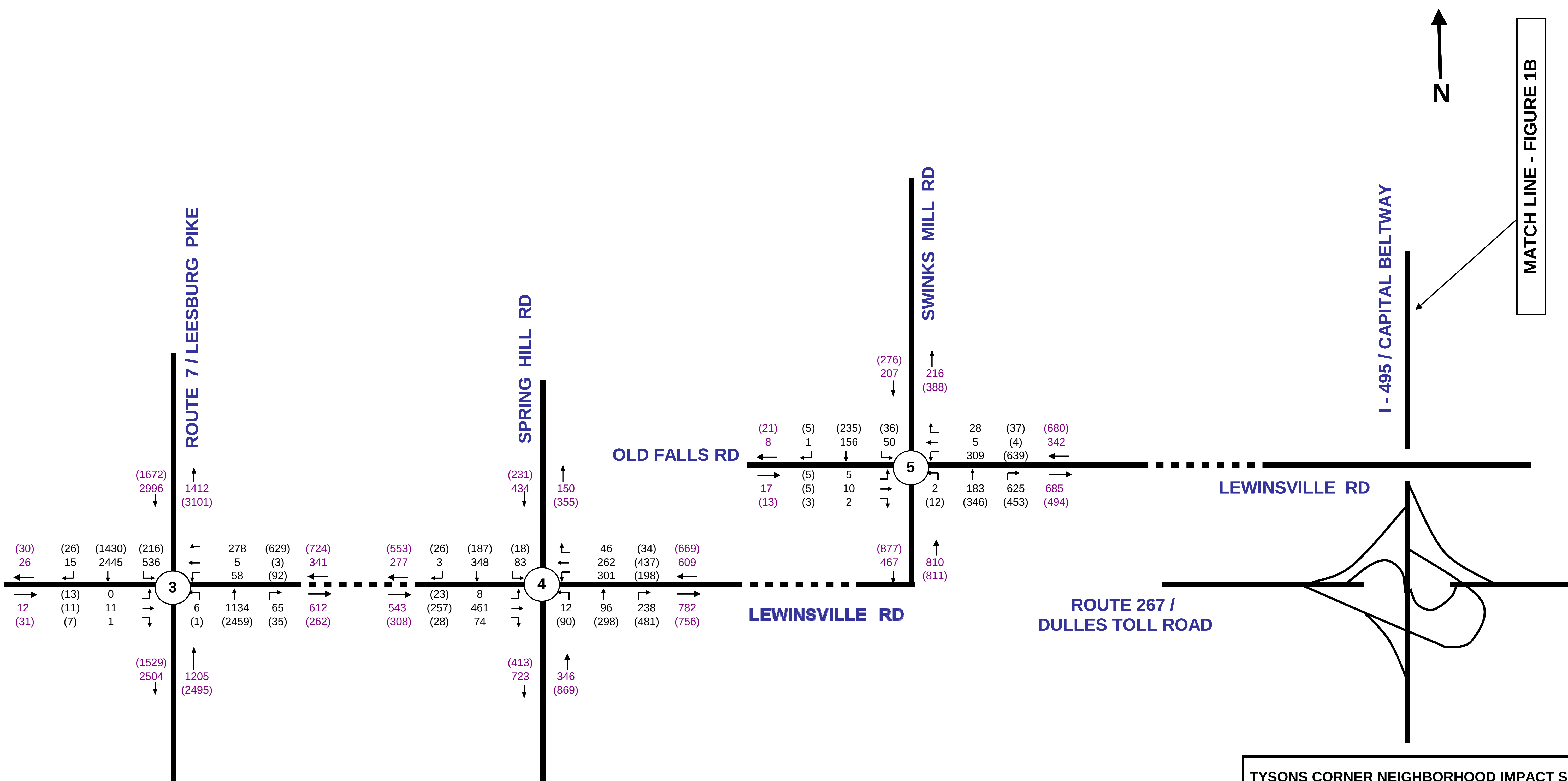
Existing (2008) Traffic Volumes

2008 turning movement counts were used to develop a line diagram of the study intersections by RK&K. Based on the proximity, the study intersections were divided into 4 groups in order to display the network line diagram with the traffic volumes using Excel spreadsheets 1 through 4.

- Sheet 1 included Intersections 3, 4 and 5;
- Sheet 2 includes Intersections 1, 2, 6, 7, and 8;

- Sheet 3 includes Intersections 9, 10, 11, 12, 13, and 14;
- Sheet 4 includes Intersections 15, 16, 17, 18, and 19.

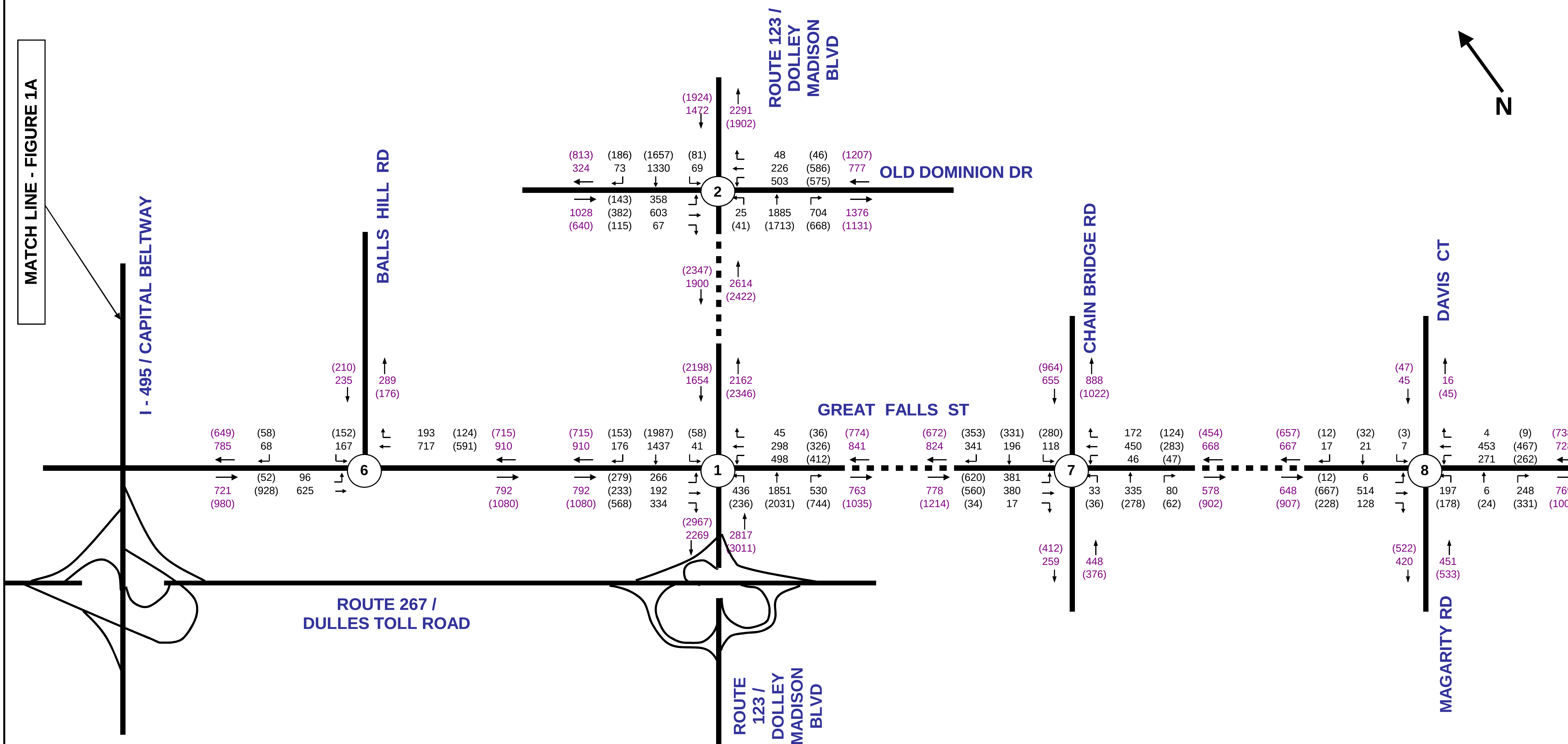
Figures 1A through 1D present the network line diagrams with 2008 traffic volumes.



LEGEND

XX (XX) - AM (PM) Peak Hour Traffic Volumes

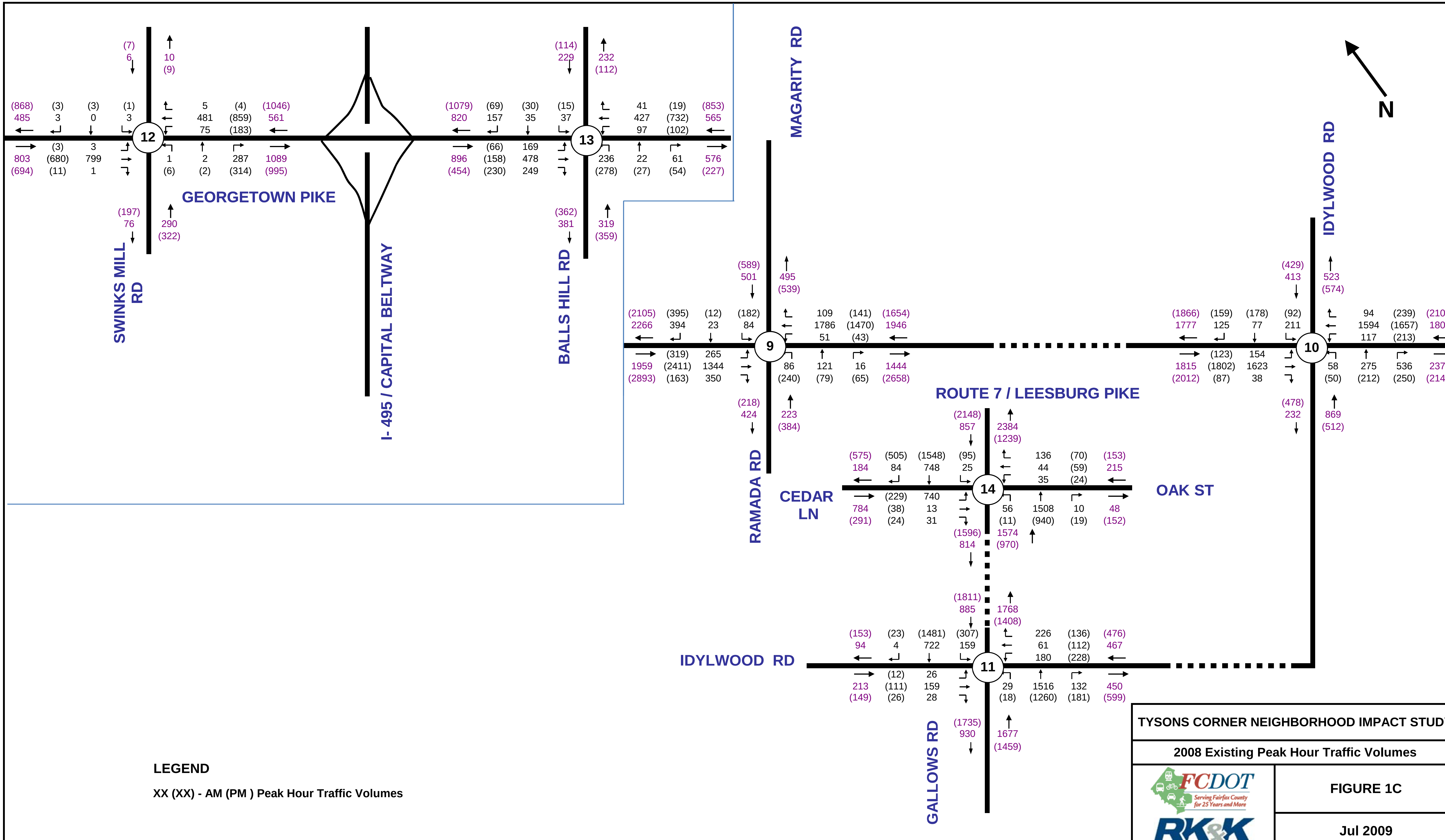
TYSONS CORNER NEIGHBORHOOD IMPACT STUDY	
2008 Existing Peak Hour Traffic Volumes	
FCDOT Serving Fairfax County for 25 Years and More	FIGURE 1A
RK&K	Jul 2009

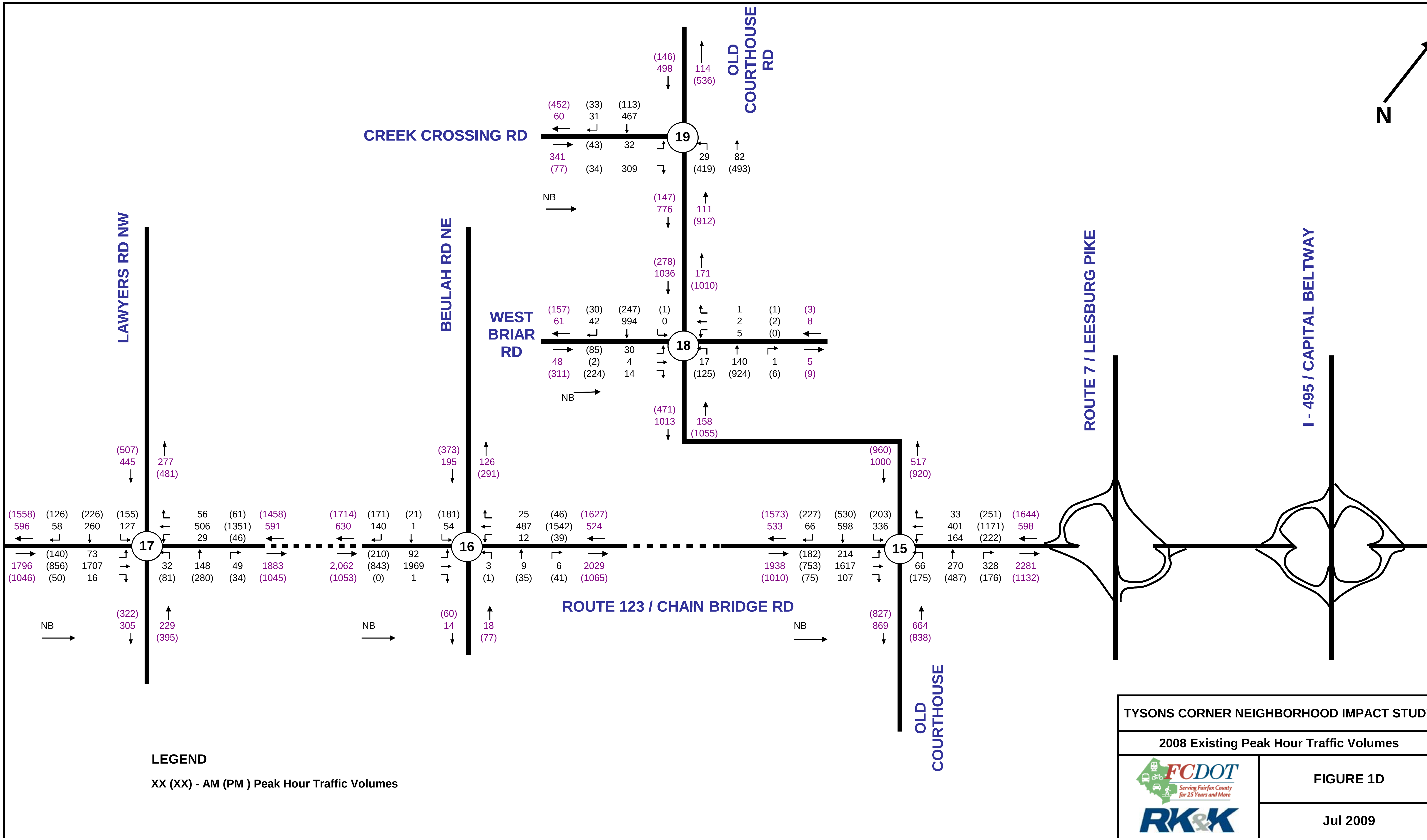


LEGEND

XX (XX) - AM (PM) Peak Hour Traffic Volumes

TYSONS CORNER NEIGHBORHOOD IMPACT STUDY	
2008 Existing Peak Hour Traffic Volumes	
FCDOT Serving Fairfax County for 25 Years and More / RK&K	**FIGURE 1B**
	Jul 2009


GEORGETOWN PIKE
SWINKS MILL RD
I-495 / CAPITAL BELTWAY
BALLS HILL RD
MAGARITY RD
IDYLWOOD RD
ROUTE 7 / LEESBURG PIKE
RAMADA RD
CEDAR LN
OAK ST
IDYLWOOD RD
GALLOWS RD
N
12
13
9
10
14
11
LEGEND
XX (XX) - AM (PM) Peak Hour Traffic Volumes
TYSONS CORNER NEIGHBORHOOD IMPACT STUDY
2008 Existing Peak Hour Traffic Volumes
FCDOT
Serving Fairfax County for 25 Years and More
RK&K
FIGURE 1C
Jul 2009



OLD COURTHOUSE RD
CREEK CROSSING RD
WEST BRIAR RD
LAWYERS RD NW
BEULAH RD NE
ROUTE 7 / LEESBURG PIKE
I - 495 / CAPITAL BELTWAY
ROUTE 123 / CHAIN BRIDGE RD
OLD COURTHOUSE
N
NB
19
18
17
16
15
LEGEND
XX (XX) - AM (PM) Peak Hour Traffic Volumes
TYSONS CORNER NEIGHBORHOOD IMPACT STUDY
2008 Existing Peak Hour Traffic Volumes
FIGURE 1D
Jul 2009
FCDOT
Serving Fairfax County for 25 Years and More
RK&K

EXISTING INTERSECTION CAPACITY ANALYSIS

Traffic software Synchro version 7.0 was used to analyze the study intersections under 2008 existing conditions. FCDOT provided Synchro networks for all the intersections except the following 6 intersections.

Intersection 5 - Lewinsville Road at Swinks Mill Road (Un-signalized)
Intersection 12 - Georgetown Pike at Swinks Mill Road (Un-signalized)
Intersection 16 - Route 123 (Maple Avenue) at Beulah Road
Intersection 17 - Route 123 (Maple Avenue) at Lawyers Road
Intersection 18 - Old Courthouse Road at Westbriar Drive (Un-signalized)
Intersection 19 - Old Courthouse Road at Creek Crossing Road (Un-signalized)

RK&K performed a quality control on the Synchro network files to coincide with the field investigation data and built Synchro networks for the above six (6) intersections based on the field investigation data. The signal timing and phasing information was kept unchanged for the existing intersection analysis.

The results of the existing intersection capacity analysis are presented in Table 1 and the Synchro worksheets are included in Appendix C.

Table 1: Intersection Capacity Analyses - Synchro Results

Scenario	EASTBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		OVERALL	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Int 1: Route 123 (Dolley Madison Boulevard) at Lewinsville Road/Great Falls Street										
AM PEAK										
2008 Existing	67.6	E	105.3	F	44.4	D	41.5	D	54.6	D
2030 Comp Plan - Existing Geo.	66.0	E	87.2	F	43.9	D	43.3	D	51.1	D
2030 GMU High Plan - Existing Geo.	62.3	E	81.2	F	39.8	D	46.0	D	48.3	D
PM PEAK										
2008 Existing	120.7	F	105.3	F	58.5	E	27.9	C	63.5	E
2030 Comp Plan - Existing Geo.	75.4	E	108.7	F	73.2	E	35.1	D	65.7	E
2030 GMU High Plan - Existing Geo.	69.8	E	98.0	F	81.4	F	32.4	C	66.9	E

Table 1: Intersection Capacity Analyses - Synchro Results										
Scenario	EASTBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		OVERALL	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Int 2: Route 123 (Dolley Madison Boulevard) at Old Dominion Drive										
AM PEAK										
2008 Existing	80.5	F	60.7	E	76.3	E	33.3	C	64.2	E
2030 Comp Plan - Existing Geo.	70.8	E	56.8	E	106.9	F	40.5	D	75.1	E
2030 GMU High Plan - Existing Geo.	73.4	E	60.6	E	88.9	F	56.6	E	73.0	E
PM PEAK										
2008 Existing	82.8	F	83.1	F	16.6	B	38.7	D	43.3	D
2030 Comp Plan - Existing Geo.	84.9	F	78.8	E	18.5	B	37.6	D	40.7	D
2030 GMU High Plan - Existing Geo.	81.7	F	79.4	E	16.6	B	39.2	D	40.5	D
Int 3: Lewinsville Road at Route 7										
AM PEAK										
2008 Existing	17.7	B	46.0	D	88.1	F	32.2	C	26.4	C
2030 Comp Plan - Existing Geo.	21.4	C	27.9	C	81.8	F	54.7	D	26.5	C
2030 GMU High Plan - Existing Geo.	21.1	C	75.3	E	78.7	E	37.4	D	37.0	D
PM PEAK										
2008 Existing	25.9	C	39.5	D	88.7	F	178.4	F	55.6	E
2030 Comp Plan - Existing Geo.	20.8	C	64.0	E	98.1	F	279.3	F	86.9	F
2030 GMU High Plan - Existing Geo.	127.5	F	35.8	D	98.1	F	594.5	F	210.0	F
Int 4: Lewinsville Road at Spring Hill Road										
AM PEAK										
2008 Existing	45.5	D	20.7	C	39.8	D	124.4	F	54.7	D
2030 Comp Plan - Existing Geo.	43.0	D	16.3	B	44.5	D	205.4	F	83.1	F
2030 GMU High Plan - Existing Geo.	43.6	D	19.9	B	34.6	C	187.5	F	77	E
PM PEAK										
2008 Existing	36.2	D	16.9	B	140.2	F	36.4	D	74.0	E
2030 Comp Plan - Existing Geo.	36.0	D	19.1	B	260.7	F	34.7	C	135.4	F
2030 GMU High Plan - Existing Geo.	40.3	D	21.9	C	425.0	F	40.4	D	196.3	F
Int 5: Lewinsville Road at Swinks Mill Road (Un-signalized)										
AM PEAK										
2008 Existing	1.5	A	-	-	0.0	-	22.0	C	4.4	-
2030 Comp Plan - Existing Geo.	3.1	A	-	-	0.0	-	55.2	F	10.2	-
2030 GMU High Plan - Existing Geo.	2.0	A	-	-	0.0	-	15.2	C	3.1	-
PM PEAK										
2008 Existing	3.1	A	-	-	0.0	-	41.5	E	8.0	-
2030 Comp Plan - Existing Geo.	3.7	A	-	-	0.0	-	91.2	F	13.2	-
2030 GMU High Plan - Existing Geo.	3.1	A	-	-	0.0	-	18.1	C	5.0	-

Table 1: Intersection Capacity Analyses - Synchro Results

Scenario	EASTBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		OVERALL	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Int 6: Lewinsville Road at Balls Hill Road										
AM PEAK										
2008 Existing	3.7	A	6.8	A	-	-	63.3	E	12.7	B
2030 Comp Plan - Existing Geo.	4.8	A	8.9	A	-	-	64.1	E	17.7	B
2030 GMU High Plan - Existing Geo.	4.8	A	8.0	A	-	-	64.1	E	16.7	B
PM PEAK										
2008 Existing	3.4	A	3.8	A	-	-	31.9	C	6.3	A
2030 Comp Plan - Existing Geo.	3.6	A	2.6	A	-	-	33.5	C	6.7	A
2030 GMU High Plan - Existing Geo.	3.8	A	4.7	A	-	-	33.8	C	7.5	A
Int 7: Great Falls Street at Chain Bridge Road										
AM PEAK										
2008 Existing	58.6	E	24.9	C	58.1	E	47.4	D	46.4	D
2030 Comp Plan - Existing Geo.	54.8	D	22.6	C	50.5	D	78.2	E	53.7	D
2030 GMU High Plan - Existing Geo.	47.4	D	23.4	C	40.4	D	59.6	E	44.2	D
PM PEAK										
2008 Existing	46.4	D	30.1	C	45.0	D	83.5	F	128.6	E
2030 Comp Plan - Existing Geo.	47.7	D	32.0	C	42.4	D	140.3	F	80.9	F
2030 GMU High Plan - Existing Geo.	45.7	D	42.7	D	37.6	D	121.4	F	76.5	E
Int 8: Great Falls Street at Magarity Road										
AM PEAK										
2008 Existing	21.0	C	21.8	C	9.1	A	26.7	C	18.4	B
2030 Comp Plan - Existing Geo.	19.6	B	21.6	C	7.5	A	23.8	C	16.9	B
2030 GMU High Plan - Existing Geo.	18.6	B	28.3	C	9.4	A	28.2	C	18.7	B
PM PEAK										
2008 Existing	21.2	C	28.0	C	9.5	A	29.9	C	21.0	C
2030 Comp Plan - Existing Geo.	22.7	C	28.2	C	7.8	A	25.3	C	18.4	B
2030 GMU High Plan - Existing Geo.	20.0	C	36.1	D	17.4	B	31.1	C	23.8	C
Int 9: Magarity Road at Route 7										
AM PEAK										
2008 Existing	26.4	C	51.9	D	108.7	F	52.8	D	43.9	D
2030 Comp Plan - Existing Geo.	33.8	C	129.2	F	111.2	F	67.0	E	78.3	E
2030 GMU High Plan - Existing Geo.	50.3	D	124.5	F	111.2	F	244.8	F	102.6	F
PM PEAK										
2008 Existing	44.0	D	52.8	D	110.5	F	59.0	E	52.9	D
2030 Comp Plan - Existing Geo.	88.4	F	78.3	E	105.5	F	90.3	F	86.3	F
2030 GMU High Plan - Existing Geo.	49.3	D	160.7	F	110.6	F	254.5	F	116.3	F

Table 1: Intersection Capacity Analyses - Synchro Results

Scenario	EASTBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		OVERALL	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Int 10: Idylwood Road at Route 7										
AM PEAK										
2008 Existing	47.5	D	48.1	D	97.9	F	95.7	F	60.7	E
2030 Comp Plan - Existing Geo.	95.6	F	63.1	E	86.0	F	119.6	F	84.3	F
2030 GMU High Plan - Existing Geo.	86.4	F	66.6	E	110.6	F	100.6	F	84.1	F
PM PEAK										
2008 Existing	48.4	D	41.3	E	72.9	E	89.0	F	51.4	D
2030 Comp Plan - Existing Geo.	90.4	F	176.0	F	231.5	F	125.5	F	142.7	F
2030 GMU High Plan - Existing Geo.	103.2	F	59.3	E	125.7	F	115.0	F	87.9	F
Int 11: Idylwood Road at Gallows Road										
AM PEAK										
2008 Existing	86.6	F	50.5	D	31.5	C	36.7	D	39.3	D
2030 Comp Plan - Existing Geo.	169.9	F	76.6	E	114.5	F	36.8	D	96.9	F
2030 GMU High Plan - Existing Geo.	123.8	F	76.7	E	133.5	F	35.5	D	102.8	F
PM PEAK										
2008 Existing	92.7	F	64.6	E	34.3	C	17.1	B	32.3	C
2030 Comp Plan - Existing Geo.	84.3	F	103	F	62.4	E	19.1	B	53.0	D
2030 GMU High Plan - Existing Geo.	89.0	F	122.9	E	63.8	E	20.5	C	56.9	E
Int 12: Georgetown Pike at Swinks Mill Road (Un-signalized)										
AM PEAK										
2008 Existing	0.1	A	1.7	A	18.5	C	59.2	F	4.5	-
2030 Comp Plan - Existing Geo.	0.2	A	0.5	A	530.7	F	376.6	F	113.6	-
2030 GMU High Plan - Existing Geo.	0.2	A	0.1	A	747.5	F	153.3	F	-	-
PM PEAK										
2008 Existing	0.1	A	3.1	A	109.7	F	98.5	F	20.7	-
2030 Comp Plan - Existing Geo.	0.3	A	15.3	C	-	F	499.5	F	-	-
2030 GMU High Plan - Existing Geo.	0.1	A	4.2	A	312.0	F	-	F	216.4	-
Int 13: Georgetown Pike at Balls Hill Road										
AM PEAK										
2008 Existing	16.1	B	14.9	B	63.4	E	19.3	B	23.7	C
2030 Comp Plan - Existing Geo.	15.8	B	14.7	B	63.1	E	20.5	0	22.9	C
2030 GMU High Plan - Existing Geo.	11.5	B	15.5	B	62.5	E	19.1	B	21.2	C
PM PEAK										
2008 Existing	7.2	A	16.9	B	45.3	D	15.2	B	20.0	C
2030 Comp Plan - Existing Geo.	8.0	A	19.6	B	43.8	D	15.6	B	21.4	C
2030 GMU High Plan - Existing Geo.	8.1	A	21.5	C	41.5	D	14.6	B	22.1	C

Table 1: Intersection Capacity Analyses - Synchro Results										
Scenario	EASTBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		OVERALL	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Int 14: Gallows Road at Cedar Lane/Oak Street										
AM PEAK										
2008 Existing	70.0	E	62.2	E	20.6	C	28.5	C	36.4	D
2030 Comp Plan - Existing Geo.	71.9	E	326.1	F	226.5	F	27.6	C	174.1	F
2030 GMU High Plan - Existing Geo.	77.1	E	415.3	F	211.2	F	27.0	C	173.1	F
PM PEAK										
2008 Existing	76.9	E	55.2	E	17.1	B	24.2	C	28.0	C
2030 Comp Plan - Existing Geo.	78.2	E	61.3	E	28.2	C	18.7	B	30.4	C
2030 GMU High Plan - Existing Geo.	78.2	E	74.9	E	29.8	C	24.7	C	34.8	C
Int 15: Route 123 at Old Courthouse Road										
AM PEAK										
2008 Existing	135.2	F	161.4	F	45.0	D	33.9	C	83.3	F
2030 Comp Plan - Existing Geo.	95.9	F	95.1	F	45.1	D	119.5	F	77.0	E
2030 GMU High Plan - Existing Geo.	216.0	F	361.2	F	42.2	D	65.2	E	149.2	F
PM PEAK										
2008 Existing	175.4	F	76.1	E	33.9	C	34.7	C	72.7	E
2030 Comp Plan - Existing Geo.	74.0	E	328.1	F	52.6	D	36.8	D	133.5	F
2030 GMU High Plan - Existing Geo.	91.5	F	208.5	F	34.2	C	34.4	C	93.4	F
Int 16: Maple Avenue at Beulah Road (Vienna)										
AM PEAK										
2008 Existing	32.8	C	52.0	D	29.0	C	12.9	B	26.3	C
2030 Comp Plan - Existing Geo.	34.3	C	56.9	E	23.5	C	15.3	B	23.5	C
2030 GMU High Plan - Existing Geo.	33.1	C	57.3	E	19.9	B	16.2	B	21.2	C
PM PEAK										
2008 Existing	50.3	D	58	E	31.2	C	203.4	F	124.9	F
2030 Comp Plan - Existing Geo.	128.4	F	64.6	E	31.8	C	221.7	F	149.1	F
2030 GMU High Plan - Existing Geo.	127.6	F	66.1	E	33.5	C	240.3	F	153.6	F
Int 17: Maple Avenue at Lawyers Road (Vienna)										
AM PEAK										
2008 Existing	61.1	E	64.2	E	172.0	F	34.9	C	122.4	F
2030 Comp Plan - Existing Geo.	88.6	F	74.7	E	373.7	F	266.9	F	264.1	F
2030 GMU High Plan - Existing Geo.	71.2	E	70.8	E	357.9	F	46.8	D	213.0	F
PM PEAK										
2008 Existing	76.9	E	80.7	F	48.8	D	213.2	F	124.7	F
2030 Comp Plan - Existing Geo.	215.0	F	47.9	D	39.0	D	139.9	F	123.1	F
2030 GMU High Plan - Existing Geo.	76.8	E	127.4	F	59.7	E	189.8	F	128.0	F

Table 1: Intersection Capacity Analyses - Synchro Results										
Scenario	EASTBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		OVERALL	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Int 18: Old Courthouse Road at Westbriar Drive (Vienna) (Un-signalized)										
AM PEAK										
2008 Existing	0.0	A	1.4	A	92.7	F	44.3	E	9.0	-
2030 Comp Plan - Existing Geo.	0.5	A	1.2	A	421.2	F	414.4	F	78.5	-
2030 GMU High Plan - Existing Geo.	0.3	A	1.8	A	27.7	D	24.6	C	3.2	-
PM PEAK										
2008 Existing	0.2	A	3.0	A	391.9	F	32.0	D	98.1	-
2030 Comp Plan - Existing Geo.	1.1	A	6.4	A	-	F	-	F	-	-
2030 GMU High Plan - Existing Geo.	0.6	A	2.7	A	248.6	F	134.4	F	56.5	-
Int 19: Old Courthouse Road at Creek Crossing (Vienna) (Un-signalized)										
AM PEAK										
2008 Existing	0.0	A	2.7	A	39.6	E	-	-	15.5	-
2030 Comp Plan - Existing Geo.	0.0	A	1.9	A	18.4	C	-	-	6.1	-
2030 GMU High Plan - Existing Geo.	0.0	A	1.4	A	12.8	B	-	-	3.6	-
PM PEAK										
2008 Existing	0.0	A	4.1	A	76.6	F	-	-	9.0	-
2030 Comp Plan - Existing Geo.	0.0	A	8.1	A	19.6	C	-	-	4.8	-
2030 GMU High Plan - Existing Geo.	0.0	A	2.7	A	17.3	C	-	-	3.3	-

Based on the results of the existing Synchro analysis, out of fifteen (15) signalized intersections, eleven (11) intersections during AM peak and eight (8) intersections during PM peak operate at acceptable levels of service i.e., LOS D or better for this study. For the four (4) un-signalized intersections, although Synchro reports don't report the overall intersection level of service, the delay for each approach of the intersection is reported. Hence, if the approach with the worst delay reports a delay of 100 sec or more, it was considered as a failing intersection. Based on the above table, under existing conditions, two (2) un-signalized intersections are failing PM Peak. In total, out of 19 intersections, eleven (11) intersections are failing during AM or/and PM peak periods. Table 2 presents a summary of number of study intersections operating under acceptable conditions or failing.

Table 2: 2008 Study Intersections Performance			
Time Period	No. of Intersections		
	LOS D or better	LOS E or F	Total
AM	11 + 4*	4	19
PM	8 + 2*	7 + 2 *	19
Total No. for AM and/or PM	6 + 2*	9 +2 *	19

Note: * - No. of Unsignalized intersection.

TRAFFIC FORECASTING

This part of the report summarizes the assumptions and methodology used in computing the 2030 future traffic volumes at the study intersections. FCDOT provided the model output volumes for years 2005 and 2030 for this study.

The Fairfax County Sub-Area Model is based on the regional model developed by the Metropolitan Washington Council of Governments (COG). The COG model covers a 6,800 square mile area, contains 2,191 traffic analysis zones, and includes approximately 27,000 road segments and about 600 transit routes. The Fairfax County model divides this land area into more numerous, smaller zones, and includes significantly greater detail on the roadway network. For example, in the County's Sub-Area model, Tysons Corner is represented by 117 small zones, compared to only eight (8) large zones in the COG model. The Route 7/Route 123 interchange in the COG model is represented by a single node, whereas the County's Sub-Area model includes a separate roadway link for each individual ramp movement at this interchange.

Two land use scenarios were considered for this study; Fairfax County Comprehensive Plan Model and GMU High Plan Model.

Comprehensive Plan Model

This scenario models the impacts of the County's Comprehensive Plan. The plan provides a vision for substantial change in Tysons (becoming more pedestrian oriented with rail). The main objectives of the current comprehensive plan include but not limited to, creating centralized areas of relatively more intense development, encouraging mixed use developments, developing a cohesive pedestrian system, and mass transit options.

GMU High Plan Model

This scenario models additional growth in the Tysons Corner area, as developed by George Mason University's Center for Regional Analysis. This model was created as an alternative to the current Comprehensive Plan, and incorporates the extension of the Metrorail to Tysons Corner. It was anticipated that the GMU High Model would generate additional traffic within the surrounding communities, or redistribute existing traffic.

Technical Approach:

A series of Excel spreadsheets were developed to develop 2030 turning movement counts at all of the study intersections. 2008 existing traffic volumes and the travel forecasting model outputs for year 2005 and 2030 years under both land use scenarios provided by FCDOT were used to compute 2030 future turning movement volumes at the study intersections.

The following steps were performed for both scenarios – Comp Plan and GMU High Plan:

- Growth Rate: Using the model volumes for years 2005 and 2030, annual average growth rates were determined under each scenario for all the available links in the network. The link volumes along with the growth rates are documented in the network line diagrams. The line diagrams are included in Appendix B.

- Refinement of Computerized Traffic Volume Forecasts: In order to reflect the real-time traffic the link volumes from both forecasting models were refined using the refinement principles stated in Chapter Four, NCHRP Report 255. An Excel spreadsheet was prepared based on Figure A-10: Calculation Form shown on page 51 in the above stated Report 255. The input data for the calculation form include 2005 and 2030 model link volumes (in and out), 2008 Link volumes computed from the turning movement counts and the growth rates calculated from the model link volumes. The calculation forms for each intersection are included in Appendix B.

- 2030 Future Link Volumes: The refined link volumes were documented on another network line diagram to reflect 2030 Future link volumes.

- Future Turning Movement Volumes: The 2030 future link volumes were using to calculate respective turning movement volumes at each intersection. A software program called winTURNS was used for this task. WinTurns is a program written in Visual Basic that is designed to calculate turning movement volumes and create turning movement diagrams. It uses an iterative approach to balance the inflows and outflows of an intersection as described in NCHRP Report 255, "Highway Traffic Data for Urbanized Area Project Planning and Design", Chapter 8. The final result shows the distribution of traffic by individual turning movements through an intersection. The input and output files for WinTurns is included in Appendix B. Due to limitations of winTURNS, the in-traffic should be equal to out-traffic at a given intersection, so the out-traffic link volumes were slightly adjusted to be equal to the in-traffic.

- Manual Adjustments: Few of the turning movements at the study intersections were adjusted manually to maintain minimum difference (+ or – 1%) between the projected growth rate computed from base counts and 2030 refined link volumes; and projected growth rate from the forecasting model in each scenario. The list of manual adjustments under each scenario is presented in a table in Appendix B.

The following list shows the excel spreadsheet tabs used for Comprehensive Plan Scenario. These figures are included in the Appendix B.

Figures 2 A through 2D: 2005-2008 Link Volume Comparison: % Change from 2005 Model Link Volumes and 2008 Field Counts
Figures 3 A through 3D: 2005 Model Link Volumes
Figures 4 A through 4D: 2005-2030 Link Volume Comparison: Growth Rate from forecasting model
Figures 5 A through 5D: 2030 Model Link Values
Figures 6 A through 6D: 2030 Future Link Volumes (Adjusted): NCHRP Report 255 – Chapter 4 Method
Figures 7 A through 7D: 2030 Future Turning Movement Volumes (Adjusted): WinTurns Output including Manual Adjustment
Figures 8 A through 8D: 2030 AM Refinement Worksheets
Figures 9 A through 9D: 2030 PM Refinement Worksheets
Figures 10 A through 10D: 2008-2030 Projected Growth Rate: For comparison with Growth Rate from forecasting Model Volumes.

Similar series of spreadsheets were created for GMU High Plan. The spreadsheets are included in Appendix B.

A comparison was performed between the year 2030 GMU high plan link volumes and Comp Plan link volumes. Similar comparison was performed with FCDOT provided model output volumes under both land use scenarios. Both the results were consistent indicating that; overall, the GMU volumes are slightly higher than the Comp Plan volumes. However, at few locations during AM and/or PM peak hours, the Comp Plan volumes are higher than GMU high plan volumes. These spreadsheets are included in Appendix B.

FUTURE INTERSECTION CAPACITY ANALYSIS

Similar to the existing intersection analysis, the 2030 future intersection capacity analysis was performed under Comp Plan and GMU High Plan Scenarios using Synchro Version 7.0. The lane configurations and the signal timing and phase information were kept unchanged as in existing conditions to determine the level of service for No – build condition. The results of both analyses are presented in Table 1 for easy review.

Based on the results, under both Comp Plan and GMU High Plan Scenario, five (5) intersections are operating at acceptable levels of service LOS D or better during both AM and PM peak periods. So, thirteen (14) intersections are failing (LOS E or F) i.e., three (3) intersections more than existing conditions.

The summary of no. of study intersections' performance under each scenario is presented in Table 3 for easy review.

Table 3: Summary of Study Intersections in all Scenarios

Time Period	2008 Existing Conditions			2030 Comp Plan			2030 GMU High Plan		
	LOS D or better	LOS E or F	Total	LOS D or better	LOS E or F	Total	LOS D or better	LOS E or F	Total
AM	11 + 4*	4	19	7 + 2*	8 + 2*	19	7 + 2*	8 + 2*	19
PM	8 + 2*	7 + 2 *	19	6 + 2*	9 + 2 *	19	6 + 2*	9 + 2 *	19
AM and/or PM	6 + 2*	9 +2 *	19	3 +2*	12 +2 *	10	3 +2*	12 +2 *	10

Note: * -No. of Unsignalized intersection.

The Synchro worksheets are included in Appendix D.

MITIGATION MEASURES

To achieve an acceptable level of service, defined for this study as LOS D or better, signal timing and geometric improvements were considered under Comp Plan and GMU High Plan Scenarios. The purpose of this task is to compare the level of improvements required by the study intersections under GMU High Plan Scenario over the required improvements for Comp Plan Scenario.

Methodology:

Using Synchro version 7.0 and SimTraffic simulation programs, the mitigation measures required by each intersection were determined. The first step in this mitigation was to optimize the signal timing to improve the level of service. However, if this does not help reduce the delay, then depending on the worst movement at the intersection, adding turn-bays were considered. In case if the through volumes are so high that the proposed turn-bays doesn't improve the level of service, then adding through lanes are considered. This approach was adopted for all the failing intersections in the study area. The cycle lengths for each intersection were kept unchanged, only signal timing splits were adjusted / optimized for better operations.

Table 4: Intersection Mitigation Measures.
This table provides the list of improvements required to achieve acceptable levels of service (LOS D or better) during AM peak and PM peak periods separately under each scenario, Comp Plan and GMU high Plan. In addition a consolidated list of both AM and PM peak period improvements is presented under both scenarios.

Table 5 presents the Synchro analysis results for the fourteen (14) failing intersections. In addition, a comparison of lane configuration under existing, 2030 Comp Plan and 2030 GMU High Plan is presented in Table 6. For the proposed lane configurations, any additions to the existing conditions are marked in red text. For GMU high Plan scenario, any differences in lane configuration when compared to Comp Plan scenario are highlighted. In addition, Table 6 also provides information about the "Worst Case" which denotes the higher overall intersection delay between AM and PM peak hours.

Out of the fourteen (14) failing intersections, three (3) intersections, namely, Intersection 2: Route 123 (Dolley Madison Boulevard) at Old Dominion Drive, Route 7, Intersection 15: Route 123 (Chain Bridge Road) at Old Courthouse Road, and Intersection 17: Route 123 (Maple Avenue) at Lawyers Road, even with the addition of substantial improvements, LOS D could not be achieved. For the two unsignalized intersections that are failing under both scenarios, a traffic signal is recommended as a proposed improvement. Prior to the installation of a traffic signal at any of these locations, a comprehensive signal warrant evaluation should be conducted to determine whether a traffic signal is warranted.

Table 4: Intersection Mitigation Measures

INT #	INTERSECTION	COMP PLAN						GMU HIGH PLAN					
		AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS	AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS
		PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS			PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS		
1	Dolley Madison Blvd & Lewinsville Road	• No Improvements	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• No Improvements	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better
2	Dolley Madison Blvd & Old Dominion Drive	• Optimize the Signal Splits	Overall Intersection LOS E* Approach Delay LOS F or better *- Could not achieve LOS D	• No Improvements	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	**AM Peak:** Overall Intersection LOS E Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	Overall Intersection LOS E* Approach Delay LOS F or better *- Could not achieve LOS D	• No Improvements	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits	**AM Peak:** Overall Intersection LOS E Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better
3	Lewinsville Road & Route 7	• No Improvements	Overall Intersection LOS C Approach Delay LOS F or better	• Optimize the Signal Splits • Add an additional through lane along NB & SB Route 7.	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add an additional through lane along EB & WB Route 7.	**AM Peak:** Overall Intersection LOS C Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• No Improvements	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along EB & WB Route 7. • Convert SB (Lewinsville Road) shared Through/Right lane into an exclusive Right turn lane with an acceleration lane.	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along EB & WB Route 7. • Convert SB (Lewinsville Road) shared Through/Right lane into an exclusive Right turn lane with an acceleration lane.	**AM Peak:** Overall Intersection LOS C Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS E or better

Table 4: Intersection Mitigation Measures

INT #	INTERSECTION	COMP PLAN						GMU HIGH PLAN					
		AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS	AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS
		PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS			PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS		
4	Lewinsville Road & Springhill Road	• Optimize the Signal Splits	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits	**AM Peak:** Overall Intersection LOS D Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an exclusive NB(Spring Hill Rd) left-turn lane	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an exclusive NB(Spring Hill Rd) left-turn lane	**AM Peak:** Overall Intersection LOS D Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS E or better
7	Great Falls Street & Chain Bridge Road	• No Improvements	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an exclusive NBR Turn Lane.	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add an exclusive NBR Turn Lane.	**AM Peak:** Overall Intersection LOS C Approach Delay LOS D or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• No Improvements	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an exclusive NBR Turn Lane.	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add an exclusive NBR Turn Lane.	**AM Peak:** Overall Intersection LOS C Approach Delay LOS D or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better
9	Route 7 & Magarity Road	• Optimize the Signal Splits • Add and exclusive WBR turn lane with pm+ov phase	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add and exclusive WBR turn lane with pm+ov phase • Add an exclusive NBR turn lane	Overall Intersection LOS D Approach Delay LOS F or better.	• Optimize the Signal Splits • Add and exclusive WBR turn lane with pm+ov phase • Add an exclusive NBR turn lane	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add and exclusive WBR turn lane with pm + ov phase • Add an additional SBL and WBL turn lane	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add and exclusive WBR turn lane with pm + ov phase • Add an additional SBL and WBL turn lanes • Add an exclusive NBR turn lane	Overall Intersection LOS D Approach Delay LOS F or better.	• Optimize the Signal Splits • Add and exclusive WBR turn lane with pm + ov phase • Add an additional SBL and WBL turn lanes • Add an exclusive NBR turn lane	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better

Table 4: Intersection Mitigation Measures														
INT #	INTERSECTION	COMP PLAN						GMU HIGH PLAN					
		AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS	AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS
		PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS			PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS		
10	Idylwood Road at Route 7	• Optimize the Signal Splits • Phase change for EBL and WBL from Pm+Pt to Prot • Add an exclusive NBL and SBL turn lane with Pm+Pt phase • Add an additional WBL and EBL turn lanes. • Add an exclusive EBR and WBR turn lanes	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Phase change for EBL and WBL from Pm+Pt to Prot • Add an exclusive NBL and SBL turn lane with Pm+Pt phase • Add an additional WBL and EBL turn lane. • Add an exclusive EBR and WBR turn lanes • Convert SBR turn lane into free movement.	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Phase change for EBL and WBL from Pm+Pt to Prot • Add an exclusive NBL and SBL turn lane with Pm+Pt phase • Add an exclusive EBR and WBR turn lanes • Add an additional WBL and EBL turn lane. • Convert SBR turn lane into free movement.	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Phase change for EBL and WBL from Pm+Pt to Prot • Add an exclusive NBL and SBL turn lane with Pm+Pt phase • Add an exclusive EBR and WBR turn lanes with pm+ov phase • Add an additional WBL and EBL turn lane. • Convert NBT and SBT lanes onto shared NBTR and SBTR, respectively.	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Phase change for EBL and WBL from Pm+Pt to Prot • Add an exclusive NBL and SBL turn lane with Pm+Pt phase • Add an exclusive EBR and WBR turn lanes	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Phase change for EBL and WBL from Pm+Pt to Prot • Add an exclusive NBL and SBL turn lane with Pm+Pt phase • Add an exclusive EBR and WBR turn lanes with pm+ov phase • Add an additional WBL and EBL turn lane. • Convert NBT and SBT lanes onto shared NBTR and SBTR, respectively.	**AM Peak:** Overall Intersection LOS D Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better
11	Idylwood Road at Gallows Road	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB.	**AM Peak:** Overall Intersection LOS D Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS E or better

Table 4: Intersection Mitigation Measures

INT #	INTERSECTION	COMP PLAN						GMU HIGH PLAN					
		AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS	AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS
		PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS			PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS		
12	Georgetown Road and Swinks Mill Road	• Provide a Signal with optimized cycle length of 90 sec	Overall Intersection LOS D Approach Delay LOS F or better	• Provide a Signal with optimized cycle length of 90 sec • Add an exclusive WBL turn lane with perm phase	Overall Intersection LOS D Approach Delay LOS F or better	• Provide a Signal with optimized cycle length of 90 sec • Add an exclusive WBL turn lane with perm phase	**AM Peak:** Overall Intersection LOS D Approach Delay LOS F or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS F or better	• Provide a Signal with optimized cycle length of 90 sec • Add an exclusive NBR turn lane with perm phase	Overall Intersection LOS C Approach Delay LOS E or better	• Provide a Signal with optimized cycle length of 90 sec • Add an exclusive WBL turn lane with perm phase	Overall Intersection LOS D Approach Delay LOS E or better	• Provide a Signal with optimized cycle length of 90 sec • Add an exclusive NBR turn lane with perm phase • Add an exclusive WBL turn lane with perm phase	**AM Peak:** Overall Intersection LOS C Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS D Approach Delay LOS E or better
14	Gallows Road at Cedar Lane/Oak Street	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS D Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS C Approach Delay LOS E or better.	• Optimize the Signal Splits • Add an additional through lane along NB and SB	**AM Peak:** Overall Intersection LOS D Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS C Approach Delay LOS E or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS E Approach Delay LOS F or better	• Optimize the Signal Splits • Add an additional through lane along NB and SB	Overall Intersection LOS C Approach Delay LOS E or better.	• Optimize the Signal Splits • Add an additional through lane along NB and SB.	**AM Peak:** Overall Intersection LOS D Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS C Approach Delay LOS E or better
15	Old Courthouse Road and Chain Bridge Road	• Optimize the Signal Splits • Add an additional EBL and SBL turn lane with Prot phase	Overall Intersection LOS E* Approach Delay LOS E or better *- Could not achieve LOS D	• Optimize the Signal Splits • Add an additional NBL and SBL turn lane with Prot phase	Overall Intersection LOS E* Approach Delay LOS F or better *- Could not achieve LOS D	• Optimize the Signal Splits • Add an additional EBL, NBL and SBL turn lane with Prot phase	**AM Peak:** Overall Intersection LOS E* Approach Delay LOS E or better **PM Peak:** Overall Intersection LOS E* Approach Delay LOS E or better *- Could not achieve LOS D	• Optimize the Signal Splits • Add an additional EBL, NBL and SBL turn lane with Prot phase	Overall Intersection LOS E* Approach Delay LOS E or better *- Could not achieve LOS D	• Optimize the Signal Splits • Add an additional SBL turn lane with Prot phase	Overall Intersection LOS D Approach Delay LOS F or better	• Optimize the Signal Splits • Add an additional EBL, NBL and SBL turn lane with Prot phase	**AM Peak:** Overall intersection LOS E*, Approach LOS F or better **PM Peak:** Overall intersection LOS D, Approach LOS F or better *- Could not achieve LOS D

INT #	INTERSECTION	COMP PLAN						GMU HIGH PLAN					
		AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS	AM PEAK		PM PEAK		CONSOLIDATED IMPROVEMENTS	RESULTS/ REMARKS
		PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS			PROPOSED IMPROVEMENTS	RESULTS / REMARKS	PROPOSED IMPROVEMENTS	RESULTS / REMARKS		
16	Beulah Road at Maple Ave (Rte 123)	• No Improvements	Overall Intersection LOS C, Approach LOS E or better	• Change operation to Act-Coord and optimized Signal Splits • Add an exclusive SBR turn lane	Overall Intersection LOS D, Approach LOS F or better	• Change operation to Act-Coord and optimized Signal Splits • Add an exclusive SBR turn lane	**AM Peak:** Overall Intersection LOS C, Approach LOS F or better **PM Peak:** Overall Intersection LOS D, Approach LOS F or better	• No Improvements	Overall Intersection LOS C, Approach LOS E or better	• Change operation to Act-Coord and optimized Signal Splits • Add exclusive EBR, WBR , and SBR turn lane. • Add an additional NBL turn lane with prot phase. • Convert EBT/R shared lane into shared EBL/T lane	Overall Intersection LOS D, Approach LOS E or better	• Change operation to Act-Coord and optimized Signal Splits • Add exclusive EBR, WBR and SBR turn lane. • Add an additional NBL turn lane with prot phase • Convert EBT/R shared lane into shared EBL/T lane	**AM Peak:** Overall intersection LOS C, Approach LOS E or better **PM Peak:** Overall intersection LOS D, Approach LOS E or better
17	Lawyers Road at Maple Ave (Rte 123)	• Change operation to Act-Coord and optimized Signal Splits with 190 sec cycle length • Add an additional EBL and SBL turn lane • Add an exclusive EBR,WBR and SBR turn lane.	Overall Intersection LOS E* Approach Delay LOS F or better *- Could not achieve LOS D	• Change operation to Act-Coord and optimized Signal Splits with 190 sec cycle length • Add an additional EBL turn lane • Add an exclusive WBR and SBR turn lane.	Overall Intersection LOS D, Approach LOS F or better	• Changed operation to Act-Coord and optimized Signal Splits with 190 sec cycle length • Add an additional EBL and SBL turn lane • Add an exclusive EBR, WBR and SBR turn lane.	**AM Peak:** Overall Intersection LOS E*, Approach LOS F or better **PM Peak:** Overall Intersection LOS D, Approach LOS F or better *- Could not achieve LOS D	• Change operation to Act-Coord and optimized Signal Splits with 190 sec cycle length • Add an additional EBL and SBL turn lane • Add an exclusive EBR, WBR, NBR and SBR turn lane.	Overall Intersection LOS E* Approach Delay LOS F or better *- Could not achieve LOS D	• Change operation to Act-Coord and optimized Signal Splits with 190 sec cycle length • Add an additional EBL turn lane • Add an exclusive WBR and SBR turn lane.	Overall Intersection LOS E* Approach Delay LOS F or better *- Could not achieve LOS D	• Change operation to Act-Coord and optimized Signal Splits with 190 sec cycle length • Add an additional EBL and SBL turn lane • Add an exclusive EBR, WBR, NBR and SBR turn lane.	**AM Peak:** Overall Intersection LOS E*, Approach LOS F or better **PM Peak:** Overall Intersection LOS E*, Approach LOS F or better *- Could not achieve LOS D
18	Old Courthouse Road and Westbriar Drive	• Provide a Signal with optimized cycle length of 120 sec	Overall Intersection LOS C, Approach LOS D or better	• Provide a Signal with optimized cycle length of 120sec • Add and exclusive WBL turn lane with perm phase	Overall Intersection LOS D, Approach LOS E or better	• Provide a Signal with optimized cycle length of 120 sec	**AM Peak:** Overall Intersection LOS B Approach Delay LOS D or better **PM Peak:** Overall Intersection LOS D, Approach LOS E or better	• Provide a Signal with optimized cycle length of 120sec	Overall Intersection LOS B, Approach LOS D or better	• Provide a Signal with optimized cycle length of 120sec • Add and exclusive WBL turn lane with perm phase	Overall Intersection LOS D, Approach LOS F or better	• Provide a Signal with optimized cycle length of 120 sec • Add and exclusive WBL turn lane with perm phase	**AM Peak:** Overall Intersection LOS B Approach Delay LOS D or better **PM Peak:** Overall Intersection LOS D, Approach LOS F or better

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results										
Direction	Eastbound		Westbound		Northbound		Southbound		Overall Intersection	
Scenario	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
Int 1: Route 123 (Dolley Madison Boulevard) at Lewinsville Road/Great Falls Street										
AM PEAK										
2008 Existing	67.6	E	105.3	F	44.4	D	41.5	D	54.6	D
2030 Comp Plan - Existing Geo.	66.0	E	87.2	F	43.9	D	43.3	D	51.1	D
2030 Comp Plan - No. Improvements	66.0	E	87.2	F	43.9	D	43.3	D	51.1	D
2030 Comp Plan - Consolidated Pro. Imp.	**83.3**	**F**	**92.2**	**F**	**42.5**	**D**	**35.8**	**D**	**50.6**	**D**
2030 GMU High Plan - Existing Geo.	62.3	E	81.2	F	39.8	D	46.0	D	48.3	D
2030 GMU High Plan - No. Improvements	62.3	E	81.2	F	39.8	D	46.0	D	48.3	D
2030 GMU High Plan - Consolidated Pro. Imp.	**75.5**	**E**	**88.4**	**F**	**40.3**	**D**	**38.2**	**D**	**48.2**	**D**
PM PEAK										
2008 Existing	120.7	F	105.3	F	58.5	E	27.9	C	63.5	E
2030 Comp Plan - Existing Geo.	75.4	E	108.7	F	73.2	E	35.1	D	65.7	E
2030 Comp Plan - No. Improvements	116.6	F	113.5	F	41.1	D	24.2	C	53.6	D
2030 Comp Plan - Consolidated Pro. Imp.	**116.6**	**F**	**113.5**	**F**	**41.1**	**D**	**24.2**	**C**	**53.6**	**D**
2030 GMU High Plan - Existing Geo.	69.8	E	98.0	F	81.4	F	32.4	C	66.9	E
2030 GMU High Plan - No. Improvements	119.9	F	150.6	F	36.7	D	19.3	B	52.4	D
2030 GMU High Plan - Consolidated Pro. Imp.	**119.9**	**F**	**150.6**	**F**	**36.7**	**D**	**19.3**	**B**	**52.4**	**D**
Int 2: Route 123 (Dolley Madison Boulevard) at Old Dominion Drive										
AM PEAK										
2008 Existing	80.5	F	60.7	E	76.3	E	33.3	C	64.2	E
2030 Comp Plan - Existing Geo.	70.8	E	56.8	E	106.9	F	40.5	D	75.1	E
2030 Comp Plan - Pro. Improvements	72.7	E	96.7	F	73.6	E	31.6	C	62.4	E
2030 Comp Plan - Consolidated Pro. Imp.	**72.7**	**E**	**96.7**	**F**	**73.6**	**E**	**31.6**	**C**	**62.4**	**E**
2030 GMU High Plan - Existing Geo.	73.4	E	60.6	E	88.9	F	56.6	E	73.0	E
2030 GMU High Plan - Proposed Imp.	66.7	E	102.3	F	59.9	E	43.8	D	60.8	E
2030 GMU High Plan - Consolidated Pro. Imp.	**66.7**	**E**	**102.3**	**F**	**59.9**	**E**	**43.8**	**D**	**60.8**	**E**
PM PEAK										
2008 Existing	82.8	F	83.1	F	16.6	B	38.7	D	43.3	D
2030 Comp Plan - Existing Geo.	84.9	F	78.8	E	18.5	B	37.6	D	40.7	D
2030 Comp Plan - No. Improvements	84.9	F	78.8	E	18.5	B	37.6	D	40.7	D
2030 Comp Plan - Consolidated Pro. Imp.	**82.5**	**F**	**96.9**	**F**	**18.4**	**B**	**32.3**	**C**	**41.6**	**D**
2030 GMU High Plan - Existing Geo.	81.7	F	79.4	E	16.6	B	39.2	D	40.5	D
2030 GMU High Plan - Proposed Imp.	82.7	F	92.3	F	18.2	B	33.6	C	41.4	D
2030 GMU High Plan - Consolidated Pro. Imp.	**82.7**	**F**	**92.3**	**F**	**18.2**	**B**	**33.6**	**C**	**41.4**	**D**

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results										
Direction	**Eastbound**		**Westbound**		**Northbound**		**Southbound**		**Overall Intersection**	
Scenario	**Delay (Sec)**	**LOS**	**Delay (Sec)**	**LOS**	**Delay (Sec)**	**LOS**	**Delay (Sec)**	**LOS**	**Delay (Sec)**	**LOS**
Int 3: Lewinsville Road at Route 7 (Leesburg Pike)										
AM PEAK										
2008 Existing	17.7	B	46.0	D	88.1	F	32.2	C	26.4	C
2030 Comp Plan - Existing Geo.	21.4	C	27.9	C	81.8	F	54.7	D	26.5	C
2030 Comp Plan - No. Improvements	21.4	C	27.9	C	81.8	F	54.7	D	26.5	C
2030 Comp Plan - Consolidated Pro. Imp.	**17.3**	**B**	**26.4**	**C**	**71.3**	**E**	**33.5**	**C**	**21.5**	**C**
2030 GMU High Plan - Existing Geo.	21.1	C	75.3	E	78.7	E	37.4	D	37.0	D
2030 GMU High Plan - Proposed Imp.	19.8	B	61.0	E	62.5	E	28.6	C	31.4	C
2030 GMU High Plan - Consolidated Pro. Imp.	**19.8**	**B**	**61.0**	**E**	**62.5**	**E**	**28.6**	**C**	**31.4**	**C**
PM PEAK										
2008 Existing	25.9	C	39.5	D	88.7	F	178.4	F	55.6	E
2030 Comp Plan - Existing Geo.	20.8	C	64.0	E	98.1	F	279.3	F	86.9	F
2030 Comp Plan - Pro. Improvements	25.0	C	44.4	D	79.8	E	83.8	F	45.1	D
2030 Comp Plan - Consolidated Pro. Imp.	**25.0**	**C**	**44.4**	**D**	**79.8**	**E**	**83.8**	**F**	**45.1**	**D**
2030 GMU High Plan - Existing Geo.	127.5	F	35.8	D	98.1	F	594.5	F	210.0	F
2030 GMU High Plan - Proposed Imp.	42.2	D	67.8	E	58.1	E	31.7	C	51.1	D
2030 GMU High Plan - Consolidated Pro. Imp.	**42.2**	**D**	**67.8**	**E**	**58.1**	**E**	**31.7**	**C**	**51.1**	**D**
Int 4: Lewinsville Road at Spring Hill Road										
AM PEAK										
2008 Existing	45.5	D	20.7	C	39.8	D	124.4	F	54.7	D
2030 Comp Plan - Existing Geo.	43.0	D	16.3	B	44.5	D	205.4	F	83.1	F
2030 Comp Plan - Pro. Improvements	57.4	E	23.4	C	71.5	E	59.2	E	50.2	D
2030 Comp Plan - Consolidated Pro. Imp.	**57.4**	**E**	**23.4**	**C**	**71.5**	**E**	**59.2**	**E**	**50.2**	**D**
2030 GMU High Plan - Existing Geo.	43.6	D	19.9	B	34.6	C	187.5	F	77.0	E
2030 GMU High Plan - Proposed Imp.	55.0	D	27.9	C	56.3	E	52.4	D	45.6	D
2030 GMU High Plan - Consolidated Pro. Imp.	**55.0**	**D**	**27.9**	**C**	**55.7**	**E**	**52.4**	**D**	**45.5**	**D**
PM PEAK										
2008 Existing	36.2	D	16.9	B	140.2	F	36.4	D	74.0	E
2030 Comp Plan - Existing Geometry	36.0	D	19.1	B	260.7	F	34.7	C	135.4	F
2030 Comp Plan - Proposed Improvements	54.2	D	41.4	D	39.6	D	59.5	E	44.4	D
2030 Comp Plan - Consolidated Pro. Imp.	**54.2**	**D**	**41.4**	**D**	**39.6**	**D**	**59.5**	**E**	**44.4**	**D**
2030 GMU High Plan - Existing Geometry	40.3	D	21.9	C	425.0	F	40.4	D	196.3	F
2030 GMU High Plan - Proposed Improvements	58.9	E	37.1	D	41.5	D	74.0	E	46.4	D
2030 GMU High Plan - Consolidated Pro. Imp.	**58.9**	**E**	**37.1**	**D**	**41.5**	**D**	**74.0**	**E**	**46.4**	**D**

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results										
Direction	Eastbound		Westbound		Northbound		Southbound		Overall Intersection	
Scenario	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
Int 7: Great Falls Street & Chain Bridge Road										
AM PEAK										
2008 Existing	58.6	E	24.9	C	58.1	E	47.4	D	46.4	D
2030 Comp Plan - Existing Geometry	54.8	D	22.6	C	50.5	D	78.2	E	53.7	D
2030 Comp Plan - Proposed Improvements	54.8	D	22.6	C	50.5	D	78.2	E	53.7	D
2030 Comp Plan - Consolidated Pro. Imp.	**43.0**	**D**	**16.0**	**B**	**32.4**	**C**	**29.2**	**C**	**27.9**	**C**
2030 GMU High Plan - Existing Geometry	47.4	D	23.4	C	40.4	D	59.6	E	44.2	D
2030 GMU High Plan - Proposed Improvements	52.6	D	26.1	C	30.9	C	17.3	B	24.9	C
2030 GMU High Plan - Consolidated Pro. Imp.	**52.6**	**D**	**26.1**	**C**	**30.9**	**C**	**17.3**	**B**	**24.9**	**C**
PM PEAK										
2008 Existing	46.4	D	30.1	C	45.0	D	83.5	F	128.6	E
2030 Comp Plan - Existing Geometry	47.7	D	32.0	C	42.4	D	140.3	F	80.9	F
2030 Comp Plan - Proposed Improvements	87.2	F	44.0	D	41.9	D	34.9	C	42.5	D
2030 Comp Plan - Consolidated Pro. Imp.	**87.2**	**F**	**44.0**	**D**	**41.9**	**D**	**34.9**	**C**	**42.5**	**D**
2030 GMU High Plan - Existing Geometry	45.7	D	42.7	D	37.6	D	121.4	F	76.5	E
2030 GMU High Plan - Proposed Improvements	108.6	F	51.9	D	31.7	C	32.0	C	44.0	D
2030 GMU High Plan - Consolidated Pro. Imp.	**108.6**	**F**	**51.9**	**D**	**31.7**	**C**	**32.0**	**C**	**44.0**	**D**
Int 9: Magarity Road at Route 7										
AM PEAK										
2008 Existing	26.4	C	51.9	D	108.7	F	52.8	D	43.9	D
2030 Comp Plan - Existing Geometry	33.8	C	129.2	F	111.2	F	67.0	E	78.3	E
2030 Comp Plan - Proposed Improvements	29.1	C	40.3	D	97.6	F	76.7	E	41.4	D
2030 Comp Plan - Consolidated Pro. Imp.	**28.8**	**C**	**39.5**	**D**	**93.1**	**F**	**77.4**	**E**	**40.8**	**D**
2030 GMU High Plan - Existing Geometry	50.3	D	124.5	F	111.2	F	244.8	F	102.6	F
2030 GMU High Plan - Proposed Improvements	39.6	D	57.1	E	112.9	F	59.7	E	51.6	D
2030 GMU High Plan - Consolidated Pro. Imp.	**37.0**	**D**	**57.1**	**E**	**110.0**	**F**	**60.0**	**E**	**50.3**	**D**
PM PEAK										
2008 Existing	44.0	D	52.8	D	110.5	F	59.0	E	52.9	D
2030 Comp Plan - Existing Geometry	88.4	F	78.3	E	105.5	F	90.3	F	86.3	F
2030 Comp Plan - Proposed Improvements	49.6	D	37.0	D	121.4	F	91.6	F	54.7	D
2030 Comp Plan - Consolidated Pro. Imp.	**49.6**	**D**	**37.0**	**D**	**121.4**	**F**	**91.6**	**F**	**54.7**	**D**
2030 GMU High Plan - Existing Geometry	49.3	D	160.7	F	110.6	F	254.5	F	116.3	F
2030 GMU High Plan - Proposed Improvements	37.5	D	51.8	D	94.5	F	95.5	F	52.9	D
2030 GMU High Plan - Consolidated Pro. Imp.	**37.5**	**D**	**51.8**	**D**	**94.5**	**F**	**95.5**	**F**	**52.9**	**D**

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results

Direction	Eastbound		Westbound		Northbound		Southbound		Overall Intersection	
Scenario	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
Int 10: Idylwood Road at Route 7										
AM PEAK										
2008 Existing	47.5	D	48.1	D	97.9	F	95.7	F	60.7	E
2030 Comp Plan - Existing Geometry	95.6	F	63.1	E	86.0	F	119.6	F	84.3	F
2030 Comp Plan - Proposed Improvements	48.9	D	44.0	D	89.4	F	69.3	E	54.7	D
2030 Comp Plan - Consolidated Pro. Imp.	**48.9**	**D**	**44.0**	**D**	**89.4**	**F**	**63.2**	**E**	**54.3**	**D**
2030 GMU High Plan - Existing Geometry	86.4	F	66.6	E	110.6	F	100.6	F	84.1	F
2030 GMU High Plan - Proposed Improvements	53.2	D	50.1	D	70.5	E	50.2	D	54.8	D
2030 GMU High Plan - Consolidated Pro. Imp.	**53.2**	**D**	**50.1**	**D**	**70.5**	**E**	**50.2**	**D**	**54.8**	**D**
PM PEAK										
2008 Existing	48.4	D	41.3	E	72.9	E	89.0	F	51.4	D
2030 Comp Plan - Existing Geometry	90.4	F	176.0	F	231.5	F	125.5	F	142.7	F
2030 Comp Plan - Proposed Improvements	54.1	D	36.0	D	102.0	F	9.2	A	47.0	D
2030 Comp Plan - Consolidated Pro. Imp.	**54.1**	**D**	**36.0**	**D**	**102.0**	**F**	**9.2**	**A**	**47.0**	**D**
2030 GMU High Plan - Existing Geometry	103.2	F	59.3	E	125.7	F	115.0	F	87.9	F
2030 GMU High Plan - Proposed Improvements	55.7	E	43.3	D	77.0	E	81.1	F	54.5	D
2030 GMU High Plan - Consolidated Pro. Imp.	**41.5**	**D**	**36.0**	**D**	**89.1**	**F**	**87.8**	**F**	**47.3**	**D**
Int 11: Idylwood Road at Gallows Road										
AM PEAK										
2008 Existing	86.6	F	50.5	D	31.5	C	36.7	D	39.3	D
2030 Comp Plan - Existing Geometry	169.9	F	76.6	E	114.5	F	36.8	D	96.9	F
2030 Comp Plan - Proposed Improvements	84.7	F	61.7	E	47.1	D	57.0	D	54.7	D
2030 Comp Plan - Consolidated Pro. Imp.	**84.7**	**F**	**61.7**	**E**	**47.1**	**D**	**57.0**	**D**	**54.7**	**D**
2030 GMU High Plan - Existing Geometry	123.8	F	76.7	E	133.5	F	35.5	D	102.8	F
2030 GMU High Plan - Proposed Improvements	78.8	E	60.6	E	57.4	E	29.6	C	53.6	D
2030 GMU High Plan - Consolidated Pro. Imp.	**78.8**	**E**	**60.6**	**E**	**57.4**	**E**	**29.6**	**C**	**53.6**	**D**
PM PEAK										
2008 Existing	92.7	F	64.6	E	34.3	C	17.1	B	32.3	C
2030 Comp Plan - Existing Geometry	84.3	F	103	F	62.4	E	19.1	B	53.0	D
2030 Comp Plan - Proposed Improvements	74.2	E	60.4	E	43.8	D	26.2	C	40.6	D
2030 Comp Plan - Consolidated Pro. Imp.	**74.2**	**E**	**60.4**	**E**	**43.8**	**D**	**26.2**	**C**	**40.6**	**D**
2030 GMU High Plan - Existing Geometry	89.0	F	122.9	F	63.8	E	20.5	C	56.9	E
2030 GMU High Plan - Proposed Improvements	75.3	E	62.2	E	47.3	D	27.6	C	42.6	D
2030 GMU High Plan - Consolidated Pro. Imp.	**75.3**	**E**	**62.2**	**E**	**47.3**	**D**	**27.6**	**C**	**42.6**	**D**

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results

Direction	Eastbound		Westbound		Northbound		Southbound		Overall Intersection	
Scenario	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
Int 12: Idylwood Road at Gallows Road										
AM PEAK										
2008 Existing	0.1	A	1.7	A	18.5	C	59.2	F	4.5	-
2030 Comp Plan - Existing Geometry	0.2	A	0.5	A	530.7	F	376.6	F	113.6	-
2030 Comp Plan - Proposed Improvements	60.6	E	27.8	C	89.4	F	22.4	C	54.7	D
2030 Comp Plan - Consolidated Pro. Imp.	**59.9**	**E**	**21.5**	**C**	**89.4**	**F**	**22.4**	**C**	**52.2**	**D**
2030 GMU High Plan - Existing Geometry	0.2	A	0.1	A	747.5	F	153.3	F	-	-
2030 GMU High Plan - Proposed Improvements	38.5	D	14.4	B	56.4	E	27.5	C	34.4	D
2030 GMU High Plan - Consolidated Pro. Imp.	**38.5**	**D**	**14.0**	**B**	**56.4**	**E**	**27.5**	**C**	**34.2**	**C**
PM PEAK										
2008 Existing	0.1	A	3.1	A	109.7	F	98.5	F	20.7	-
2030 Comp Plan - Existing Geometry	0.3	A	15.3	C	-	F	499.5	F	-	-
2030 Comp Plan - Proposed Improvements	32.9	C	35.2	D	85.2	F	27.5	C	40.8	D
2030 Comp Plan - Consolidated Pro. Imp.	**32.9**	**C**	**35.2**	**D**	**85.2**	**F**	**27.5**	**C**	**40.8**	**D**
2030 GMU High Plan - Existing Geometry	0.1	A	4.2	A	312.0	F	-	F	216.4	-
2030 GMU High Plan - Proposed Improvements	44.5	D	35.0	C	64.9	E	27.2	C	42.4	D
2030 GMU High Plan - Consolidated Pro. Imp.	**39.7**	**D**	**34.1**	**C**	**55.5**	**E**	**26.7**	**C**	**39.0**	**D**
Int 14: Gallows Road at Cedar Lane/Oak Street										
AM PEAK										
2008 Existing	70.0	E	62.2	E	20.6	C	28.5	C	36.4	D
2030 Comp Plan - Existing Geometry	71.9	E	326.1	F	226.5	F	27.6	C	174.1	F
2030 Comp Plan - Proposed Improvements	77.7	E	56.1	E	53.7	D	31.3	C	54.6	D
2030 Comp Plan - Consolidated Pro. Imp.	**77.7**	**E**	**56.1**	**E**	**53.7**	**D**	**31.3**	**C**	**54.6**	**D**
2030 GMU High Plan - Existing Geometry	77.1	E	415.3	F	211.2	F	27.0	C	173.1	F
2030 GMU High Plan - Proposed Improvements	73.0	E	37.2	D	60.3	E	31.8	C	54.9	D
2030 GMU High Plan - Consolidated Pro. Imp.	**73.0**	**E**	**37.2**	**D**	**60.3**	**E**	**31.8**	**C**	**54.9**	**D**
PM PEAK										
2008 Existing	76.9	E	55.2	E	17.1	B	24.2	C	28.0	C
2030 Comp Plan - Existing Geometry	78.2	E	61.3	E	28.2	C	18.7	B	30.4	C
2030 Comp Plan - Proposed Improvements	75.2	E	40.7	D	38.8	D	15.3	B	30.9	C
2030 Comp Plan - Consolidated Pro. Imp.	**75.2**	**E**	**40.7**	**D**	**38.8**	**D**	**15.3**	**B**	**30.9**	**C**
2030 GMU High Plan - Existing Geometry	78.2	E	74.9	E	29.8	C	24.7	C	34.8	C
2030 GMU High Plan - Proposed Improvements	75.1	E	41.4	D	43.9	D	19.9	B	34.4	C
2030 GMU High Plan - Consolidated Pro. Imp.	**75.1**	**E**	**41.4**	**D**	**43.9**	**D**	**19.9**	**B**	**34.4**	**C**

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results

Direction	Eastbound		Westbound		Northbound		Southbound		Overall Intersection	
Scenario	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
Int 15: Old Courthouse Road and Chain Bridge Road										
AM PEAK										
2008 Existing	135.2	F	161.4	F	45.0	D	33.9	C	83.3	F
2030 Comp Plan - Existing Geometry	95.9	F	95.1	F	45.1	D	119.5	F	77.0	E
2030 Comp Plan - Proposed Improvements	92.1	F	80.7	F	47.5	D	50.5	D	60.4	E
2030 Comp Plan - Consolidated Pro. Imp.	**91.4**	**F**	**76.1**	**E**	**49.0**	**D**	**50.9**	**D**	**60.6**	**E**
2030 GMU High Plan - Existing Geometry	216.0	F	361.2	F	42.2	D	65.2	E	149.2	F
2030 GMU High Plan - Proposed Improvements	95.1	F	101.3	F	72.0	E	45.5	D	78.0	E
2030 GMU High Plan - Consolidated Pro. Imp.	**95.1**	**F**	**101.3**	**F**	**72.0**	**E**	**45.5**	**D**	**78.0**	**E**
PM PEAK										
2008 Existing	175.4	F	76.1	E	33.9	C	34.7	C	72.7	E
2030 Comp Plan - Existing Geometry	74.0	E	328.1	F	52.6	D	36.8	D	133.5	F
2030 Comp Plan - Proposed Improvements	50.4	D	52.2	D	74.9	E	62.2	E	59.7	E
2030 Comp Plan - Consolidated Pro. Imp	**67.3**	**E**	**53.7**	**D**	**79.7**	**F**	**59.7**	**E**	**61.1**	**E**
2030 GMU High Plan - Existing Geometry	91.5	F	208.5	F	34.2	C	34.4	C	93.4	F
2030 GMU High Plan - Proposed Improvements	45.2	D	54.7	D	62.9	E	54.5	D	54.7	D
2030 GMU High Plan - Consolidated Pro. Imp.	**61.3**	**E**	**54.8**	**D**	**67.1**	**E**	**48.1**	**D**	**54.6**	**D**
Int 16: Maple Avenue a Beulah Road (Vienna)										
AM PEAK										
2008 Existing	32.8	C	52.0	D	29.0	C	12.9	B	26.3	C
2030 Comp Plan - Existing Geometry	34.3	C	56.9	E	23.5	C	15.3	B	23.5	C
2030 Comp Plan - No Improvements	34.3	C	56.9	E	23.5	C	15.3	B	23.5	C
2030 Comp Plan - Consolidated Pro. Imp	**50.0**	**D**	**88.3**	**F**	**37.0**	**D**	**11.0**	**B**	**33.8**	**C**
2030 GMU High Plan - Existing Geometry	33.1	C	57.3	E	19.9	B	16.2	B	21.2	C
2030 GMU High Plan - Proposed Improvements	33.1	C	57.3	E	19.9	B	16.2	B	21.2	C
2030 GMU High Plan - Consolidated Pro. Imp.	**37.9**	**D**	**76.4**	**E**	**20.1**	**C**	**14.1**	**B**	**21.7**	**C**
PM PEAK										
2008 Existing	50.3	D	58	E	31.2	C	203.4	F	124.9	F
2030 Comp Plan - Existing Geometry	128.4	F	64.6	E	31.8	C	221.7	F	149.1	F
2030 Comp Plan - Proposed Improvements	76.7	E	91.7	F	67.7	E	40.5	D	55.0	D
2030 Comp Plan - Consolidated Pro. Imp.	**76.7**	**E**	**91.7**	**F**	**67.7**	**E**	**40.5**	**D**	**55.0**	**D**
2030 GMU High Plan - Existing Geometry	127.6	F	66.1	E	33.5	C	240.3	F	153.6	F
2030 GMU High Plan - Proposed Improvements	72.4	E	50.9	D	45.6	D	53.2	D	55.0	D
2030 GMU High Plan - Consolidated Pro. Imp.	**72.4**	**E**	**50.9**	**D**	**45.6**	**D**	**53.2**	**D**	**55.0**	**D**

Table 5: Intersection Capacity Analysis with Proposed Improvements- Synchro Results										
Direction	Eastbound		Westbound		Northbound		Southbound		Overall Intersection	
Scenario	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
Int 17: Maple Avenue a Lawyers Road (Vienna)										
AM PEAK										
2008 Existing	61.1	E	64.2	E	172.0	F	34.9	C	122.4	F
2030 Comp Plan - Existing Geometry	88.6	F	74.7	E	373.7	F	266.9	F	264.1	F
2030 Comp Plan - Proposed Improvements	71.7	E	115.9	F	72.2	E	78.7	E	78.6	E
2030 Comp Plan - Consolidated Pro. Imp.	**71.7**	**E**	**115.9**	**F**	**72.2**	**E**	**78.7**	**E**	**78.6**	**E**
2030 GMU High Plan - Existing Geometry	71.2	E	70.8	E	357.9	F	46.8	D	213.0	F
2030 GMU High Plan - Proposed Improvements	109.8	F	77.5	E	71.9	E	52.5	D	76.4	E
2030 GMU High Plan - Consolidated Pro. Imp.	**109.8**	**F**	**77.5**	**E**	**71.9**	**E**	**52.5**	**D**	**76.4**	**E**
PM PEAK										
2008 Existing	76.9	E	80.7	F	48.8	D	213.2	F	124.7	F
2030 Comp Plan - Existing Geometry	215.0	F	47.9	D	39.0	D	139.9	F	123.1	F
2030 Comp Plan - Proposed Improvements	87.8	F	38.5	D	54.0	D	20.1	C	38.6	D
2030 Comp Plan - Consolidated Pro. Imp.	**87.9**	**F**	**38.5**	**D**	**34.4**	**C**	**32.7**	**C**	**42.2**	**D**
2030 GMU High Plan - Existing Geometry	76.8	E	127.4	F	59.7	E	189.8	F	128.0	F
2030 GMU High Plan - Proposed Improvements	84.9	F	93.6	F	37.3	D	59.0	E	64.5	E
2030 GMU High Plan - Consolidated Pro. Imp.	**84.9**	**F**	**93.6**	**F**	**37.3**	**D**	**59.0**	**E**	**64.5**	**E**
Int 18: Old Courthouse Road and Westbriar Drive (Vienna)										
AM PEAK										
2008 Existing	0.0	A	1.4	A	92.7	F	44.3	E	9.0	-
2030 Comp Plan - Existing Geometry	0.5	A	1.2	A	421.2	F	414.4	F	78.5	-
2030 Comp Plan - Proposed Improvements	21.9	C	4.0	A	51.8	D	43.1	D	24.5	C
2030 Comp Plan - Consolidated Pro. Imp.	**21.9**	**C**	**3.7**	**A**	**51.8**	**D**	**43**	**D**	**24.5**	**C**
2030 GMU High Plan - Existing Geometry	0.3	A	1.8	A	27.7	D	24.6	C	3.2	-
2030 GMU High Plan - Proposed Improvements	18.3	B	3.0	A	43	D	33.4	C	18.4	B
2030 GMU High Plan - Consolidated Pro. Imp.	**18.2**	**B**	**2.5**	**A**	**42.9**	**D**	**33.4**	**C**	**18.2**	**B**
PM PEAK										
2008 Existing	0.2	A	3.0	A	391.9	F	32.0	D	98.1	-
2030 Comp Plan - Existing Geometry	1.1	A	6.4	A	-	F	-	F	-	-
2030 Comp Plan - Proposed Improvements	5.9	A	15.9	B	22.5	C	29.3	C	17.3	B
2030 Comp Plan - Consolidated Pro. Imp.	**5.9**	**A**	**15.9**	**B**	**22.5**	**C**	**29.3**	**C**	**17.3**	**B**
2030 GMU High Plan - Existing Geometry	0.6	A	2.7	A	248.6	F	134.4	F	56.5	-
2030 GMU High Plan - Proposed Improvements	12.6	A	36.5	D	64.2	E	25.3	C	38.4	D
2030 GMU High Plan - Consolidated Pro. Imp.	**12.6**	**A**	**36.5**	**D**	**64.2**	**E**	**25.3**	**C**	**38.4**	**D**

Table 6: Intersection Lane Configuration

INT #	INTERSECTION	Direction	Existing (2008)			Comp Plan (2030)			GMU High Plan (2030)		
1	Dolley Madison Blvd and Lewinsville Road	Eastbound	1L	1LT 1T	2R	1L	1LT 1T	2R	1L	1LT 1T	2R
		Westbound	1L	1LT	1TR	1L	1LT	1TR	1L	1LT	1TR
		Northbound	2L	2T	1R	2L	2T	1R	2L	2T	1R
		Southbound	2L	3T	1R	2L	3T	1R	2L	3T	1R
		Worst Case	PM - LOS E - 63.5 Sec			PM - LOS D - 53.6 Sec			PM - LOS D - 52.4 Sec		
2	Dolley Madison Blvd and Old Dominion Drive	Eastbound	2L	2T	1R	2L	2T	1R	2L	2T	1R
		Westbound	2L	2T	1R	2L	2T	1R	2L	2T	1R
		Northbound	1L	2T	1R	1L	2T	1R	1L	2T	1R
		Southbound	1L	2T	1R	1L	2T	1R	1L	2T	1R
		Worst Case	AM - LOS E - 64.2 Sec			AM - LOS E - 62.4 Sec			AM - LOS E - 60.8 Sec		
3	Lewinsville Road & Route 7	Eastbound	1L	2T	1R	1L	3T	1R	1L	3T	1R
		Westbound	2L	2T	1R	2L	3T	1R	2L	3T	1R
		Northbound	1L	1T	1R	1L	1T	1R	1L	1T	1R
		Southbound	1L	1T	1TR	1L	1T	1TR	1L	1T	1TR
		Worst Case	PM - LOS E - 55.6 Sec			PM - LOS D - 45.1 Sec			PM - LOS D - 51.1 Sec		
4	Lewinsville Road and Spring Hill Road	Eastbound	-	1LT	1R	-	1LT	1R	-	1LT	1R
		Westbound	1L	1TR	-	1L	1TR	-	1L	1TR	-
		Northbound	-	1LT	1R	-	1LT	1R	1L	1T	1R
		Southbound	-	1LTR	-	-	1LTR	-	-	1LTR	
		Worst Case	PM - LOS E - 74.0 Sec			AM - LOS D - 50.2 Sec			PM - LOS D - 46.4 Sec		
7	Great Falls Street and Chain Bridge Road	Eastbound	1L	1T	1R	1L	1T	1R	1L	1T	1R
		Westbound	1L	1T	1R	1L	1T	1R	1L	1T	1R
		Northbound	1L	1TR	-	1L	1T	1R	1L	1T	1R
		Southbound	1L	1TR	-	1L	1TR	-	1L	1TR	-
		Worst Case	PM - LOS E - 55.9 Sec			PM - LOS D - 42.5 Sec			PM - LOS D - 44.0 Sec		
9	Route 7 and Magarity Road	Eastbound	2L	3T	1R	2L	3T	1R	2L	3T	1R
		Westbound	1L	1T	1TR	1L	2T	1R	1L	2T	1R
		Northbound	2L	1TR	-	2L	1T	1R	2L	1T	1R
		Southbound	1L	1TR	1R	1L	1TR	1R	2L	1TR	1R
		Worst Case	PM - LOS D - 52.9 Sec			PM - LOS D - 54.7 Sec			PM - LOS D - 52.9 Sec		
10	Idylwood Road at Route 7	Eastbound	1L	2T	1TR	2L	3T	1R	2L	3T	1R
		Westbound	1L	2T	1TR	2L	3T	1R	2L	3T	1R
		Northbound		1LT	1R	1L	1T	1R	1L	1TR	1R
		Southbound		1LT	1R	1L	1T	1R	1L	1TR	1R

Table 6: Intersection Lane Configuration

INT	INTERSECTION	Direction	Existing (2008)			Comp Plan (2030)			GMU High Plan (2030)		
		Worst Case	AM - LOS E - 60.7 Sec			AM - LOS D - 54.3 Sec			AM - LOS D - 54.8Sec		
11	Idylwood Road and Gallows Road	Eastbound	1L	1TR		1L	1TR		1L	1TR	
		Westbound	1L	1T	1R	1L	1T	1R	1L	1T	1R
		Northbound	1L	2T	1R	1L	3T	1R	1L	3T	1R
		Southbound	1L	1T	1TR	1L	2T	1TR	1L	2T	1TR
		Worst Case	AM - LOS D - 39.3 Sec			AM - LOS D - 54.7 Sec			AM - LOS D - 53.6 Sec		
12	Georgetown Pike and Swinks Mill Road	Eastbound	-	1LTR	-	-	1LTR	-	-	1LTR	-
		Westbound	-	1LTR	-	1L	1TR	-	1L	1TR	-
		Northbound	-	1LTR	-	-	1LTR	-	-	1LT	1R
		Southbound	-	1LTR	-	-	1LTR	-	-	1LTR	-
		Worst Case	PM - * - 20.7 Sec			AM - LOS D - 52.2 Sec			PM - LOS D - 39.0 Sec		
14	Cedar Lane and Gallows Road	Eastbound	1L	1LT	1TR	1L	1LT	1TR	1L	1LT	1TR
		Westbound		1LT	1R		1LT	1R		1LT	1R
		Northbound	1L	1T	1TR	1L	2T	1TR	1L	2T	1TR
		Southbound	1L	1T	1TR	1L	2T	1TR	1L	2T	1TR
		Worst Case	AM - LOS D - 36.4 Sec			AM - LOS D - 54.6 Sec			AM - LOS D - 54.9 Sec		
15	Old Courthouse Road and Chain Bridge Road	Eastbound	1L	1T	1TR	2L	1T	1TR	2L	1T	1TR
		Westbound	1L	2T	1R	1L	2T	1R	1L	2T	1R
		Northbound	1L	2T	1R	2L	2T	1R	2L	2T	1R
		Southbound	1L	2T	1R	2L	2T	1R	2L	2T	1R
		Worst Case	AM - LOS F - 83.3 Sec			PM - LOS E - 61.1 Sec			AM - LOS E - 78.0 Sec		
16	Beulah road and Maple Avenue	Eastbound	1L	1TR	-	1L	1TR	-	1L	1LT	1R
		Westbound	-	1LTR	-	-	1LTR	-	-	1LT	1R
		Northbound	1L	1T	1TR	1L	1T	1TR	2L	1T	1TR
		Southbound	1L	1T	1TR	1L	2T	1R	1L	2T	1R
		Worst Case	PM - LOS F - 124.1 Sec			PM - LOS D - 55.0 Sec			PM - LOS D - 55.0 Sec		
17	Lawyers Road and Maple Avenue	Eastbound	1L	1TR	-	2L	1T	1R	2L	1T	1R
		Westbound	1L	1TR	-	1L	1T	1R	1L	1T	1R
		Northbound	1L	1T	1TR	1L	1T	1TR	1L	2T	1R
		Southbound	1L	1T	1TR	2L	2T	1R	2L	2T	1R
		Worst Case	PM - LOS F - 124.7 Sec			AM - LOS E - 78.6 Sec			AM - LOS E - 76.4 Sec		
18	Old Courthouse Rd and Westbriar Drive	Eastbound	-	1LTR	-	-	1LTR	-	-	1LTR	-
		Westbound	-	1LTR	-	1L	1TR	-	1L	1TR	-
		Northbound	-	1LTR	-	-	1LTR	-	-	1LTR	-
		Southbound	-	1LTR	-	-	1LTR	-	-	1LTR	-
		Worst Case	PM - LOS F - 98.1 Sec			AM - LOS C - 24.5 Sec			PM - LOS D - 38.4 Sec		

Since this study is considered as a planning effort by FCDOT, the storage lengths for the turn-bays are proposed based on the 95th percentile queue lengths. In cases, where it is not geometrically feasible to provide the 97th queue lengths, 50th percentile queue lengths are used. Table 7 presents the storage length details for fourteen (14) intersections under both scenarios. The proposed physical improvements are presented as intersection diagrams using aerial images provided by FCDOT included in Appendix F and the respective planning level cost estimates are included in Appendix F.

Based on the results and proposed improvements presented above, same set of intersections are failing (LOS E or LOS F) under both future Comp Plan and GMU High Plan scenarios. In addition, the proposed mitigation measures are very close for both scenarios. Even though the GMU High Land Use Plan volumes are higher than the existing Comprehensive Plan, from the standpoint of traffic operations there is no significant difference between the two scenarios. However, there is significant cost involved in implementing the required improvements to accommodate the future traffic under both scenarios in addition to the planned improvements under existing Comprehensive Plan.

In conclusion, revising the existing Comprehensive Plan by considering the GMU High Land Use Alternative will not cause any significant traffic impacts in the study area.

Table 7: Intersection Storage Lengths – Existing and Proposed

INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95^{th} Percentile Queue Length								STORAGE LENGTHS / 50^{th} Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
1	Dolley Madison Blvd & Lewinsville Road	2008 Existing	Existing	166	144	227	-	832	548	364	308	166	144	227	-	832	548	364	308
		2030 Comp Plan	AM Peak	286	78	482	-	311	53	51	74	159	88	317	-	246	0	26	24
			PM Peak	364	313	601	-	231	206	49	35	193	256	385	-	175	77	39	33
			Pro. Comp Plan	375	325	625	-	325	225	75	75	200	275	400	-	250	100	50	50
		2030 GMU High Plan	AM Peak	274	102	400	-	335	110	51	84	159	96	261	-	269	31	26	32
			PM Peak	359	352	517	-	318	275	41	35	185	302	305	-	253	143	32	32
			Pro. GMU Plan	375	375	525	-	350	300	75	100	200	325	325	-	275	150	50	50
2	Dolley Madison Blvd & Old Dominion Drive	2008 Existing	Existing	269	576	309	48	384	385	250	115	269	576	309	48	384	385	250	115
		2030 Comp Plan	AM Peak	259	27	343	55	17	456	332	74	182	0	231	10	5	335	128	27
			PM Peak	176	58	402	117	8	0	253	171	127	9	285	66	7	0	90	98
			Pro. Comp Plan	275	75	425	125	25	475	350	175	200	25	300	75	25	350	150	100
		2030 GMU High Plan	AM Peak	251	43	415	45	23	447	151	70	191	2	295	8	8	324	51	33
			PM Peak	153	105	402	80	12	41	169	184	107	46	293	42	10	0	59	108
			Pro. GMU Plan	275	125	425	100	25	450	175	200	200	75	300	50	25	325	75	125

Table 7: Intersection Storage Lengths – Existing and Proposed

INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95th Percentile Queue Length								STORAGE LENGTHS / 50th Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
3	Lewinsville Road & Route 7	2008 Existing	Existing	895	340	436	300	92	92	68	-	895	-	436	300	92	-	68	-
		2030 Comp Plan	AM Peak	574	7	12	39	23	15	214	-	482	-	3	5	6	0	142	-
			PM Peak	400	13	13	28	54	14	258	-	272	-	3	9	19	0	174	-
			Pro. Comp Plan	575	25	25	50	75	25	275	-	500	-	25	25	25	0	175	-
		2030 GMU High Plan	AM Peak	950	11	12	92	21	14	312	-	690	-	3	30	6	0	223	-
			PM Peak	837	11	13	85	42	14	733	-	588	-	3	43	17	0	497	-
			Pro. GMU Plan	950	25	25	100	50	25	750	-	700	-	25	50	25	0	500	-
4	Lewinsville Road & Spring Hill Road	2008 Existing	Existing	-	-	0	-	-	346	-	-	-	-	0	-	-	346	-	-
		2030 Comp Plan	AM Peak	-	-	159	-	-	194	-	-	-	-	106	-	-	122	-	-
			PM Peak	-	-	78	-	-	355	-	-	-	-	40	-	-	227	-	-
			Pro. Comp Plan	-	-	175	-	-	375	-	-	-	-	125	-	-	250	-	-
		2030 GMU High Plan	AM Peak	-	-	153	-	38	300	-	-	-	-	97	-	13	189	-	-
			PM Peak	-	-	165	-	244	400	-	-	-	-	97	-	166	289	-	-
			Pro. GMU Plan	-	-	175	-	250	400	-	-	-	-	100	-	175	300	-	-

Table 7: Intersection Storage Lengths – Existing and Proposed																			
INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95th Percentile Queue Length								STORAGE LENGTHS / 50th Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
7	Great Falls Street & Chain Bridge Road	2008 Existing	Existing	168	201	186	384	226	-	-	-	168	201	186	-	226	-	-	-
		2030 Comp Plan	AM Peak	18	32	166	75	20	158	532	-	4	0	88	-	6	67	234	-
			PM Peak	32	33	561	104	24	64	908	-	11	0	325	-	11	0	580	-
			Pro. Comp Plan	50	50	575	125	25	175	925	-	25	0	350	-	25	75	600	-
		2030 GMU High Plan	AM Peak	16	31	265	87	22	76	451	-	3	0	131	-	7	0	231	-
			PM Peak	14	26	725	89	22	72	832	-	3	0	457	-	9	0	546	-
			Pro. GMU Plan	25	50	750	100	25	100	845	-	25	0	475	-	25	25	575	-
9	Route 7 at Magarity Road	2008 Existing	Existing	296	265	131	-	100	-	354	354	296	265	131	-	100	-	354	354
		2030 Comp Plan	AM Peak	311	154	120	693	93	26	377	126	255	61	68	383	59	0	216	17
			PM Peak	41	75	112	483	285	55	427	493	21	33	61	283	180	0	250	404
			Pro. Comp Plan	325	175	125	700	300	75	450	500	275	75	75	400	200	0	250	425
		2030 GMU High Plan	AM Peak	511	156	120	207	109	28	265	77	321	70	68	125	61	0	208	7
			PM Peak	295	35	57	180	222	86	458	160	227	10	31	96	168	28	335	61
			Pro. GMU Plan	525	175	125	225	225	100	475	175	325	75	75	125	175	50	350	75

Table 7: Intersection Storage Lengths – Existing and Proposed

INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95^{th} Percentile Queue Length								STORAGE LENGTHS / 50^{th} Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
10	Idylwood Road at Route 7	2008 Existing	Existing	336	-	429	-	-	461	-	222	336	-	429	-	-	461	-	222
		2030 Comp Plan	AM Peak	360	68	282	93	103	922	331	0	188	32	150	54	65	680	205	0
			PM Peak	219	47	601	99	438	150	67	0	168	18	479	37	322	95	35	0
			Pro. Comp Plan	375	75	625	100	450	925	350	0	200	50	500	75	325	680	225	0
		2030 GMU High Plan	AM Peak	204	43	209	82	113	942	206	62	157	21	160	47	67	709	140	0
			PM Peak	178	142	296	115	168	330	116	235	132	77	244	60	95	249	66	162
			Pro. GMU Plan	225	150	300	125	175	950	225	250	175	100	250	75	100	725	150	175
11	Idylwood Road at Gallows Road	2008 Existing	Existing	252	-	87	106	210	123	253	-	252	-	87	106	210	123	253	-
		2030 Comp Plan	AM Peak	57	-	290	270	54	84	316	-	24	-	210	155	29	45	151	-
			PM Peak	40	-	515	187	27	133	301	-	15	-	355	87	11	71	173	-
			Pro. Comp Plan	75		525	300	75	150	325	-	25	-	375	175	50	75	175	-
		2030 GMU High Plan	AM Peak	97	-	308	236	46	135	320	-	48	-	229	131	24	81	155	-
			PM Peak	49	-	590	176	23	143	378	-	20	-	399	77	9	80	187	-
			Pro. GMU Plan	100	-	600	250	50	150	400	-	50	-	400	150	25	100	200	-

Table 7: Intersection Storage Lengths – Existing and Proposed

INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95th Percentile Queue Length								STORAGE LENGTHS / 50th Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
12	Georgetown Pike & Swinks Mill Road	2008 Existing	Existing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2030 Comp Plan	AM Peak	-	-	16	-	-	-	-	-	-	-	7	-	-	-	-	-
			PM Peak	-	-	304	-	-	-	-	-	-	-	181	-	-	-	-	-
			Pro. Comp Plan	-	-	325	-	-	-	-	-	-	-	200	-	-	-	-	-
		2030 GMU High Plan	AM Peak	-	-	5	-	-	341	-	-	-	-	1	-	-	201	-	-
			PM Peak	-	-	224	-	-	325	-	-	-	-	92	-	-	194	-	-
			Pro. GMU Plan	-	-	225	-	-	350	-	-	-	-	100	-	-	225	-	-
14	Cedar Lane at Gallows Road	2008 Existing	Existing	970	-	-	630	240	-	147	-	970	-	-	630	240	-	147	-
		2030 Comp Plan	AM Peak	759	-	-	323	28	-	57	-	510	-	-	182	14	-	29	-
			PM Peak	185	-	-	75	6	-	198	-	118	-	-	0	4	-	82	-
			Pro. Comp Plan	775	-	-	325	50	-	200	-	525	-	-	200	25	-	100	-
		2030 GMU High Plan	AM Peak	809	-	-	170	24	-	62	-	554	-	-	47	9	-	29	-
			PM Peak	189	-	-	76	13	-	255	-	120	-	-	0	8	-	135	-
			Pro. GMU Plan	825	-	-	200	25	-	275	-	575	-	-	50	25	-	150	-

Table 7: Intersection Storage Lengths – Existing and Proposed

INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95th Percentile Queue Length								STORAGE LENGTHS / 50th Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
15	Old Courthouse Road & Chain Bridge Road	2008 Existing	Existing	182	-	271	148	253	37	150	198	182	-	271	148	253	37	150	198
		2030 Comp Plan	AM Peak	265	-	87	112	113	87	336	23	195	-	45	61	72	49	241	0
			PM Peak	161	-	140	121	263	52	361	601	91	-	79	69	161	19	291	431
			Pro. Comp Plan	275	-	150	125	275	100	375	625	200	-	100	75	175	50	300	450
		2030 GMU High Plan	AM Peak	483	-	81	830	199	73	263	40	357	-	39	575	146	39	203	0
			PM Peak	164	-	315	273	138	55	251	329	121	-	222	163	78	24	192	193
			Pro. GMU Plan	500	-	325	850	200	75	275	350	375	-	225	575	150	50	225	200
16	Beulah Road & Maple Avenue	2008 Existing	Existing	239	-	-	-	140	-	128	-	239	-	-	-	140	-	128	-
		2030 Comp Plan	AM Peak	160	-	-	-	65	-	9	13	115	-	-	-	52	-	5	0
			PM Peak	579	-	-	-	504	-	44	0	414	-	-	-	291	-	36	0
			Pro. Comp Plan	600	-	-	-	525	-	50	25	425	-	-	-	300	-	50	0
		2030 GMU High Plan	AM Peak	113	82	-	12	100	-	33	4	68	0	-	0	62	-	19	0
			PM Peak	362	418	-	0	323	-	140	7	255	288	-	0	174	-	83	5
			Pro. GMU Plan	375	425	-	25	325	-	150	25	275	300	-	0	175	-	100	25

Table 7: Intersection Storage Lengths – Existing and Proposed

INT #	INTERSECTION	Scenario	Time Period	STORAGE LENGTHS / 95^{th} Percentile Queue Length								STORAGE LENGTHS / 50^{th} Percentile Queue Length							
				EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
17	Lawyers Road & Maple Avenue	2008 Existing	Existing	183	-	118	-	136	-	125	-	183	-	118	-	136	-	125	-
		2030 Comp Plan	AM Peak	185	0	187	81	114	-	291	10	159	0	268	0	87	-	310	0
			PM Peak	310	23	44	110	24	-	336	15	282	0	37	0	7	-	325	0
			Pro. Comp Plan	325	25	200	125	125	-	350	25	300	0	275	0	100	-	325	0
		2030 GMU High Plan	AM Peak	150	29	83	172	67	28	124	16	124	12	94	87	43	11	92	0
			PM Peak	198	53	125	59	148	25	113	57	131	12	154	16	93	0	83	29
			Pro. GMU Plan	200	75	150	175	150	50	125	75	150	25	175	100	100	15	100	50
18	Old Courthouse Road & Westbriar Drive	2008 Existing	Existing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2030 Comp Plan	AM Peak	-	-	9	-	-	-	-	-	-	-	3	-	-	-	-	-
			PM Peak	-	-	189	-	-	-	-	-	-	-	63	-	-	-	-	-
			Pro. Comp Plan	-	-	200	-	-	-	-	-	-	-	75	-	-	-	-	-
		2030 GMU High Plan	AM Peak	-	-	16	-		-	-	-	-	-	5	-	-	-	-	-
			PM Peak	-	-	97	-		-	-	-	-	-	58	-	-	-	-	-
			Pro. GMU Plan	-	-	100	-		-	-	-	-	-	75	-	-	-	-	-

Conceptual Cost Estimates

For intersections analyzed within the study area that did not meet the operational requirement of LOS D using the Comp Plan traffic volumes and/or the GMU Plan traffic volumes, further analysis was done to determine what physical improvements, such as additional through/turn lanes and/or increased storage lengths for turn lanes, were needed to achieve a LOS D for the intersection. Conceptual cost estimates for these improvements were developed based on the criteria and assumptions outlined below. In developing these estimates, if the County's document entitled Fairfax County Comprehensive Plan, Tysons Corner Urban Center, Transportation had additional lanes identified for a roadway at one of the analyzed intersections, then construction costs for those lanes and the associated physical improvements are not included in the project cost for that intersection.

These conceptual cost estimates reflect the level of detail available at this early phase of project development and, therefore, certain contingencies are applied. The Total Project Cost consists of the following cost items; Total Construction, Final Design, Construction Management/Inspection, and Right of Way Acquisition Costs.

The Total Construction Cost estimate is broken down into the categories of Roadway Construction, Landscaping, Maintenance of Traffic, Project Utility Relocation, Erosion and Sediment Control, Drainage with a General Contingency applied to the summed amount. The following describes each category item used within the Total Construction Cost.

A – Roadway Construction

Category A is a breakdown of construction items that would normally be included in a construction cost estimate. Due to the limited detail available at this level of project development the following items are included:

- Remove Existing Pavement, Median, Sidewalk, & Curb/Gutter - This quantity item is based on the amount of material that would need to be removed to accommodate full depth median widening and/or full depth pavement widening along the outside for each intersection improvement.
- Grading – The grading quantity is based on a one (1) foot depth of earthwork to be removed and or placed within the square yard area of both Asphalt Concrete Pavement and Cement Concrete Sidewalk quantity items.
- Asphalt Concrete Pavement – The Asphalt Concrete Pavement quantity is based on the area of any additional full depth pavement required to accommodate each intersection improvement.
- Miscellaneous – This item includes standard curb and gutter that will be placed along the new edge of roadway, five (5) foot wide cement concrete sidewalk that will be placed along any new roadway pavement widening to the outside, and raised median area required for new left turn bays and reconstruction of intersection islands.

B – Landscaping

Category B is based on 5 percent of the combined cost amount for Grading, Pavement and Miscellaneous items. This includes topsoil, seeding mulching and minor plantings. Due to the nature or location of the improvements it is assumed that the plantings would require more topsoil and mulching items.

C – Maintenance of Traffic

Category B is based on 40 percent of the combined cost amount for Grading, Pavement and Miscellaneous items. This includes temporary traffic channelization devices, signs, and pavement markings.

D - Traffic Items

Category D is a breakdown of typical traffic items that include permanent Signing and Pavement Markings, Roadway Lighting and Signals. The permanent Signing and Pavement marking item cost was developed using a cost per mile amount. The Roadway Lighting item costs were added when an outer pavement edge was moved to accommodate a lane and were developed using a cost per mile amount. The Signal item cost was based on per each signal, were included when a lane or more was added to the intersection and when a signal was added to an intersection that previously did not have a signal.

E – Project Utility Relocation

Category E is based on 30 percent of the combined cost amount for Grading, Pavement and Miscellaneous items. This includes minor utility surface facility adjustments.

F – Erosion and Sediment Control

Category F is based on 5 percent of the combined cost amount for Grading, Pavement and Miscellaneous items and includes and includes silt fence, inlet protection and temporary seeding.

G – Drainage

Category G is based on 25 percent of the combined cost amount for Grading, Pavement and Miscellaneous items and includes minor drainage work such as manhole and inlet adjustments, pipe culvert extensions and inlet relocations within the new pavement area.

H – Construction Costs

Category H is the summation of Categories A through G and is the base construction cost prior to contingencies.

General Contingency

The General Contingency applied to the construction cost is 40 percent at this early phase of project development and accounts for unforeseen conditions and potential changes that may arise.

<u>Total Construction Cost</u>

The Total Construction cost is the base Construction Cost with the General Contingency applied.

<u>Final Design Costs</u>

The Final Design Cost is based on 15 percent of the Total Construction Cost and includes planning work required to prepare any environmental documentation and for the final design of the project.

<u>Construction Management/Inspection</u>

The Construction Management / Inspection cost is based on 15 percent of the Total Construction Cost and includes management and inspection services during construction of the project.

<u>Right Of Way Acquisition Costs</u>

The Right of Way Acquisition Costs are based on the area of take computed to be required to accommodate additional lane widening and sidewalk. Due to the dense commercial nature of the project location a $1,000,000 per acre cost was used.

<u>Total Project Cost</u>

The Total Project Cost is based on the summation of costs that include: Total Construction, Final Design, Construction Management / Inspection, and Right of Way Acquisition. The conceptual cost estimates for improvements on each failing intersection within the study limits can be found in Appendix F.

Table 8 provides the summary of costs involved in implementing the required mitigation for all the appropriate intersections under Comp Plan and GMU High Plan Scenarios. It also presents a comparison of the total cost involved to implement mitigation at all the required intersections within the key study intersections. Based on this information, it is projected that the GMU High plan improvements may cost up to <u>$**2.2 Million**</u> more when compared to the Comp Plan improvements. Considering the number of study intersections and the cost involved, there is no significant difference between the two scenarios.

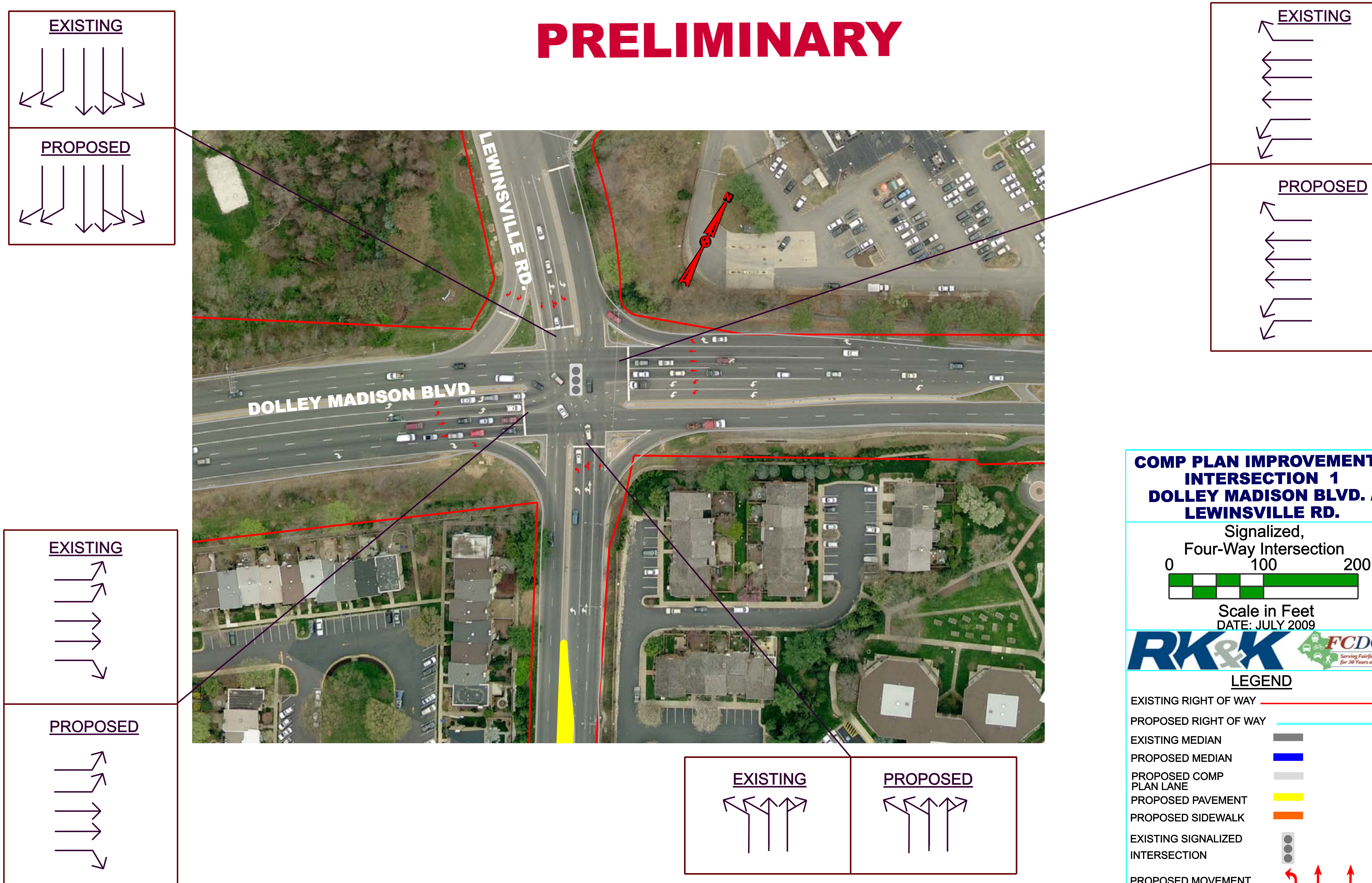
Table 8: Cost Estimation for Proposed Mitigation			
	Cost For Mitigation		Cost Difference Comp Plan Vs. GMU High Plan
Intersection	Comp Plan	GMU High Plan	
Int 1: Dolley Madison Boulevard at Lewinsville Road/Great Falls Street	$110,000.00	$60,000.00	50,000.00
Int 2: Route 123 (Dolley Madison Boulevard) at Old Dominion Drive	$763,000.00	$410,000.00	353,000.00
Int 3: Lewinsville Road at Route 7 (Leesburg Pike)	$0.00	$110,000.00	110,000.00
Int 4: Lewinsville Road at Spring Hill Road	$37,000.00	$581,000.00	544,000.00
Int 7: Great Falls Street & Chain Bridge Road	$654,000.00	$643,000.00	11,000.00
Int 9: Magarity Road at Route 7	$1,462,000.00	$1,245,000.00	217,000.00
Int 10: Idylwood Road at Route 7	$2,765,000.00	$2,894,000.00	129,000.00
Int 11: Idylwood Road at Gallows Road	$1,126,000.00	$1,003,000.00	123,000.00
Int 12: Idylwood Road at Gallows Road	$675,000.00	$925,000.00	250,000.00
Int 14: Gallows Road at Cedar Lane/Oak Street	$10,000.00	$10,000.00	0.00
Int 15: Old Courthouse Road and Chain Bridge Road	$1,369,000.00	$1,973,000.00	604,000.00
Int 16: Maple Avenue a Beulah Road (Vienna)	$568,000.00	$1,913,000.00	1,345,000.00
Int 17: Maple Avenue a Lawyers Road (Vienna)	$1,741,000.00	$1,738,000.00	3,000.00
Int 18: Old Courthouse Road and Westbriar Drive (Vienna)	$501,000.00	$437,000.00	64,000.00
Total Cost of Mitigation	**$11,781,000.00**	**$13,942,000.00**	**2,161,000.00**

Note: The Green text in the table indicates that the GMU High Plan Cost is higher than the Comp Plan improvements and the Red text indicates that the Comp Plan Cost is higher than the GMU High Plan improvements.

The recommended geometric improvements are presented on intersection aerial images (refer following figures) for both Comp Plan and GMU High Plan Scenarios. The improvements are laid out in such a way that the differences in geometry between the existing conditions and each of the future scenarios are clearly noticeable. The following text provides a reference for each of the aerial images presenting the details of proposed physical improvements under both Comp Plan and GMU Plan scenarios.

Tysons Corner Neighborhood Traffic

PRELIMINARY



COMP PLAN IMPROVEMENTS INTERSECTION 1 DOLLEY MADISON BLVD. / LEWINSVILLE RD.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

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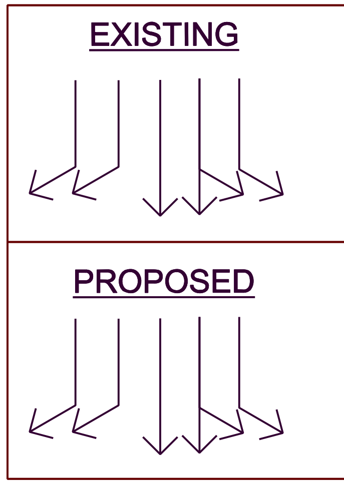
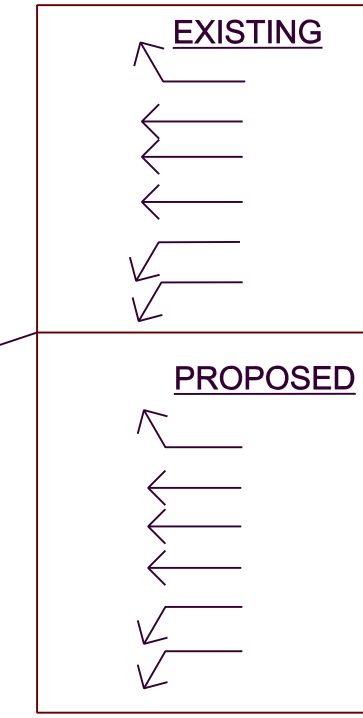
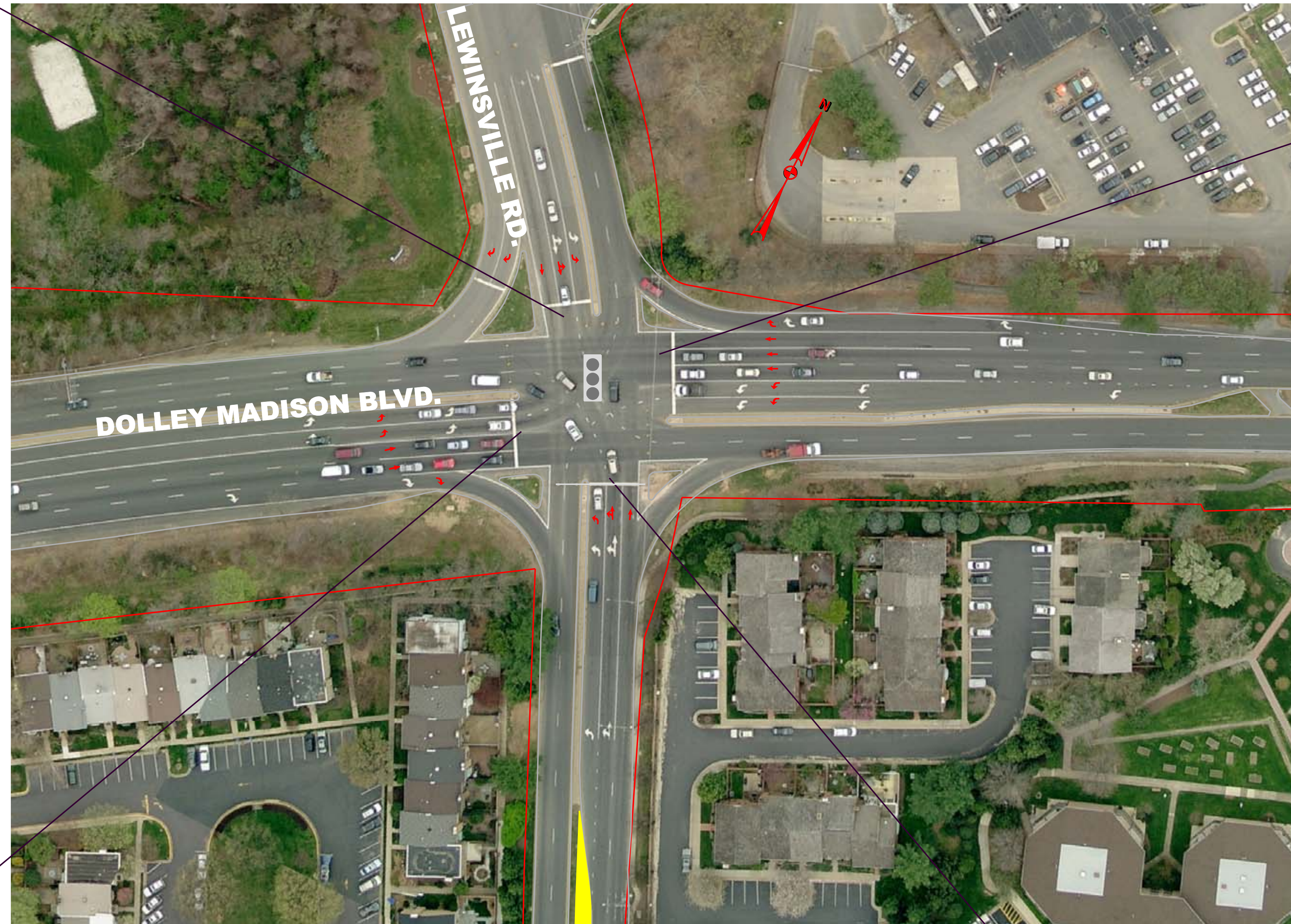
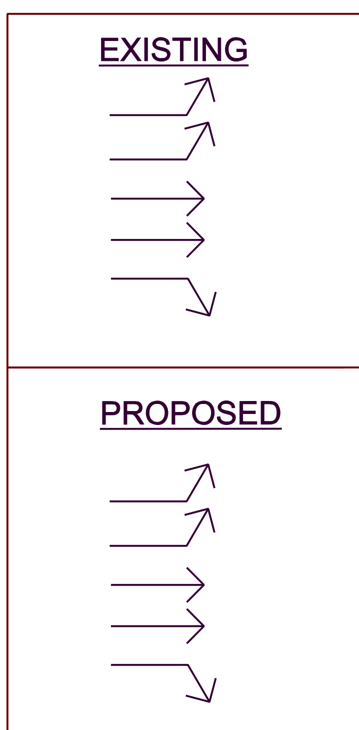
Tysons Corner Neighborhood Traffic

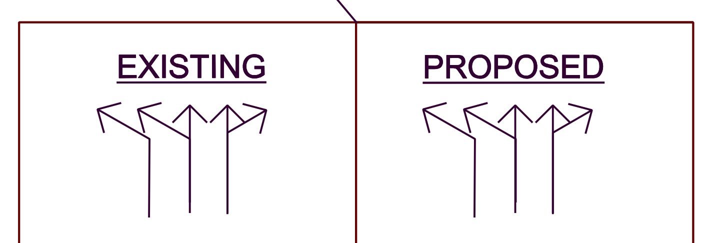
PRELIMINARY











GMU PLAN IMPROVEMENTS
INTERSECTION 1
DOLLEY MADISON BLVD. / LEWINSVILLE RD.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet
DATE: JULY 2009

RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

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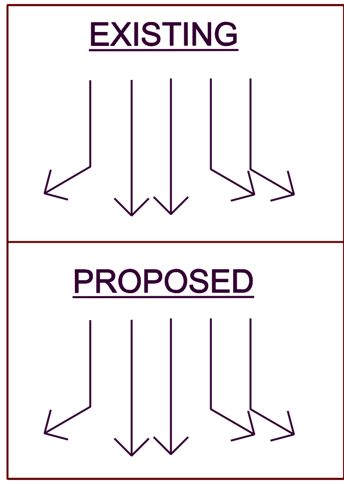
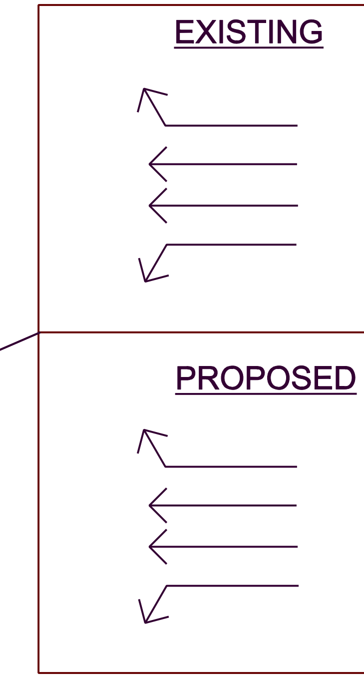
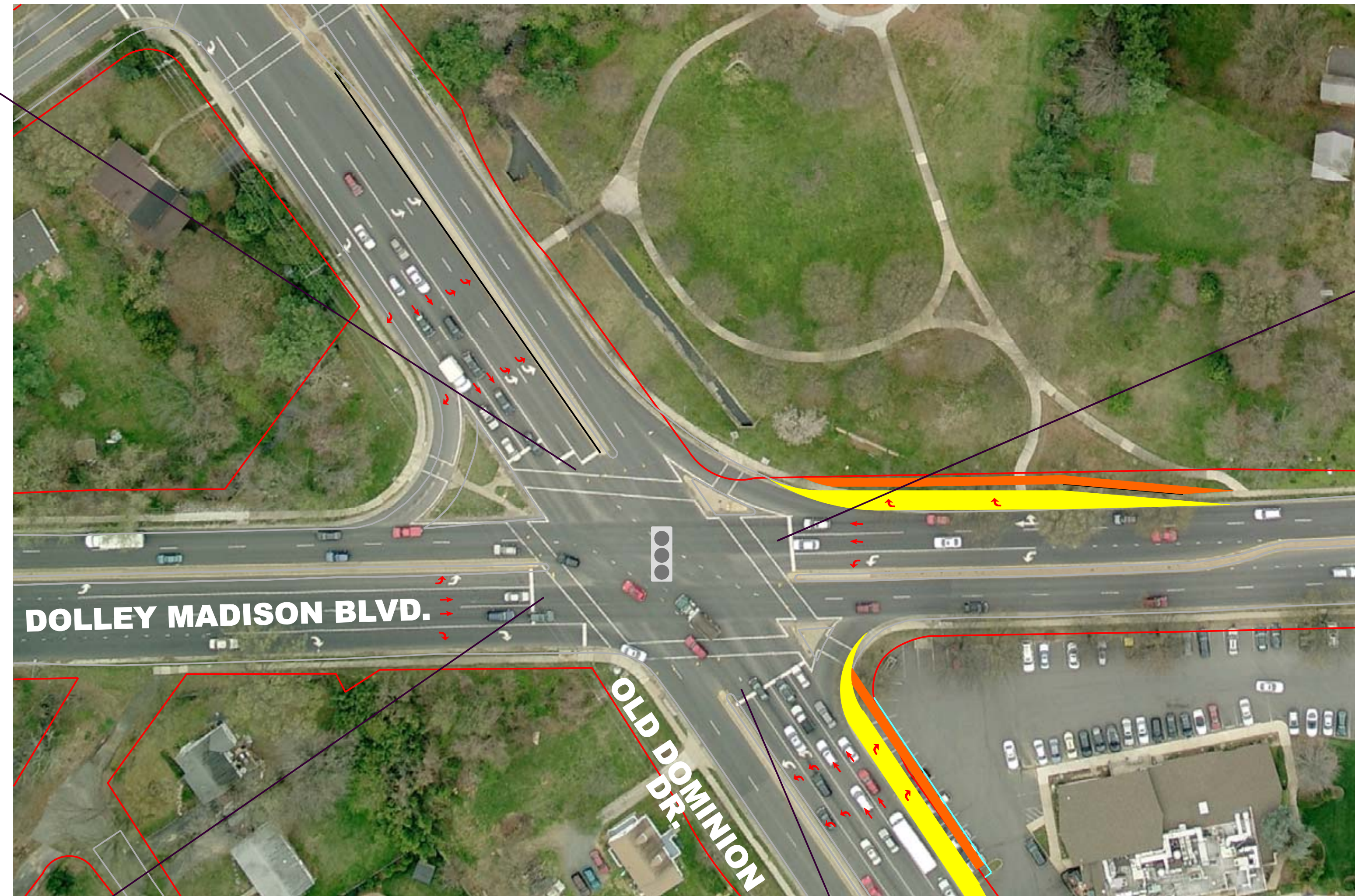
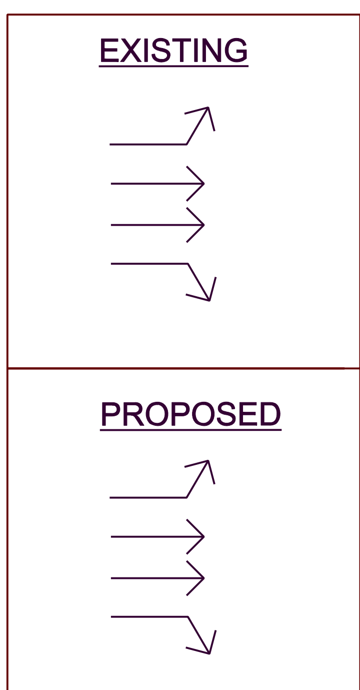
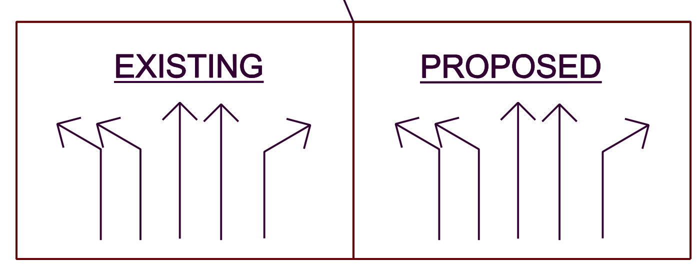
PRELIMINARY











COMP PLAN IMPROVEMENTS INTERSECTION 2 DOLLEY MADISON BLVD. / OLD DOMINION DR.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

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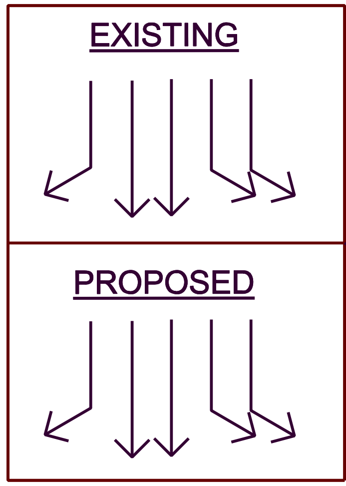
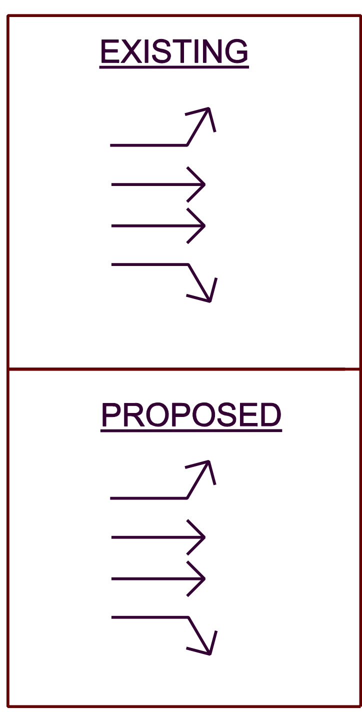
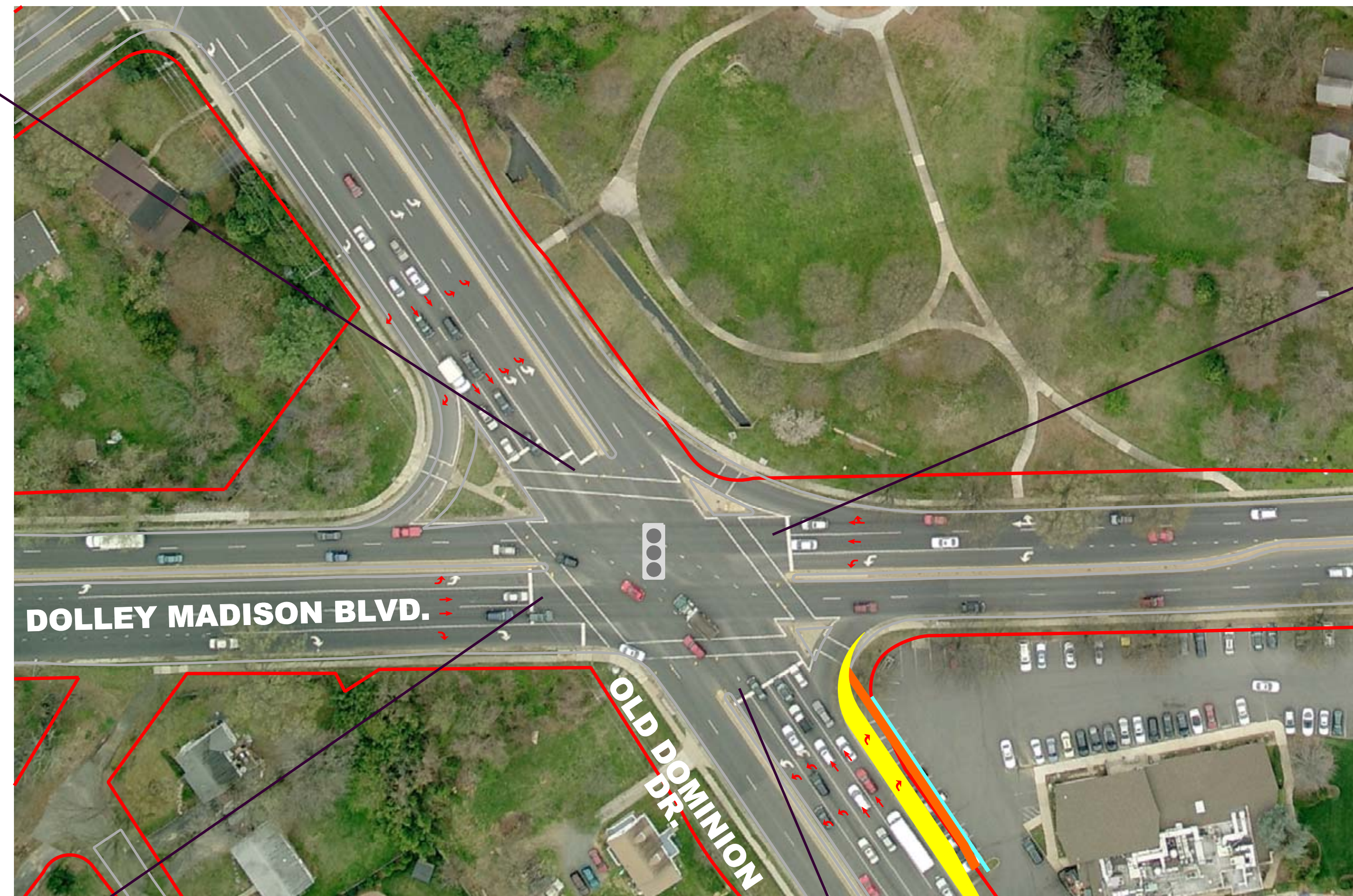
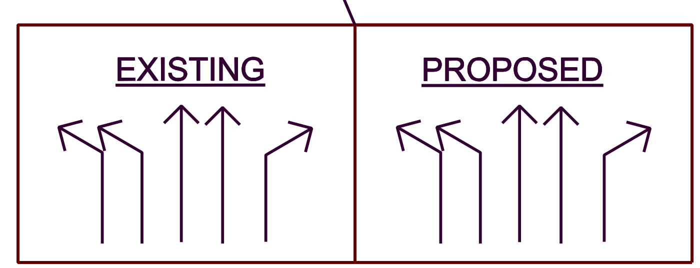
Tysons Corner Neighborhood Traffic

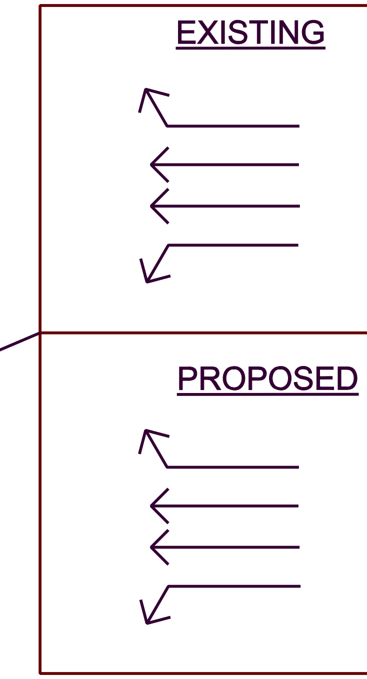
PRELIMINARY











GMU PLAN IMPROVEMENTS
INTERSECTION 2
DOLLEY MADISON BLVD. /
OLD DOMINION DR.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

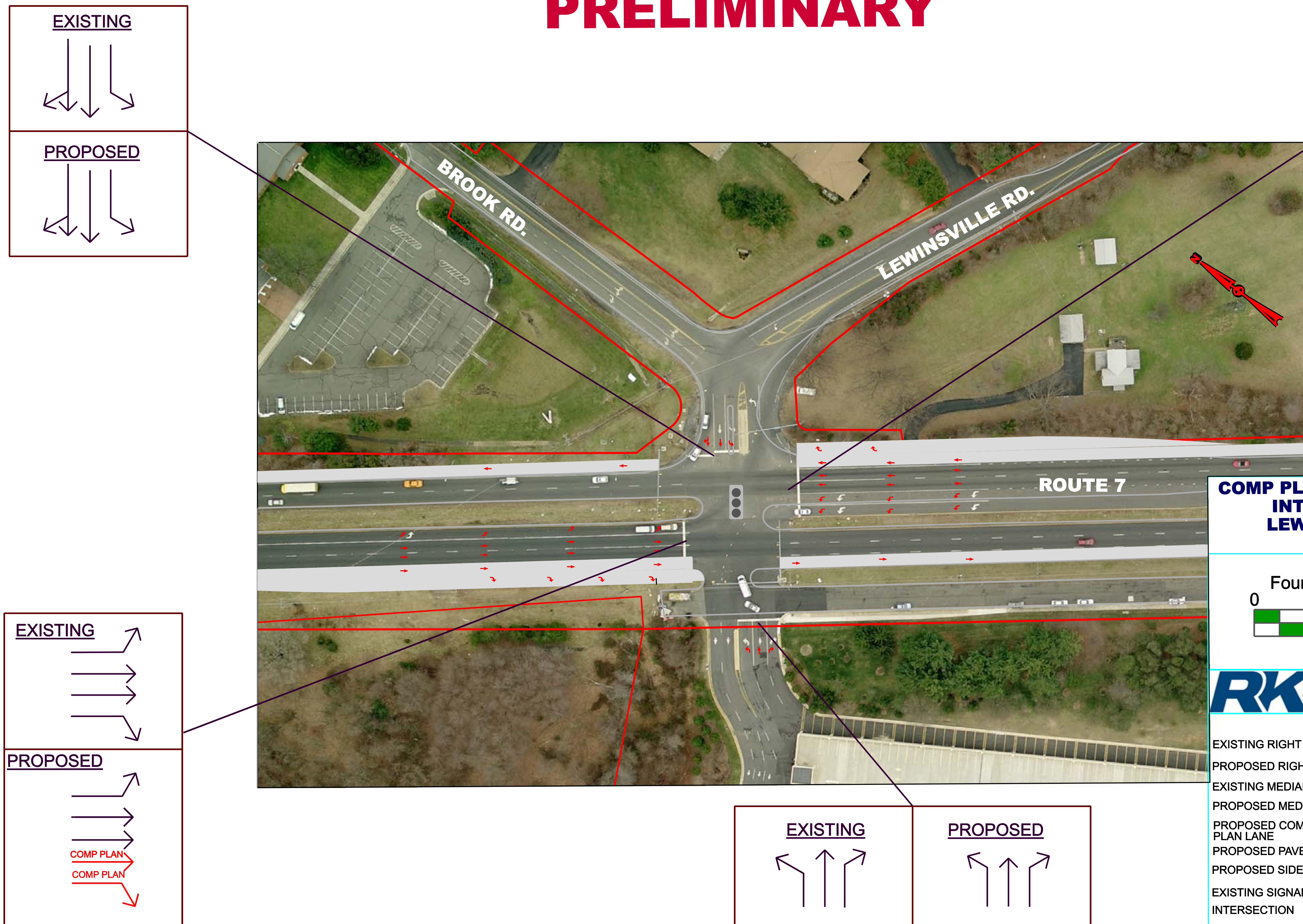
LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING MEDIAN
- PROPOSED MEDIAN
- PROPOSED COMP PLAN LANE
- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED MOVEMENT

807-077-03_Intrsec#02_GMU.dgn 7/29/2009 7:51:45 AM

Tysons Corner Neighborhood Traffic

PRELIMINARY



COMP PLAN IMPROVEMENTS INTERSECTION 3 LEWINSVILLE RD. / ROUTE 7

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

PROPOSED SIDEWALK

EXISTING SIGNALIZED INTERSECTION

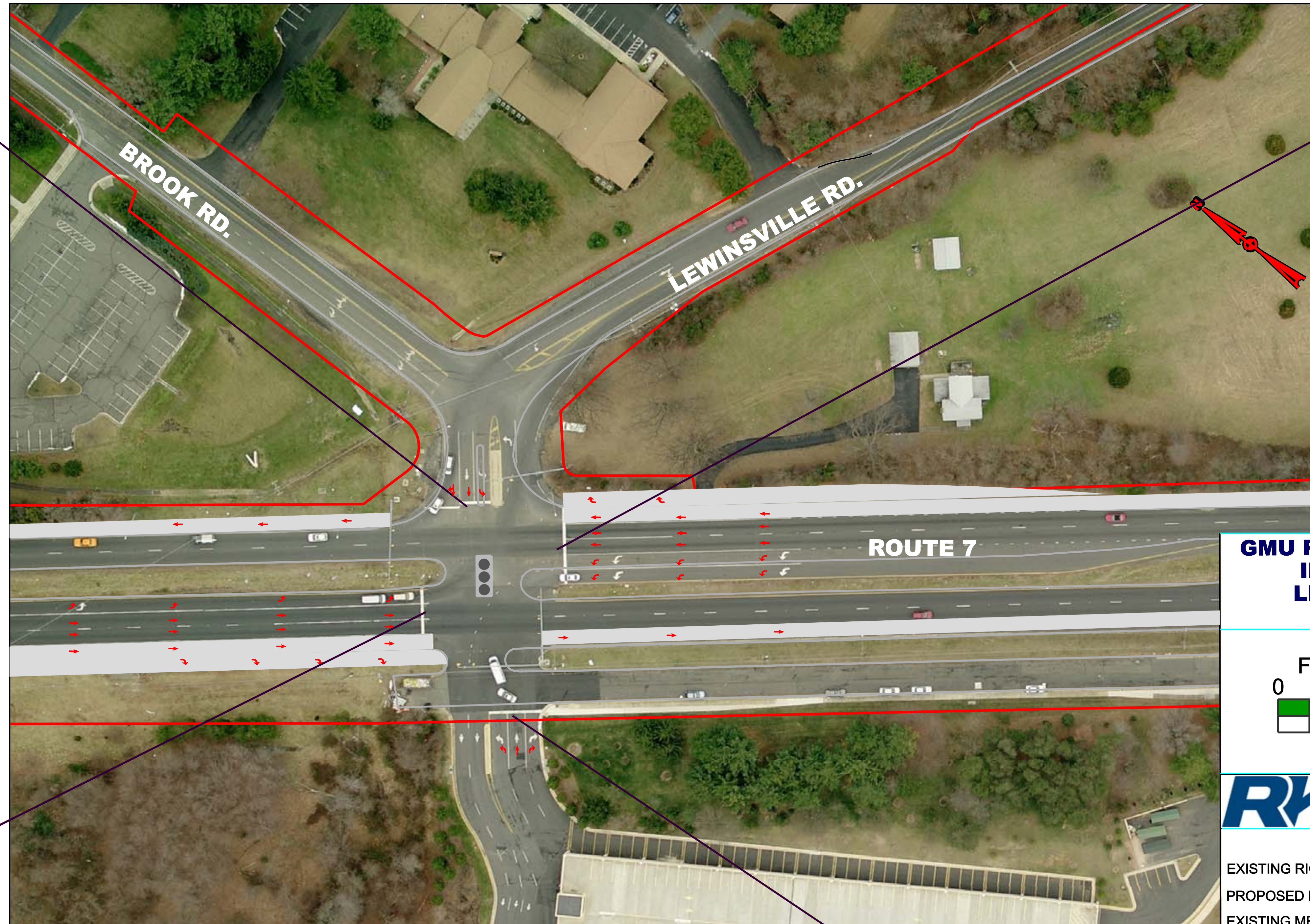
PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic

PRELIMINARY

EXISTING

PROPOSED



EXISTING

PROPOSED

COMP PLAN

COMP PLAN

EXISTING

PROPOSED

COMP PLAN

COMP PLAN

EXISTING

PROPOSED

GMU PLAN IMPROVEMENTS INTERSECTION 3 LEWINSVILLE RD. / ROUTE 7

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

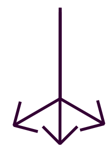
PROPOSED SIDEWALK

EXISTING SIGNALIZED INTERSECTION

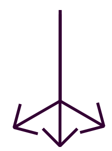
PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic

EXISTING



PROPOSED



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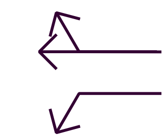
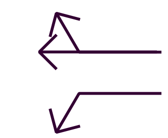


PROPOSED



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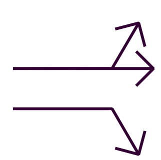
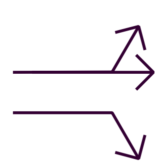


PROPOSED



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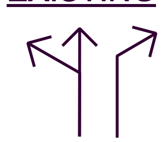


PROPOSED

COMP PLAN IMPROVEMENTS
INTERSECTION 4
LEWINSVILLE RD. / SPRING HILL RD.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic

GMU PLAN IMPROVEMENTS INTERSECTION 4 LEWINSVILLE RD. / SPRING HILL RD.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT

EXISTING

PROPOSED

EXISTING

PROPOSED

EXISTING

PROPOSED

EXISTING

PROPOSED

NEW

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

PROPOSED SIDEWALK

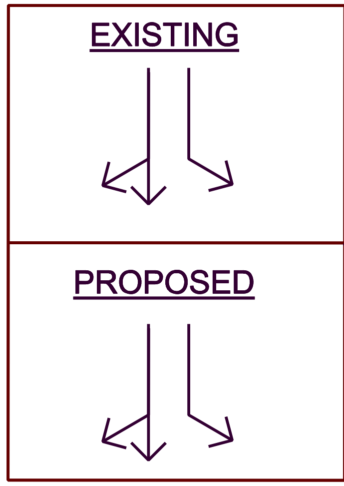
EXISTING SIGNALIZED INTERSECTION

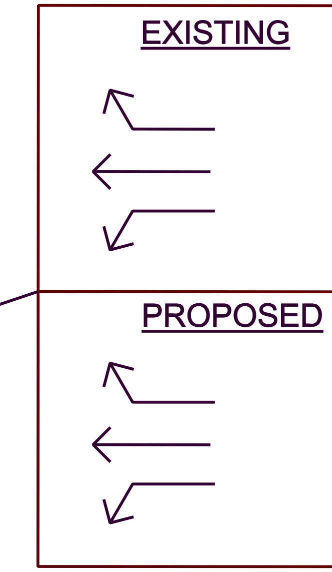
PROPOSED MOVEMENT

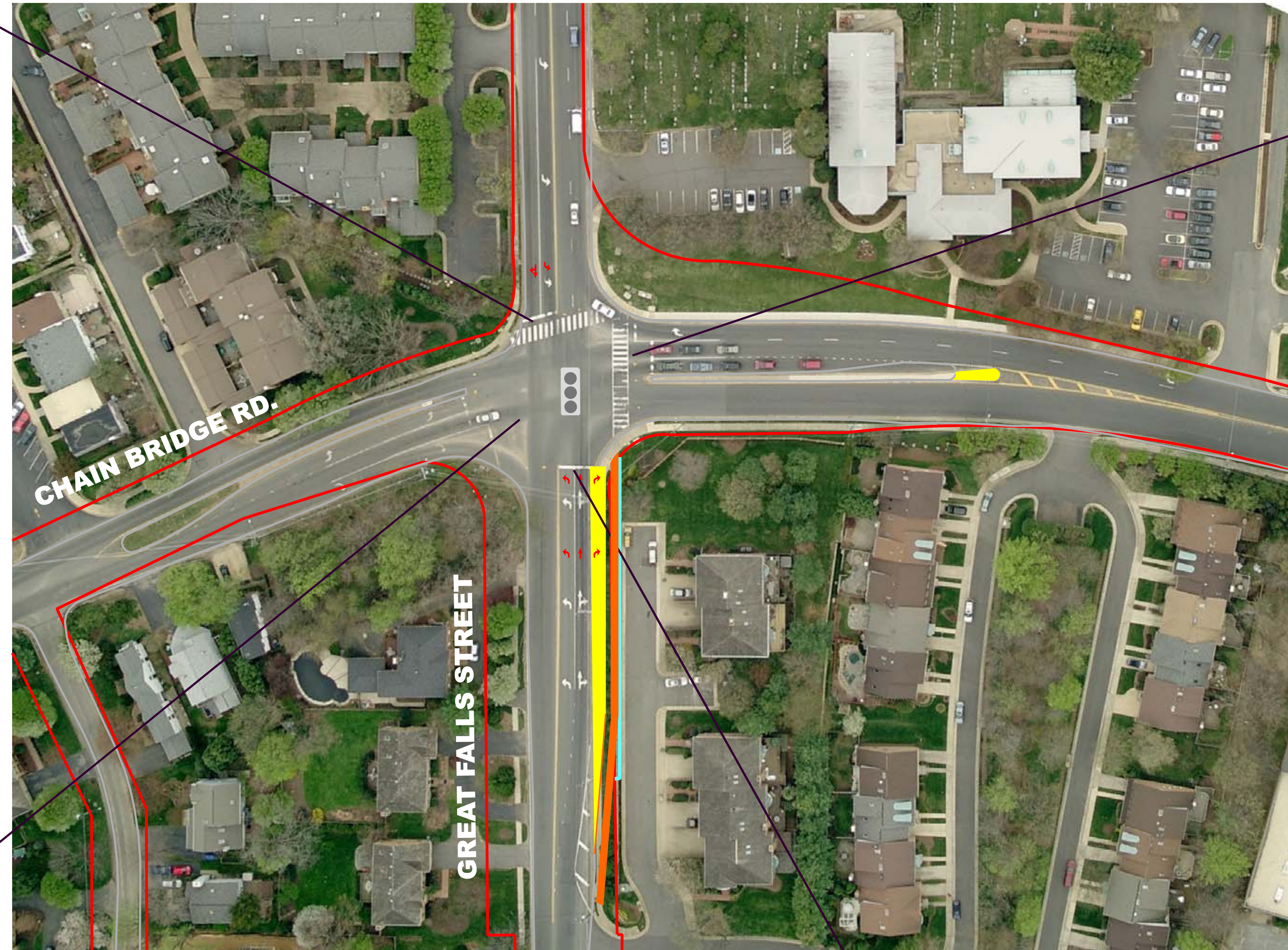
807-077-03_Intrsec#04_GMU.dgn 7/24/2009 3:57:42 PM

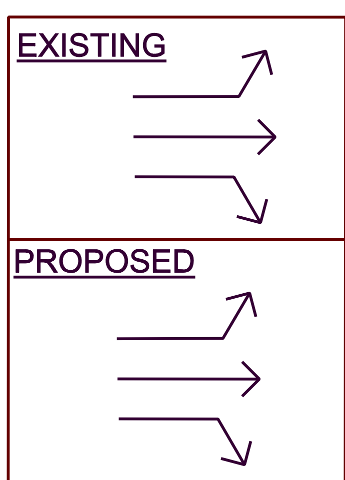
Tysons Corner Neighborhood Traffic

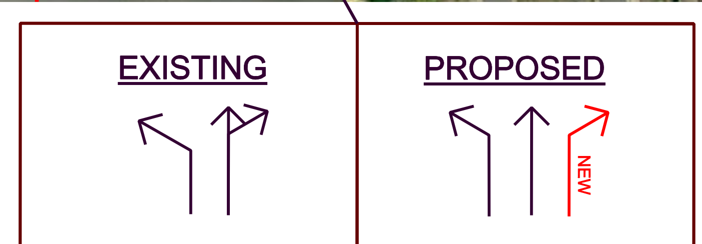
PRELIMINARY











COMP PLAN IMPROVEMENTS INTERSECTION 7 / GREAT FALLS STREET / CHAIN BRIDGE RD.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K
FCDOT Serving Fairfax County for 30 Years and More

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING MEDIAN
- PROPOSED MEDIAN
- PROPOSED COMP PLAN LANE
- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED MOVEMENT

807-077-03_Intrsec#07.dgn 7/16/2009 9:55:46 AM

Tysons Corner Neighborhood Traffic

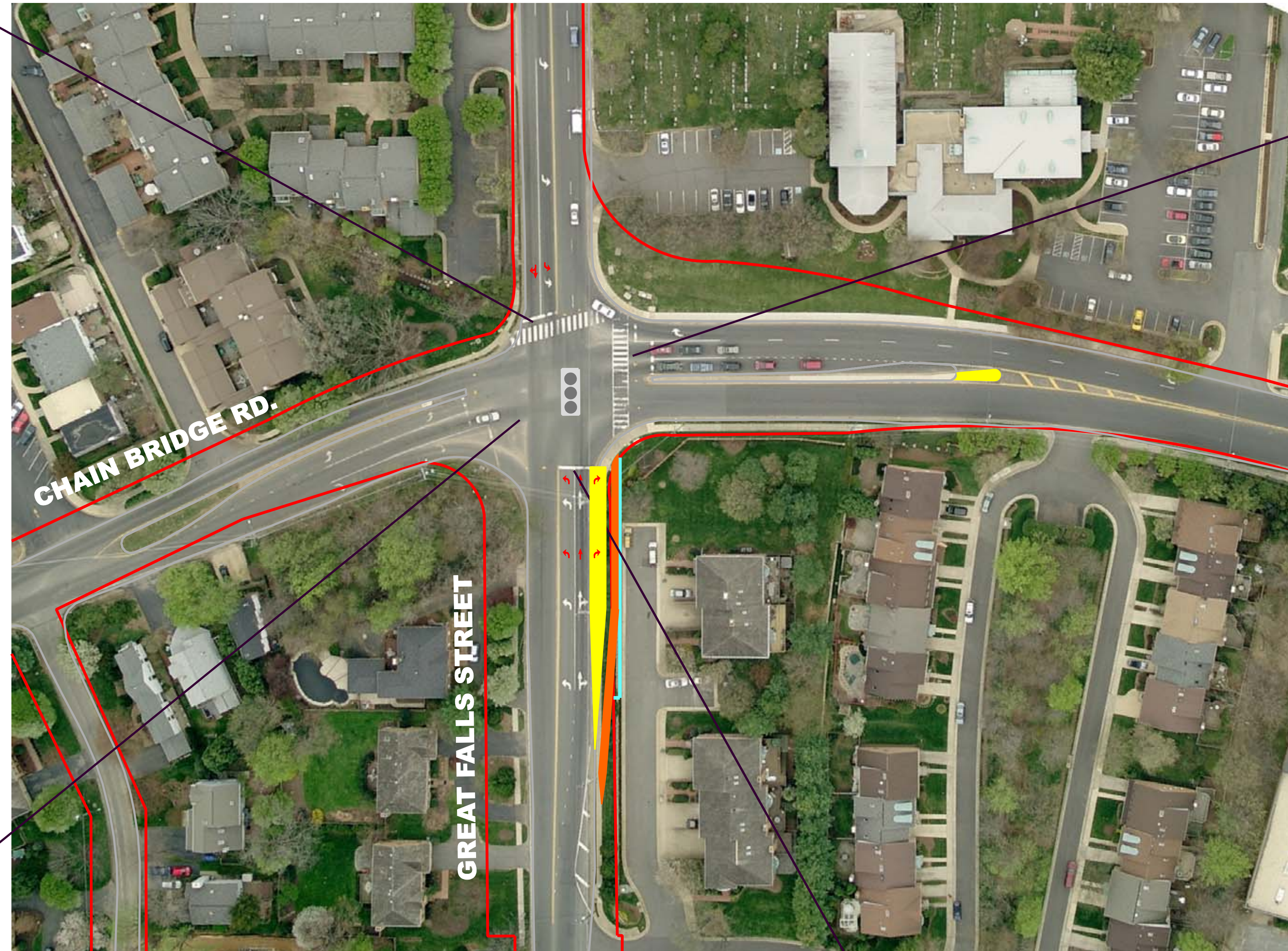
PRELIMINARY

EXISTING

PROPOSED

EXISTING

PROPOSED



EXISTING

PROPOSED

EXISTING

PROPOSED

NEW

GMU PLAN IMPROVEMENTS INTERSECTION 7 / GREAT FALLS STREET / CHAIN BRIDGE RD.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

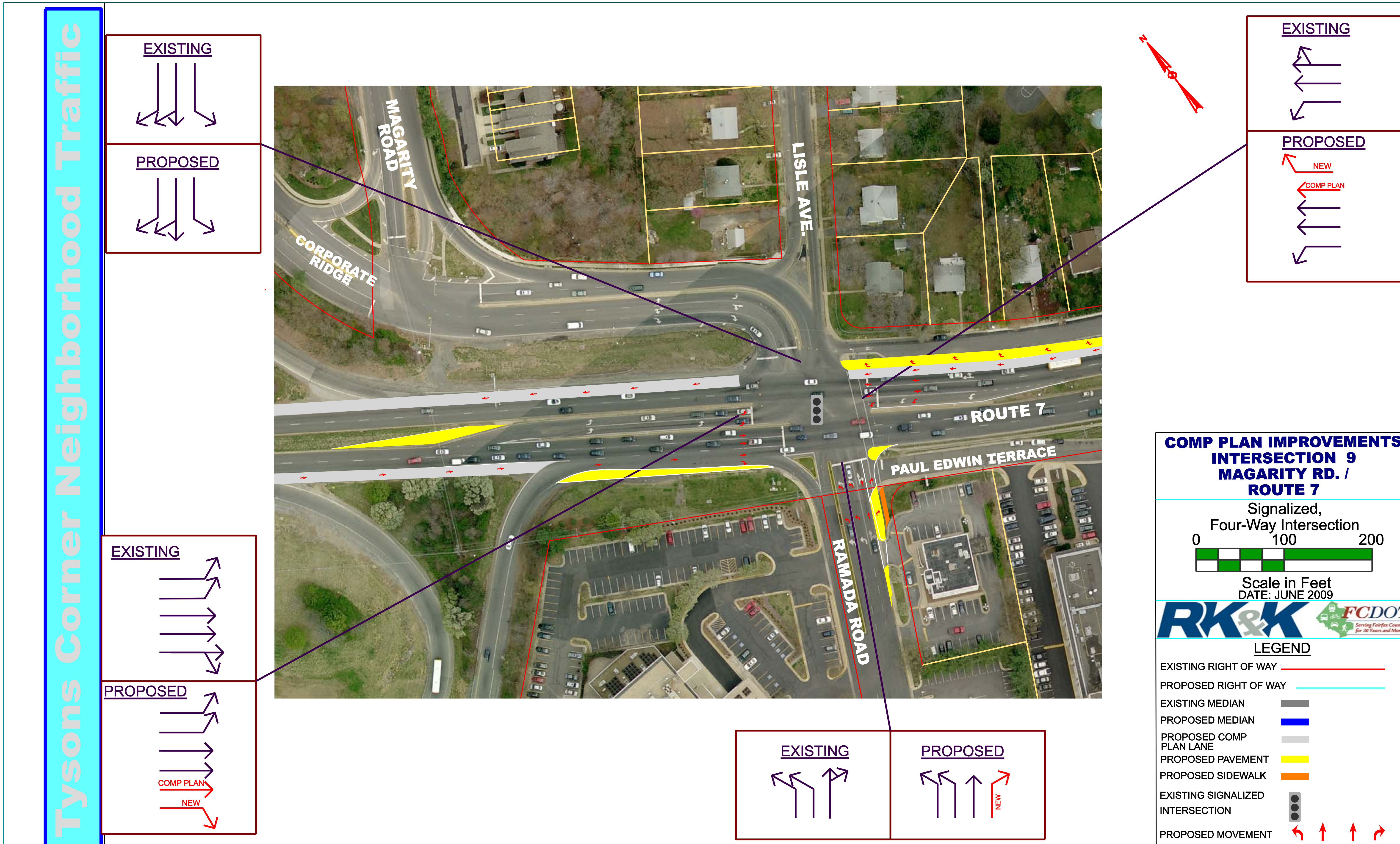
PROPOSED PAVEMENT

PROPOSED SIDEWALK

EXISTING SIGNALIZED INTERSECTION

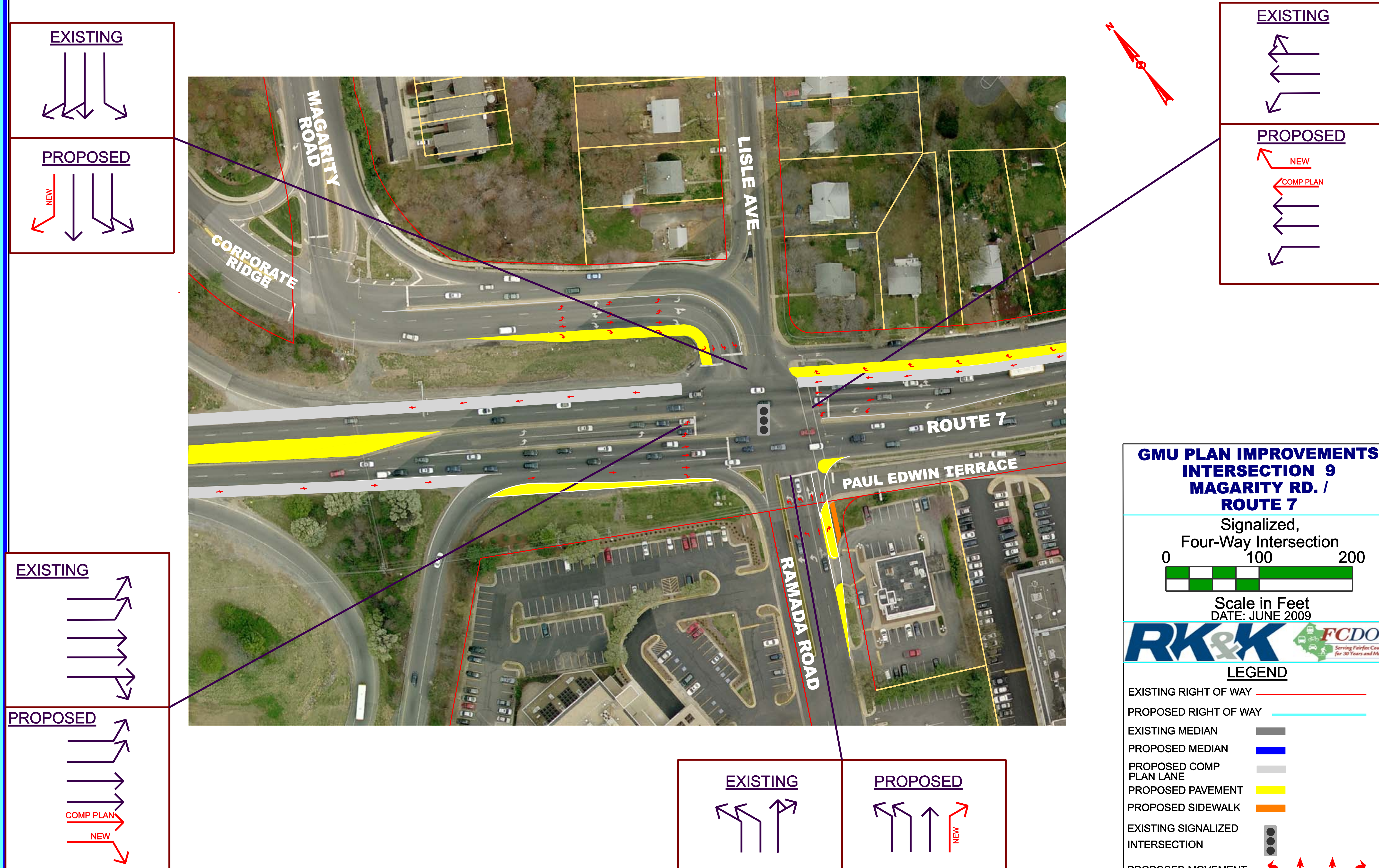
PROPOSED MOVEMENT

807-077-03_Intrsec#07_GMU.dgn 7/16/2009 10:45:06 AM



807-077-03_Intrsec#09.dgn 7/9/2009 10:55:30 AM

Tysons Corner Neighborhood Traffic



GMU PLAN IMPROVEMENTS
INTERSECTION 9
MAGARITY RD. / ROUTE 7

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JUNE 2009

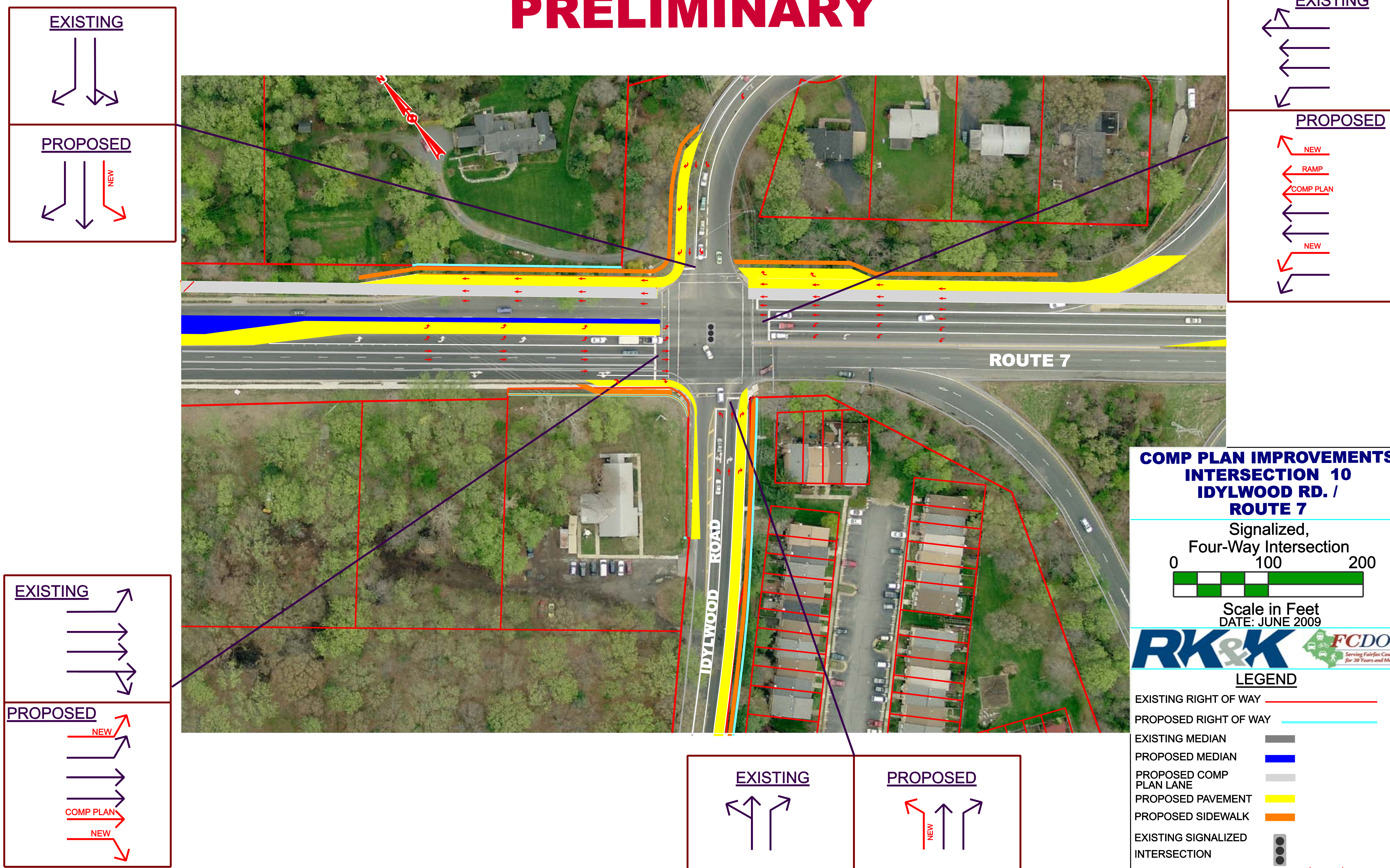
RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic

PRELIMINARY



COMP PLAN IMPROVEMENTS
INTERSECTION 10
IDYLWOOD RD. / ROUTE 7

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

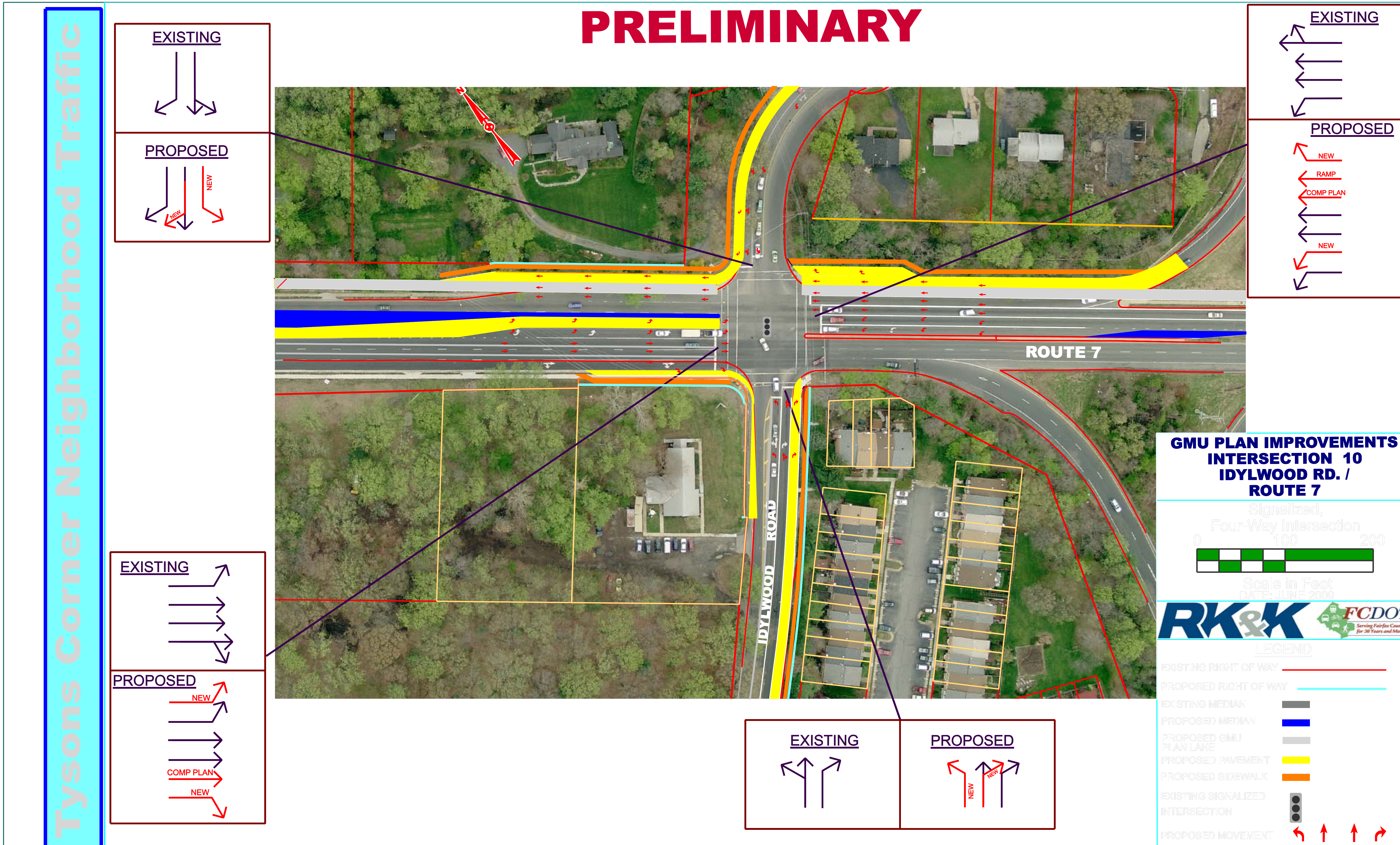
DATE: JUNE 2009

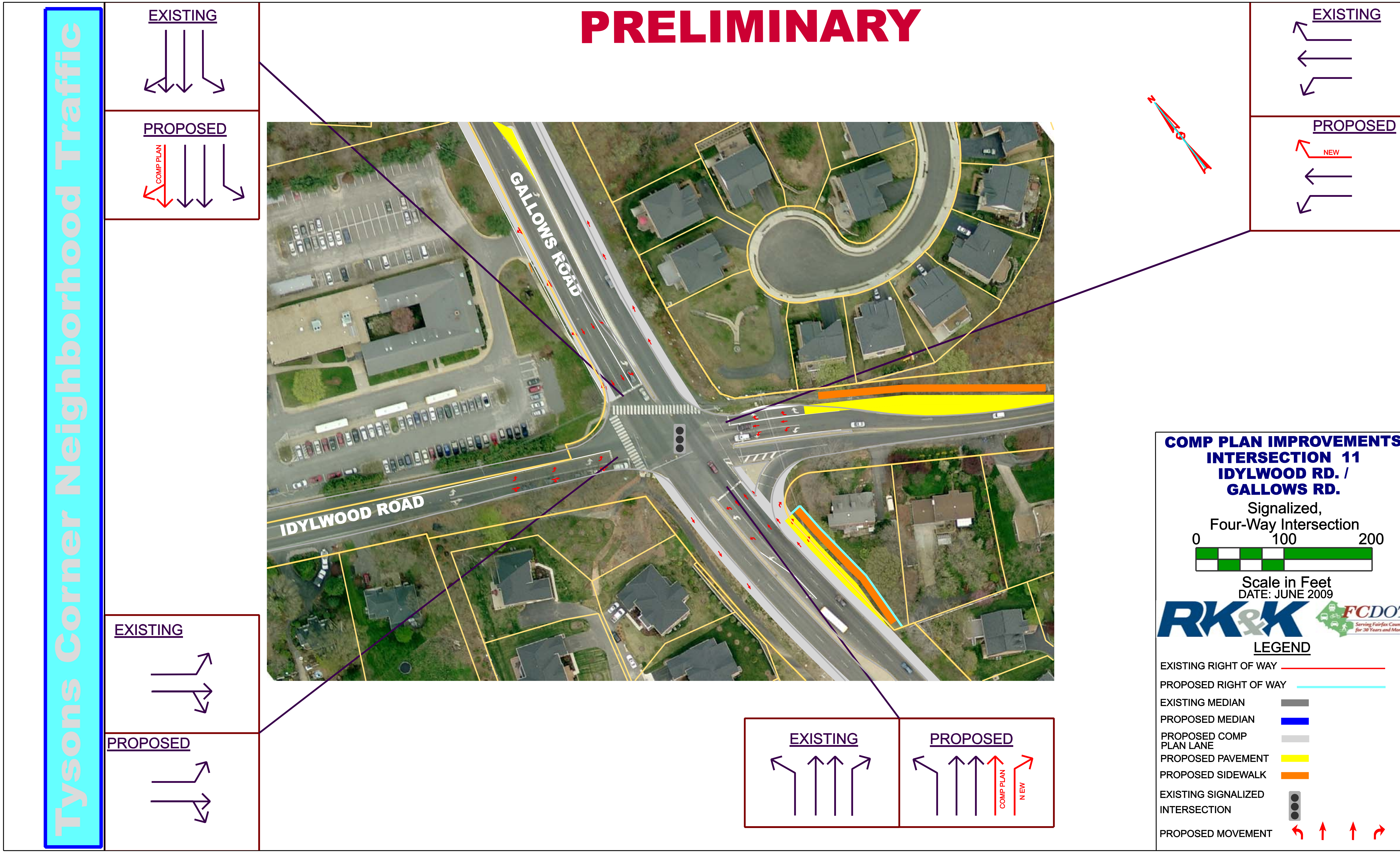
RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING MEDIAN
- PROPOSED MEDIAN
- PROPOSED COMP PLAN LANE
- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED MOVEMENT

807-077-03_Intrsec#10.dgn 6/29/2009 3:29:42 PM


PRELIMINARY
Tysons Corner Neighborhood Traffic
EXISTING
PROPOSED
NEW
RAMP
COMP PLAN
ROUTE 7
IDYLWOOD ROAD
GMU PLAN IMPROVEMENTS
INTERSECTION 10
IDYLWOOD RD. /
ROUTE 7
Signalized,
Four-Way Intersection
0 100 200
Scale in Feet
DATE: JUNE 2009
RK&K
FCDOT
Serving Fairfax County for 30 Years and More
LEGEND
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED GMU PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT



807-077-03_Intrsec#11.dgn 7/6/2009 3:19:44 PM

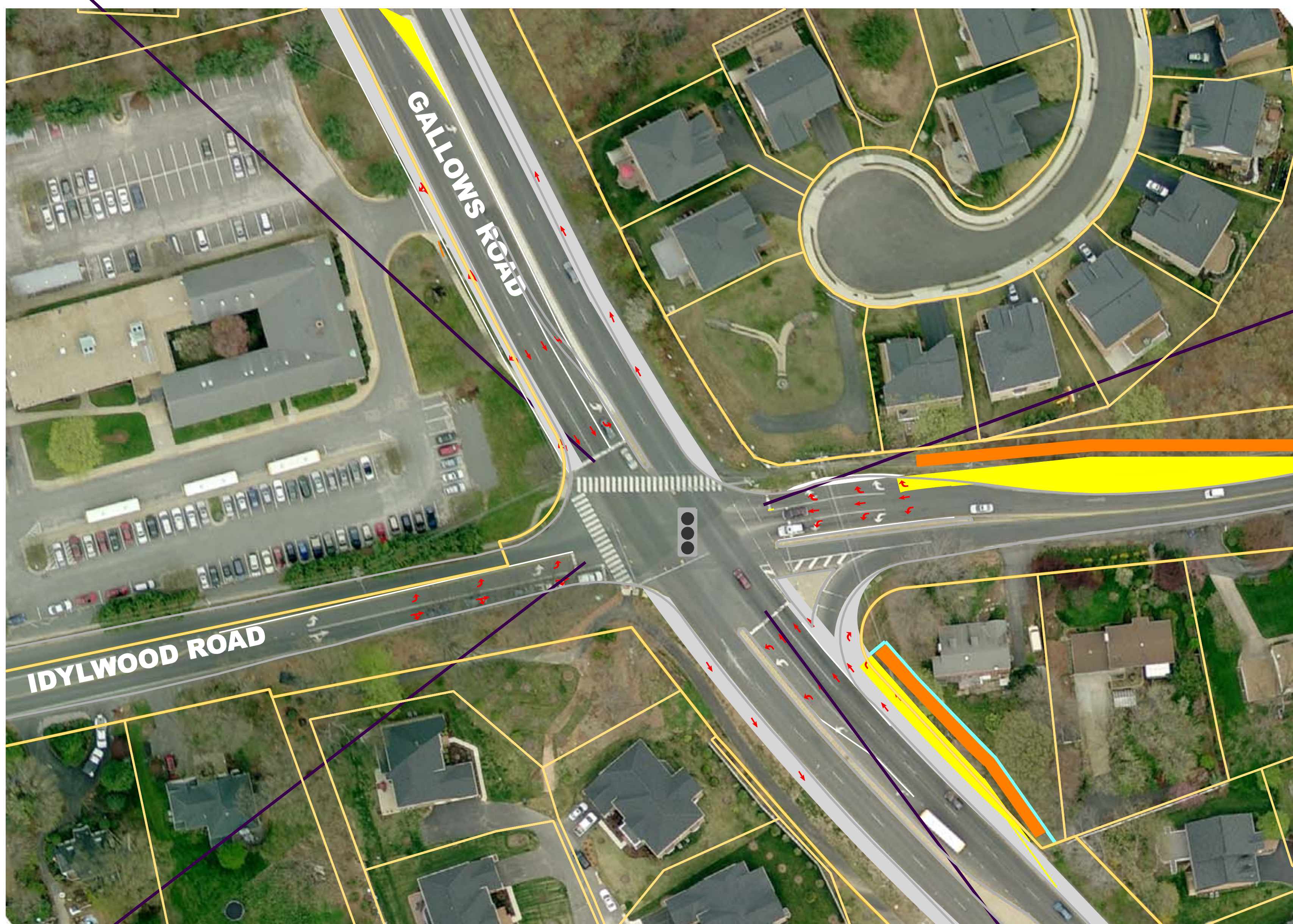
Tysons Corner Neighborhood Traffic

PRELIMINARY

EXISTING

PROPOSED

COMP PLAN



EXISTING

PROPOSED

NEW

EXISTING

PROPOSED

EXISTING

PROPOSED

COMP PLAN

NEW

GMU PLAN IMPROVEMENTS
INTERSECTION 11
IDYLWOOD RD. / GALLOWS RD.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JUNE 2009

RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

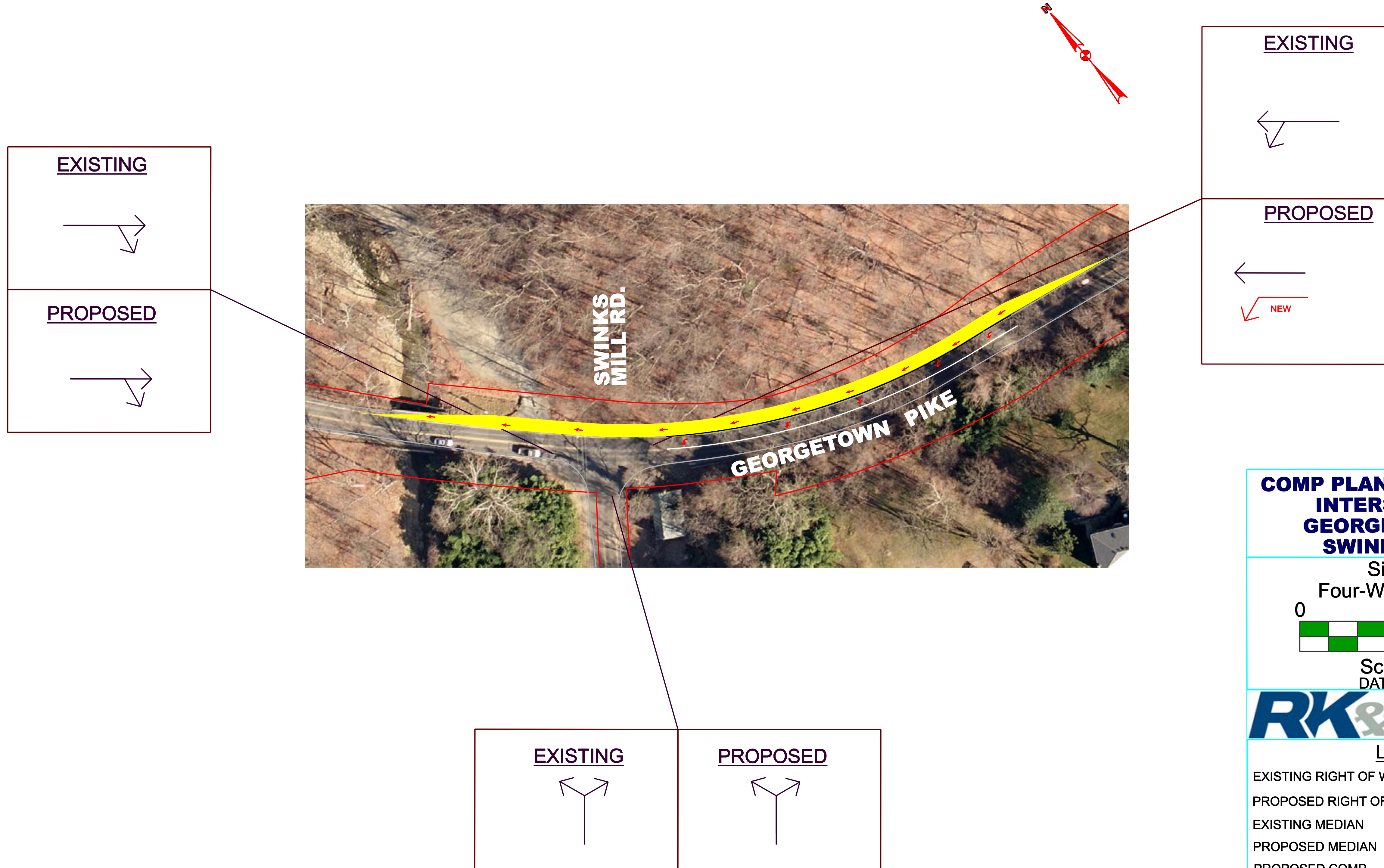
PROPOSED SIDEWALK

EXISTING SIGNALIZED INTERSECTION

PROPOSED MOVEMENT

807-077-03_Intrsec#11_GMU.dgn 7/6/2009 5:17:04 PM

Tysons Corner Neighborhood Traffic



COMP PLAN IMPROVEMENTS
INTERSECTION 12
GEORGETOWN PIKE / SWINKS MILL RD.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

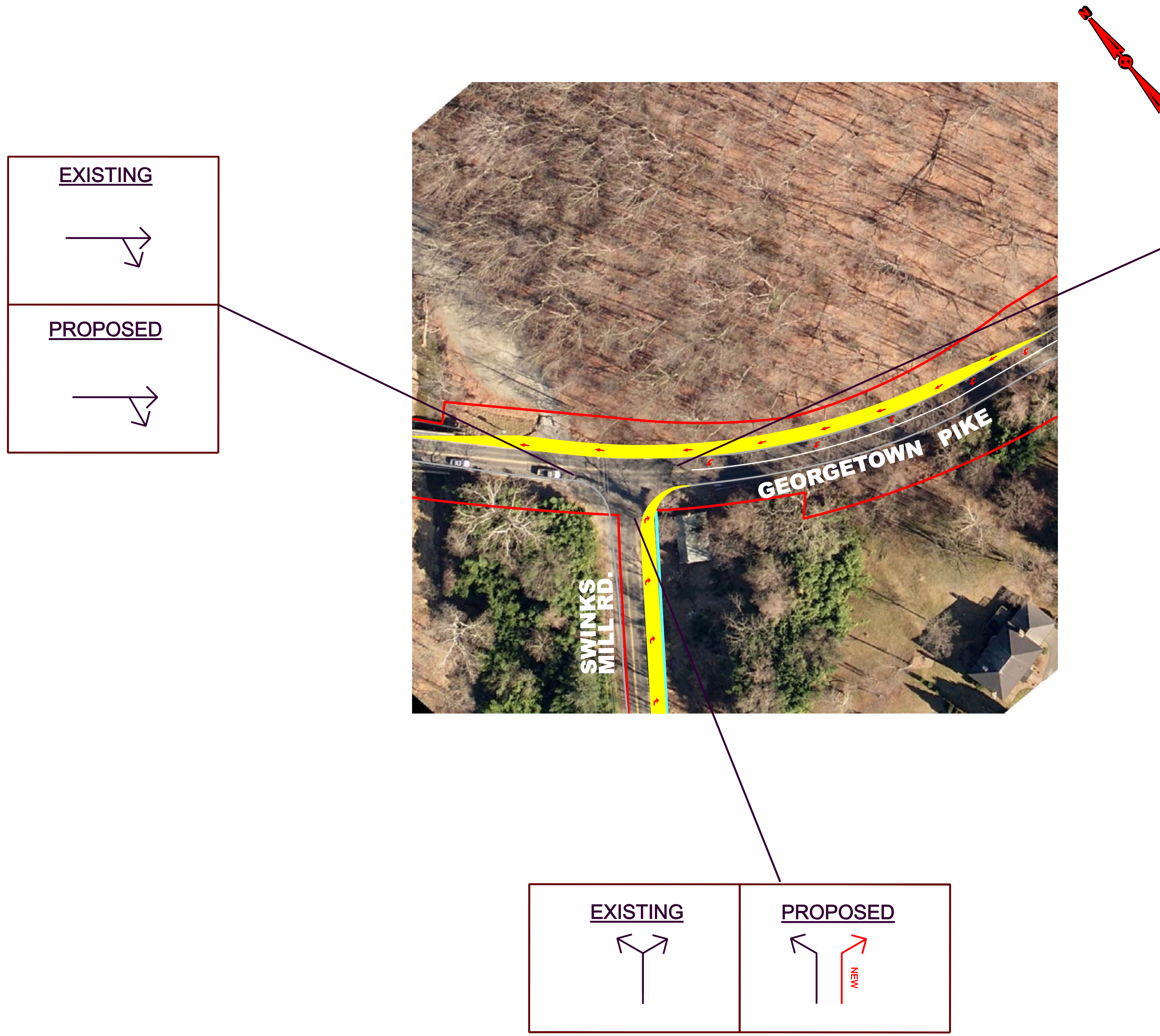
DATE: JULY 2009

RK&K FCDOT

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING MEDIAN
- PROPOSED MEDIAN
- PROPOSED COMP PLAN LANE
- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic



GMU PLAN IMPROVEMENTS
INTERSECTION 12
GEORGETOWN PIKE / SWINKS MILL RD.

Signalized,
Four-Way Intersection

0 100 200
Scale in Feet
DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

807-077-03_Intrsec#12_GMU.dgn 7/16/2009 4:14:26 PM

Tysons Corner Neighborhood Traffic

PRELIMINARY

EXISTING

PROPOSED

COMP PLAN

EXISTING

PROPOSED

EXISTING

PROPOSED

EXISTING

PROPOSED

COMP PLAN

EXISTING

PROPOSED

COMP PLAN

COMP PLAN IMPROVEMENTS
INTERSECTION 14
CEDAR LANE / GALLOWS RD.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JUNE 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

PROPOSED SIDEWALK

EXISTING SIGNALIZED INTERSECTION

PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic

PRELIMINARY

EXISTING

PROPOSED

COMP PLAN

EXISTING

PROPOSED

EXISTING

PROPOSED

COMP PLAN

EXISTING

PROPOSED

GMU PLAN IMPROVEMENTS
INTERSECTION 14
CEDAR LANE /
GALLOWS RD.

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JUNE 2009

RK&K

FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

PROPOSED SIDEWALK

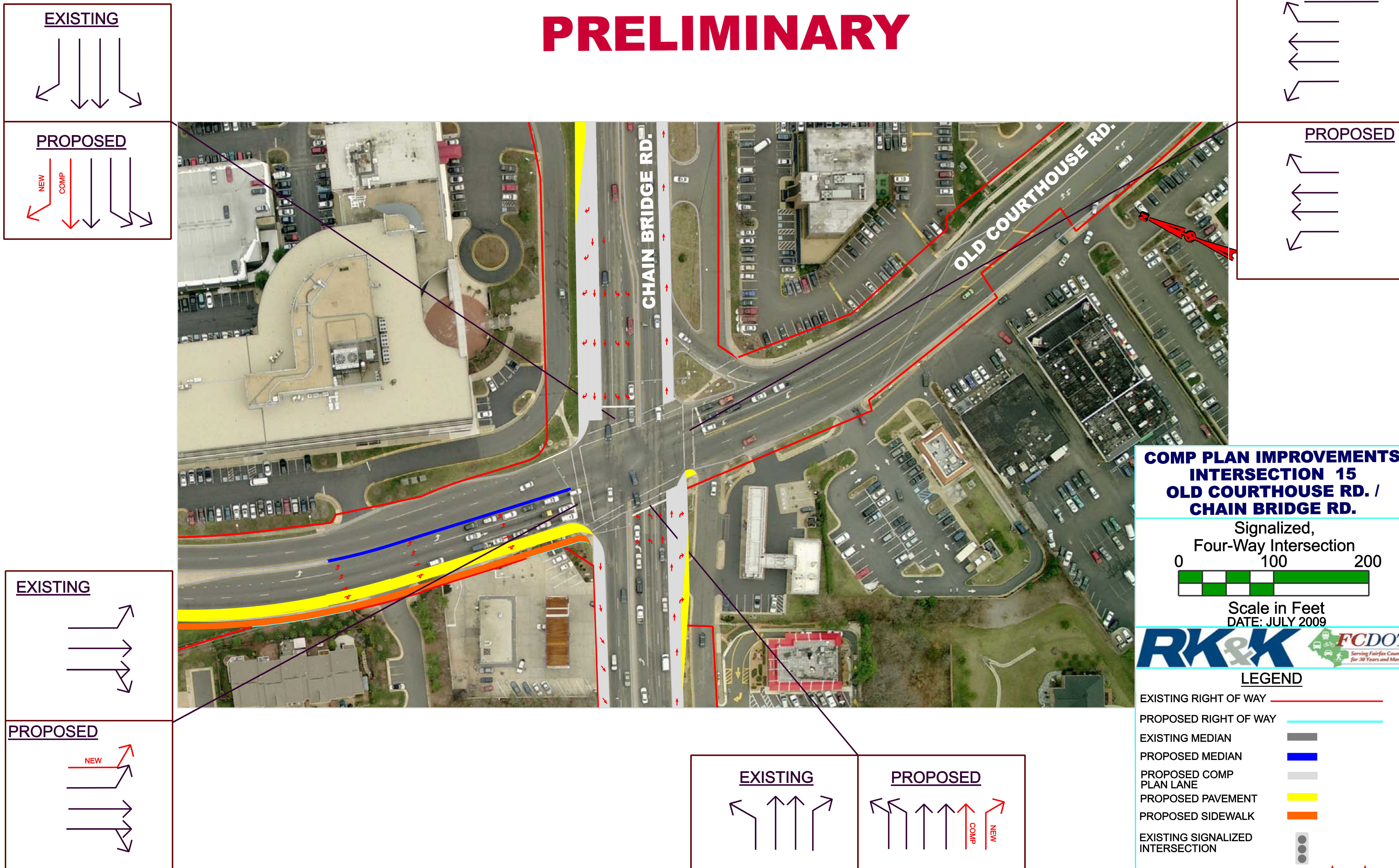
EXISTING SIGNALIZED INTERSECTION

PROPOSED MOVEMENT

807-077-03_Intrsec#14_GMU.dgn 7/8/2009 3:08:48 PM

Tysons Corner Neighborhood Traffic

PRELIMINARY



COMP PLAN IMPROVEMENTS
INTERSECTION 15
OLD COURTHOUSE RD. / CHAIN BRIDGE RD.

Signalized,
Four-Way Intersection

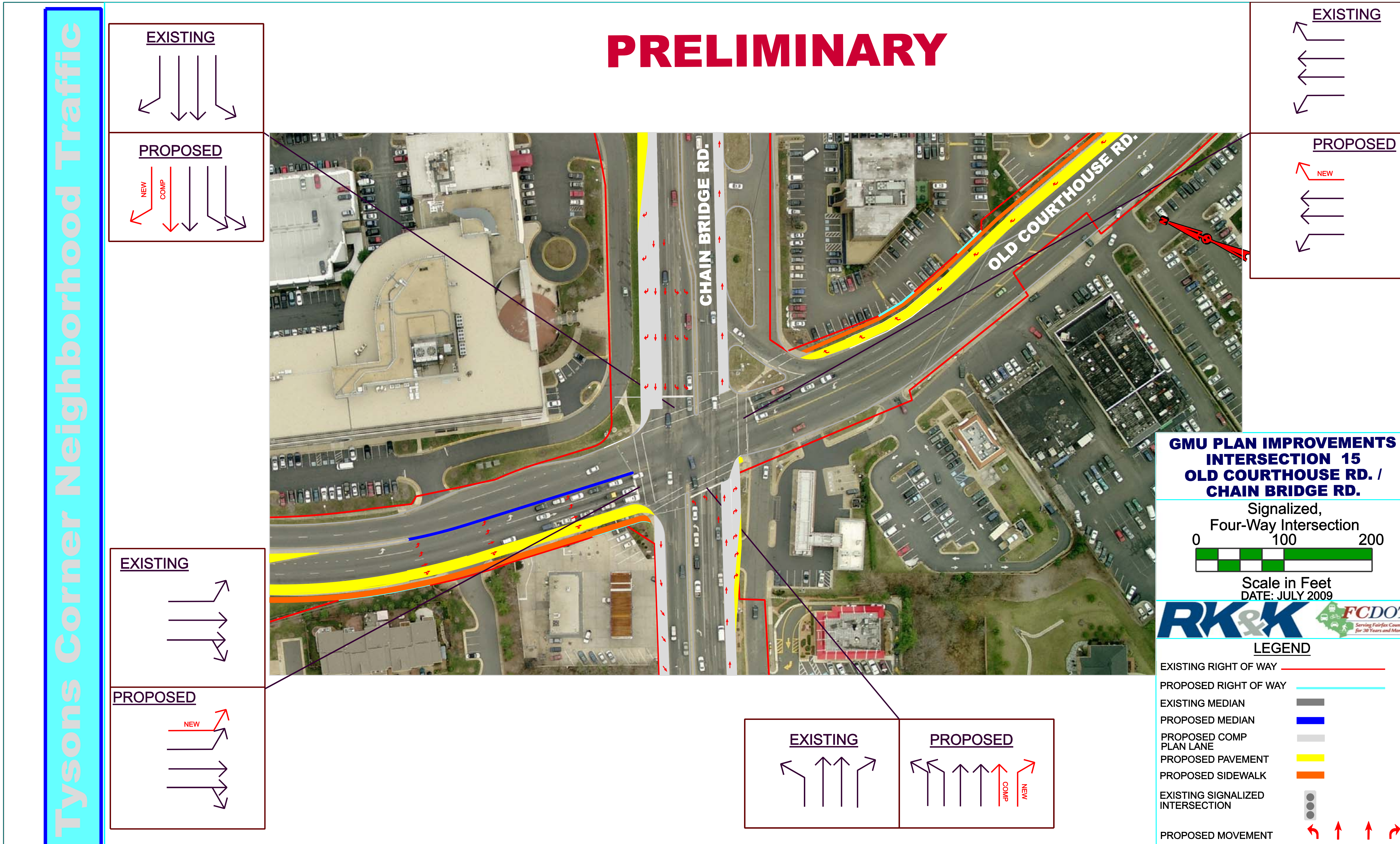
0 100 200
Scale in Feet
DATE: JULY 2009

RK&K FCDOT

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
EXISTING SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

807-077-03_Intrsec#15.dgn 7/28/2009 3:03:21 PM



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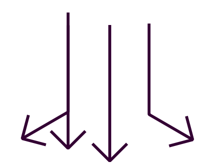
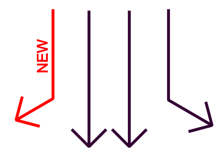
PRELIMINARY

EXISTING



PROPOSED



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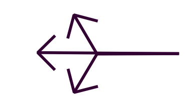

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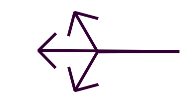

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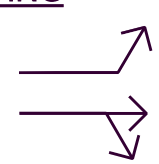

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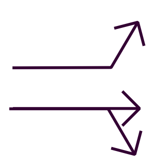

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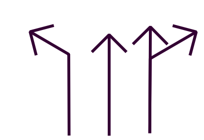
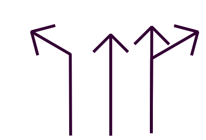


PROPOSED



COMP PLAN IMPROVEMENTS INTERSECTION 16 BEULAH RD. / MAPLE RD.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

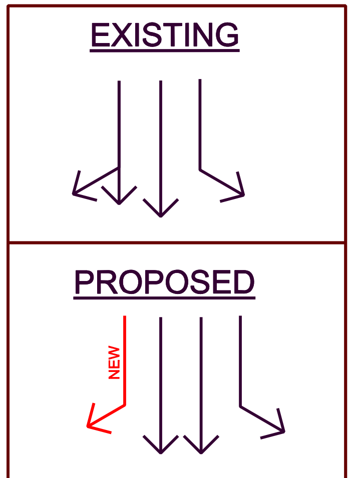
PROPOSED SIDEWALK

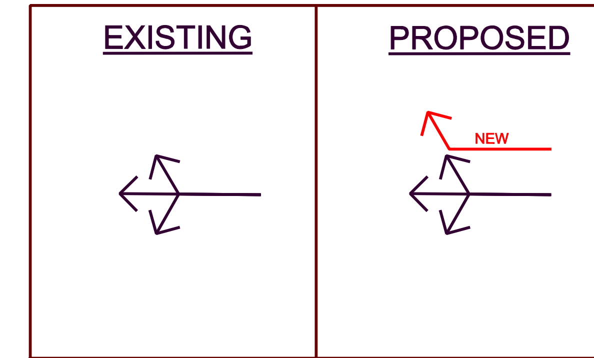
PROPOSED MOVEMENT

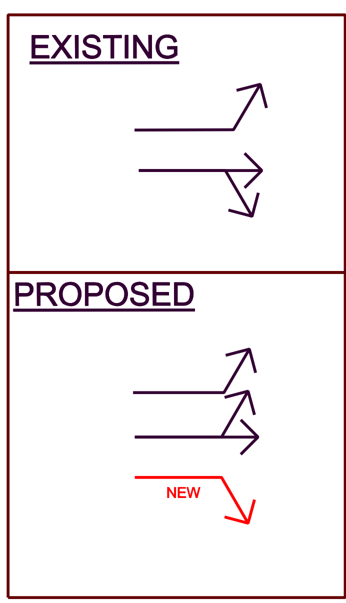
807-077-03_Intrsec#16.dgn 7/28/2009 5:35:58 PM

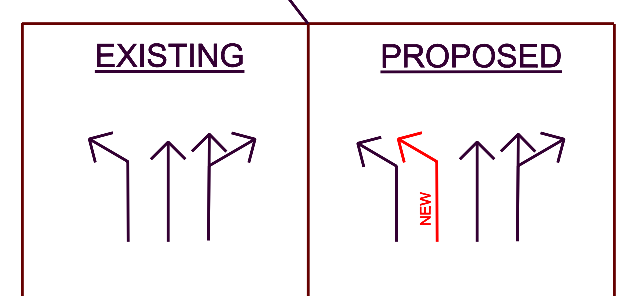
Tysons Corner Neighborhood Traffic

PRELIMINARY









GMU PLAN IMPROVEMENTS INTERSECTION 16 BEULAH RD. / MAPLE AVE.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT

Serving Fairfax County for 30 Years and More

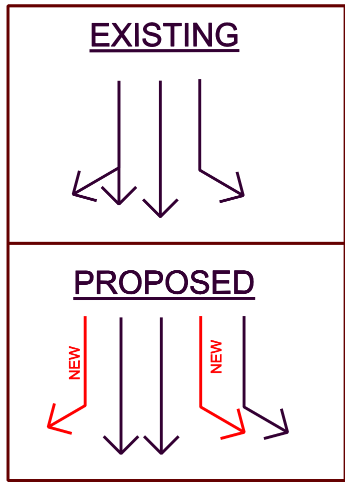
LEGEND

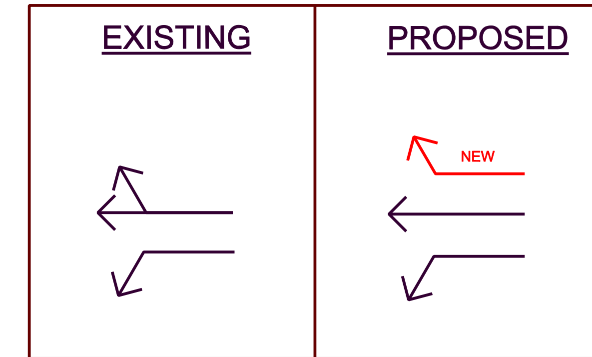
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING MEDIAN
- PROPOSED MEDIAN
- PROPOSED COMP PLAN LANE
- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED MOVEMENT

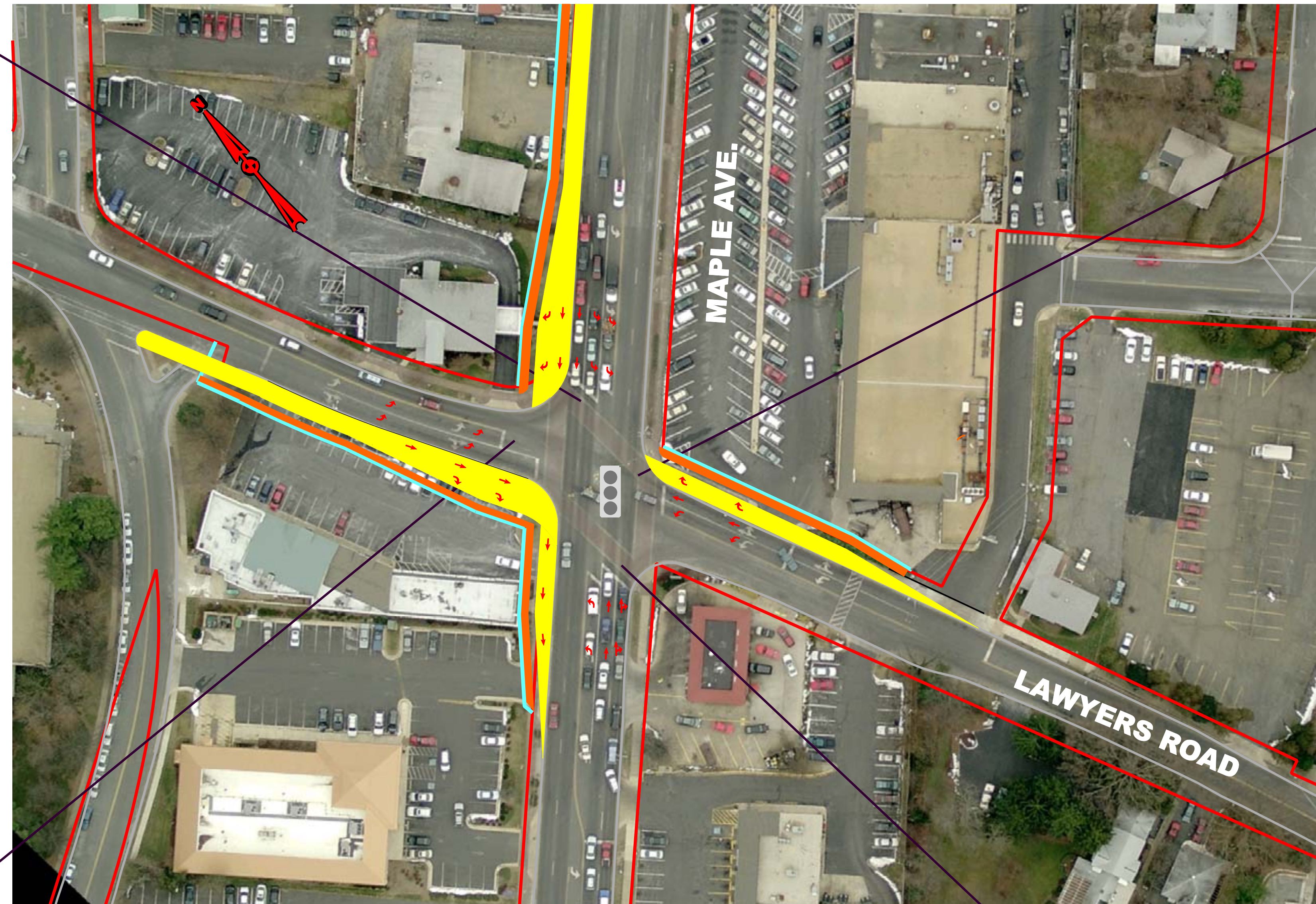
807-077-03_Intrsec#16_GMU.dgn 7/29/2009 11:13:50 AM

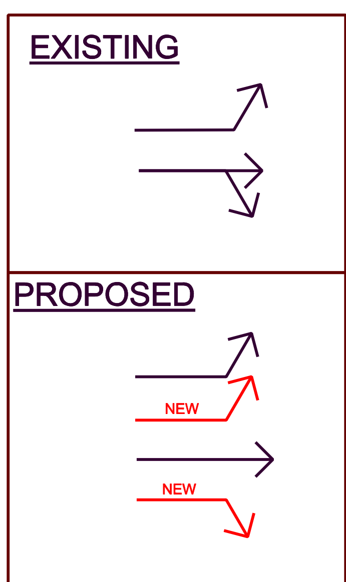
Tysons Corner Neighborhood Traffic

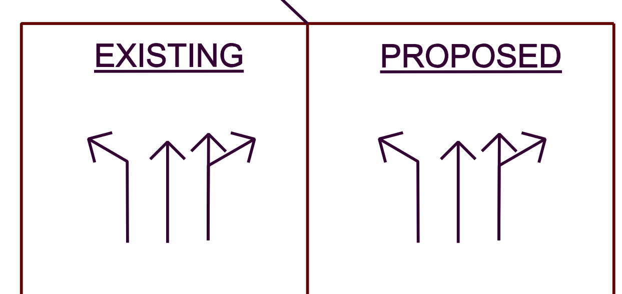
PRELIMINARY











COMP PLAN IMPROVEMENTS INTERSECTION 17 LAWYERS RD. / MAPLE AVE.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

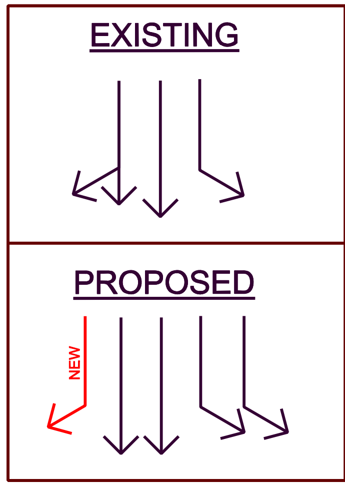
DATE: JULY 2009

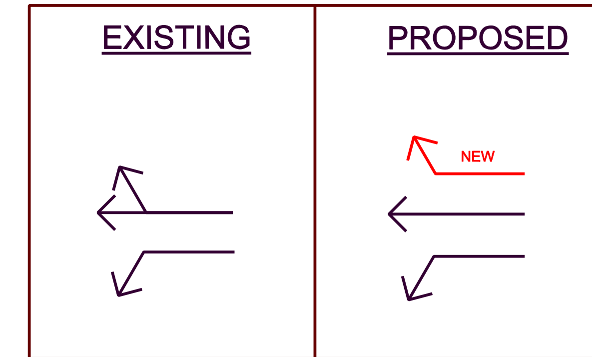
RK&K FCDOT Serving Fairfax County for 30 Years and More

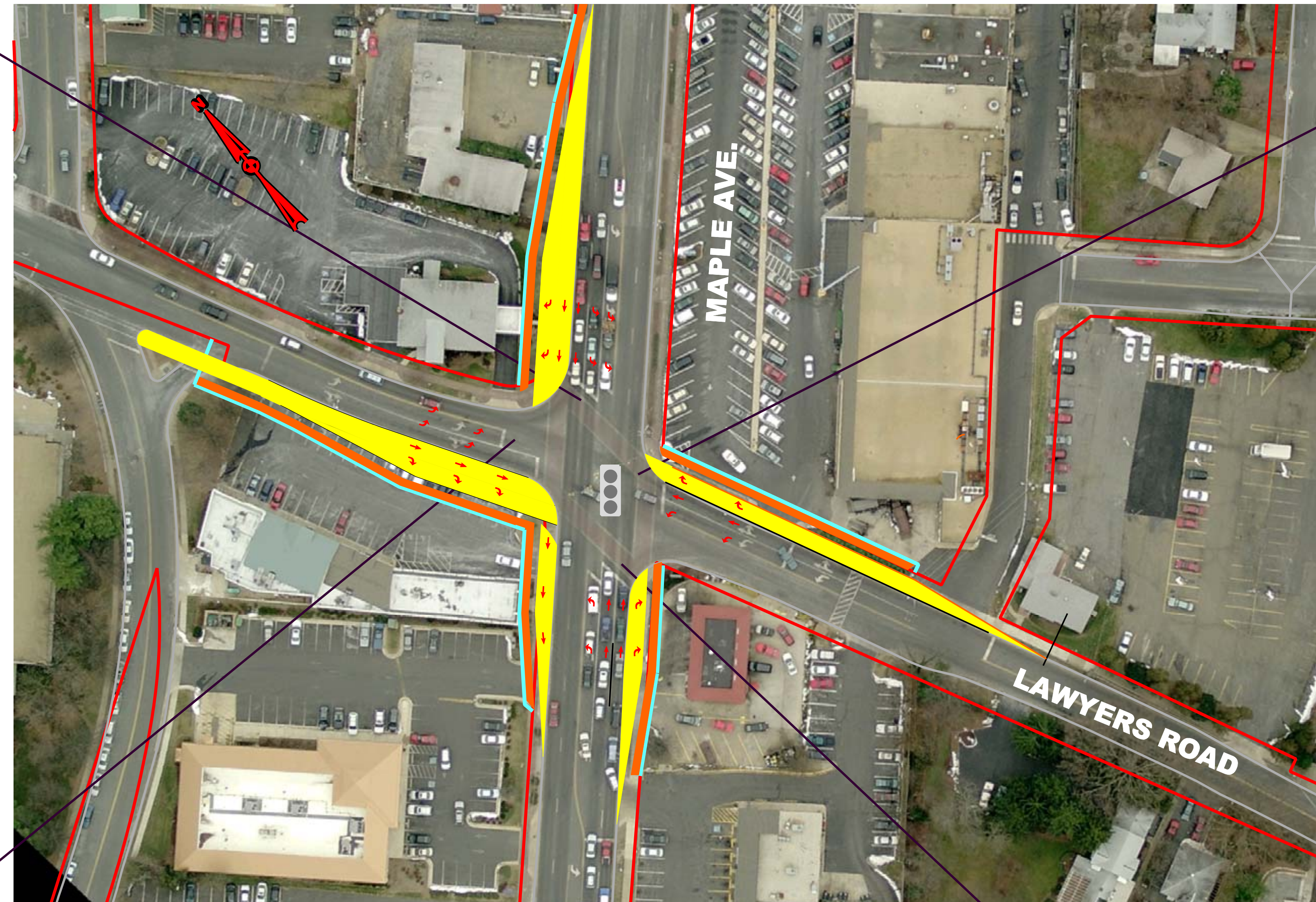
LEGEND

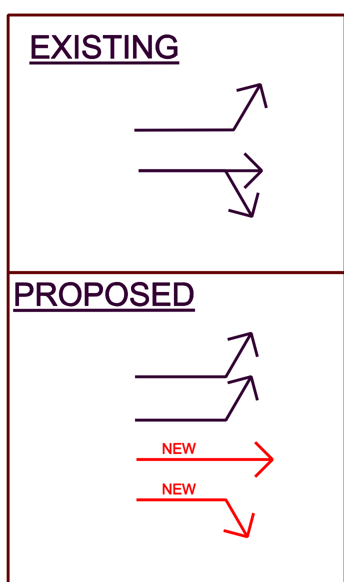
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING MEDIAN
- PROPOSED MEDIAN
- PROPOSED COMP PLAN LANE
- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED MOVEMENT

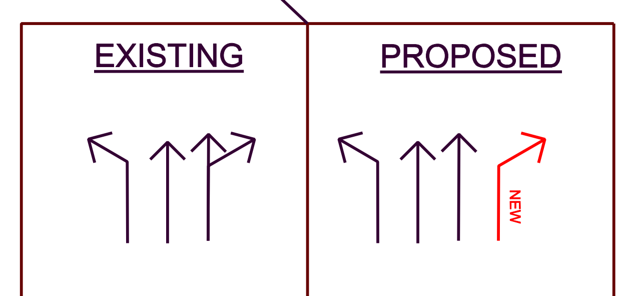
PRELIMINARY











GMU PLAN IMPROVEMENTS INTERSECTION 17 LAWYERS RD. / MAPLE AVE.

Signalized, Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

PROPOSED SIDEWALK

EXISTING SIGNALIZED INTERSECTION

PROPOSED MOVEMENT

Tysons Corner Neighborhood Traffic

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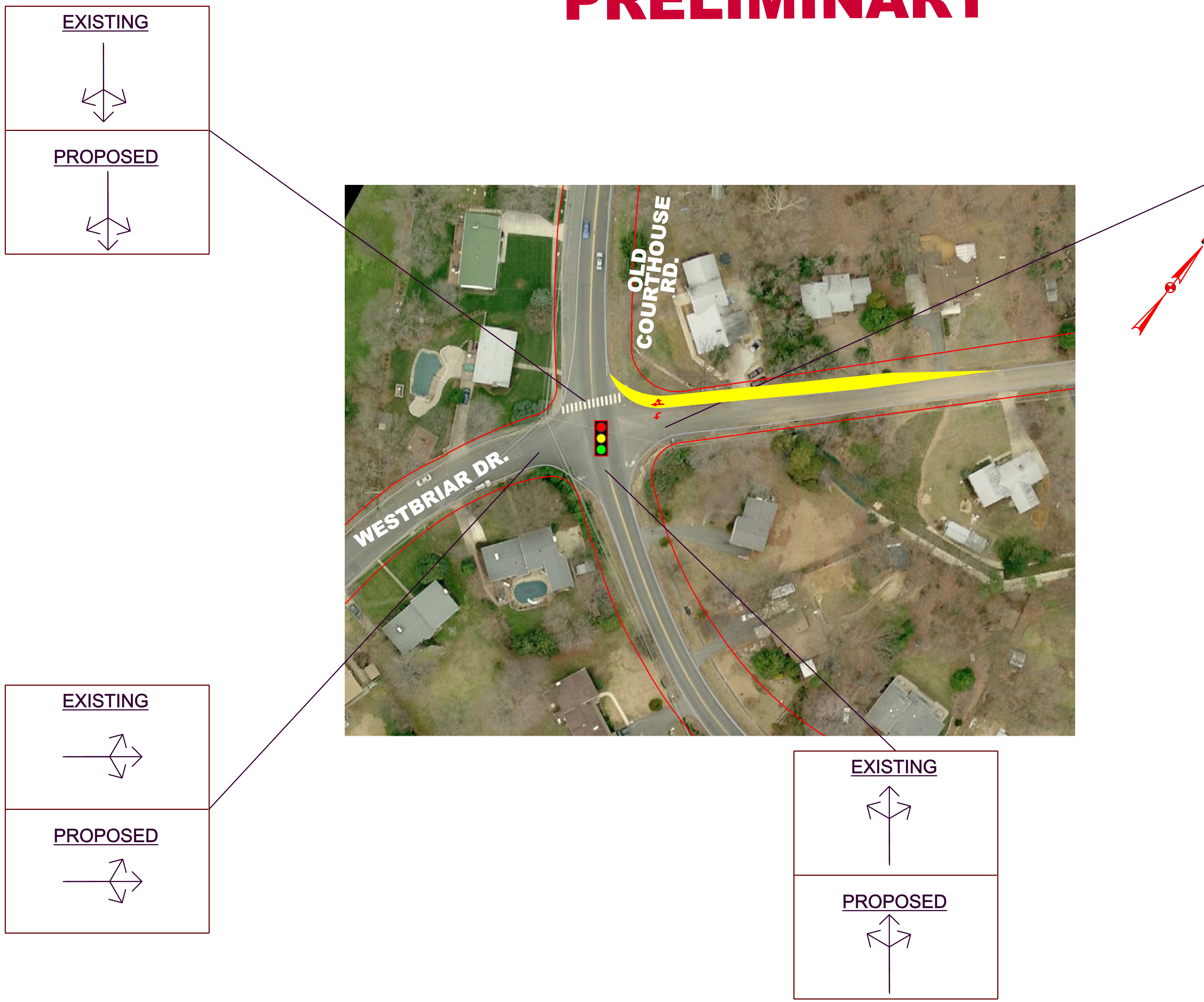
Tysons Corner Neighborhood Traffic

PRELIMINARY



COMP PLAN IMPROVEMENTS
INTERSECTION 18
OLD COURTHOUSE RD. /
WESTBRIAR DRIVE

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
EXISTING MEDIAN
PROPOSED MEDIAN
PROPOSED COMP PLAN LANE
PROPOSED PAVEMENT
PROPOSED SIDEWALK
PROPOSED SIGNALIZED INTERSECTION
PROPOSED MOVEMENT

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Tysons Corner Neighborhood Traffic

PRELIMINARY

EXISTING

PROPOSED

EXISTING

PROPOSED

NEW

EXISTING

PROPOSED

EXISTING

PROPOSED

GMU PLAN IMPROVEMENTS INTERSECTION 18 OLD COURTHOUSE RD. / WESTBRIAR DRIVE

Signalized,
Four-Way Intersection

0 100 200

Scale in Feet

DATE: JULY 2009

RK&K FCDOT Serving Fairfax County for 30 Years and More

LEGEND

EXISTING RIGHT OF WAY

PROPOSED RIGHT OF WAY

EXISTING MEDIAN

PROPOSED MEDIAN

PROPOSED COMP PLAN LANE

PROPOSED PAVEMENT

PROPOSED SIDEWALK

PROPOSED SIGNALIZED INTERSECTION

PROPOSED MOVEMENT

Intersection 1 – Route 123 (Dolley Madison Blvd) at Lewinsville Road/Great Falls Street

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 shared left/through lane; 1 though lane; 2 right turn lanes

Westbound – 1 left turn lane; 1 shared left/through lane 1 shared through/right turn lane

Northbound – 2 left turn lanes; 2 through lanes; 1 right turn lane

Southbound – 2 left turn lanes; 3 through lanes; 1 right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, landscaping, and other appurtenances. Total estimated cost of improvements is $110,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, landscaping, and other appurtenances. Total estimated cost of improvements is $60,000.00.

Intersection 2 – Route 123 (Dolley Madison Blvd) at Old Dominion Drive

Existing Traffic Movements:

Eastbound – 2 left turn lanes, 2 through lanes, 1 right turn lane

Westbound – 2 left turn lanes; 2 through lanes; 1 right turn lane

Northbound – 1 left turn lane; 2 through lanes; 1 right turn lane

Southbound – 1 left turn lane; 2 through lanes; 1 right turn lane

Proposed Comp Plan Improvements

To achieve an optimum LOS given existing physical constraints, there is some removal of existing pavement/concrete and additional pavement needed to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $763,000.00.

Proposed GMU Plan Improvements

To achieve an optimum LOS given existing physical constraints, there is some removal of existing pavement/concrete and additional pavement needed to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7 there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $410,000.00.

Intersection 3 – Lewinsville Road at Route 7 (Leesburg Pike)

Existing Traffic Movements:

Eastbound – 1 left turn lane; 2 through lanes; 1 right turn lane
Westbound – 2 left turn lanes; 2 through lanes; 1 right turn lane
Northbound – 1 left turn lane; 1 through lane; 1 right turn lane
Southbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane

Proposed Comp Plan Improvements

There are no physical additions needed to achieve an overall intersection LOS D and, therefore, no costs for improvements.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, landscaping, and other appurtenances. Total estimated cost of improvements is $110,000.00.

Intersection 4 – Lewinsville Road at Spring Hill Road

Existing Traffic Movements:

Eastbound – 1 shared left turn and through lane; 1 right turn lane
Westbound – 1 left turn lane; 1 shared through and right turn lane
Northbound – 1 shared left turn and through lane; 1 right turn lane
Southbound – 1 shared left turn, through and right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, additional storage lengths for turning lanes are needed as shown on Table 7. The associated project costs are for grading, paving, drainage, maintenance of traffic, pavement marking, landscaping, and other appurtenances. Total estimated cost of improvements is $37,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for a northbound dedicated left turn lane and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes needed as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, landscaping, and other appurtenances. Total estimated cost of improvements is $581,000.00.

Intersection 7 – Great Falls Street & Chain Bridge Road

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 through lane; 1 right turn lane
Westbound – 1 left turn lane; 1 through lane; 1 right turn lane
Northbound – 1 left turn lane; 1 shared through and right turn lane

Southbound – 1 left turn lane; 1 shared through and right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for a northbound dedicated right turn lane and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes needed as shown on Table 7, there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $654,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for a northbound dedicated right turn lane and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes needed as shown on Table 7, there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $565,000.00.

Intersection 9 – Magarity Road at Route 7

Existing Traffic Movements:

Eastbound – 2 left turn lanes; 3 through lanes; 1 right turn lane
Westbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane
Northbound – 2 left turn lane; 1 shared through and right turn lane
Southbound – 1 left turn lane; 1 shared through and right turn lane; 1 right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for northbound and westbound dedicated right turn lanes and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, and other appurtenances. Total estimated cost of improvements is $1,462,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for northbound and westbound dedicated right turn lanes and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, and other appurtenances. Total estimated cost of improvements is $1,245,000.00.

Intersection 10 – Idylwood Road at Route 7

Existing Traffic Movements:

Eastbound – 1 left turn lane; 2 through lanes; 1 shared through and right turn lanes
Westbound – 1 left turn lane; 2 through lanes; 1 shared through and right turn lanes
Northbound – 1 shared left turn and through lane; 1 right turn lane
Southbound – 1 shared left turn and through lane; 1 right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for additional dedicated left turn lanes for all four movements and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, raised median, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $2,765,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for additional dedicated left turn lanes for all four movements and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, raised median, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $2,894,000.00.

Intersection 11 – Idylwood Road at Gallows Road

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 shared through and right turn lane
Westbound – 1 left turn lane; 1 through lane; 1 right turn lane
Northbound – 1 left turn lane; 2 through lanes; 1 right turn lane
Southbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,126,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed to accommodate storage lane requirements. Due to the additional storage lengths needed for turning lanes as shown on Table 7, there are associated project costs for grading, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,003,000.00.

Intersection 12 – Georgetown Pike and Swinks Mill Road

Existing Traffic Movements:

Eastbound – 1 shared left turn, through and right turn lane
Westbound – 1 shared left turn, through and right turn lane
Northbound – 1 shared left turn, through and right turn lane
Southbound – 1 shared left turn, through and right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is additional pavement needed for a westbound dedicated left turn lane and storage lane requirements. Due to the additional storage length for the turning lane as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, lighting, signals, landscaping, and other appurtenances. Total estimated cost of improvements is $675,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is additional pavement needed for a westbound dedicated left turn lane and a northbound dedicated right turn lane as well as their storage lane requirements. Due to the storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $925,000.00.

Intersection 14 – Gallows Road at Cedar Lane/Oak Street

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 shared left turn and through lane; 1 shared through and left turn lane
Westbound – 1 shared left turn and through lane; 1 right turn lane
Northbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane
Southbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, the only physical improvements needed are signing and pavement marking for the storage lane requirements as shown on Table 7. Total estimated cost of improvements is $10,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, the only physical improvements needed are signing and pavement marking for the storage lane requirements as shown on Table 7. Total estimated cost of improvements is $10,000.00.

Intersection 15 – Old Courthouse Road and Chain Bridge Road

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane
Westbound – 1 left turn lane; 2 through lanes; 1 right turn lane
Northbound – 1 left turn lane; 2 through lanes; 1 right turn lane
Southbound – 1 left turn lane; 2 through lanes; 1 right turn lane

Proposed Comp Plan Improvements

To achieve an optimum LOS given existing physical constraints, there is some removal of existing pavement/concrete and additional pavement needed for additional eastbound, northbound and southbound dedicated left turn lanes and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, raised median, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,369,000.00.

Proposed GMU Plan Improvements

To achieve an optimum LOS given existing physical constraints, there is some removal of existing pavement/concrete and additional pavement needed for additional eastbound, northbound and southbound dedicated left turn lanes and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, raised median, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,973,000.00.

Intersection 16 – Maple Avenue at Beulah Road (Vienna)

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 shared through and right turn lane
Westbound – 1 shared left turn, through and right turn lane
Northbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane
Southbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane

Proposed Comp Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for a southbound dedicated right turn lane and storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $568,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is some removal of existing pavement/concrete and additional pavement needed for additional eastbound (right turn), westbound (right turn), northbound (left turn) and southbound (right turn) dedicated turn lanes and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,913,000.00.

Intersection 17 – Maple Avenue at Lawyers Road (Vienna)

Existing Traffic Movements:

Eastbound – 1 left turn lane; 1 shared through and right turn lane
Westbound – 1 left turn lane; 1 shared through and right turn lane
Northbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane
Southbound – 1 left turn lane; 1 through lane; 1 shared through and right turn lane

Proposed Comp Plan Improvements

To achieve an optimum LOS given existing physical constraints, there is some removal of existing pavement/concrete and additional pavement needed for additional eastbound, northbound and southbound dedicated left turn lanes and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,741,000.00.

Proposed GMU Plan Improvements

To achieve an optimum LOS given existing physical constraints, there is some removal of existing pavement/concrete and additional pavement needed for additional eastbound and southbound dedicated left turn lanes; additional eastbound, westbound and southbound dedicated right turn lanes; and to accommodate storage lane requirements. Due to the additional storage lengths for turning lanes as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, curb and gutter, sidewalks, lighting, signals, landscaping, right of way acquisition, and other appurtenances. Total estimated cost of improvements is $1,738,000.00.

Intersection 18 – Old Courthouse Road and Westbriar Drive (Vienna)

Existing Traffic Movements:

Eastbound – 1 shared left turn, through and right turn lane
Westbound – 1 shared left turn, through and right turn lane
Northbound – 1 shared left turn, through and right turn lane
Southbound – 1 shared left turn, through and right turn lane

Proposed Comp Plan Improvements To achieve an overall LOS D, there is additional pavement needed for additional eastbound and southbound dedicated left turn lanes; additional eastbound, westbound and southbound dedicated right turn lanes; and to accommodate storage lane requirements. Due to the additional storage length for the turning lane as shown on Table 7there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, signals, landscaping, and other appurtenances. Total estimated cost of improvements is $596,000.00.

Proposed GMU Plan Improvements

To achieve an overall LOS D, there is additional pavement needed for a westbound dedicated left turn lane and storage lane requirements. Due to the additional storage length for the turning lane as shown on Table 7 there are associated project costs for grading, paving, drainage, maintenance of traffic, pavement marking, signals, landscaping, and other appurtenances. Total estimated cost of improvements is $437,000.00.