VALLEY FORGE
CONVENTION CENTER PARTNERS, L.P.

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PRESIDENT & CEO

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VIA HAND DELIVERY AND FEDERAL EXPRESS

June 22, 2007

Mr. Ronald G. Wagenmann
Township Manager
Upper Merion Township
175 West Valley Forge Road
King of Prussia, PA 19406
United States of America

RE: Application of Valley Forge Convention Center Partners, L.P. for a Category 3 Slot Machine Operator License

Dear Mr. Wagenmann:

As I believe you are aware, Valley Forge Convention Center Partners, L.P. ("VFCCP") will soon purchase the existing Valley Forge Convention Center ("Center") and, in connection with renovating the facility, apply to the Pennsylvania Gaming Control Board ("PGCB") for a Category 3 Slot Machine Operator License ("License"). The award of a License to VFCCP will allow for the operation of up to 500 slot machines at the Center.

This letter and its attached exhibits constitute the Local Impact Report required to be submitted to Upper Merion Township pursuant to PGCB regulations (§441.3(d)) and Appendix 41 of VFCCP's Category 3 Application and Disclosure Information Form (the "Application"). We are pleased to provide these materials to you for your information and consideration.

As you will see, this letter is divided into two sections. First, we detail the positive impact that the award of a License to VFCCP will have on Upper Merion Township as a whole, and the King of Prussia business and commercial districts in particular. Second, we detail the absence of adverse impact on the various municipal resources and services set forth in Appendix 41.

Positive Impact of the Valley Forge Entertainment Center

Upper Merion Township and Montgomery County will enjoy significant economic benefits as a result of the creation of the Valley Forge Entertainment Center.[1] Such benefits will include:

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[1] The Valley Forge Entertainment Center will be the gaming venue located wholly within the Convention Center.

- $2.8 million in increased annual tax revenue for Upper Merion Township, the Upper Merion School District, and Montgomery County through new gaming taxes and increased non-gaming taxes and assessments.

- Creation of over 500 new jobs. This includes over 150 permanent, full-time jobs with wage and salary levels higher than those currently paid in the region's hospitality industry, and hundreds of indirect jobs that will be created as a result of increased tourism, convention bookings, and business meetings.

- Total capital investment by VFCCP of $43 million for renovations of existing facilities and the creation of the gaming venue. It is estimated that 50% of these expenditures will be made within Montgomery County.

- Creation of 850 construction jobs during the renovation / build period.

- Significant additional spending by Center patrons at King of Prussia-area restaurants, shops, and attractions.

See *Econsult Corporation Economic Impact Report* ("Exhibit "A").

Absence of Adverse Impact on Municipal Resources and Services

Because the proposed gaming activities will be integrated within the already existing Center, there will be little to no adverse impact on the Township's resources and services.

- ***Traffic:*** A significant portion of Center's gaming patrons will already be visiting the site and immediate area for conventions, hotel stays, shopping, or restaurant visits. As such, these visitors will not be adding significant new traffic to the roadway system. The low volume of additional traffic generated by persons interested in gaming only will have a minimal impact on the operation of the roadways and intersections in the vicinity of the Center. See *June 2007 Traffic Impact Study prepared by McMahon Transportation Engineers & Planners* (Exhibit "B").

- ***Housing:*** The proposed gaming venue will not adversely impact residential areas, churches, schools and/or cultural areas. The gaming component of the Center will be wholly self-contained within the existing convention facility. There is no need for expansion onto open areas of the Center or adjacent properties. Importantly, the Center is effectively walled off from residential sites and other sensitive areas. To the west, the Center is separated from residential properties and the Valley Forge National Historic Park by a four-lane, limited access highway, U.S. Route 422 (more commonly known as the County Line Expressway), and State Route 363 (North Gulph Road). The Center is further isolated by State Route 23 (West Valley Forge Road), 9th Avenue and 8th Avenue to the north, and 1st Avenue and the Pennsylvania Turnpike to the south. Finally, all adjoining properties are dedicated to business, commercial and light industrial uses. See *Figure 1, June 2007 Traffic Impact Study prepared by McMahon Transportation Engineers & Planners* (Exhibit "B") and *Aerial Map* (Exhibit "C").

- ***Water and Sewer Systems:*** The Center is an existing facility that has sufficient water and sewer capacity. Inasmuch as the gaming venue will be wholly self-contained within the Center, additional water and sewage services are not required. See *June 16, 2007 Letter from Nave Newell, Inc. -- Engineers, Surveyors & Landscape Architects* (Exhibit "D").

- ***Police and Fire Services:*** As discussed above, a significant portion of projected gaming patrons will be persons already visiting the area's convention facilities, shopping malls, hotels and restaurants. Given that adequate police and fire resources are already in place to handle existing visitor levels, the expansion of such services will be reviewed in cooperation with authorized public safety personnel.

- ***Tourism Resources:*** The introduction of limited gaming to the Center will complement and add a new dimension to the numerous tourist options currently available in the King of Prussia area. These options include the King of Prussia Mall, Valley Forge National Historic Park, several golf courses, numerous restaurants and various other retail outlets. In addition, the renovated Center will enhance the King of Prussia area's position as significant regional destination, and strengthen the Delaware Valley's position in the national convention market. See *Econsult Corporation Economic Impact Report* ("Exhibit "A").

Thank you for your attention and courtesy with respect to these important matters. We would be pleased to discuss this letter and its attachments with you, as well as any other aspect of VFCCP's Application, at your convenience.

Very truly yours,

Michael C. Forman
President & CEO

MCF/gh
Enclosures

EXHIBIT A

POTENTIAL LOCAL ECONOMIC IMPACTS OF THE PROPOSED CATEGORY 3 ENTERTAINMENT CENTER GAMING FACILITY FOR THE VALLEY FORGE CONVENTION CENTER

VFCC Partners, L.P.

Submitted to VFCC Partners, L.P. to support their application for a Category 3 gaming license by:

Econsult Corporation
6th Floor
3600 Market Street
Philadelphia, PA 19104

June 2007

EXECUTIVE SUMMARY

Valley Forge Convention Center Partners, L.P. ("VFCC PARTNERS") currently owns and operates the Valley Forge Convention and Exhibition Center, which includes two hotels and convention space, and is located in Valley Forge near the King of Prussia Mall, in Montgomery County, Pennsylvania. VFCC PARTNERS is submitting an application to the Pennsylvania Gaming Control Board for one of two Category 3 Slot Machine Operator Licenses to develop, own, and operate a first-class, 500-slot entertainment center facility inside the existing Valley Forge Convention Center.

Based on an estimated 750,000 annual visits to the proposed entertainment center, the potential economic benefits to the host community, the Southeastern Pennsylvania region, and the Commonwealth are estimated to be significant. Such benefits would primarily come from revenue that would be generated via gaming taxes, along with other taxes generated by additional induced economic activity. A secondary benefit would be the increased economic activity and employment associated with the construction and ongoing operations of the entertainment center and the increased volume of hotel and meeting business that would occur throughout the region.

Below are the potential annual ongoing economic, fiscal, and qualitative benefits of the proposed entertainment center:

Spending and Employment

- **Overall, we estimate that total indirect and direct potential ongoing annual economic impacts generated by the entertainment center for the State of Pennsylvania to be:**
    - **$45 million in additional spending**
    - **Over 500 new jobs (including 150 at the entertainment center)**
    - **Over $13 million in wages and employee earnings**

Taxes

- **Combined, gaming and induced non-gaming state taxes could approach $31.7 million annually with this proposed entertainment center.**

- **Combined, gaming and induced non-gaming local taxes could approach $2.8 million annually with this proposed entertainment center.**

Qualitative Benefits

- **The entertainment center should generate the greatest "recapture" rate for Pennsylvania, due to its proximity to both Atlantic City and Delaware gaming facilities, and the large number of Pennsylvanians who currently leave the Commonwealth to patronize such opportunities.**

- **In addition to stimulating economic development and jobs, the entertainment center would provide expanded and increased meeting and entertainment opportunities for residents and visitors, and provide an important stimulus for regional tourism, convention/meeting activity, and the local retail sector.**

1.0 INTRODUCTION

Valley Forge Convention Center Partners, L.P. ("VFCC PARTNERS") is submitting an application to the Pennsylvania Gaming Control Board for one of two Category 3 Slot Machine Operator Licenses to develop, own, and operate a first-class, 500-slot entertainment center facility inside the existing Valley Forge Convention Center, located in Montgomery County, Pennsylvania. The existing facility (with proposed upgrades) meets the basic requirements established for Category 3 licenses, as enumerated in the gaming legislation in section 58 Pa. Code 441.23. The Gaming Commission will consider applicants, and will award no more than two licenses.

If awarded a license, the gaming facility could be constructed (inside the existing Center) and open for operations within 12 months of the issuance of an unappealable license. After some economic benefits associated with the construction, the new entertainment center would begin generating new economic benefits immediately thereafter. Such benefits include generating new regional spending and employment, and state and local government revenues.

The primary potential benefit to the state and host community would be its fiscal impact: the revenue that would be generated via the gaming taxes, currently set at 55% of gross gaming revenues, along with other taxes generated by additional economic activity. A secondary, but quite important benefit would be the increased economic activity and employment associated with the ongoing operations of the entertainment center and the increased volume of hotel and meeting business that would occur throughout the region. This report identifies and estimates these economic and fiscal impacts for the proposed entertainment center.

Construction and ongoing-operations of the proposed entertainment center are likely to generate economic and fiscal benefits to the Southeast Pennsylvania region and to the entire Commonwealth. There are likely to be three areas of significant, quantifiable impact:

1. Construction expenditure impact
2. Ongoing entertainment center operations impact
3. Ancillary patron spending impacts
    a. VFCC hotels
    b. Hotels and locations outside of VFCC

In addition, there are also likely to be several potential qualitative benefits associated with this proposal that could make this particular proposal even more attractive to the State. The prescribed nature of the various category license arrangements (500 slots and 55% gross revenue tax) somewhat limits the variations in expected gaming revenues and basic economic impacts for any proposed Category 3 licenses throughout the state. However, due to the nature of this particular market, the VFCC PARTNERS proposal should show significantly higher gaming wins and overall impacts, including spillover benefits, because four factors play key roles in maximizing these economic and revenue benefits:

1. Market catchment area population density and socio-economic make-up

- to maximize potential gaming market

2. Market catchment areas that overlap population centers in surrounding states
   - to maximize "exports"; that is, patrons from other states

3. Locations with large numbers of Pennsylvanians who leave the Commonwealth to patronize gaming facilities in nearby states
   - to maximize "recapture" or "import substitution" of Pennsylvania gamers

4. Proximity to additional attractions/destinations that will allow efficient cross-marketing opportunities
   - to strengthen the tourism/convention industry and the retail sector, and extend market outreach to increase exports or recapture

The VFCC proposal positively addresses each of these factors, differentiating it from other potential Category 3 license applications.

1.1 Project Description: *VFCC Facility and Planned Upgrades*

The current space at the Valley Forge Convention and Exhibition Center is an ideal setting for the proposed entertainment facility. It already offers a wide-range of amenities and meeting space that will be continuously improved to become the high-end boutique that VFCC PARTNERS outlines in their proposal.

The 850,000 square foot Valley Forge Convention and Exhibition Center currently is comprised of two hotels containing a combined total of 488 rooms. In addition, both the Scanticon Business Center and the Radisson Hotel contain full service restaurants. Other amenities include various meeting rooms, lounges, a nightclub, health and fitness area/spa, and outdoor aquatic center.

The Valley Forge Convention and Exhibition Center currently contains 108,000 square feet of meeting, convention, and exhibition space. An additional 30,000 square feet of upscale meeting, conference and banquet facilities are available as either meeting rooms or ballrooms.

A highlight of the current space is a completely renovated state-of-the-art private entertainment area, renamed the Waterford. It replaces the long running Lily Langtry's Victorian Restaurant and Showplace. This is the first of a number of planned improvements to upgrade the overall ambiance and attractiveness of the complex.

VFCC PARTNERS plans to renovate and redevelop approximately 18,000 square feet within the existing center for use as the Category 3 entertainment center, which includes additional space for back office purposes. Additional internal (no external changes are planned) improvements to all parts of the complex are included in the plans for the new entertainment center. The interior theme will be designed as a "high-end" facility considering the limited number of slots and the facility location. The premiere "boutique" image will be utilized to set the entertainment center apart from the other larger facilities, and to fill a niche not already covered in the area. Patron comfort and

prestige would be incorporated into both facility design and service considerations, including increased emphasis on well-trained personable staff in all areas, valet parking, players club, convenient service systems (slot marketing, beverage service), clean and well-maintained patron areas, and hands-on management interacting with customers. Quality customer service will be the hallmark of the VFCC entertainment center.

1.2 Estimated Entertainment Center Visits and Gaming Revenues

The underlying data for all of the estimates presented here are the forecast for visitation and spending at the proposed facility. Pro forma estimates of entertainment center visits and gaming revenues were developed by PKF and f/b Capital Partners, using standard models incorporating market boundaries, market share, and adult population gaming propensities.

Using various reasonable assumptions about annual growth rates, market penetration, and utilization ramp-up, the entertainment center is forecast to generate approximately 740,000 entertainment center visits and $59.8 million in gross gaming revenues, or "entertainment center wins", in its first full year of operation (for our purposes, assumed to be 2009). Of this, almost 660,000 visits and $53 million in gross revenues would be generated by visitors to Valley Forge. In addition, approximately 85,000 visits and $6 million in gross gaming revenue would come from hotel guests at both VFCC hotels and hotels in the area.

Note that the estimates for gaming visits by hotel guests (at VFCC hotels and nearby hotels) are based on *existing* occupancy levels, and do not account for any additional hotel room nights generated by the existence or operation of the facility. This is clearly conservative (and appropriate) when estimating entertainment center visitor numbers, but also clearly omits an important potential spin-off effect: generating more hotel visitors.

1.3 Employment Generator

VFCC entertainment center would directly employ over 150 people at wage and salary levels higher than those currently paid in the region's hospitality industry. In addition, hundreds of indirect jobs will be created by the economic activity that is generated the entertainment center's operations, including through increased tourism and convention meeting activity. We estimate the total ongoing employment effect (direct plus indirect and induced jobs) will be in excess of 500 new jobs in Pennsylvania. This is in addition to 850 construction period jobs – our estimate of employment includes both full-time and part time jobs.

1.4 Revenue Generator

The proposed entertainment center would generate millions of dollars of new taxes and fees to both the Commonwealth and the local governments. In addition to the gaming taxes imposed by

the Commonwealth (a portion of which would be distributed back to Montgomery County and Upper Merion Township), the Commonwealth will see increases in personal and corporate income as well as sales tax revenues. Upper Merion Township and School District, as well as Montgomery County, will likely benefit from higher property tax payments.

1.5 Catalyst for Economic Development

VFCC entertainment center will also act as a significant catalyst for the economic competitiveness of the Valley Forge and King of Prussia areas, especially as it relates to the Valley Forge Convention and Visitors Bureau's new and aggressive efforts to stimulate convention, tourism, and entertainment activities. It is important to note that this effort is likely to strengthen the entire region's economy as opposed to merely shifting a static demand across more venues.

VFCC PARTNERS' proposed entertainment center development is being designed to deliver the maximum economic value to Montgomery County, the Southeast Pennsylvania region, and the Commonwealth of Pennsylvania, providing each with the potential for significant growth in revenue, employment, and tourism.

In addition, this project would complement the area's regional retail sector, including the King of Prussia Mall. King of Prussia Mall, offering high-end retail and attracting over 26 million visitors a year, is the largest retail mall in the eastern U.S. The Radisson Hotel, part of the VFCC PARTNERS entertainment center complex, is the official hotel for the King of Prussia Mall. This existing relationship presents an opportunity for VFCC PARTNERS to develop joint marketing programs and potential patron contracts, as well as an opportunity to build an image of prestige that distinguishes it from nearby casinos.

A key advantage of the project will be the ability to significantly enhance an important component of the region's convention and tourism assets: the Valley Forge Convention Center (VFCC), and the hotels of the Valley Forge and King of Prussia area, the region's largest market outside of Philadelphia. The VFCC serves as an important complement to the Pennsylvania Convention Center, and together they project an unparalleled set of meeting, convention, and assembly facilities options to a wide range of convention and meeting space demands throughout the Mid-Atlantic region and the entire country.

1.6 Site and Neighborhood Characteristics – minimal negative impacts

The specific site being proposed by VFCC PARTNERS is ideally suited for Category 3 entertainment center use. The VFCC site is basically already used for similar purposes, and should generate only minimal cost impacts on nearby residents or businesses.

- Strategically located in the Philadelphia Metropolitan area, in an area not directly covered

by other existing or proposed gaming facilities

- Tourist attractions nearby
- Enjoys a prominent location, visible from major highways
- Has excellent transportation access and has sufficient access and parking infrastructure
- Is not close to residential areas or schools

2.0 ECONOMIC IMPACTS

The potential economic impacts of the project would be generated via four key avenues:

- Construction activity (construction periods only)
- Ongoing entertainment center facility operational spending (annual)
- Ongoing increased VFCC hotel operations (annual)
- Ongoing ancillary spending by entertainment center patrons, outside VFCC (annual)

Before presenting the specific estimates, we define the various types of economic impacts, and describe the methodology used to estimate them. We estimate the potential economic impacts for each phase of the proposed project in terms of three measures of economic activity: (1) total sales or output (total economic activity), (2) wages and earnings, and (3) employment.

Each of these impacts are going to be generated by **direct (initial or ongoing)** spending on (1) construction (one-time impact for each phase), (2) annual operations of the entertainment center facility, combined with (3) increased hotel operations (ongoing annual impacts). Operating expenditures will include entertainment center and facility spending on payroll, food and other supplies, advertising, and other services. Ancillary spending includes spending outside of the entertainment center on transportation, meals and refreshments, souvenirs, retail, lodging, or other entertainment.

We focus on **direct expenditures** that are anticipated to be spent inside the County or inside the Commonwealth. Each of these "benefit areas" will have different impacts due to the different size of the economies (and hence different multipliers). Since the County is fully contained in the Commonwealth, the Commonwealth percentages will always be higher than the County impact estimates.

Total Economic Activity (All Expenditures)

These **direct** expenditures created by the entertainment center facility will generate additional economic activity by way of **indirect** and **induced** expenditures. **Indirect** expenditures are those expenditures resulting from all intermediate rounds of goods and services produced by various firms that are stimulated by the direct expenditures (construction, operations, and ancillary). For example, the entertainment center facility might purchase linen services from a supplier who would in turn purchase linens, detergent, delivery vehicles, etc., from other businesses. Since some of these items are produced in the region, the entertainment center facility's expenditures for linen services will generate additional rounds of expenditure in the region and Commonwealth. **Induced** expenditures are those that are generated through the spending of households' incomes (salaries and wages) earned as part of the direct and indirect expenditures. For example, employees of a construction firm will spend their earnings on various items (housing, food, clothing), and since some of these items are produced in the region, the construction period expenditures will generate additional rounds of expenditures in the region. Using an Input-Output model, we then calculate these indirect and induced effects and the spending, earnings, and employment generated by the

indirect and induced spending.[1]

Together, the direct, indirect, and induced expenditures sum to the **total** economic activity or output that could be generated by the entertainment center facility. The construction expenditures and the associated indirect and induced expenditures will have a one-time impact, while the operating and ancillary expenditures and their associated indirect and induced expenditures will have ongoing, annual economic impacts.

Earnings and Employment Impacts

We also estimate the potential economic impacts of the proposed entertainment center facility in terms of two additional measures of economic activity: total earnings (wages and salaries), and total employment. These estimates are based on two independent but related direct numbers: first, if direct employment and payroll can be estimated (as is the case with the entertainment center facility via project proformas of the direct employment anticipated for the construction and the ongoing operations of the facility), the model will generate estimates of indirect and induced earnings and employment that will be associated with the direct expenditures and employment. Even without direct employment numbers (for instance in the case of ancillary spending), the Input-Output models can be used to generate estimates of earnings and employment based on the total spending in the industries.

We turn now to the estimation of these impacts. In this analysis, we estimate the impacts for Montgomery County and for the Commonwealth of Pennsylvania.

2.1 Economic Impacts of Construction Expenditures (One-Time)

Over the initial several years, VFCC PARTNERS envisions approximately $40 million for repositioning and redevelopment costs associated with the gaming venue[2]. This is in addition to approximately $3 million for roofs, elevators, and parking lot upgrades. Overall, the planned capital expenditure would approach $43 million. We assume that 50% of these expenditures would be made in Montgomery County, and due to planned "in-State" purchasing, we assume 95% will be spent in Pennsylvania. VFCC Partners also plan to establish a minority-based purchasing plan for the construction project.

[1] We have used U.S. Department of Commerce's Regional Input-Output Modeling System II (RIMS II) models for the County and State. Note that since the County is entirely situated in the State, all state impact estimates INCLUDE the County impacts. (Note this is not true for a *metro* area that crosses state borders.) We also generated impacts for the 5-county Southeast Pennsylvania region, which are very similar in magnitude to the State impacts reported in this analysis. The Input-Output model, which is one of the most commonly used for economic impact analyses, is described in detail in an Appendix to this report.

[2] This excludes approximately $10 million in equipment (mostly slot machine) purchases.

These development and construction expenditures would stimulate successive rounds of economic activity in the County and Commonwealth in the form of increased sales by businesses, increased employment, and increased expenditures by businesses and employees. While these would be "one-time" impacts coinciding with the construction phase, they are, nevertheless, substantial. The estimated impacts for construction period are presented in Table 2.1.1.

Table 2.1
Potential One-Time Economic Impacts Attributable to Construction
($ Millions in 2007 Dollars)

Description	Montgomery County	Pennsylvania Commonwealth
Direct Expenditures ($MM)	$ 21.5	$ 40.9
Indirect & Induced Expenditures ($MM)	$ 16.3	$ 59.0
Total Output ($MM)	**$ 37.8**	**$ 99.9**
Multiplier	1.76	2.45
Total Employment	**179**	**867**
Total Earnings ($MM)	**$ 6.8**	**$ 32.0**

Source: Econsult Corporation (2007)
**Results may not add due to rounding*
***Total Output includes Total Earnings*
****Total Employment includes part-time and full-time jobs*

In Montgomery County, the $21.5 million in direct construction expenditures will generate an additional $16.3 million in indirect and induced expenditures, resulting in $37.8 million in total output. This suggests a multiplier of 1.76, which is fairly common for a large, economically diverse county. For each $1 in direct construction expenditures, Montgomery County will benefit from an additional $0.76 in indirect and induced expenditures. The $37.8 million in total output includes $6.8 million in total earnings, supporting nearly 180 total jobs.

In the Commonwealth of Pennsylvania, the $40.9 million in direct construction expenditures will generate an additional $59.0 million in indirect and induced expenditures, resulting in $99.9 million in total output. This suggests a multiplier of 2.45, suggesting that for each $1 in direct construction expenditures, the Commonwealth benefits from an additional $1.45 in indirect and induced expenditures. The $99.9 million in total output includes $32.0 million in total earnings, supporting nearly 870 total jobs.

It is important to note that these construction expenditures represent investments by upgrading existing infrastructure assets to the region and the Commonwealth rather than (1) new construction or (2) new green field construction. As such, while the expenditure impact would be less than that for a new facility, there are several regional benefits that outweigh the lower expenditures: regional infrastructure efficiency associated with renovating existing physical assets with surrounding infrastructure in place to increase sustainable development in the Commonwealth.

2.2 Annual Impacts of Entertainment Center Expenditures (Ongoing)

VFCC entertainment center would employ approximately 150 people at wage and salary levels higher than those currently paid in the local hospitality industry. In addition, hundreds of indirect jobs will be created by the economic activity that is generated by VFCC entertainment center's operations. Like the construction expenditures, the operating expenditures would stimulate successive rounds of spending by businesses and employees. Unlike the impacts of construction, the impacts of operating expenditures would be repeated year after year, and would grow over time.

Based on data obtained from f/b Capital Partners, annual entertainment center pro forma operating expenditures (consisting of fixed costs, variable costs, and management fees) would be at a steady-state, or full operations, by 2009. Fixed costs for gaming are estimated at $10,000 per slot machine, while variable and management fees would be 10% and 3% of gross revenue, respectively. Based on these estimates, annual entertainment center operating expenditures would amount to $11.4 million, as outlined in Table 2.2.1

Table 2.2.1
Estimated Annual Direct Entertainment Center Operating Expenditures (2009)

Description			Total Expenditures ($ Millions)
Fixed Costs	$10,000 per slot machine	500 slots	$ 5.0
Variable Costs	10% of Gross Revenue	Gross Revenue: $49.0 million	$ 4.9
Management Fees	3% of Gross Revenue	Gross Revenue: $49.0 million	$ 1.5
Total Operating Expenditures			**$ 11.4**

Source: FB Capital Partners, Econsult Corporation (2007)

These annual entertainment center operating expenditures would generate significant economic impacts in Montgomery County and the Commonwealth of Pennsylvania. For location of direct expenditures, we assume that 80% of these direct expenditures would be spent in Montgomery County and 100% in the Commonwealth.

Table 2.2.2
Potential Annual Ongoing Economic Impacts Attributable to Entertainment Center Operations
Steady State Full Operations 2009
($ Millions in 2007 Dollars)

Description	Montgomery County	Pennsylvania Commonwealth
Direct Expenditures ($MM)	$ 9.1	$ 11.4
Indirect & Induced Expenditures ($MM)	$ 6.4	$ 12.8
Total Output ($MM)	**$ 15.5**	**$ 24.2**
Multiplier	1.70	2.12
Total Employment	**169**	**344**
Total Earnings ($MM)	**$ 3.1**	**$ 7.1**

Source: Econsult Corporation (2007)
**Results may not add due to rounding*
***Total Output includes Total Earnings*
****Total Employment includes part-time and full-time jobs*

In Montgomery County, the $9.1 million in annual entertainment center operations expenditures will generate an additional $6.4 million in indirect and induced expenditures, resulting in $15.5 million in total output. This suggests a multiplier of 1.70, which implies that each $1 in direct entertainment center operating expenditures will generate an additional $0.70 in indirect and induced expenditures in Montgomery County. The $15.5 million in total output includes $3.1 million in wages and earnings, supporting nearly 170 total jobs.

For the Commonwealth of Pennsylvania, the $11.4 million in annual entertainment center operations expenditures will generate an additional $12.8 million in indirect and induced expenditures, resulting in $24.2 million in total output. This suggests a multiplier of 2.12, suggesting that for each $1 in direct operating expenditures, the Commonwealth benefits from an additional $1.12 in indirect and induced expenditures. The $24.2 million in total output includes $7.1 million in total earnings, supporting over 340 total jobs.

2.3 Annual Impacts of Increased VFCC Hotel Expenditures (Ongoing)

In addition to patron spending inside the entertainment center facility, this project is expected to lead to increased hotel and convention activities in order to accommodate entertainment center guests and expanded meetings at the two VFCC hotels (Radisson Valley Forge and Valley Forge Scanticon with a combined 488 rooms). Based on data obtained from f/b Capital Partners, we consider the difference in 2008 and 2009 annual hotel operating expenditures (less 3% growth) as the portion of hotel operating expenditures attributable to the entertainment center-induced

increased operations. The increase in hotel and convention operating expenditures amounts to $3.0 million, an approximate 10% increase on a current $30 million annual base.[3] As before, we assume 80% of these expenditures are in Montgomery County and 100% in Pennsylvania.

Table 2.3
Potential Annual Ongoing Economic Impacts Attributable to Increased VFCC Hotel Operations
($ Millions in 2007 Dollars)

Description	Montgomery County	Pennsylvania Commonwealth
Direct Expenditures ($MM)	$ 2.4	$ 3.0
Indirect & Induced Expenditures ($MM)	$ 1.3	$ 3.1
Total Output ($MM)	**$ 3.7**	**$ 6.1**
Multiplier	1.55	2.03
Total Employment	**28**	**72**
Total Earnings ($MM)	**$ 0.7**	**$ 1.8**

**Results may not add due to rounding*
***Total Output includes Total Earnings*
****Total Employment includes part-time and full-time jobs*

In Montgomery County, the $2.4 million in increased annual hotel operations expenditures will generate an additional $1.3 million in indirect and induced expenditures, resulting in $3.7 million in total output. This suggests a multiplier of 1.55, which implies that each $1 in direct entertainment center operating expenditures will generate an additional $0.55 in indirect and induced expenditures in Montgomery County. The $3.7 million in total output includes $0.7 million in total earnings, supporting nearly 30 total jobs.

In the Commonwealth of Pennsylvania, the $3.0 million in increased annual hotel operations expenditures will generate an additional $3.1 million in indirect and induced expenditures, resulting in $6.1 million in total output. This suggests a multiplier of 2.03, suggesting that for each $1 in direct construction expenditures, the Commonwealth benefits from an additional $1.03 in indirect and induced expenditures. The $6.1 million in total output includes $1.8 million in total earnings, supporting over 70 total jobs.

[3] Also, the hotel spends more than $1.5 million per year on standard capital improvement projects including room upgrades and refurbishment. We would also not attribute these expenditures to the entertainment center, and hence do not include them in the model.

2.4 Economic impacts of Ancillary Expenditures (Ongoing) (Visitor Spending outside of VFCC)

In addition to patron spending inside the entertainment center facility, and the increase in hotel/convention expenditures at the VFCC described above, this project can be expected to generate significant additional visitor spending (by the patrons) outside of the VFCC[4] at other area establishments, including primarily other Valley Forge and King of Prussia area hotels, restaurants, shops, entertainment, and cultural venues.

As we noted earlier, PKF and f/b Capital Partners' estimates for gaming visits by hotel guests (at VFCC hotels and nearby hotels) are based on *existing* occupancy levels, and do not account for any additional hotel room nights generated by the existence or operation of the facility. This is clearly conservative (and appropriate) when estimating entertainment center visitor numbers, but also clearly omits an important, potential spin-off effect: generating more hotel visitors and more visitor spending by both overnighters and daytrippers.

We refer to this as "ancillary" spending, and it represents an estimate of the incremental spending in the economy in addition to entertainment center and other VFCC spending. The magnitude of this ancillary spending will be influenced by several factors:

- Total estimated number of patrons/visitors
- Residence of entertainment center patrons
- Proportion of visitors who stay overnight (and length of stay) in other hotels
- Proportion of visitor classified as DAYTRIPPERS
- Average daily ancillary expenditures per OVERNIGHT or DAYTRIPPER visitor
- Spending of DAYTRIPPERS and OVERNIGHT visitors

We have developed estimates of direct ancillary spending based in part on VFCC PARTNERS' estimates of annual entertainment center visitors, as provided by f/b Capital Partners using PKF data. Underlying our estimates are several assumptions, which we think are conservative, thereby making our estimates of ancillary direct spending conservative.

We define direct ancillary (outside of the entertainment center facility) spending to be the sum of the spending by OVERNIGHT visitors (outside of VFCC hotels) and DAYTRIPPERS. In order to estimate the two direct expenditure amounts, we use the following methodology.[5]

The first step is to estimate the proportion and number of OVERNIGHTERS and DAYTRIPPERS out of a TOTAL estimated 750,000 annual entertainment center visits. First, we exclude

[4] We look at this separately, since all of the expenditures by visitors in the facility are already accounted for in the operating expenditures. Indeed this ancillary impact represents a significant potential benefit for the County and region.
[5] An alternative method is to make an assumption about the amount of spending each entertainment center visitor will spend on his or her trip, and then make an assumption about what PORTION of that spending will be made INSIDE and OUTSIDE of the entertainment center and VFCC. Although this is a reasonable and direct method, we do not use this methodology because we do not have any good basis for making the proportion assumption

approximately 175,000 visits that are expected to be LOCAL -- that is, visitors will be coming from Zone 1 (closest to the facility) and 88,000 patrons who are already hotel guests. This leaves an estimated 490,000 visits from all areas outside of Zone 1.

In their work for the Philadelphia Gaming Advisory Task Force, the Innovation Group (IG) estimated that only a small proportion (2-4%) of visitors to slots-only facilities stay overnight at the destination.[6] This estimate should clearly be adjusted down for VFCC since city facilities are closer to many of the region's main attractions and tourist destinations. We conservatively assume that 1%, or 4,900 of the new visitors will become overnighters and stay in area hotels outside of the VFCC hotels, with an average length of stay (LOS) of 1.5 nights and 1.8 occupants per room. The remaining non-Zone 1 visitors (485,000) would be classified as Day trippers, but we assume only 25% of day trippers spend any money outside of the VFCC.

Based on average Valley Forge area daily hotel room rates of $113/night (for 2006[7]), we assume a per-visitor trip spending of $150 for overnighters and $50 for daytrippers. This in turn generates annual direct spending for overnighters of $750,000 and daytrippers of $6.1 million, or nearly 6.9 million combined. We also assume that 90% of the ancillary spending occurs in Montgomery County and 100% in Pennsylvania.

Table 2.4
Potential Annual Ongoing Economic Impacts Attributable to Ancillary Spending
($ Millions in 2007 Dollars)

Description	Montgomery County	Pennsylvania Commonwealth
Direct Expenditures ($MM)	$ 6.2	$ 6.9
Indirect & Induced Expenditures ($MM)	$ 3.9	$ 7.6
Total Output ($MM)	**$ 10.1**	**$ 14.5**
Multiplier	1.64	2.12
Total Employment	**94**	**190**
Total Earnings ($MM)	**$ 1.9**	**$ 4.2**

Source: Econsult Corporation (2007)
**Results may not add due to rounding*
***Total Output includes Total Earnings*
****Total Employment includes part-time and full-time jobs*

In Montgomery County, the $6.2 million in ancillary spending will generate an additional $3.9 million in indirect and induced expenditures, resulting in $10.1 million in total output. This suggests a multiplier of 1.64, which implies that each $1 in direct entertainment center operating expenditures will generate an additional $0.64 in indirect and induced expenditures in Montgomery

[6] Philadelphia Gaming Advisory Task Force: The Final Report, 2005.
[7] The $113 daily room rate is based on 11 months YTD data from VFPCVB. With an overall occupancy rate of 68%, this generates a "revenue per available room" (REVPAR) estimate of $77. We expect most of the additional occupancy in the higher end hotels, and also include an allowance for food to generate out conservative estimate of $150/night per overnight.

County. The $10.1 million in total output includes $1.9 million in total earnings, supporting nearly 100 total jobs.

In the Commonwealth of Pennsylvania, the $6.9 million in increased annual hotel operations expenditures will generate an additional $7.6 million in indirect and induced expenditures, resulting in $14.5 million in total output. This suggests a multiplier of 2.12, which implies that for each $1 in direct construction expenditures, the Commonwealth benefits from an additional $1.12 in indirect and induced expenditures. The $14.5 million in total output includes $4.2 million in total earnings, supporting nearly 200 total jobs.

Overall, we estimate that total direct, indirect, and induced potential ongoing annual economic impacts generated by the VFCC Entertainment center for the State of Pennsylvania to be:

- **$45 million additional overall spending activity**
- **Over 500 new jobs**
- **Over $13 million in wages and salaries**

3 .0 IMPACTS ON STATE AND LOCAL TAX REVENUE

The Commonwealth of Pennsylvania, Montgomery County, and Upper Merion Township and School District would all see significant tax revenues generated, directly and indirectly, by the proposed entertainment center, especially once in operation. In this section we provide estimates for those increased revenues, first at the state level and then at the local/county level.

3.1 State Tax Revenues

In addition to the license fee ($5 million, one-time for Category 3) and any other fees associated with the award of a license, the entertainment center facility will pay significant taxes to the Commonwealth based on the level of its activities (in particular the state tax on entertainment center gross gaming revenues), and taxes generated by the up front construction activities. The direct operating activities of the entertainment center facility, along with the increased hotel operations and ancillary spending, will generate sizable new tax revenues annually to the Commonwealth, including personal and corporate income and sales taxes. We use our own model of the Pennsylvania tax system to estimate the Commonwealth's annual tax revenue associated with the indirect and induced economic activity generated by the entertainment center facility operations and ancillary spending, and add that to the estimates of direct gaming taxes.

PKF has estimated an annual "win" of $59.8 million, in 2007 dollars, in the first stabilized year of gaming. This estimate contains two components:

- $52.7 million from the area residential market
- $7.1 million from the hotel visitor market.

The Commonwealth imposes gaming taxes, applied to gross gaming revenues, in three categories. Based on an estimate of $59.8 million in annual gross gaming revenues, the proposed entertainment center would generate the nearly $30.5 million in revenues during the first year of full operation:

Table 3.1
Potential Direct Gaming Taxes
($ Millions in 2007 Dollars)

Description	Tax Rate	Total Gaming Taxes
Gaming Fund	34%	$20.3 million
Race Horse Development Fund	12%	$7.2 million
Economic Development and Tourism Fund	5%	$2.9 million
Total State Gaming Revenue	**51%**	**$30.5 million**

Table 3.1.1
Potential Non-Gaming State Taxes
($ Millions in 2007 Dollars)

Description	Pennsylvania State Personal Income Tax	Pennsylvania State Sales and Use Tax	Pennsylvania State Corporate Net Income Tax	Pennsylvania State Capital Stock and Franchise Tax	Total Tax Impact
Construction Period (One-Time)	$0.88	$0.95	$0.25	$0.16	**$2.23**
Annual Entertainment center Operations (Ongoing)	$0.20	$0.33	$0.09	$0.05	**$0.67**
Annual Increased Hotel Operations (Ongoing)	$0.05	$0.07	$0.02	$0.01	**$0.15**
Annual Ancillary Spending (Ongoing)	$0.12	$0.18	$0.05	$0.03	**$0.38**
Total Annual Ongoing	$0.37	$0.58	$0.16	$0.09	**$1.2**

Source: Econsult Corporation (2007)

As shown in Table 3.1.1, the construction period is estimated to generate a one-time tax impact of $2.2 million. Annual entertainment center operations and annual increased hotel operations are estimated to generate annual ongoing tax impacts for the Commonwealth of Pennsylvania of $0.7 and $0.2 million, respectively, while ancillary spending will generate an estimated $0.4 million in annual taxes. Total induced state non-gaming annual taxes will amount to over $1.2 million.

Combined, gaming and induced non-gaming state taxes could approach $31.7 million annually with this proposed entertainment center.

3.2 Local Tax Revenues

Montgomery County, Upper Merion Township, and the Upper Merion School District would all see increased tax revenues, directly via gaming taxes or via increases in existing local tax bases. Currently, the facility pays a total of $443,472 in property taxes, comprised of:

- Upper Merion Township $51,511
- School District $323,752
- Montgomery County $68,209

Total local gaming taxes will amount to $2.4 million, while increases in total non-gaming taxes amount to $0.4 million, amounting to total local tax revenues of $2.8 million.

Table 3.2.1
Property Tax Rates
Upper Merion Township, Montgomery County

Description	Mills	Mills (Equalized @ 1.87)
County Millage	2.890	5.404
Municipality Millage	1.991	3.723
School Millage	13.480	25.208
Total Millage	18.361	34.335

Table 3.2.2
Potential *INCREASES* in Local Tax Revenues
($ Millions in 2007 Dollars)

Description	Total Tax Impact
Gaming Taxes	
2% for Local host community fee	$ 1.2
2% for DCED Montgomery County Economic Development	$ 1.2
Total Gaming Taxes	**$ 2.4**
Non-Gaming Taxes	
Real Estate Taxes	
County	$ 0.02
Township	$ 0.02
School District	$ 0.1
Township Privilege Tax	$ n/a
2% County Room Tax (VFCC + outside hotels)	$ 0.22
Amusement	$ n/a
Total Non-Gaming Taxes	**$ 0.4**
Total Gaming and Non-Gaming Taxes	**$ 2.8**

Source: Econsult Corporation (2007)

Combined, gaming and induced non-gaming local taxes could approach $2.8 million annually with this proposed entertainment center.

4.0 POTENTIAL QUALITATIVE IMPACTS

This proposal offers Pennsylvania a unique opportunity to: (1) maximize the overall net fiscal impact of the gaming industry to the Commonwealth, and (2) strengthen the Southeast Pennsylvania convention and tourism industry, one of the Commonwealth's most important sources of economic growth.

In designing this proposed project VFCC PARTNERS has made every effort to minimize and remediate negative qualitative impacts, while maximizing positive qualitative impacts.

4.1 Positive Qualitative Impacts

In addition to the quantitative economic impacts discussed in previous sections, the proposed entertainment center facility project would generate several important unique qualitative benefits for the County and Commonwealth. While these are all valuable to the County and its citizens, it is difficult to place a dollar estimate on their values, since they are not directly exchanged in the marketplace.

- The VFCC entertainment center should generate the greatest "recapture" rate for Pennsylvania, due to its proximity to both Atlantic City and Delaware gaming facilities, and the large number of Pennsylvanians who currently leave the Commonwealth to patronize such opportunities. As noted above, this recapture has the same stimulating effect on the economy as a new export.

- In addition to stimulating economic development and jobs, the VFCC entertainment center would provide expanded and increased meeting and entertainment opportunities for residents and visitors, and provide an important stimulus for regional tourism and convention/meeting activity. VFCC PARTNERS intend to work closely with local and state tourism and convention officials to enhance their marketing efforts. Marketing will take advantage of the proximity to important cultural, historical, and entertainment tourist attractions. This will boost tourism and convention attendance, generating significant additional business for the region's hospitality industry.

Convention/ Tourism Builder – strengthens regional convention and tourism efforts

VFCC entertainment center should provide an important stimulus for Montgomery County and regional tourism. VFCC entertainment center will

- Be designed as a convention-enhancing amenity

- Offer exciting non-casino entertainment activities, in addition to a high-quality gaming experience

- Work closely with VFCB and State tourism and convention officials to enhance their marketing efforts
- Take advantage of its location in the center of the Metropolitan area easily accessible via convenient highway access
- Boost tourism and convention attendance, generating significant additional business for Montgomery County and the region's hospitality industry.

4.2 Minimal impacts to neighborhoods, local government services or infrastructure

The impacts of the proposed entertainment center should have only minor negative impacts on the neighboring communities and the County government, primarily because this would not represent a significant change of use. Sufficient transportation and parking infrastructure is basically in place, and the facility is not adjacent to residential neighborhoods. Furthermore, The River Crossing Complex projects being promoted by Chester and Montgomery Counties anticipates over $220 million in highway upgrades in this immediate area. VFCC PARTNERS are planning to not only mitigate any such impacts, but also to improve existing conditions to the extent possible. The River Crossing Complex projects being promoted by Chester and Montgomery Counties anticipates over $220 million in highway upgrades in this immediate area.

APPENDIX A: RIMS II INPUT-OUTPUT MODELS

A.1 REGIONAL INPUT-OUTPUT MODELS AND METHODOLOGY

The regional economic impact estimates in this report are based on a standard regional input-output model developed by the U. S. Department of Commerce, Bureau of Economic Analysis. This model, the Regional Input-Output Modeling System (RIMS II), is a standard and widely used tool for estimating regional economic impacts. The results generated from the RIMS II are widely recognized as reasonable and plausible in cases where the data utilized as the input to the model are accurate and based on reasonable assumptions. This section describes the basic concepts that underlie RIMS II.

In general, if the demand for the output of an industry in a given region increases by $1 million, total regional output increases by $1 million. This increase is referred to as the *direct expenditure effect*. However, the economic impact on the region of the $1 million increase in final demand does not stop with the direct expenditure effect. Regional firms will also be called upon to increase their production to meet the needs of the industry where the initial increase in final demand occurs. Further, other suppliers must also increase production to meet the needs of the initial group of supplier firms. The total increase in expenditures by regional suppliers is considered the "indirect" economic impact of the initial $1 million in sales, and is included in measures of the total economic impact of the initial $1 million in sales.

The total economic impact of the $1 million in initial sales includes one additional element. All economic activity that results from the initial $1 million in sales, whether direct or indirect, requires workers, and these workers must be paid for their labor. This means that part of the direct and indirect output produced is actually in the form of wages and salaries paid to workers in the various affected industries. These wages and salaries will in turn be spent in part on goods and services produced locally, creating another round of regional economic impacts referred to as "induced" impacts.

Direct expenditures are input into the RIMS II model. The model then produces a calculation of the total expenditures within the regional economy that results from these direct expenditures. This total effect is the sum of the initial direct, indirect, and induced expenditures. The RIMS II model also estimates the proportion of direct, indirect, and induced expenditures that represent income earned by regional households. Finally, the RIMS II model calculates total expenditure impacts that occur within each industrial sector, and translates this estimate into an estimate of the total number of full-time and part-time jobs within each industry required to produce this output.

The RIMS II model is based on regional *multipliers*, which are summary measures of economic impacts generated from direct changes in expenditures, earnings, or employment. Multipliers show the overall impact to a regional economy resulting from a change in a particular industry. Multipliers can vary widely by industry and area. Multipliers are higher for regions with a diverse industry mix. Industries that buy most of their materials from outside the Commonwealth or region tend to have lower multipliers. Multipliers also tend to be higher for industries located in larger areas, because more of the spending by the industry stays within the area.

A.2 FISCAL IMPACT MODEL

The economic activity estimated to result from an economic development project should result in additional tax revenue for Commonwealth and local government in the region where that economic activity occurs. Econsult's Fiscal Impact Model is designed to estimate this level of additional tax revenue based on the estimates of economic impact produced by the RIMS II model.

The RIMS II model provides estimates of direct, indirect, and induced expenditures, earnings, and employment within a county, metropolitan area, or state. Econsult combines the output of the RIMS II model with U. S. Census Bureau County Business Patterns data to produce estimates of the distribution of additional employment and earnings by county within a region or state. In addition, U. S. Census Bureau "Journey to Work" data on commuting flows from the 2000 Census are utilized to estimate income earned by residents of each county within a region.

Pennsylvania Commonwealth business and sales taxes are estimated based on the most recent data on average sales tax base per employee by major industry, as contained in publications from the Pennsylvania Department of Revenue. The RIMS II model produces estimates of additional employment by industry. These estimates, combined with estimates of the average business and sales tax base per employee, and current and projected future tax rates, produce the estimates of additional annual state business and sales tax revenue.

For the current study, the fiscal impact estimates take into account estimated additional revenue from the following major tax sources:

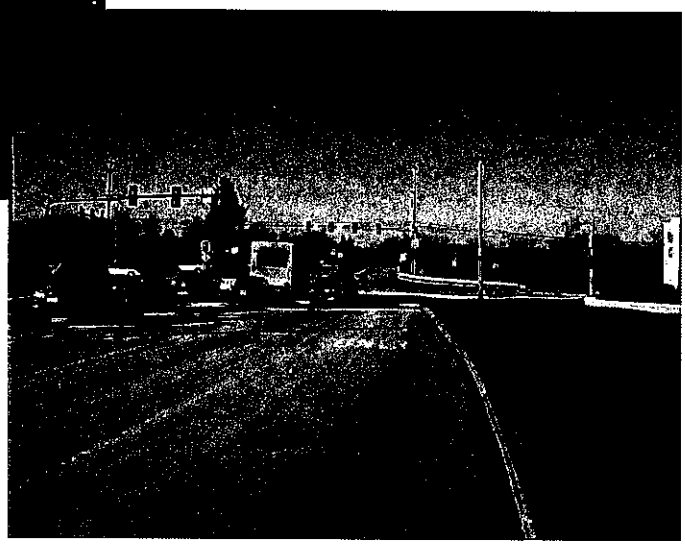
- Pennsylvania Commonwealth sales tax
- Pennsylvania personal income tax
- Pennsylvania corporate net income tax
- Pennsylvania capital stock and franchise tax

EXHIBIT B

Traffic Impact Study

for the

Valley Forge Convention Center



Upper Merion Township,
Montgomery County,
Pennsylvania

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TABLE OF CONTENTS

	Page
Executive Summary	1
Introduction	4
Existing Transportation Setting	5
Roadway Characteristics	5
Existing Traffic Volumes	7
Planned Roadway Improvements	7
Future Traffic Volumes without Entertainment Center	11
Regional Traffic Growth	11
Local Traffic Growth	11
Future Traffic Volumes with Entertainment Center	15
Trip Generation	15
Trip Distribution and Assignment	16
Site Access	21
Capacity/Level-of-Service Analyses	22
North Gulph Road and First Avenue	22
North Gulph Road and right-in/right-out-only driveway	22
North Gulh Road and main driveway	26
First Avenue and main driveway	26
First Avenue and secondary driveway	27
First Avenue and right-in/right-out-only driveway	27
Summary	27

APPENDIX A - *Intersection Sketches and Photographs*

APPENDIX B - *Manual Turning Movement Count Data*

APPENDIX C - *Other Development Trip Assignment*

APPENDIX D - *Site Trip Distribution*

APPENDIX E - *Level of Service Methodology*

APPENDIX F - *Existing (2007) Capacity/Level of Service Analysis Worksheets*

APPENDIX G - *Future (2009) Capacity/Level of Service Analysis Without Development Worksheets*

APPENDIX H - *Future (2009) Capacity/Level of Service Analysis With Development Worksheets*

LIST OF TABLES

Number		Page
1	Existing Roadway Characteristics	5
2	Vehicular Trip Generation	15

LIST OF FIGURES

Number		Page
1	Site Location Map	6
2	2007 Existing Weekday Morning Peak Hour Traffic Volumes	8
3	2007 Existing Weekday Afternoon Peak Hour Traffic Volumes	9
4	2007 Existing Saturday Midday Peak Hour Traffic Volumes	10
5	2009 Future Weekday Morning Peak Hour Traffic Volumes without Entertainment Center	12
6	2009 Future Weekday Afternoon Peak Hour Traffic Volumes without Entertainment Center	13
7	2009 Future Saturday Midday Peak Hour Traffic Volumes without Entertainment Center	14
8	Directions of Approach and Departure	17
9	2009 Future Weekday Morning Peak Hour Traffic Volumes with Entertainment Center	18
10	2009 Future Weekday Afternoon Peak Hour Traffic Volumes with Entertainment Center	19
11	2009 Future Saturday Midday Peak Hour Traffic Volumes with Entertainment Center	20

12	2007 Existing Levels of Service	23
13	2009 Future Levels of Service without Entertainment Center	24
14	2009 Future Levels of Service with Entertainment Center	25

Executive Summary

Valley Forge Convention Center Partners L.P. proposes to develop an entertainment center with a 500-slot gaming facility at the existing Valley Forge Convention Center (VFCC), located on the east side of North Gulph Road, north of First Avenue, in Upper Merion Township, Montgomery County, Pennsylvania. This entertainment center, which is expected to be constructed within the existing square footage of the complex, is expected to be an amenity to the existing complex, geared predominantly toward the people already visiting the site; each person must spend $10.00 on-site prior to be allowing into the entertainment space, in accordance with the Class III license requirements of the Pennsylvania Gaming Control Board.

The scope of this traffic impact study includes an evaluation of the existing 2007 weekday morning, weekday afternoon, and Saturday midday peak hours, as well as those same future 2009 peak hours, both without the entertainment center and upon full build-out of the entertainment center, at the following intersections:

- North Gulph Road and First Avenue
- North Gulph Road and right-in/right-out-only VFCC driveway
- North Gulph Road and main VFCC driveway
- First Avenue and main VFCC driveway
- First Avenue and secondary VFCC driveway
- First Avenue and right-in/right-out-only VFCC driveway

The evaluation of traffic conditions associated with the proposed entertainment center reveals the following findings and conclusions:

- **Existing Traffic Volumes** – Manual turning movement traffic counts were conducted in February 2007 during the weekday morning peak period (7:00 AM to 9:00 AM), the weekday afternoon peak period (4:00 PM to 6:00 PM), and the Saturday midday peak period (12:00 PM to 3:00 PM) at the study intersections. These traffic counts were scheduled to overlap with a peak convention at the site. Seasonal adjustment factors contained in the PennDOT publication, 2005 *Pennsylvania Traffic Data,* were reviewed to ensure that the collected counts reflect typical conditions. The collected traffic data reflects higher than average data, and therefore, a seasonal adjustment factor was not utilized to adjust the data.

- **Future Traffic Volumes without Entertainment Center** – To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 2.1 percent compounded for two years, or 4.24 percent total. Additionally, to account for local traffic growth, traffic associated with five other planned area developments was included in the future traffic volume projections.

- **Trip Generation** – Traffic volumes generated by the proposed entertainment center were prepared based on the ITE article "Trip Generation Characteristics of Small to Medium Sized Casinos," published 2001. It is anticipated that the 500 gaming positions will generate approximately 250 total (inbound and outbound) trips during the weekday morning peak

hour, approximately 295 total (inbound and outbound) trips during the weekday afternoon peak hour, and approximately 320 total (inbound and outbound) trips during the Saturday midday peak hour. It should be noted that these estimates are considered conservative. Studies conducted at local gaming facilities, including one in New Jersey and two in Delaware, by Pennoni Associates indicate that the trip generation of a 500-space gaming facility will be only 179 trips per hour during the weekday afternoon peak hour and 126 trips during the Saturday midday peak hour. The morning peak hour was not included in their study. Additionally, it is expected that a portion of this gaming facility traffic will be traffic that is already visiting the site for a convention, hotel visit, or restaurant visit and, therefore, not adding new traffic to the adjacent roadway system. However, since this type of license is new to Pennsylvania, it is not clear exactly how much of the gaming facility traffic will be new to the site compared to how much will be shared traffic from other uses on this site. Therefore, to provide a conservative estimate of the traffic impact of the redevelopment, for the purposes of this analysis, it has been assumed that all traffic generated by the gaming facility will be new to the site.

- **Site Access** – Access to the proposed entertainment center will be provided via the existing VFCC driveways intersecting North Gulph Road and First Avenue.

- **Capacity/Level-of-Service Analysis** – The peak hour traffic volumes were analyzed to determine existing operating conditions and future operating conditions (both without and with the proposed entertainment center) in accordance with the standard techniques contained in the current *Highway Capacity Manual*. The results of the analyses are as follows for each of the study intersections:

  - *North Gulph Road and First Avenue* – Under existing conditions and 2009 future without- and with-entertainment center conditions, this signalized intersection operates at overall LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours, with several movements operating with delay (LOS E) during the weekday morning and weekday afternoon peak hours. Minor traffic signal timing modifications are necessary to mitigate the impacts of the entertainment center.

  - *North Gulph Road and right-in/right-out-only driveway* – Under existing conditions and 2009 future without- and with-entertainment center conditions, this unsignalized intersection operates at LOS B or better during all three peak hours.

  - *North Gulph Road and main VFCC driveway* – Under existing and future conditions, the exiting left-turn movement will operate at LOS F during at least one of the peak hours due to the heavy traffic volumes on Gulph Road. This is expected to continue with the proposed redevelopment. All other critical movements at this intersection will operate at LOS D or better during each of the peak hours with the proposed redevelopment.

- *First Avenue and main VFCC driveway* – Under existing conditions and 2009 future without-entertainment center conditions, this unsignalized intersection operates at LOS D or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours, with the exception of the southbound movement (LOS F) during the weekday afternoon peak hour. With the proposed entertainment center, this unsignalized intersection will continue to operate similar to without-entertainment center conditions.

- *First Avenue and secondary VFCC driveway* – Under existing conditions, this unsignalized intersection operates at LOS D or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours. Under 2009 future without- and with-entertainment center conditions, this unsignalized intersection will experience delay (LOS E) on the minor street southbound approach during the weekday afternoon peak hour. All other movements at this intersection are expected to operate at LOS D or better during all three peak hours.

- *First Avenue and right-in/right-out-only driveway* – Under existing conditions and 2009 future without- and with-entertainment center conditions, this unsignalized intersection operates at LOS C or better during all three peak hours.

Based on the relatively low volume of traffic expected to be generated by this development, the entertainment center will have only a minimal impact on the operation of the roadways and intersections in the vicinity of the site. Since North Gulph Road is part of the State Highway System, all roadway and access improvements will be subject to the review and approval of PennDOT.

Introduction

Valley Forge Convention Center Partners L.P. proposes to develop an entertainment facility, consisting of a 500-slot gaming facility, at the existing Valley Forge Convention Center (VFCC), located on the east side of North Gulph Road, north of First Avenue, in Upper Merion Township, Montgomery County, Pennsylvania. This entertainment space will be constructed within the existing square footage of the site. It is expected to be geared predominantly toward the people already visiting the site; each person must spend $10.00 on-site prior to be allowing into the entertainment space, in accordance with the Class III license requirements of the Pennsylvania Gaming Control Board. This entertainment center will be an amenity to the existing complex, which includes hotels, office space, exhibition space, and restaurant space. Public access will not be restricted; however, visitors must first pay the $10.00 access requirement.

The purpose of this traffic study is to present an evaluation of the incremental traffic impacts of the proposed entertainment center within the study area in Upper Merion Township, as well as provide recommendations regarding the proposed site accesses, for efficient traffic movements to and from the site.

Manual turning movement traffic counts were completed at the site driveways and site-adjacent intersections during the weekday morning peak period (7:00 AM to 9:00 AM), the weekday afternoon peak period (4:00 PM to 6:00 PM), and the Saturday midday peak period (11:00 AM to 2:00 PM). To assess existing traffic conditions, these existing traffic volumes were subjected to detailed capacity/level-of-service analysis, in accordance with accepted methodologies, for the highest peak hour during each peak period, which serves as the basis for this evaluation.

Next, future traffic volumes without the proposed entertainment center were projected utilizing an annual traffic growth rate to account for regional traffic growth, as well as local traffic growth associated with five other known area developments. The future traffic volumes were projected to the year 2009, the anticipated build-out year of the entertainment center, at the study intersections. The future traffic volumes without the entertainment center were then subjected to detailed capacity/level-of-service analysis.

Finally, the traffic generated by the proposed entertainment center was established based on accepted methodologies and assigned to the roadway network and site accesses. The site-generated traffic volumes were added to future without-entertainment-center traffic volumes, and subjected to detailed capacity/level-of-service analysis to assess future traffic conditions with the entertainment center.

Existing Transportation Setting

The proposed entertainment center will be located within the Valley Forge Convention Center complex, east of North Gulph Road and north of First Avenue, in Upper Merion Township, Montgomery County, Pennsylvania **(Figure 1)**. The existing roadways and intersections in the vicinity of the site, which comprise the study area roadway network, are described in this section.

Roadway Characteristics

The study area roadway network and characteristics are summarized below in **Table 1.**

Table 1. Existing Roadway Characteristics

Roadway	Roadway Jurisdiction	Travel Lanes (per direction)	Shoulders	Speed Limit
North Gulph Road (S.R. 3039)	State	2	No	35 mph
First Avenue	Township	2	No	35 mph

The following key intersections in the vicinity of the site compromise the study area:

- North Gulph Road and First Avenue
- North Gulph Road and right-in/right-out-only VFCC driveway
- North Gulph Road and main VFCC driveway
- First Avenue and main VFCC driveway
- First Avenue and secondary VFCC driveway
- First Avenue and right-in/right-out-only VFCC driveway

These intersections are the closest intersections to the site, and are expected to be most impacted by the entertainment center. Beyond this study area, site traffic will have an even smaller impact as it disseminates throughout the roadway network. The existing characteristics of the study intersections, including field sketches and photographs, are summarized in **Appendix A**.

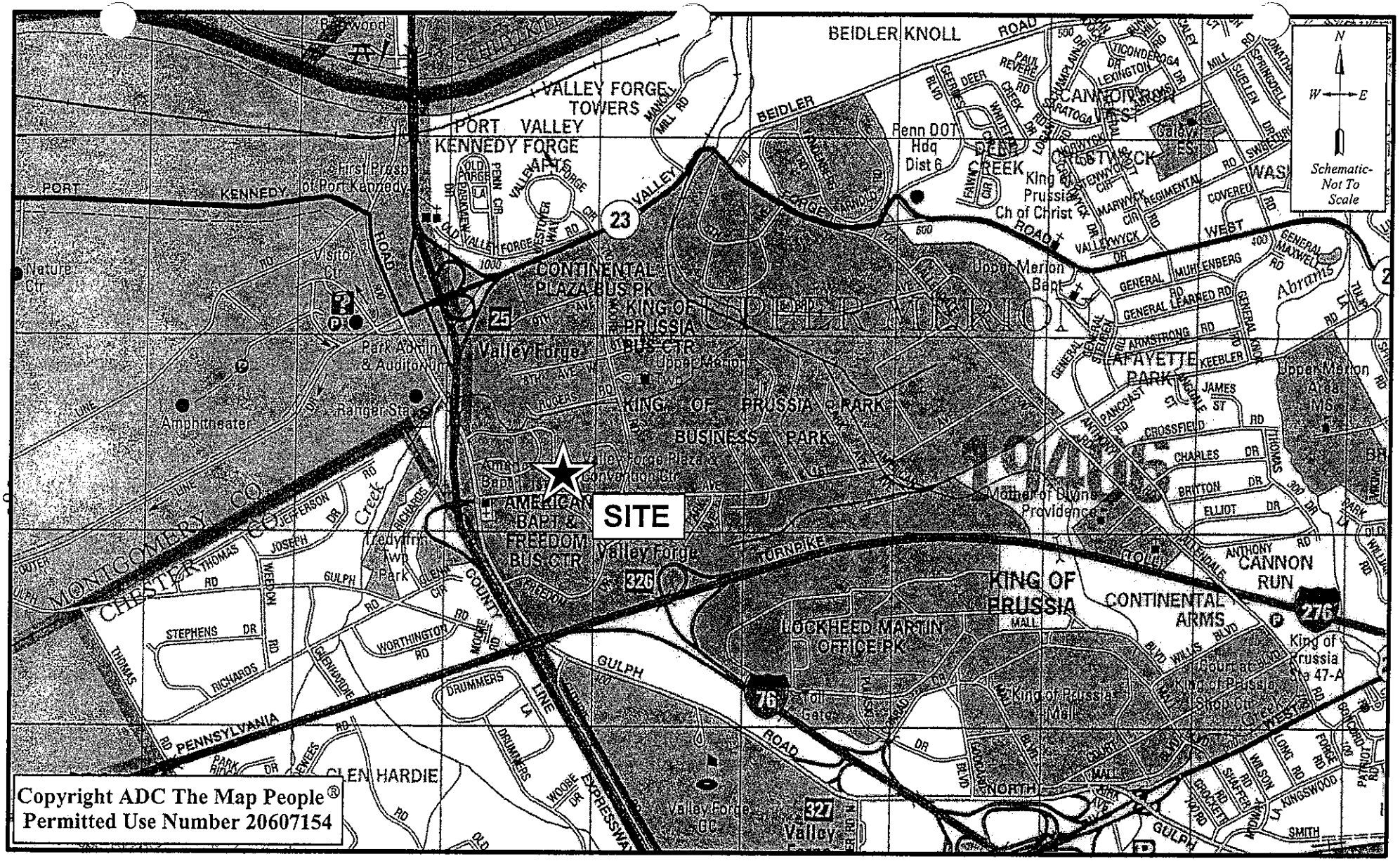


FIGURE 1

Site Location Map

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

(6/12/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure1.dwg

Existing Traffic Volumes

Manual turning movement traffic counts were conducted in February 2007 during the weekday morning peak period (7:00 AM to 9:00 AM), the weekday afternoon peak period (4:00 PM to 6:00 PM), and the Saturday midday peak period (12:00 PM to 3:00 PM) at the study intersections. These periods were selected to encompass the combined peak hours of both site and non-site traffic on weekdays (commuter periods) and on a weekend (Saturday). These counts were also conducted during a peak convention occurring on the site in order to properly reflect peak conditions, and serve as the base for this analysis. The results of these traffic counts are tabulated by 15-minute intervals in **Appendix B**. The four highest consecutive 15-minute peak intervals during these traffic count periods constitute the peak hours that are the basis of this traffic analysis.

Seasonal adjustment factors contained in the PennDOT publication, *2005 Pennsylvania Traffic Data,* were reviewed to ensure that the collected counts reflect typical conditions. The collected traffic data reflects higher than average data, and therefore, a seasonal adjustment factor was not utilized to adjust the data. The resultant peak hour traffic volumes are depicted in **Figure 2, 3, and 4** for the weekday morning, weekday afternoon, and Saturday midday peak hours, respectively.

Planned Roadway Improvements

Through discussions with the Township and review of PennDOT's *Twelve Year Transportation Program,* there are no plans to improve any of the study area roadways by the Township, PennDOT, or other area developers that would have a significant effect on traffic operations by the 2009 opening year of the project. Future plans exist for the improvement of the PA Route 422 corridor in this project area; however, these improvements are not expected to be completed until at least 2013. It should be noted that, in conjunction with that corridor improvement project, it is expected that left-turns will be prohibited at the main access intersection with Gulph Road. The access intersection will be restricted to right-in/right-out movements only. However, this improvement project is not expected to occur until 2013 and, therefore, it was not assumed to be in place under the future 2009 conditions of this report.

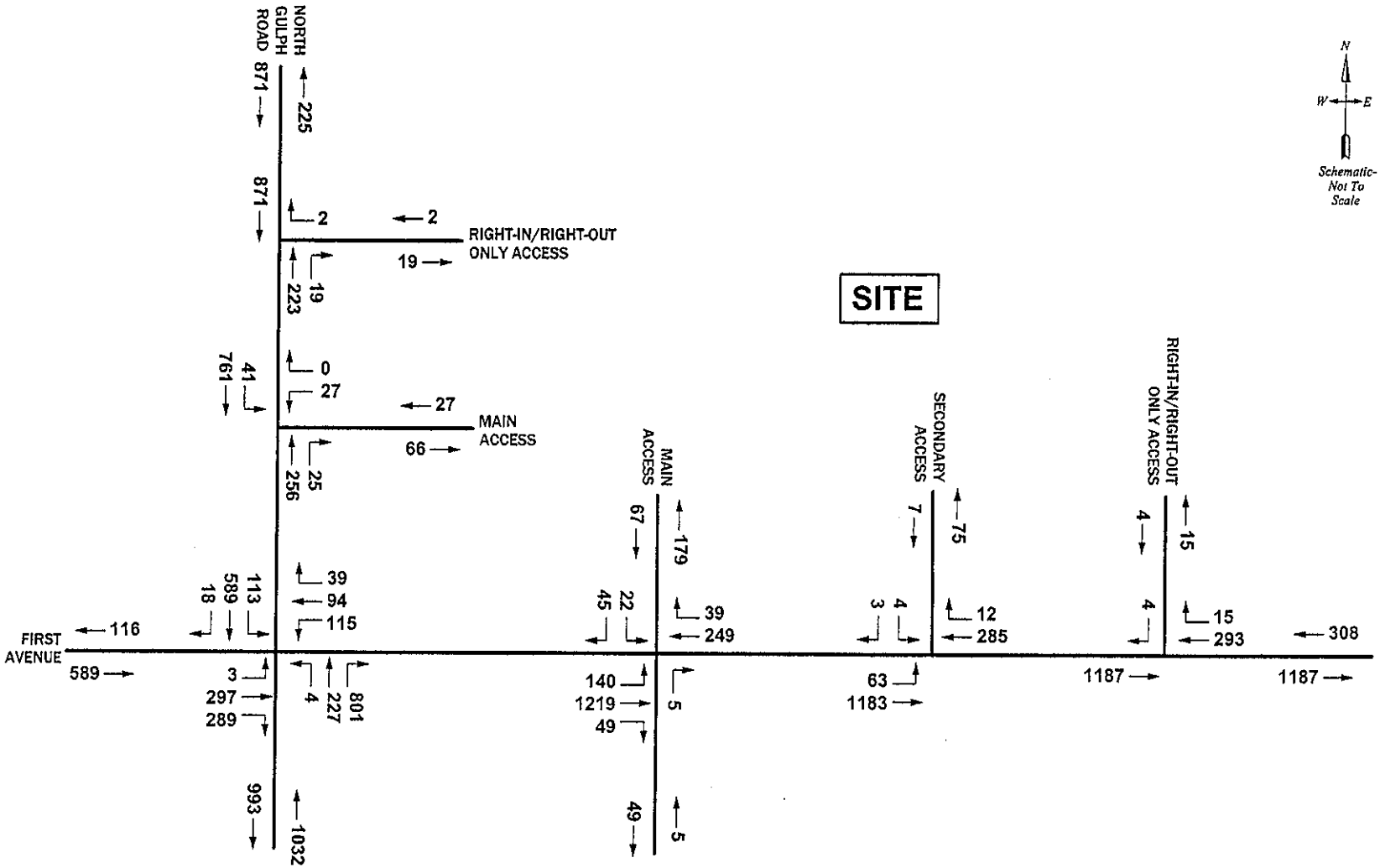


FIGURE 2

2007 Existing Weekday Morning Peak Hour Traffic Volumes

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure2.dwg

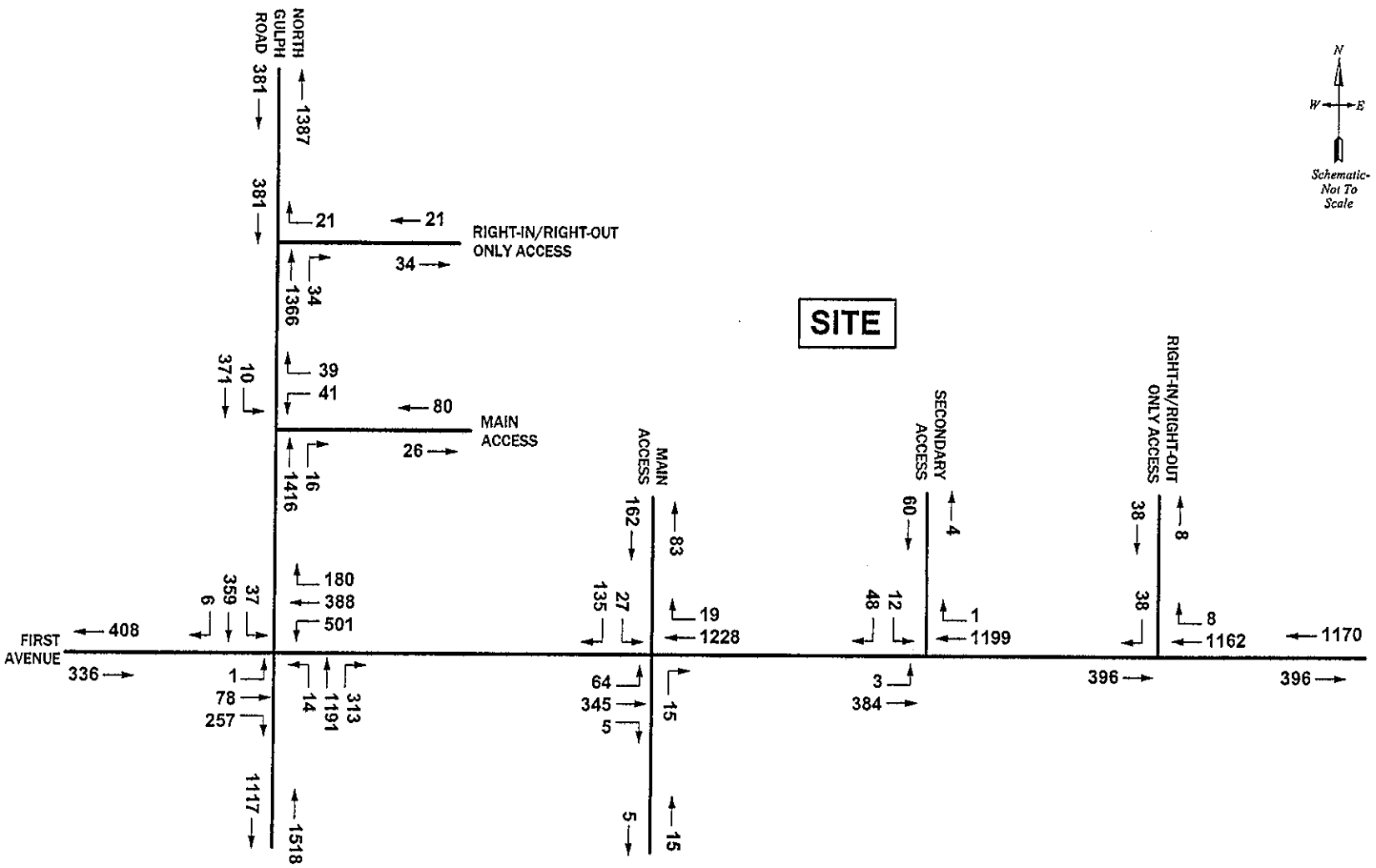


FIGURE 3

2007 Existing Weekday Afternoon Peak Hour Traffic Volumes

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure3.dwg

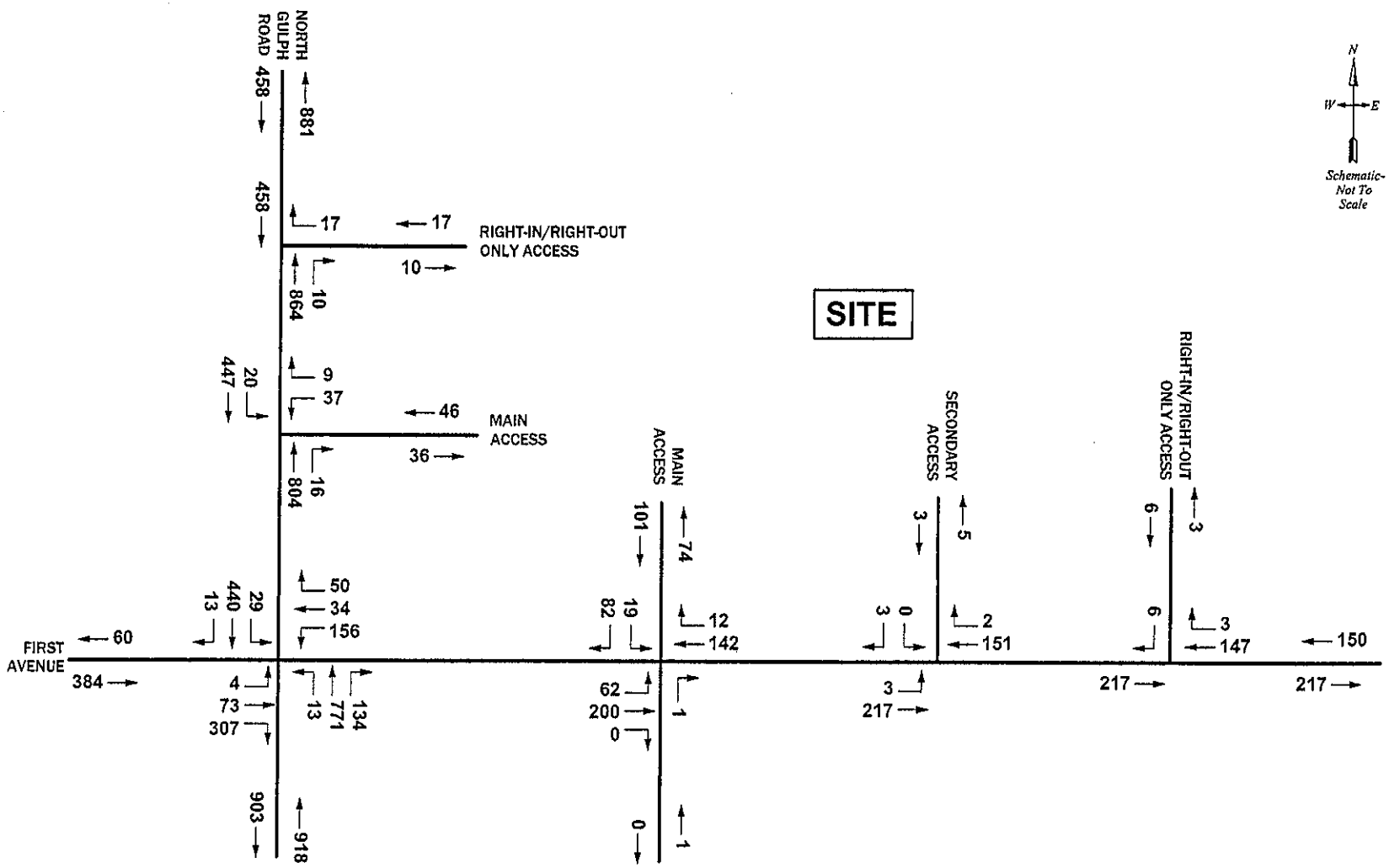


FIGURE 4

2007 Existing Saturday Midday Peak Hour Traffic Volumes

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure4.dwg

Future Traffic Volumes without Entertainment Center

This section presents projected traffic volumes without the proposed entertainment center for the future year 2009. The future year 2009 without-entertainment-center traffic volumes were estimated by increasing the existing 2007 peak hour traffic volumes to account for regional and local traffic growth, as described below. The future year (2009) without-entertainment-center traffic volumes for the weekday morning, weekday afternoon, and Saturday midday peak hours are illustrated in **Figures 5, 6, and 7**, respectively.

Regional Traffic Growth

To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 2.1 percent compounded for two years, or 4.24 percent total, which is consistent with the traffic growth rate recommended by PennDOT's Bureau of Planning and Research for similar roadways in Montgomery County.

Local Traffic Growth

To account for local traffic growth, the following developments were identified and included in the future traffic volume projections:

- *Village at Valley Forge* – Mixed-use development consisting of approximately 950,000 square feet of retail space, 50,000 square feet of office space, a 2,000-unit apartment building, and a 500-room hotel, to be located along North Gulph Road, west of Warner Road.

- *Rita's Water Ice* – A 1,008 square foot water ice store, to be located along South Gulph Road, west of Bill Smith Boulevard.

- *Cypress Equities Development* – 145,148 square foot home improvement store, 24,600 square foot automobile sales agency, and a 30,000 square foot pet store development, to be located along the south side of South Gulph Road, east of Bill Smith Boulevard.

- *LMC Properties* – 113,000 square foot office addition, to be located along Geerdes Boulevard, north of Valley Forge Road (S.R. 0023).

- *Preferred Construction Advisors* – 73,369 square foot warehouse addition, to be located along Third Avenue, west of Allendale Road.

The anticipated trip generation and trip distribution/assignment features of each of these other developments are provided in **Appendix C**.

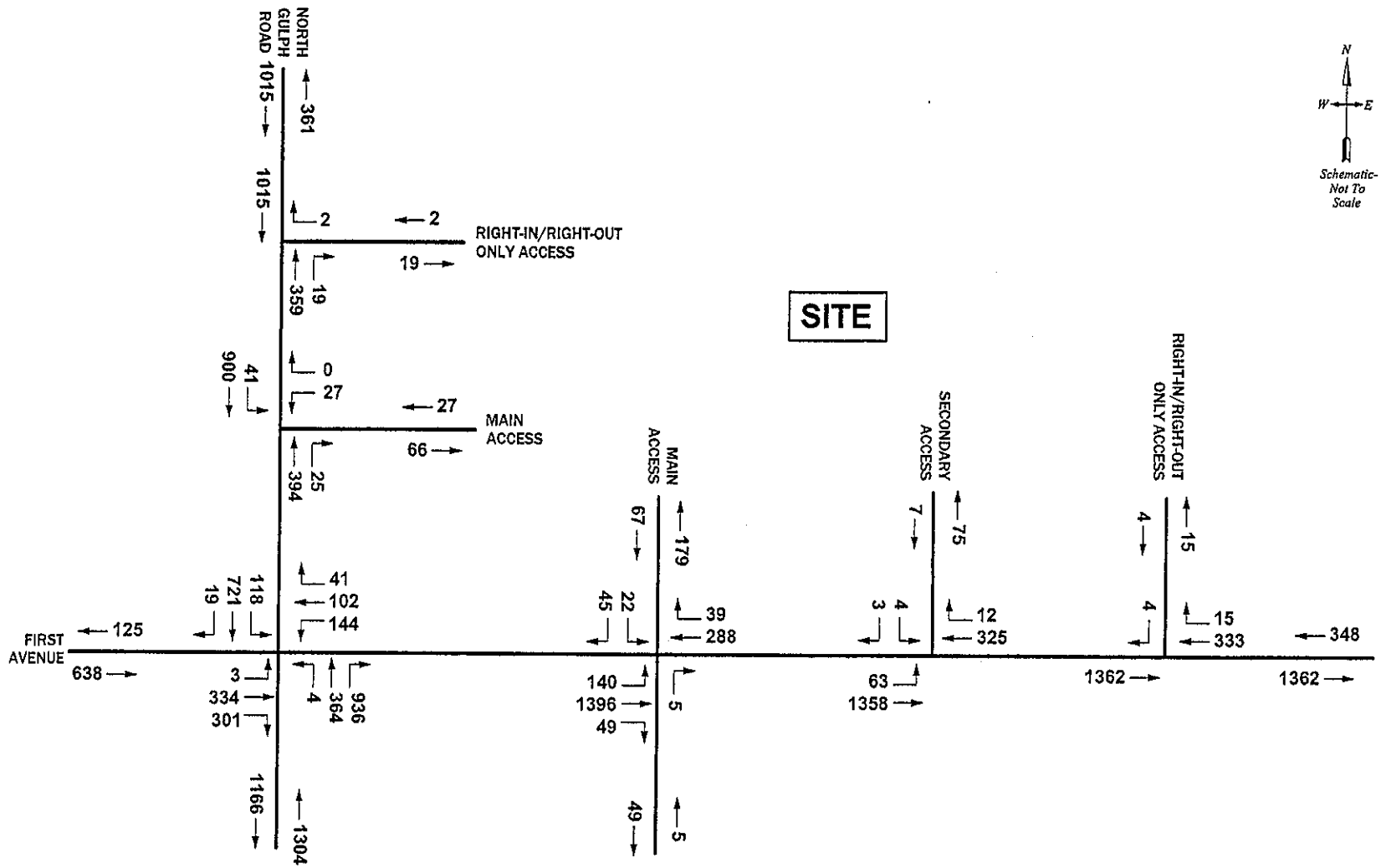


FIGURE 5

2009 Future Weekday Morning Peak Hour Traffic Volumes Without Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure5.dwg

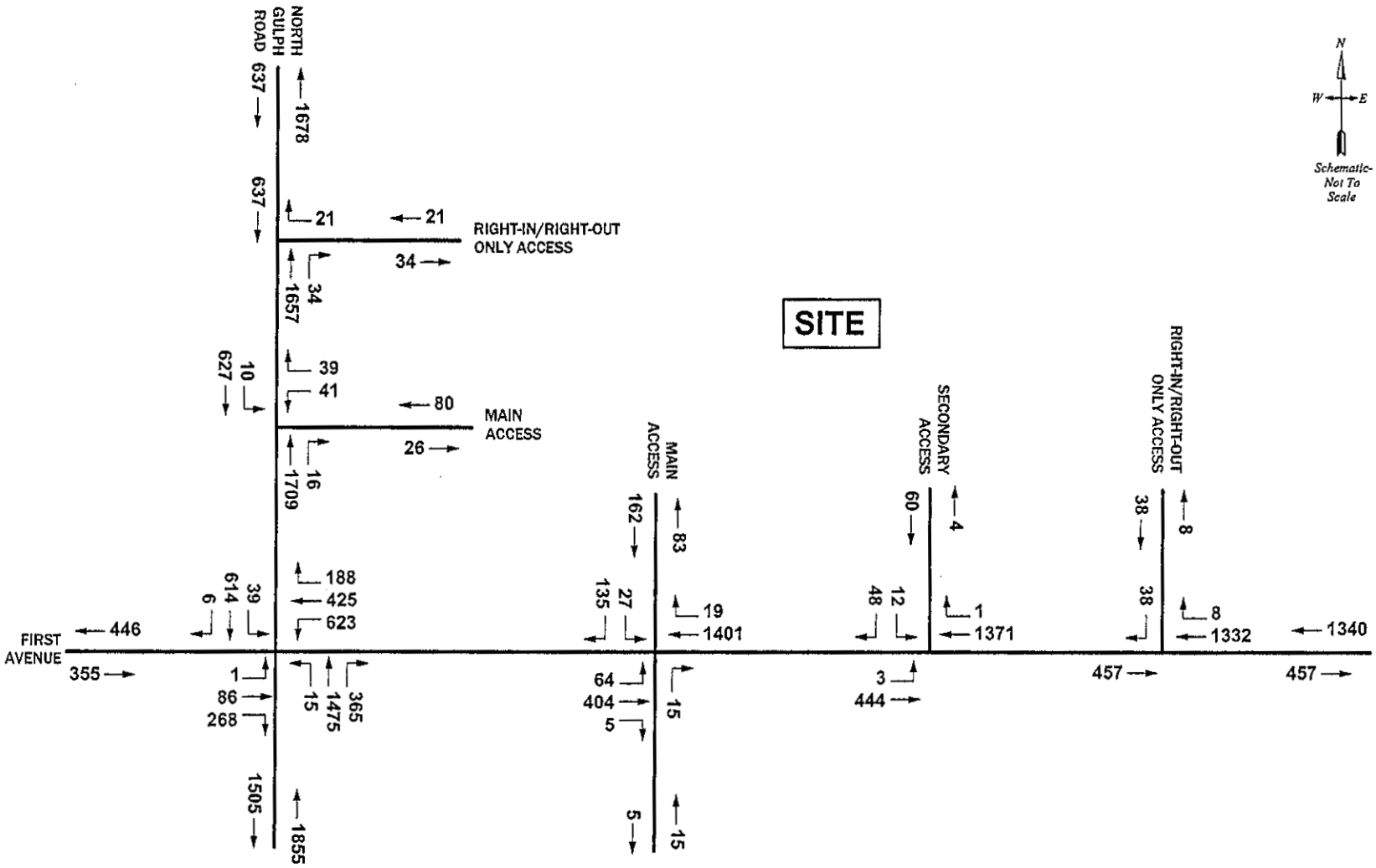


FIGURE 6

2009 Future Weekday Afternoon Peak Hour Traffic Volumes Without Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure6.dwg

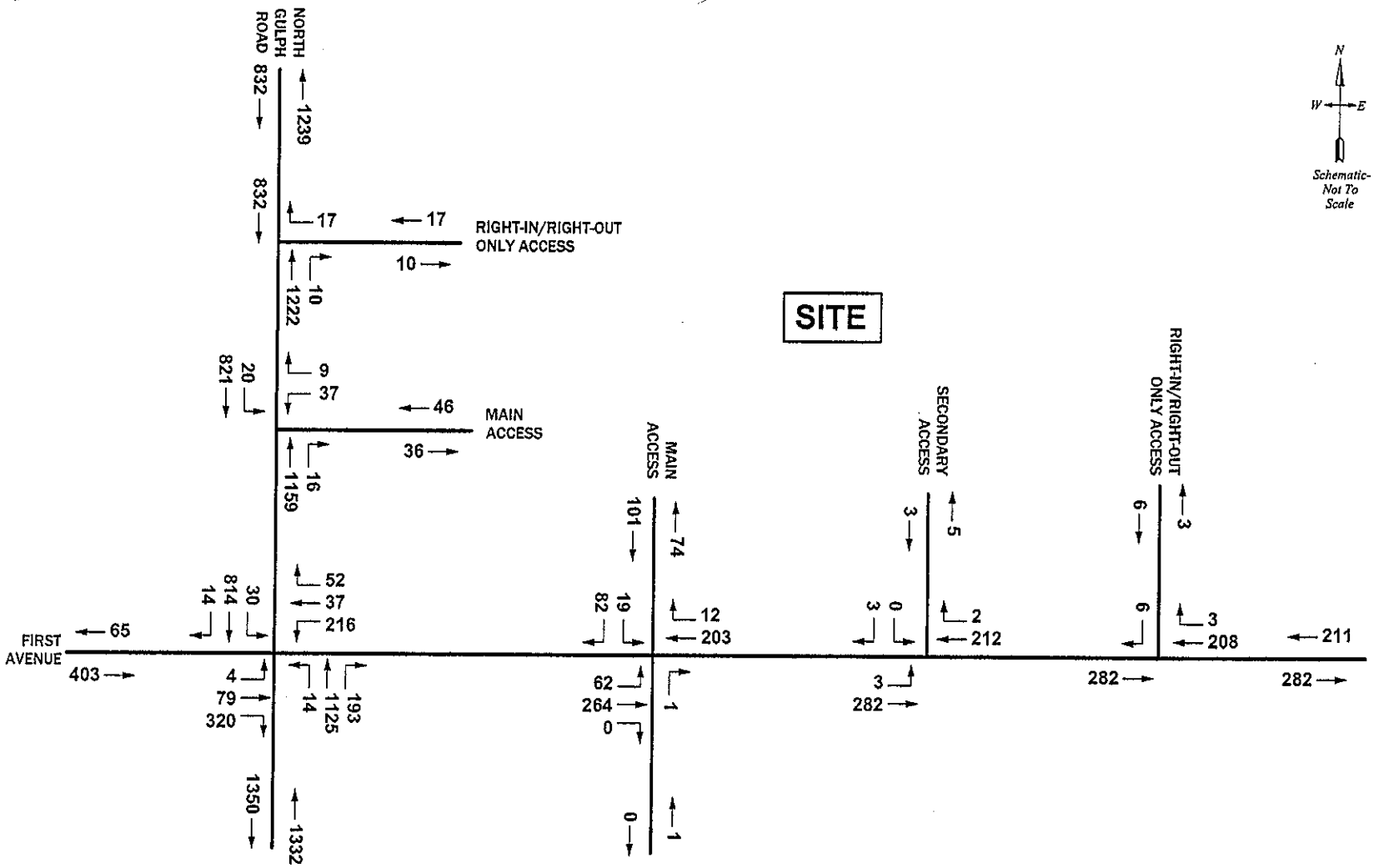


FIGURE 7

2009 Future Saturday Midday Peak Hour Traffic Volumes Without Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure7.dwg

Future Traffic Volumes with Entertainment Center

Evaluation of the proposed entertainment center is based upon the incremental increase in traffic volumes generated by the development during the peak hours, as described below.

Trip Generation

Traffic volumes generated by the proposed entertainment center were prepared based on the ITE article "Trip Generation Characteristics of Small to Medium Sized Casinos", published 2001. **Table 2** presents the anticipated vehicular trip generation for the proposed entertainment center.

Table 2. Vehicular Trip Generation[1]

Land Use	Size (slots)	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour				Saturday Midday Peak Hour		
		In	Out	Total		In	Out	Total		In	Out	Total
Entertainment Center	500	140	110	250		155	140	295		170	150	320

1 – ITE article, "Trip Generation Characteristics of Small to Medium Sized Casinos", published 2001.

These trip generation projections should be considered conservative. Trip generation estimates completed based on traffic counts conducted by Pennoni Associates at three local gaming facilities, including one in New Jersey and two in Delaware, suggest lower projections. Based on the latter counts, it would be expected that a 500-slot facility would generate approximately 179 trips during the weekday afternoon peak hour and 126 trips during the Saturday midday peak hour. The weekday morning peak hour was not included in their study. In order to provide a conservative estimate of the traffic impacts of this redevelopment, the higher ITE trip generation projections have been utilized in this traffic impact study.

It should also be noted that a portion of this gaming facility traffic will be traffic that is already visiting the site for a convention, hotel visit, or restaurant visit and, therefore, not adding new traffic to the adjacent roadway system, particularly since the Class III license includes a requirement that each gaming facility visitor must spend at least $10.00 on site prior to being admitted into the gaming facility. However, since this type of license is new to Pennsylvania, it is not clear exactly how much of the gaming facility traffic will be new to the site compared to how much will be shared traffic from other uses on this site. Again, to provide a conservative estimate of the traffic impact of the redevelopment, for the purposes of this analysis, it has been assumed that all traffic generated by the gaming facility will be new to the site.

Trip Distribution and Assignment

Site-generated traffic will approach and depart the site via different routes depending on factors such as existing traffic patterns, the locations of major roadways, and the locations of the development's site accesses. The distribution percentages for the anticipated directions of approach and departure are illustrated in **Figure 8**.

Application of the percentages illustrated in Figure 8 to the new peak hour trips contained in Table 2 provides an estimate of site traffic to be added to the study area. The trip distribution/assignment worksheets are contained in **Appendix D**. The site-generated traffic volumes were added to the future without-entertainment-center traffic volumes to result in total future peak hour traffic volumes with entertainment center for each peak hour. The 2009 future traffic volumes with entertainment center are illustrated in **Figures 9, 10, and 11** for the weekday morning, weekday afternoon, and Saturday midday peak hours, respectively.

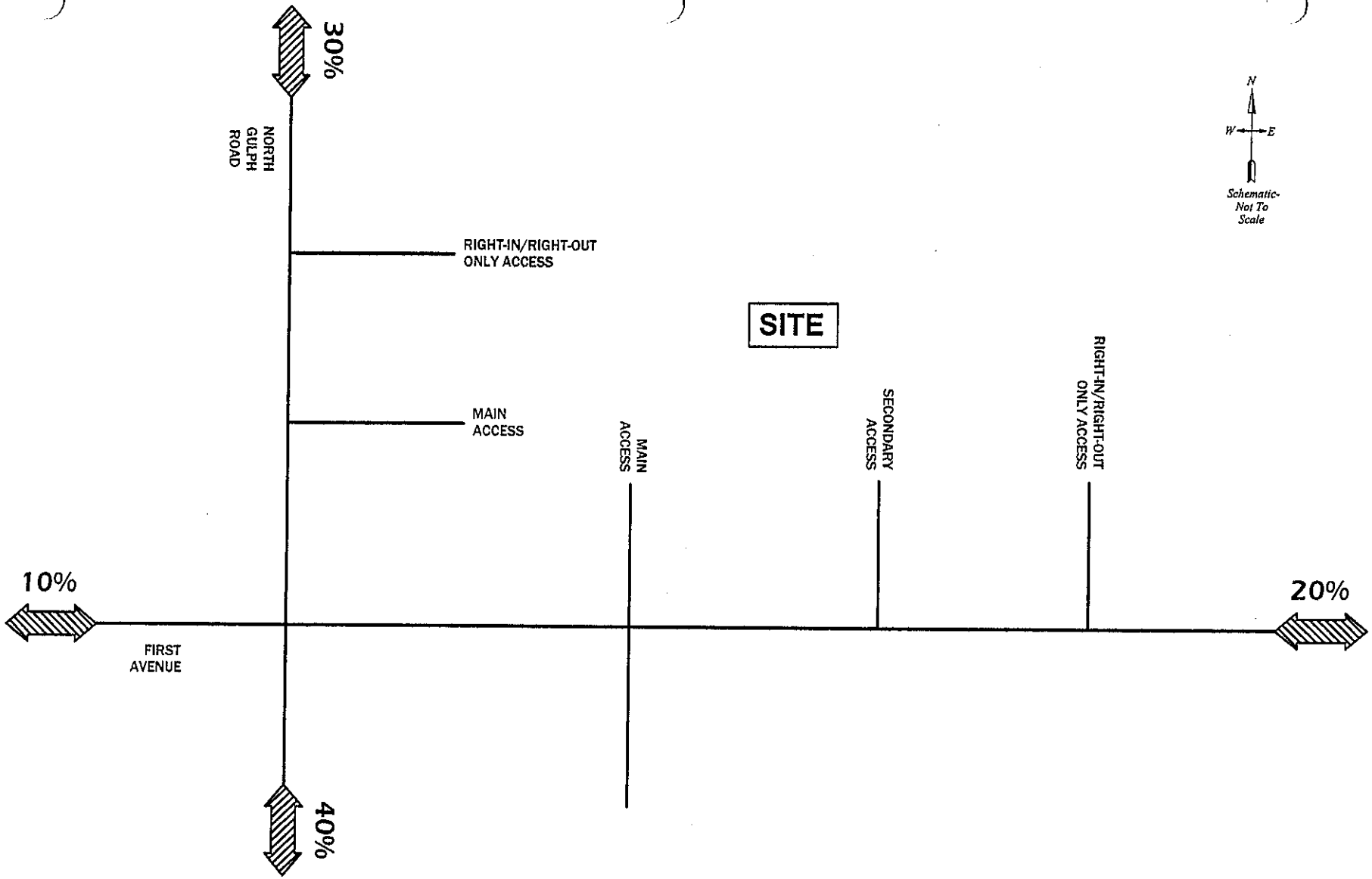


FIGURE 8

Directions of Approach and Departure

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\8068\9\Dwg\Figures\6-07\Figure8.dwg

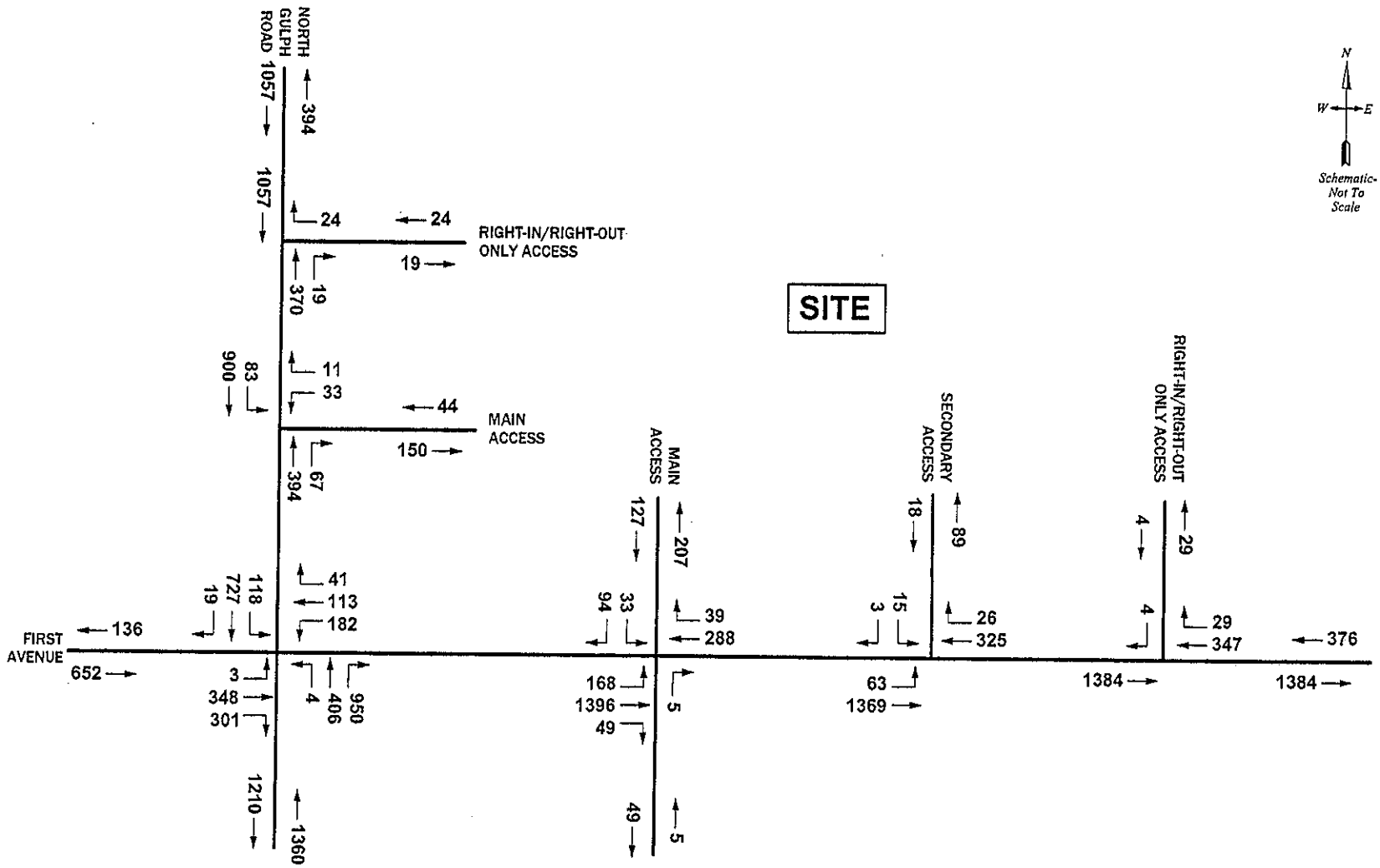


FIGURE 9

2009 Future Weekday Morning Peak Hour Traffic Volumes With Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) I:\Eng\806819\Dwg\Figures\6-07\Figure9.dwg

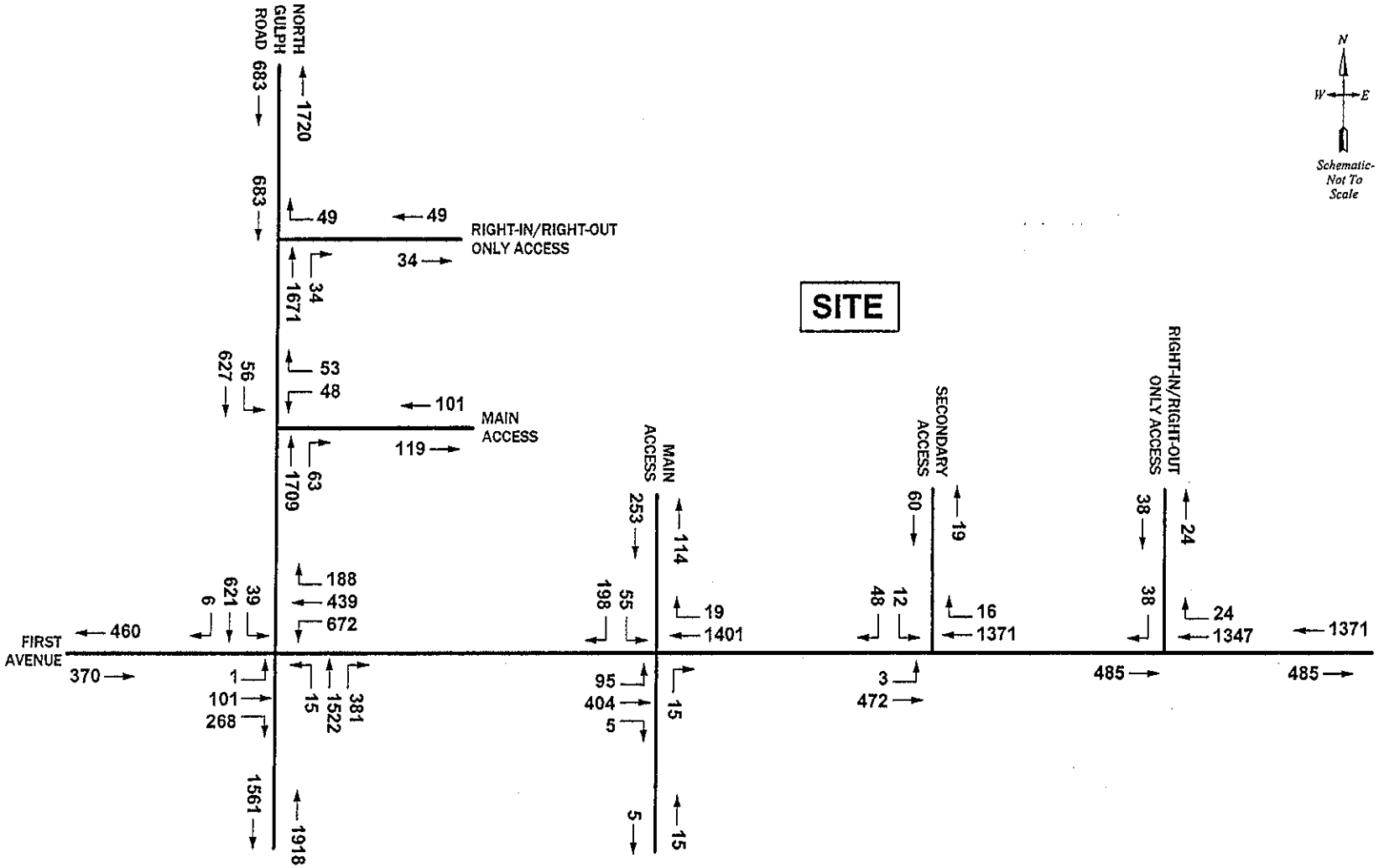


FIGURE 10

2009 Future Weekday Afternoon Peak Hour Traffic Volumes With Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) I:\Eng\806819\Dwg\Figures\6-07\Figure10.dwg

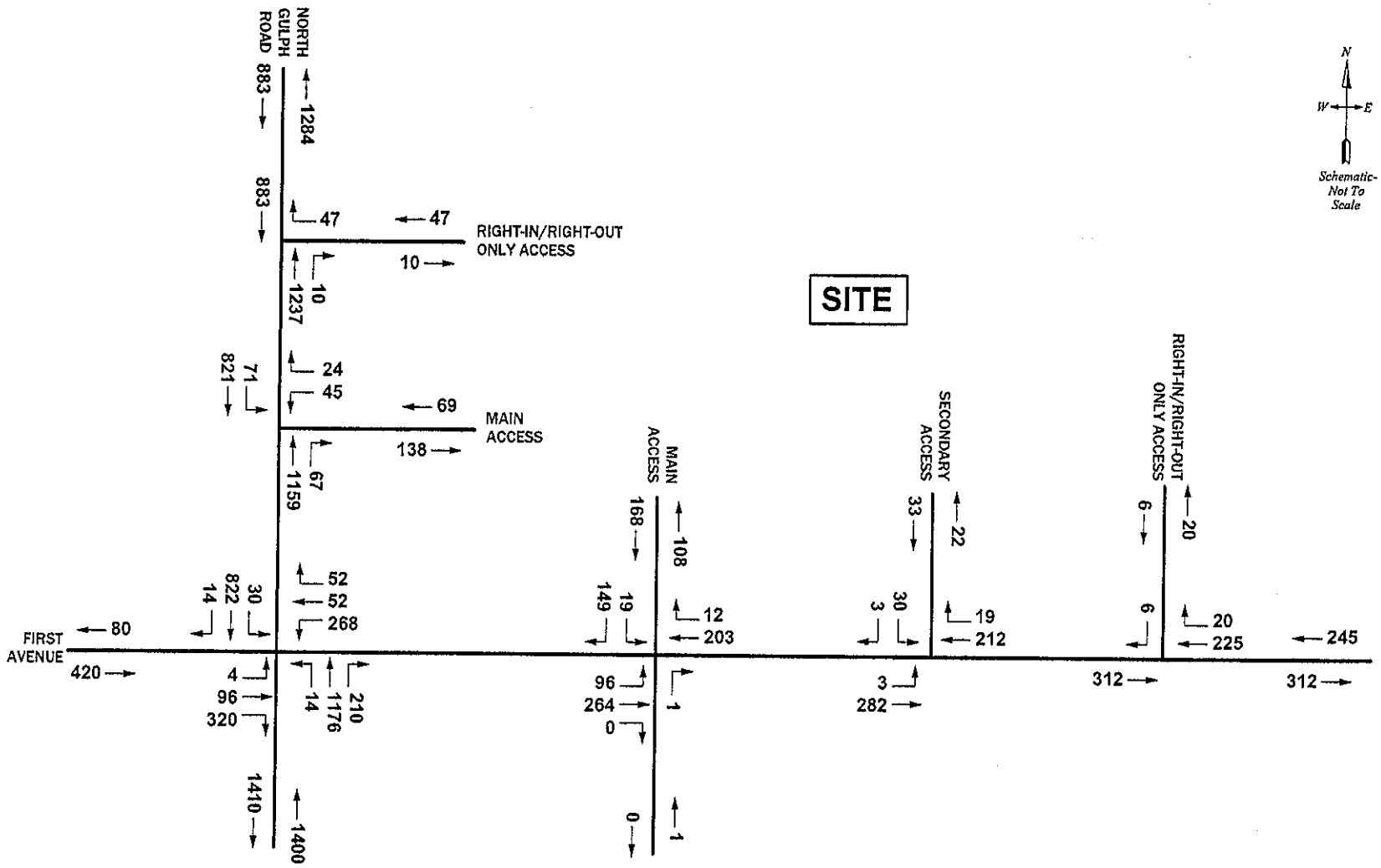


FIGURE 11

2009 Future Saturday Midday Peak Hour Traffic Volumes With Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(3/08/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure11.dwg

Site Access

Access to the entertainment center is proposed via the existing driveways to the Valley Forge Convention Center. Access to the Valley Forge Convention Center is currently provided via a right-in/right-out-only driveway and full-movement driveway intersecting North Gulph Road, and two full-movement driveways and a right-in/right-out-only driveway intersecting First Avenue. No modifications are proposed at these access intersections in conjunction with the proposed redevelopment.

Capacity/Level-of-Service Analyses

The peak hour traffic volumes were analyzed to determine existing operating conditions and future operating conditions, both without and with the entertainment center, in accordance with the standard techniques contained in the current *Highway Capacity Manual (2000)*. These standard capacity/level-of-service analysis techniques, which calculate total control delay, are more thoroughly described in **Appendix E** for both signalized and unsignalized intersections, as well as the correlation between average total control delay and the respective levels of service (LOS) for each intersection type. In the surrounding area, PennDOT District 6-0, as well as many local municipalities, typically considers LOS A through D as constituting acceptable operating conditions, while LOS E represents conditions approaching capacity and LOS F indicates that traffic volumes have exceeded available capacity.

The results of the capacity/level-of-service analyses are illustrated in **Figures 12, 13, and 14** for existing, 2009 future without-entertainment-center, and 2009 future with-entertainment-center peak hour traffic conditions, respectively. The detailed capacity/level-of-service analysis worksheets are contained in **Appendix F, G, and H** for existing, 2009 future without-entertainment-center, and 2009 future with-entertainment-center peak hour traffic conditions, respectively. The analysis results are summarized below for each study intersection.

North Gulph Road and First Avenue

Under existing conditions, this signalized intersection operates at overall LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours, with several movements operating with delay (LOS E) during the weekday morning and weekday afternoon peak hours.

Under 2009 future without-entertainment-center conditions, this signalized intersection will continue to operate at overall LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours, with several movements operating with delay (LOS E) during the weekday morning and weekday afternoon peak hours.

Under 2009 future with-entertainment-center conditions, with minor signal timing modifications, this signalized intersection will continue to operate at overall LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours, with several movements operating with delay (LOS E) during the weekday morning and weekday afternoon peak hours, however, with less delay than under future without-entertainment-center conditions. It should be noted that the proposed entertainment center is expected to increase traffic volumes at this intersection by no more than five percent during any of the peak hours.

North Gulph Road and right-in/right-out-only driveway

Under existing conditions, this unsignalized intersection operates at LOS B or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours.

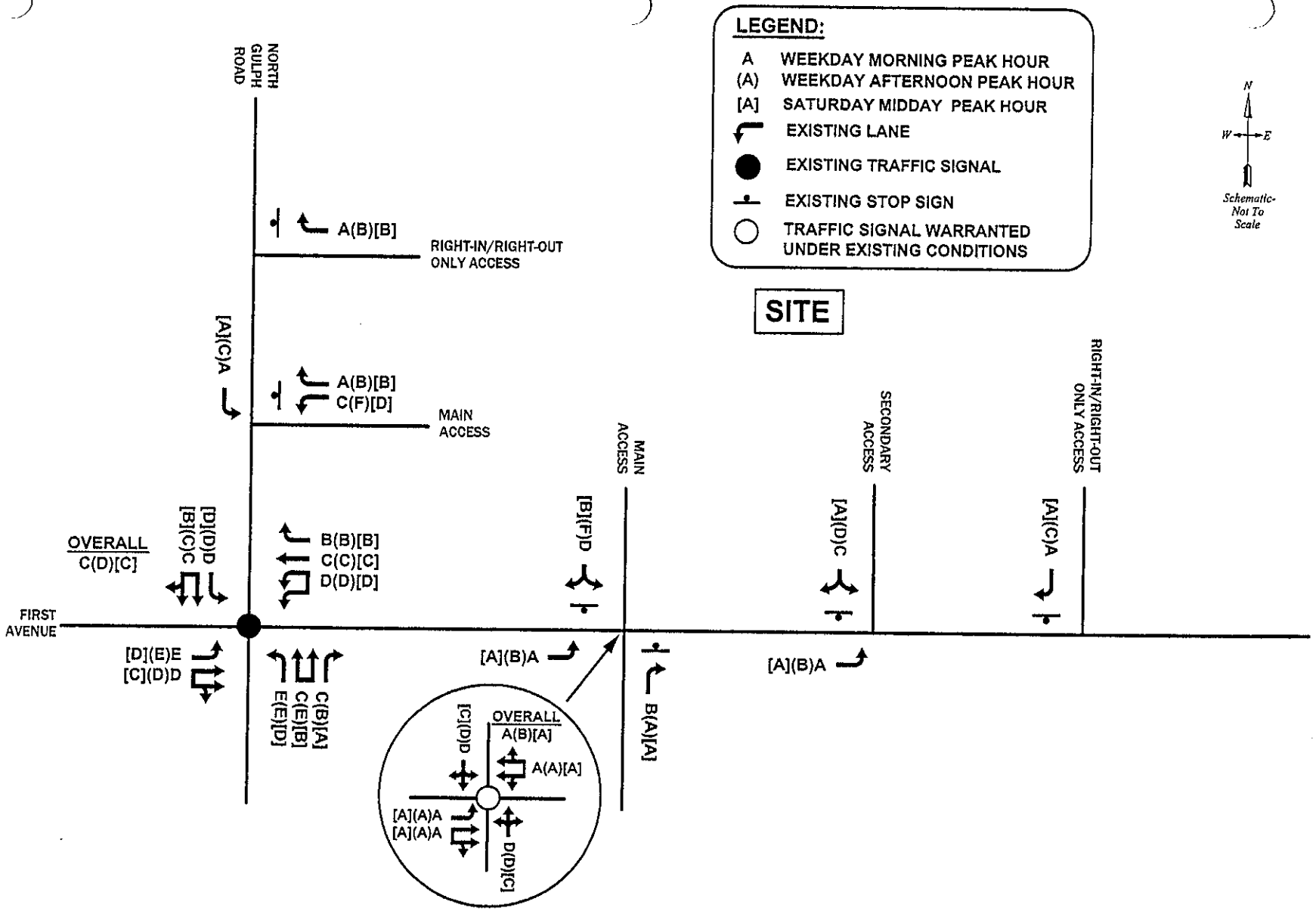


FIGURE 12

2007 Existing Levels of Service

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(6/11/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure12.dwg

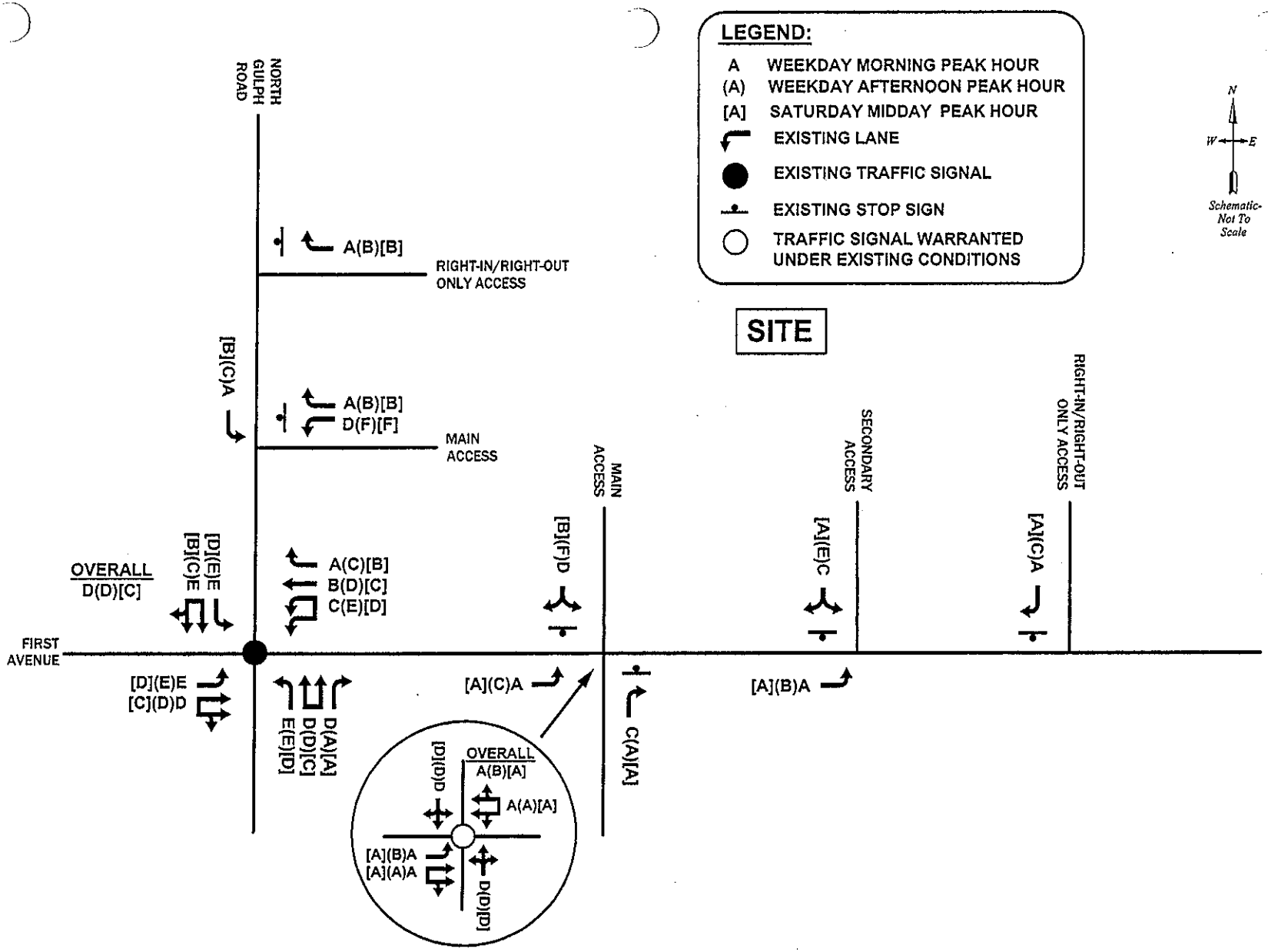


FIGURE 13

2009 Future Levels of Service Without Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(6/12/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure13.dwg

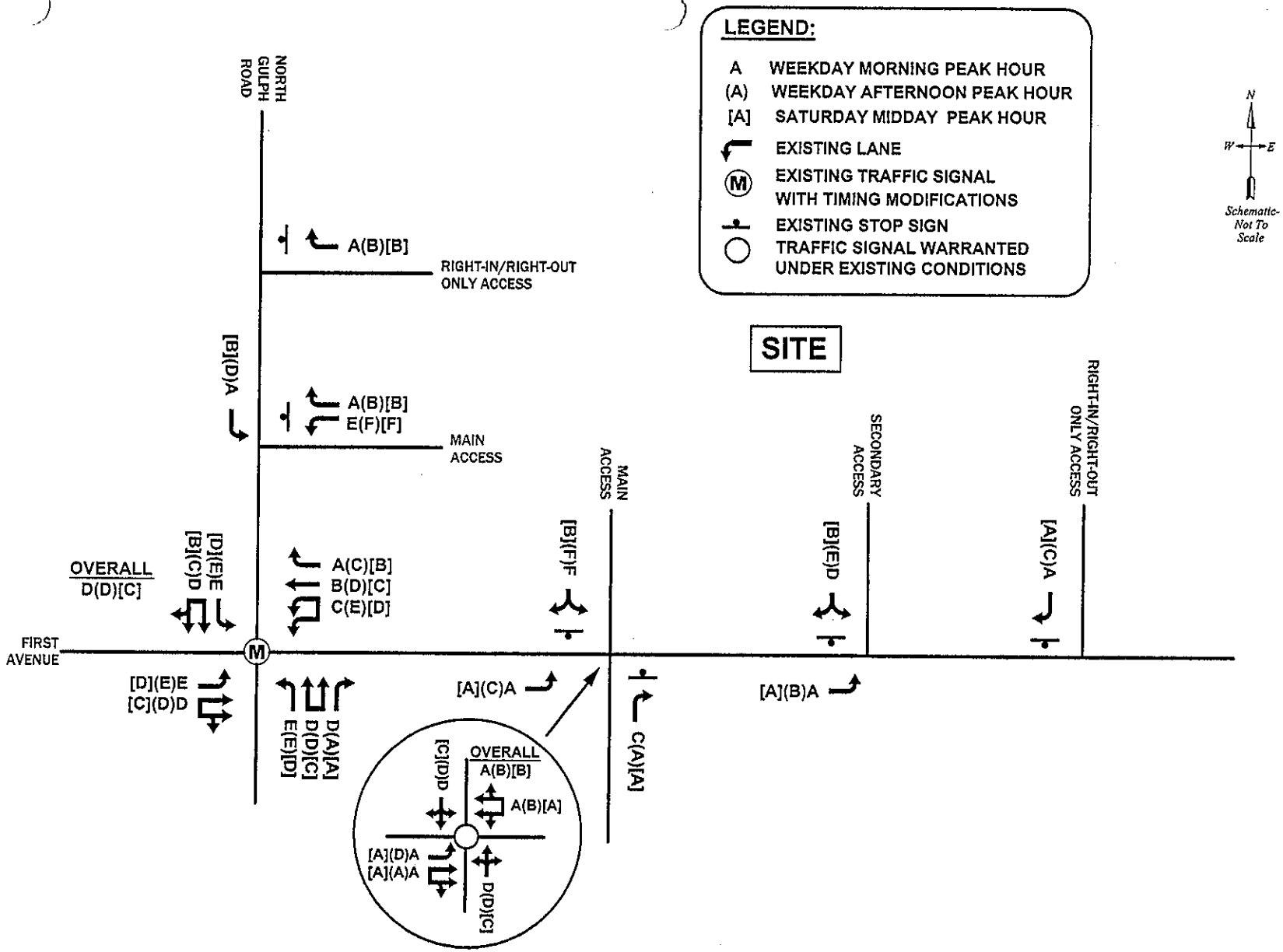


FIGURE 14

2009 Future Levels of Service With Entertainment Center

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(6/12/07-LBK) i:\Eng\806819\Dwg\Figures\6-07\Figure14.dwg

Under 2009 future without-entertainment-center conditions, this unsignalized intersection will continue to operate at LOS B or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours.

Under 2009 future with-entertainment-center conditions, this unsignalized intersection will continue to operate at LOS B or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours.

North Gulph Road and main driveway

Under existing conditions, this unsignalized intersection operates at acceptable LOS D or better conditions during the weekday morning, weekday afternoon, and Saturday midday peak hours with the exception of the westbound left-turn movement (LOS F) during the weekday afternoon peak hour.

Under 2009 future without-entertainment-center conditions, this unsignalized intersection will operate at acceptable LOS D or better conditions during the weekday morning, weekday afternoon, and Saturday midday peak hours with exception, once again, of the westbound left-turn movement (LOS F) during the weekday afternoon and now Saturday midday peak hours. In conjunction with the PA Route 422 improvement project, it is proposed to restrict access at this location to right-in/right-out movements only. This modification, which is expected to be implemented around 2013, will shift all left-turning traffic to First Avenue and result in LOS D or better operation for all movements at this intersection once that improvement project is completed.

Under 2009 future with-entertainment-center conditions, this unsignalized intersection will continue to operate at acceptable LOS D or better conditions during the weekday morning, weekday afternoon, and Saturday midday peak hours with exception, once again, of the westbound left-turn movement (LOS E and F) during all three peak hours. Again, based upon the intersection modifications expected in conjunction with the Route PA 422 improvement project, all movements at this intersection will operate at LOS D or better conditions once that improvement project is completed.

First Avenue and main driveway

Under existing conditions, this unsignalized intersection operates at acceptable LOS D or better conditions during the weekday morning, weekday afternoon, and Saturday midday peak hours with the exception of the southbound movement (LOS F) during the weekday afternoon peak hour. It should be noted that the existing traffic volumes that travel through this intersection are sufficient to meet the warrant criteria for installation of a traffic signal. Installation of a traffic signal would enable all movements at the intersection to operate at LOS D or better during all three peak hours.

Under 2009 future without-entertainment-center conditions, this unsignalized intersection will operate at acceptable LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours with the exception, again, of the southbound movement (LOS F) during the weekday afternoon peak hour. Installation of a traffic signal, which is warranted under existing

conditions, would enable all movements at the intersection to operate at LOS D or better during all three peak hours.

Under 2009 future with-entertainment-center conditions, this unsignalized intersection will continue to operate at acceptable LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours with the exception, again, of the southbound movement (LOS F) during the weekday afternoon peak hour. Again, installation of a traffic signal, which is warranted under existing conditions, would enable all movements at the intersection to operate at LOS D or better during all three peak hours even with the proposed entertainment center.

First Avenue and secondary driveway

Under existing conditions, this unsignalized intersection operates at acceptable LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours.

Under 2009 future without-entertainment-center conditions, this unsignalized intersection will operate at acceptable LOS D or better during the weekday morning, weekday afternoon, and Saturday midday peak hours with the exception of the southbound movement (LOS E) during the weekday afternoon peak hour.

Under 2009 future with-entertainment-center conditions, this unsignalized intersection will continue to operate as under without entertainment-center conditions during all three peak hours.

First Avenue and right-in/right-out-only driveway

Under existing conditions, this unsignalized intersection operates at LOS C or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours.

Under 2009 future without-entertainment-center conditions, this unsignalized intersection will continue to operate at LOS C or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours.

Under 2009 future with-entertainment-center conditions, this unsignalized intersection will continue to operate at LOS C or better for all movements during the weekday morning, weekday afternoon, and Saturday midday peak hours.

Summary

Based on the relatively low volume of traffic expected to be generated by this development, the entertainment center will have only a minimal impact on the operations of the roadways and intersections in the vicinity of the site. Since North Gulph Road is part of the State Highway System, all roadway and access improvements will be subject to the review and approval of PennDOT.

APPENDIX A

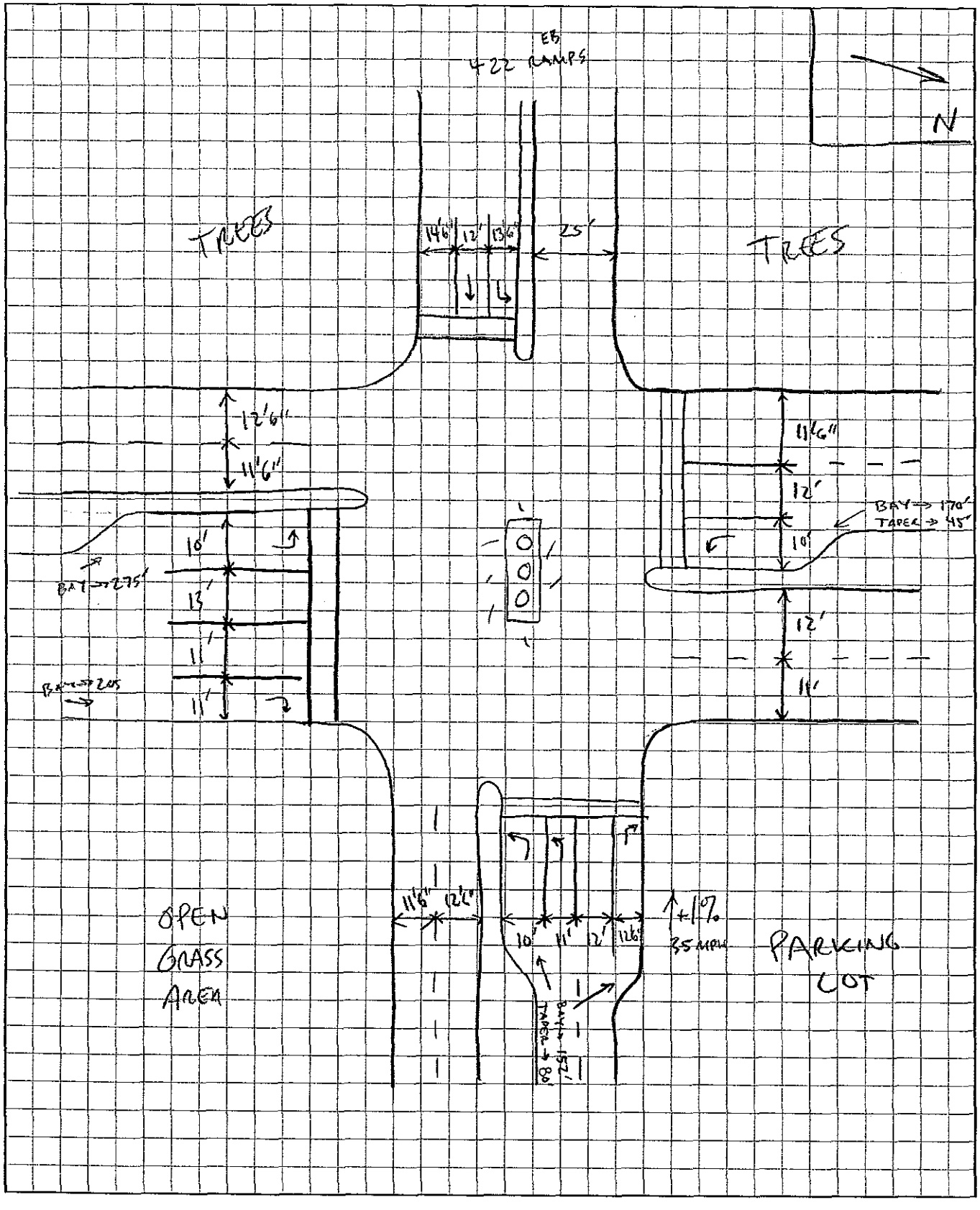
Intersection Sketches and Photographs

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806819.11 Sheet ____ of ____

Description Gulph Rd + First Avenue / 422 EB ramps Designed By NDB Date 1/31/07

Checked By _____ Date _____

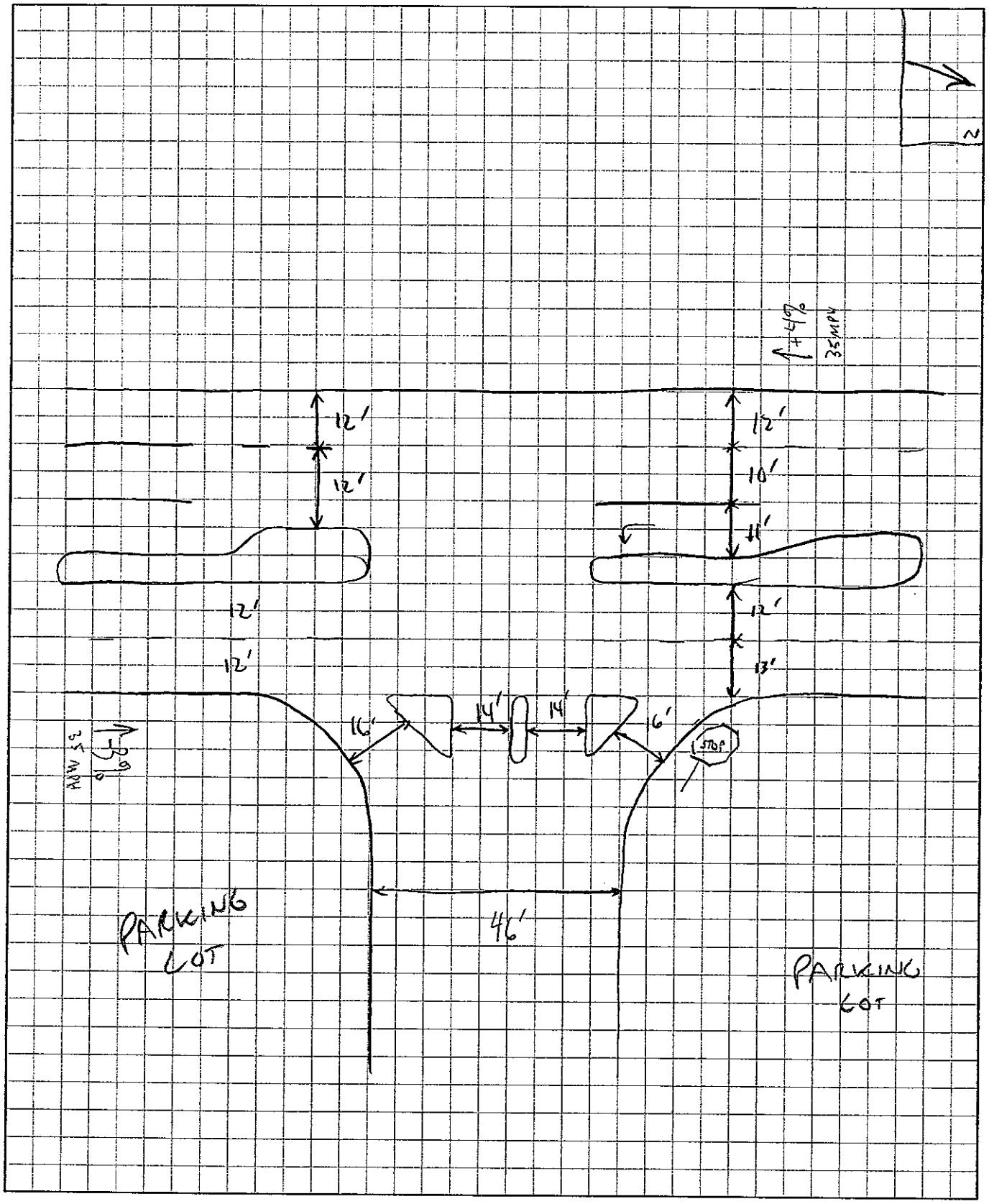


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806819.11 Sheet ____ of ____

Description Guelph Rd + Full Movement Access Designed By NDB Date 1/31/07

Checked By _____ Date _____

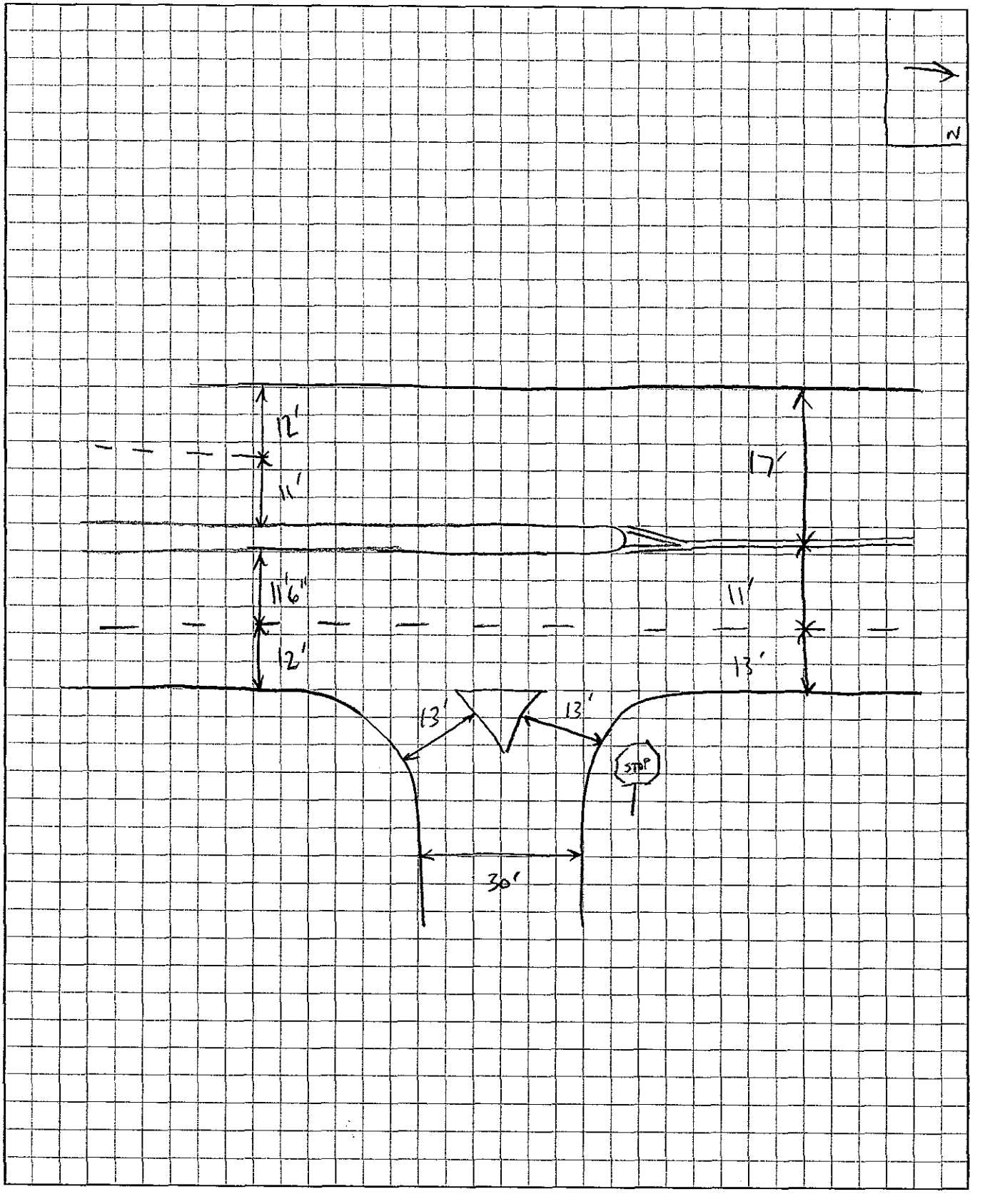


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806819.11 Sheet ____ of ____

Description Guelph Rd - Right In / Right Out Access Designed By NOB Date 1/31/07

Checked By _____ Date _____

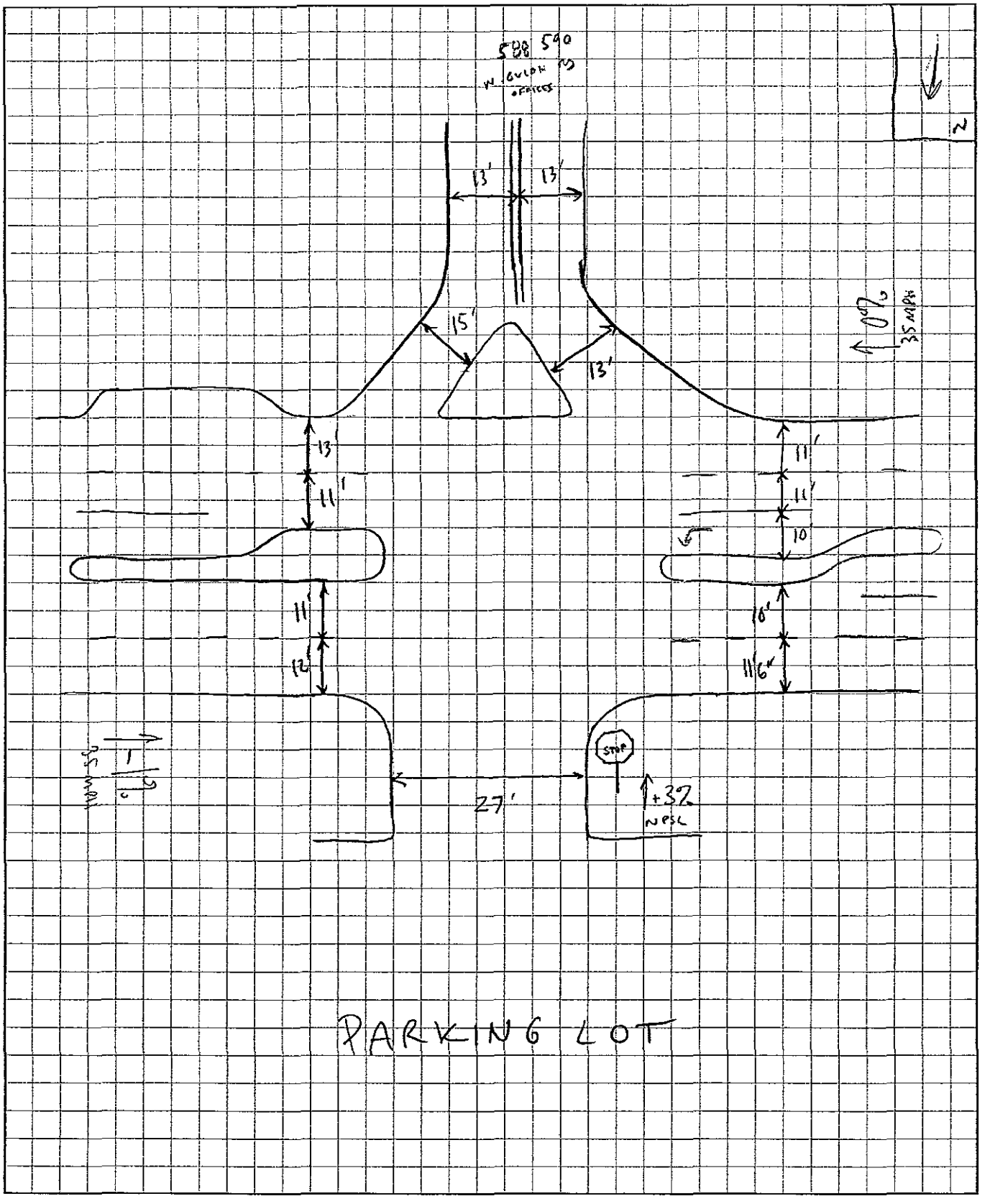


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806819.11 Sheet ____ of ____

Description First Ave + Main Access Designed By MJB Date 1/31/07

Checked By _____ Date _____

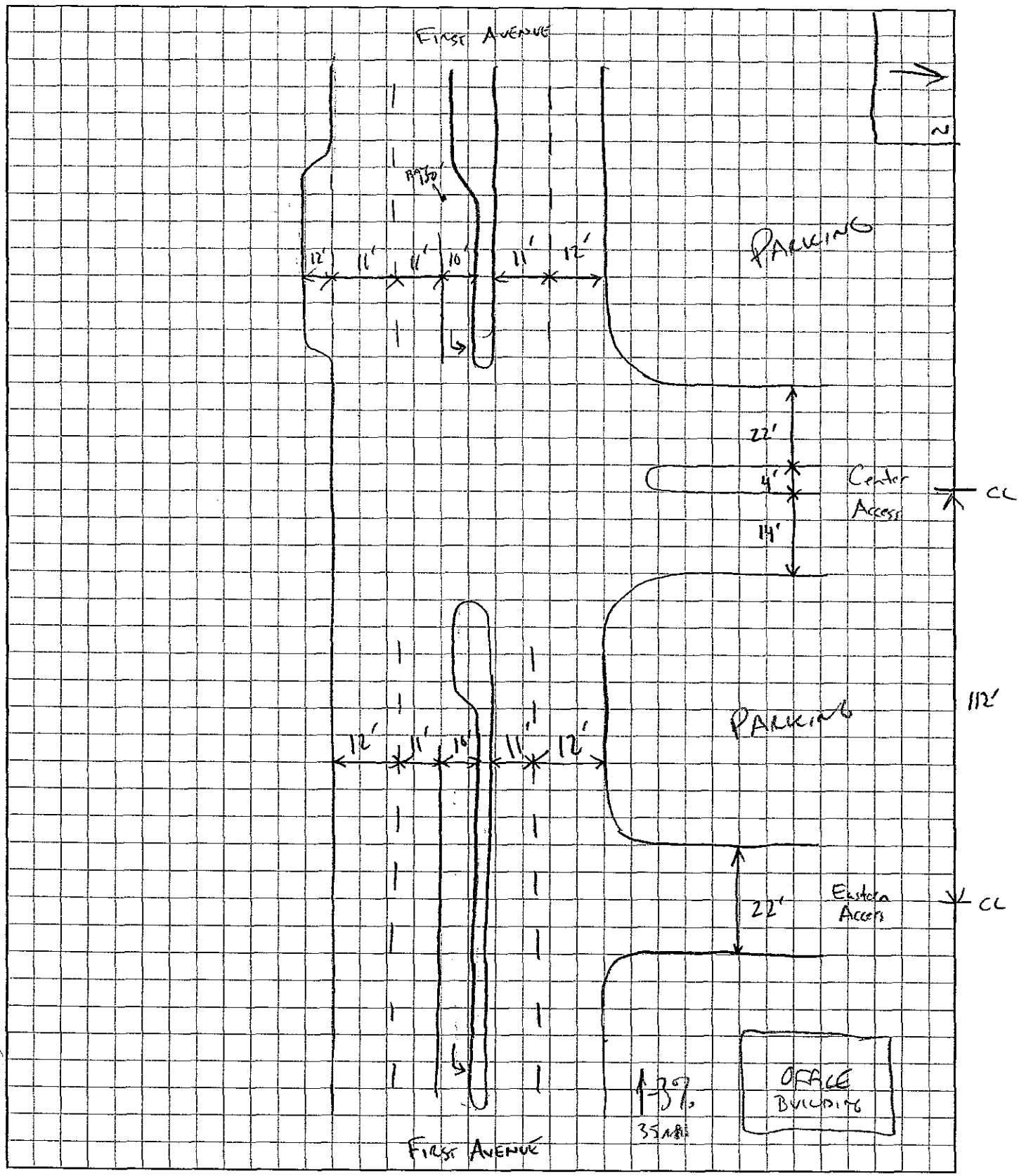


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806819.11 Sheet ____ of ____

Description First Avenue + Center Access + Eastern Access Designed By NBB Date 1/31/07

Checked By _____ Date _____

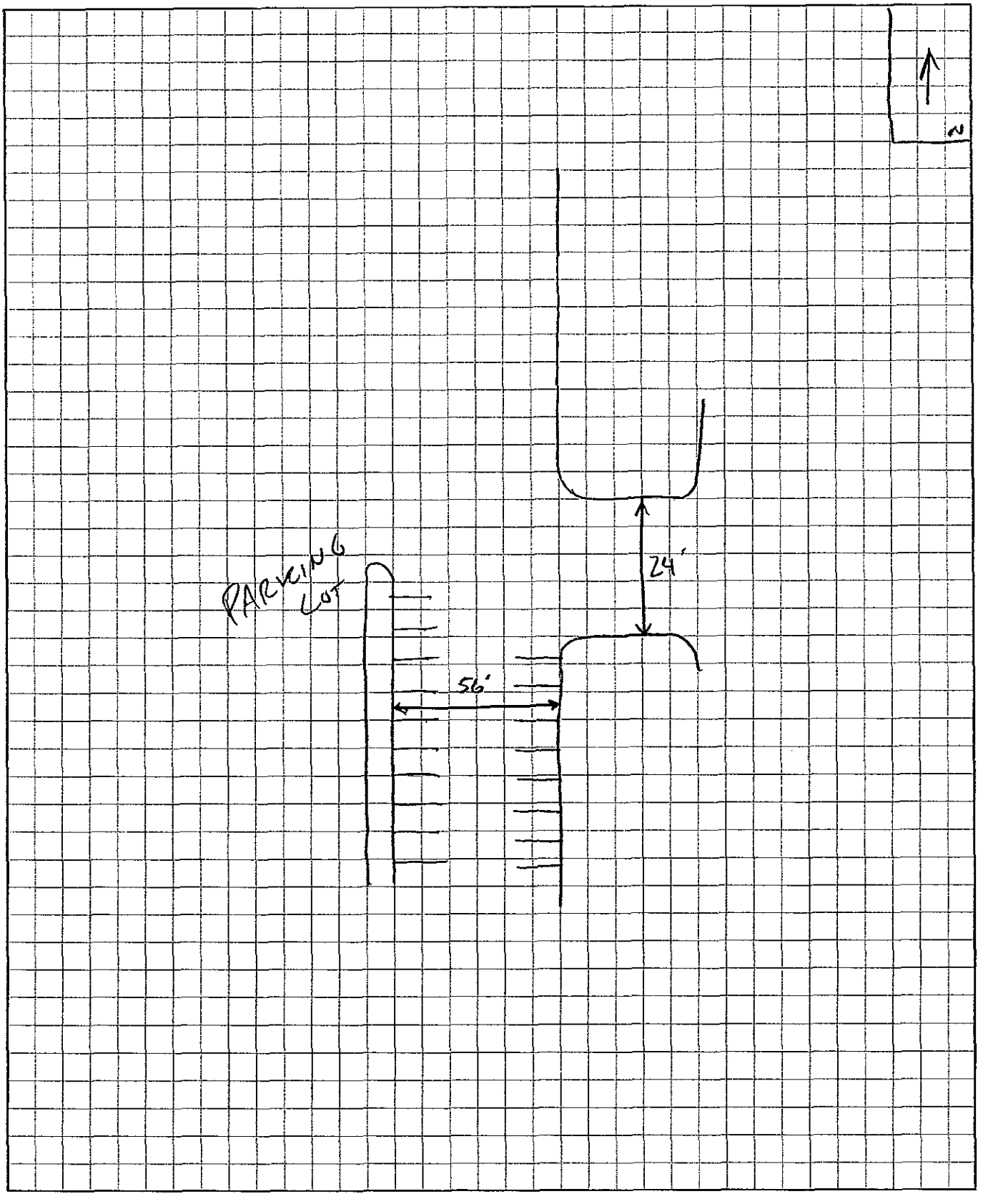


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806519.11 Sheet ____ of ____

Description INTERNAL DRIVEWAY + ACCESS TO PARKING LOT Designed By NOB Date 1/31/07

Checked By _____ Date _____

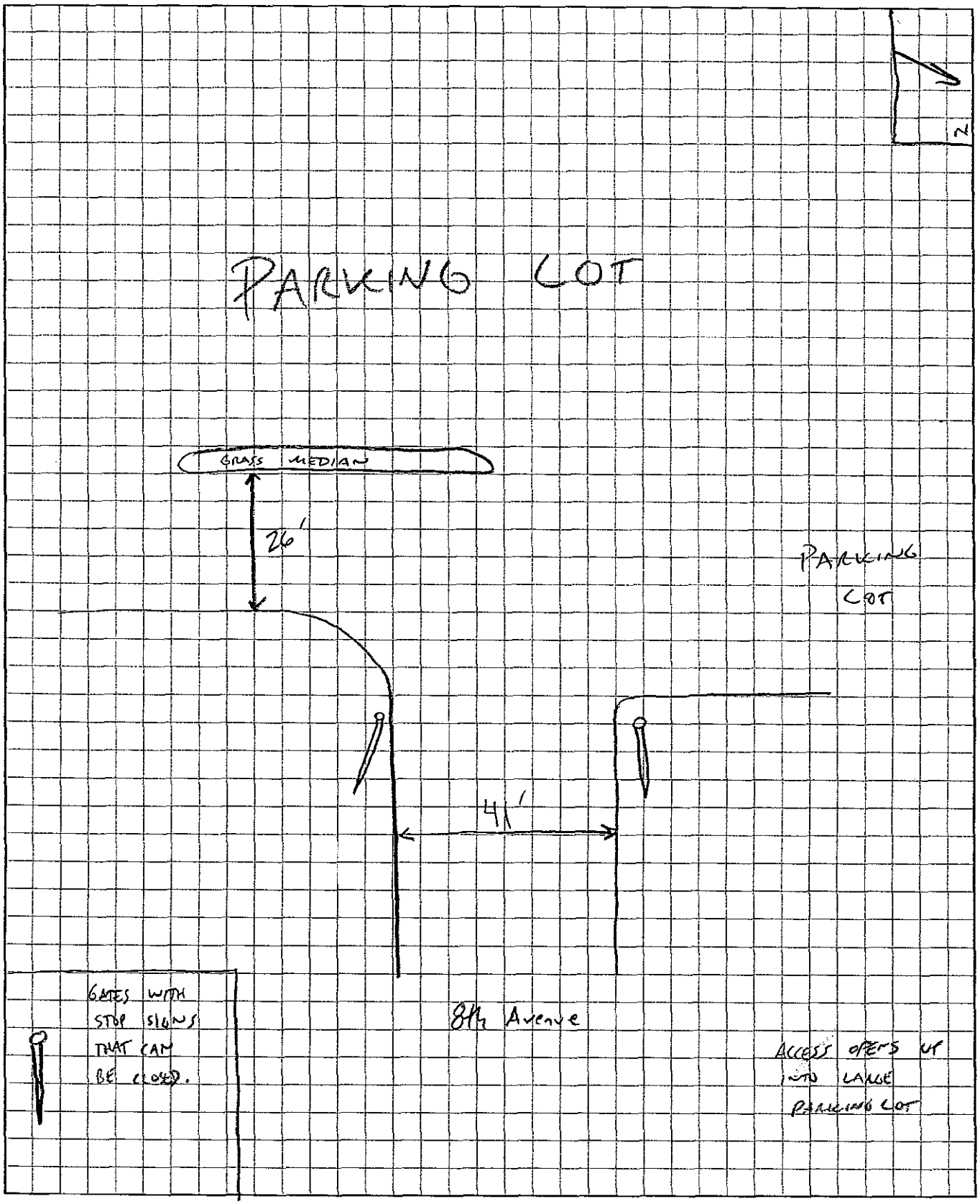


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. 806819.11 Sheet ____ of ____

Description 8th Avenue + Access Designed By NOB Date 1/31/07

Checked By _____ Date _____



Project: vfcc

Date: 1/31/2007

Name: ndb

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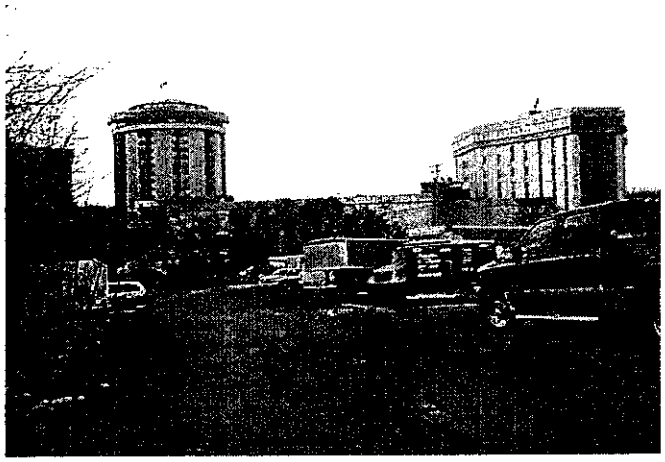
8th Ave & Access - Looking east on 8th Ave



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8th Ave & Access - Looking south into Parking Lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9360.JPG
8th Ave & Access - Looking north in to parking lot

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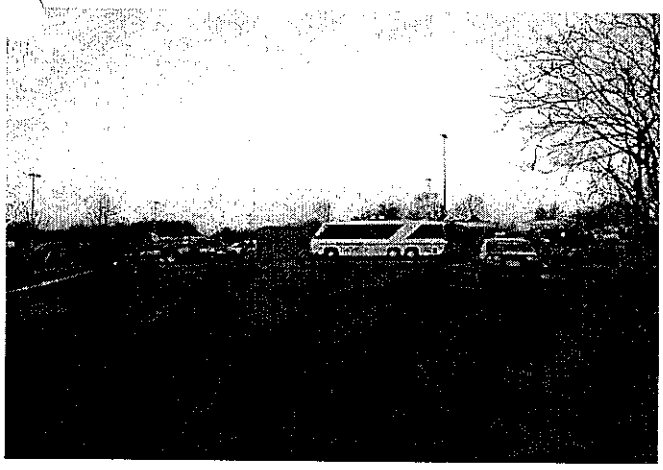
8th Ave & Access - Looking north in to parking lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9362.JPG
8th Ave & Access - Gates on north side of 8th Ave

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9363.JPG
8th Ave & Access - Gate on south side of 8th Ave

Project: vfcc **Date:** 1/31/2007

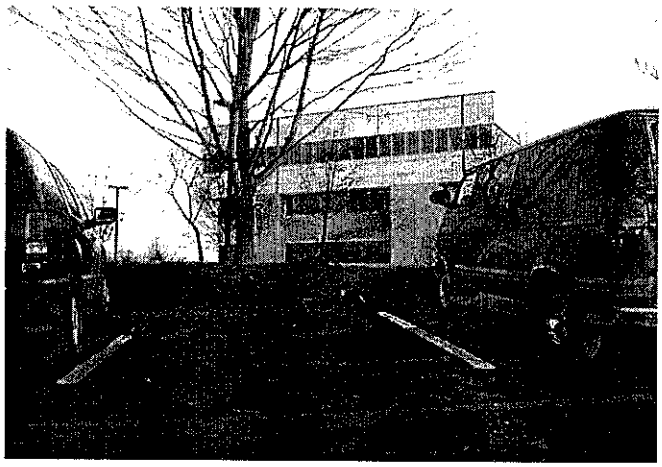
Name: ndb **File:** I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9364.JPG
8th Ave & Access - 8th Ave WB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9365.JPG
8th Ave & Access - 8th Ave WB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9366.JPG
Looking to additional parking north of parking lot



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9367.JPG
Looking to additional parking north of parking lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9368.JPG
king to additional parking north of parking lot

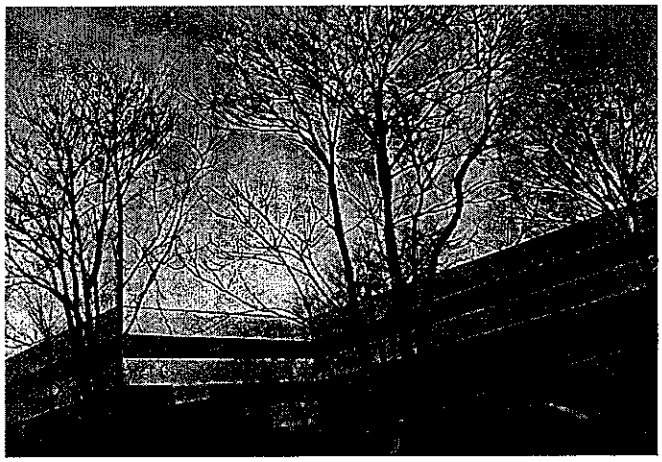
I:\eng\806819\Traffic\Pictures\vfcc\IMG_9369.JPG
Looking to additional parking north of parking lot

Project: vfcc

Date: 1/31/2007

Name: ndb

File: I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls



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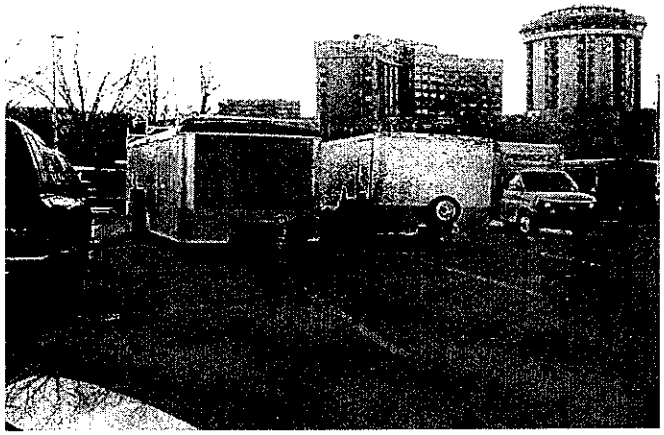
Looking to additional parking north of parking lot



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9371.JPG
Shows parking of some trailers compared to actual parking spots

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9372.JPG
Internal Driveway & Access to Additonal Lot - Looking west to Parking Lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9373.JPG
Internal Driveway & Access to Additonal Lot - Looking east into additional lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9374.JPG
Internal Driveway & Access to Additonal Lot - Looking west to Parking Lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9375.JPG
Internal Driveway & Access to Additonal Lot - Looking west to Parking Lot

Project: vfcc

Date: 1/31/2007

Name: ndb

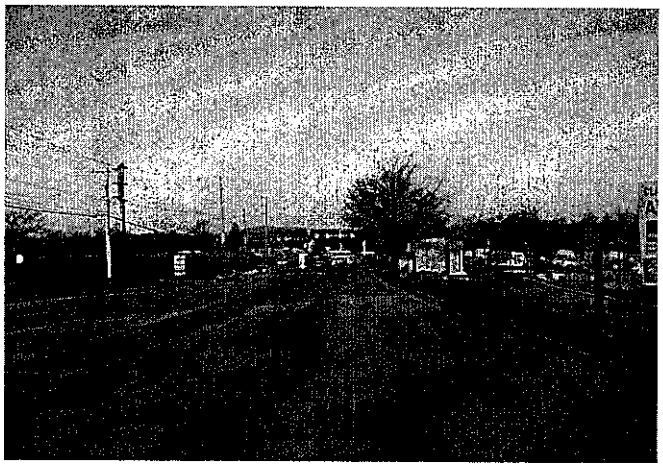
File: I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9376.JPG
Internal Driveway & Access to Additonal Lot - Looking south into Parking Lot

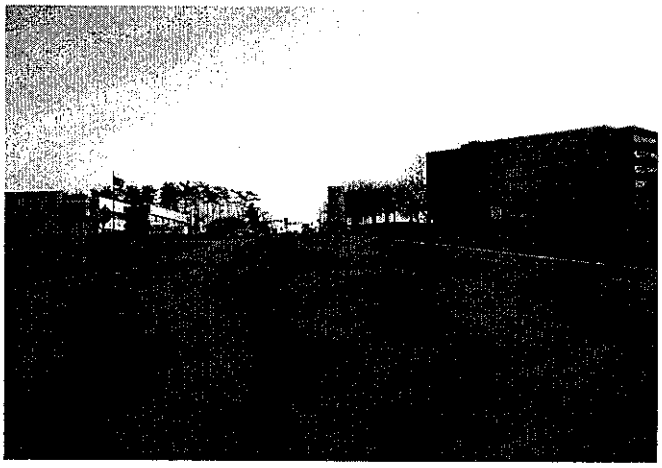
I:\eng\806819\Traffic\Pictures\vfcc\IMG_9377.JPG
Internal Driveway & Access to Additonal Lot - Looking east into additional lot

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9378.JPG
First Ave & Center / Eastern Accesses - Center Access SB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9379.JPG
First Ave & Center / Eastern Accesses - Looking north into Lot of Center Access



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9380.JPG
t Ave & Center / Eastern Accesses - First Ave WB Departure



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9381.JPG
First Ave & Center / Eastern Accesses - Looking east on First Ave

Project: vfcc **Date:** 1/31/2007

Name: ndb **File:** I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9382.JPG
First Ave & Center / Eastern Accesses - First Ave EB Approach to Center Access

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9383.JPG
First Ave & Center / Eastern Accesses - Looking north into Center Access

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9384.JPG
First Ave & Center / Eastern Accesses - First Ave EB Departure from Eastern Access

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9385.JPG
First Ave & Center / Eastern Accesses - Looking north into Eastern Access

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9386.JPG
First Ave & Center / Eastern Accesses - First Ave WB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9387.JPG
First Ave & Center / Eastern Accesses - Looking north into Eastern Access

Project: vfcc

Date: 1/31/2007

Name: ndb

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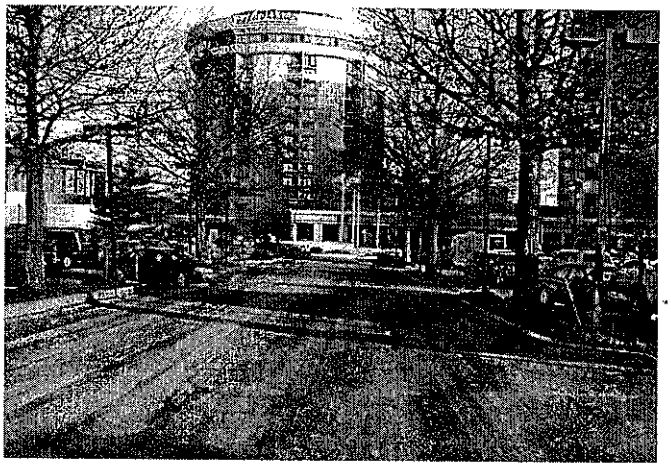
I:\eng\806819\Traffic\Pictures\vfcc\IMG_9388.JPG
First Ave & Center / Eastern Accesses - Looking south to First Ave (Shows Median)

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9389.JPG
First Ave & Center / Eastern Accesses - Eastern Access SB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9390.JPG
First Ave & Main Access / Office Access - Main Access SB Approach



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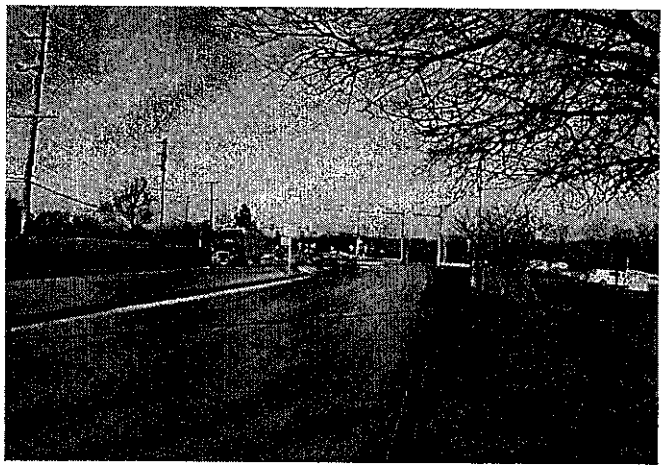
First Ave & Main Access / Office Access - Looking north into lot



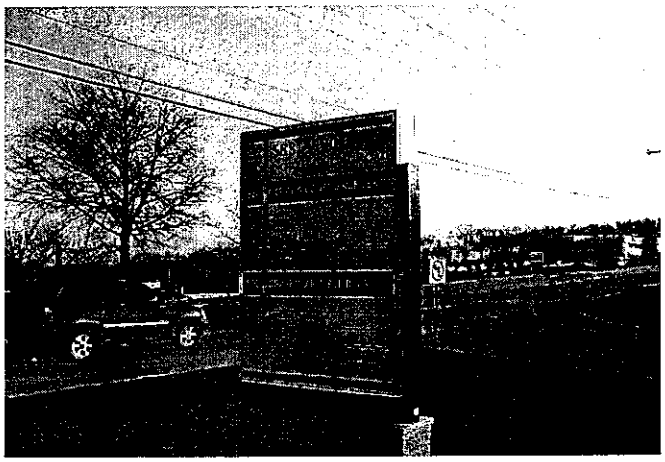
I:\eng\806819\Traffic\Pictures\vfcc\IMG_9392.JPG
Ave & Main Access / Office Access - First Ave WB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9393.JPG
First Ave & Main Access / Office Access - First Ave EB Approach

Project: vfcc **Date:** 1/31/2007

Name: ndb **File:** I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9394.JPG
First Ave & Main Access / Office Access - Looking south into Office Access



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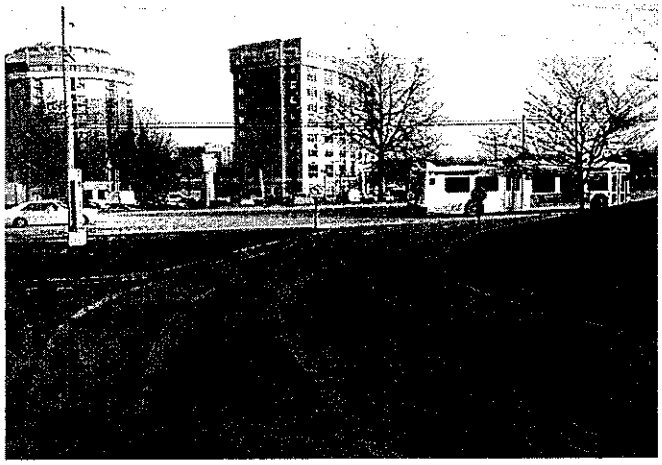
First Ave & Main Access / Office Access -



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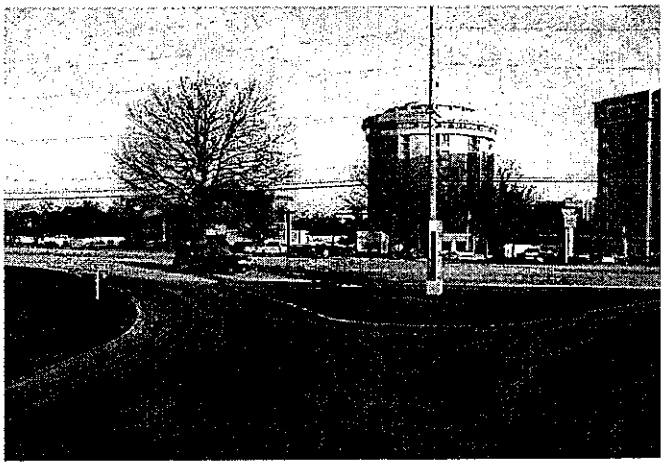
First Ave & Main Access / Office Access - Office Access NB Approach



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First Ave & Main Access / Office Access - Office Access NB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9398.JPG
First Ave & Main Access / Office Access - First Ave EB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9399.JPG
Gulph Rd & R In R Out Access - Access WB Approach

Project: vfcc

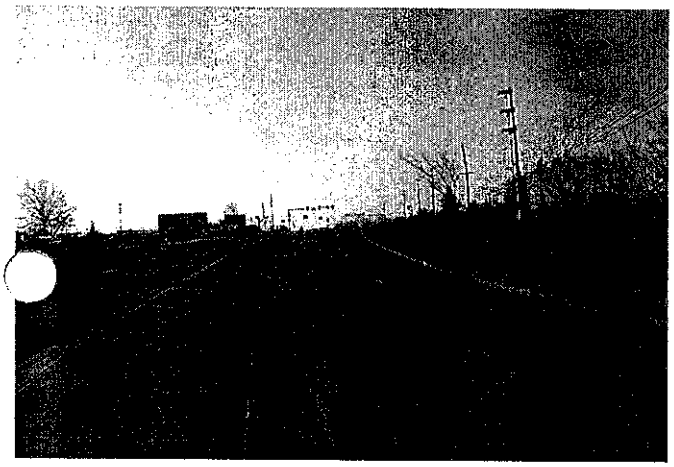
Date: 1/31/2007

Name: ndb

File: I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9400.JPG
Gulph Rd & R In R Out Access - Gulph Rd NB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9401.JPG
Gulph Rd & R In R Out Access - Gulph Rd SB Approach



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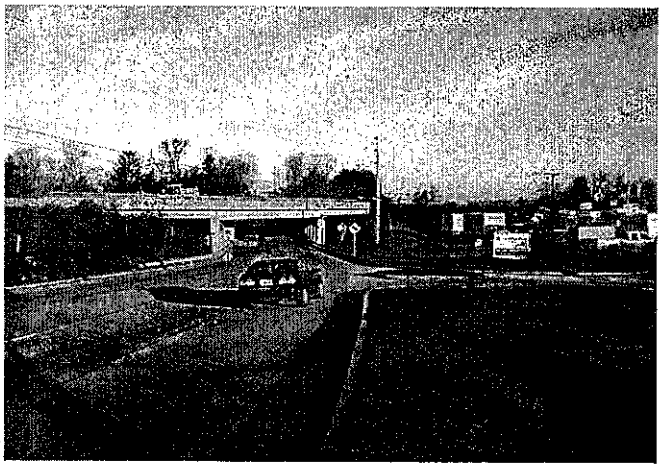
Gulph Rd & R In R Out Access - Gulph Rd SB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9403.JPG
Gulph Rd & R In R Out Access - Gulph Rd NB Approach



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ph Rd & R In R Out Access - Gulph Rd NB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9405.JPG
Gulph Rd & Full Access - Gulph Rd SB Approach

Project: vfcc **Date:** 1/31/2007

Name: ndb **File:** I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls

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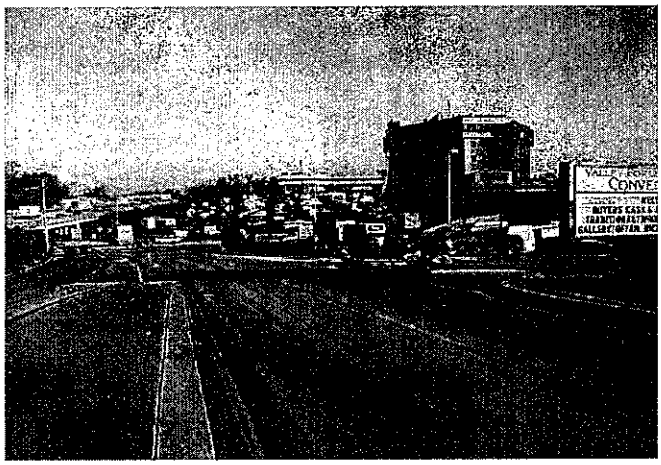
Gulph Rd & Full Access - Access WB Appraoch

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9407.JPG
Gulph Rd & Full Access - Access WB Appraoch



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Gulph Rd & Full Access - Gulph Rd NB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9409.JPG
Gulph Rd & Full Access - Gulph Rd NB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9410.JPG
Gulph Rd & Full Access - Gulph Rd SB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9411.JPG
Gulph Rd & Full Access - Looking east into Lot

Project: vfcc

Date: 1/31/2007

Name: ndb

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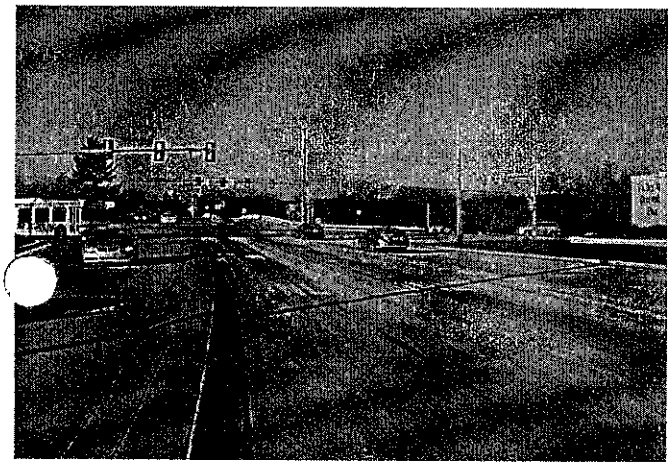
I:\eng\806819\Traffic\Pictures\vfcc\IMG_9412.JPG
Gulph Rd & Full Access - Gulph Rd NB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9413.JPG
Gulph Rd & 422 Ramps / First Ave - First Ave WB Approach



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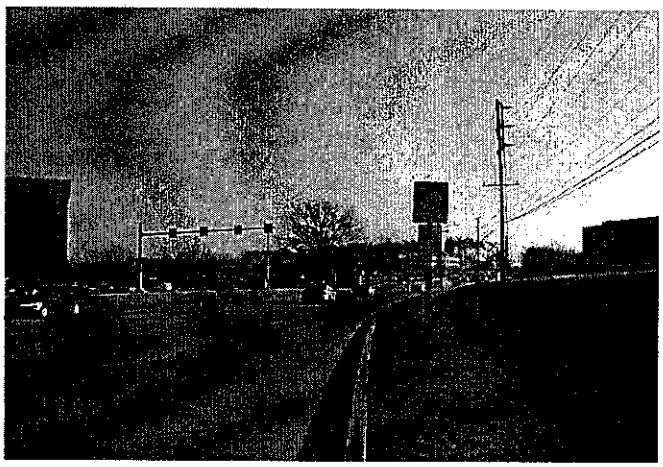
Gulph Rd & 422 Ramps / First Ave - First Ave WB Approach



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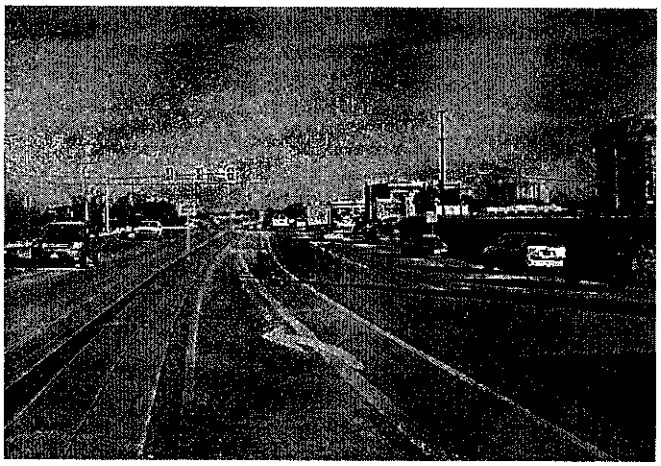
Gulph Rd & 422 Ramps / First Ave - First Ave EB Departure



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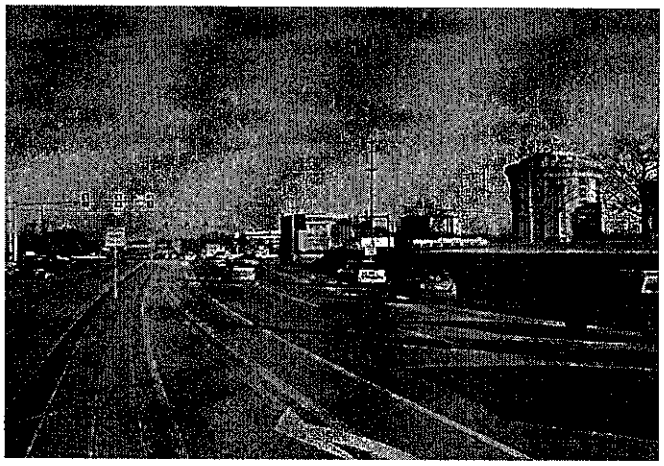
'oh Rd & 422 Ramps / First Ave - Gulph Rd NB Approach



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9417.JPG
Gulph Rd & 422 Ramps / First Ave - Gulph Rd NB Approach

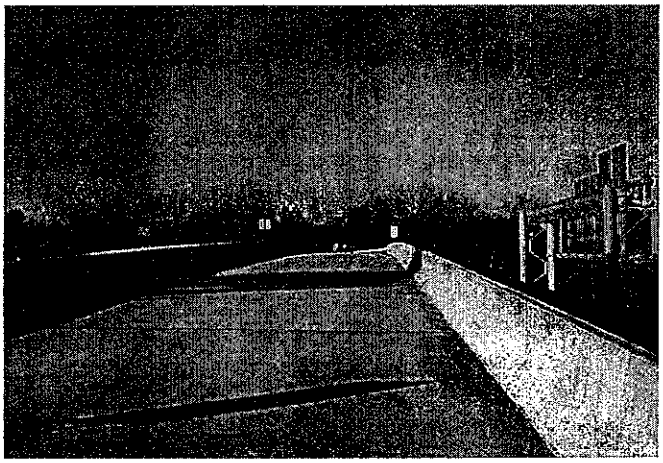
Project: vfcc **Date:** 1/31/2007

Name: ndb **File:** I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9418.JPG
Gulph Rd & 422 Ramps / First Ave - Gulph Rd SB Departure

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9419.JPG
Gulph Rd & 422 Ramps / First Ave - 422 Ramps EB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9420.JPG
Gulph Rd & 422 Ramps / First Ave - 422 Ramps EB Approach



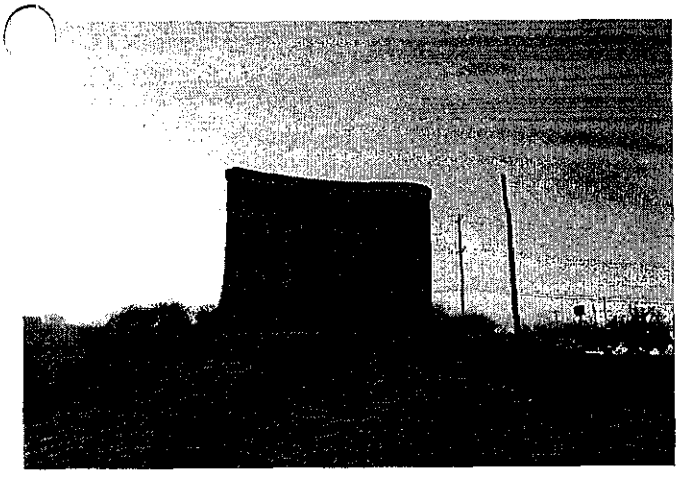
I:\eng\806819\Traffic\Pictures\vfcc\IMG_9421.JPG
Gulph Rd & 422 Ramps / First Ave - Looking west to Rt 422

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9422.JPG
Gulph Rd & 422 Ramps / First Ave - Gulph Rd SB Approach

I:\eng\806819\Traffic\Pictures\vfcc\IMG_9423.JPG
Gulph Rd & 422 Ramps / First Ave - Gulph Rd NB Departure

Project: vfcc **Date:** 1/31/2007

Name: ndb **File:** I:\eng\806819\Traffic\Pictures\vfcc\806819.11_Pics.xls



I:\eng\806819\Traffic\Pictures\vfcc\IMG_9424.JPG
Figure 67:

APPENDIX B

Manual Turning Movement Count Data

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Right In Right Out Access
Counter/Board #: GH/2284

File Name : vforge01w
Site Code : 00000000
Start Date : 2/2/2007
Page No : 1

Groups Printed- Unshifted

	Gulph Rd Southbound			VFCC R In R Out Access Westbound			Gulph Rd Northbound					
Start Time	Left	Thru	HV	Left	Right	HV	Thru	Right	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	0	181	3	0	1	0	64	3	7	10	249	259
07:15	0	229	1	0	1	0	50	1	3	4	281	285
07:30	0	240	2	0	0	0	60	3	3	5	303	308
07:45	0	211	1	0	0	0	53	11	3	4	275	279
Total	0	861	7	0	2	0	227	18	16	23	1108	1131
08:00	1	191	6	0	1	0	60	4	6	12	257	269
08:15	0	193	4	0	0	0	51	7	5	9	251	260
08:30	0	206	5	0	1	0	57	16	6	11	280	291
08:45	0	144	2	0	0	0	57	10	4	6	211	217
Total	1	734	17	0	2	0	225	37	21	38	999	1037
16:00	0	89	1	0	4	0	285	0	2	3	378	381
16:15	1	103	3	0	2	0	332	4	2	5	442	447
16:30	0	106	3	0	7	0	371	2	3	6	486	492
16:45	2	90	0	0	7	0	330	28	1	1	457	458
Total	3	388	7	0	20	0	1318	34	8	15	1763	1778
17:00	0	82	2	0	5	0	333	0	4	6	420	426
17:15	0	115	1	0	9	0	259	1	4	5	384	389
17:30	0	87	4	0	5	0	321	0	1	5	413	418
17:45	0	62	0	0	1	0	302	0	3	3	365	368
Total	0	346	7	0	20	0	1215	1	12	19	1582	1601
Grand Total	4	2329	38	0	44	0	2985	90	57	95	5452	5547
Apprch %	0.2	99.8		0	100		97.1	2.9				
Total %	0.1	42.7		0	0.8		54.8	1.7		1.7	98.3	

McMahon Associates, Inc.

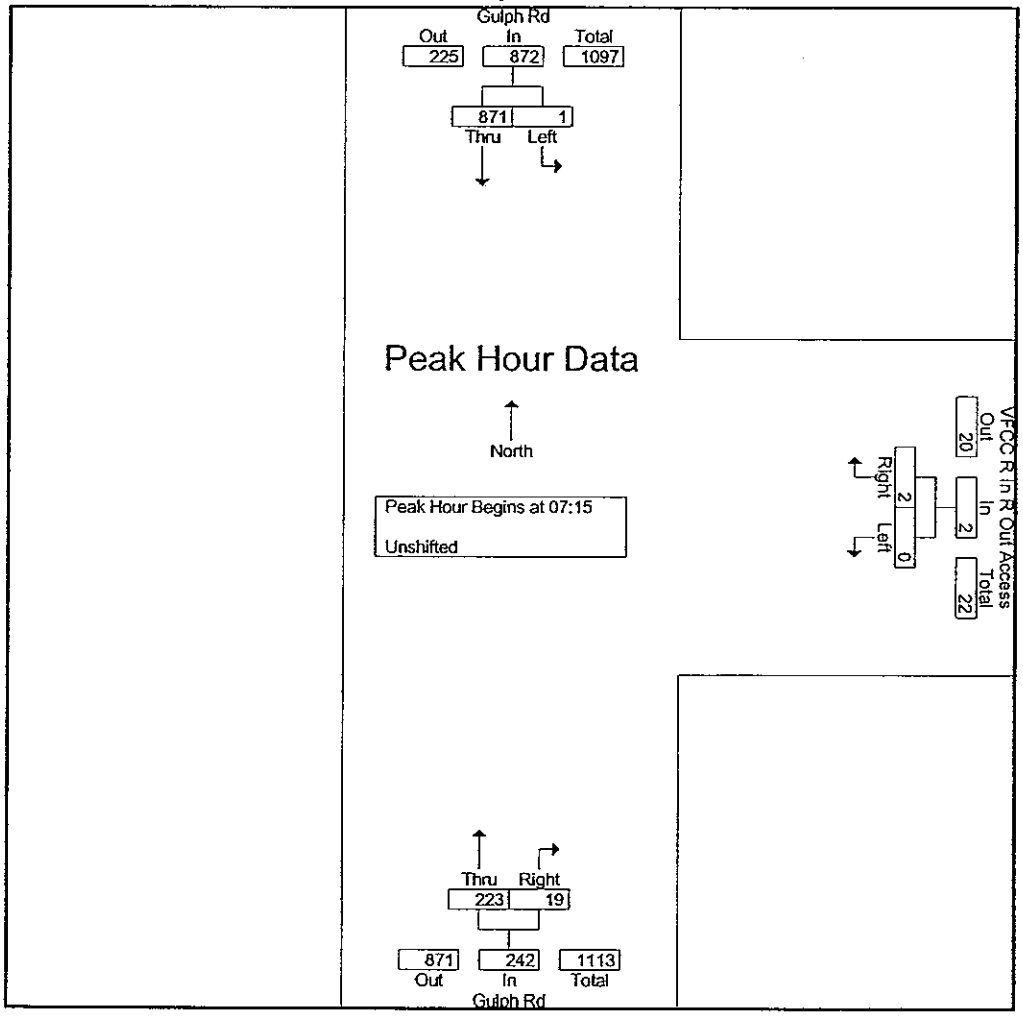
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Right In Right Out Access
Counter/Board #: GH/2284

File Name : vforge01w
Site Code : 00000000
Start Date : 2/2/2007
Page No : 2

	Gulph Rd Southbound			VFCC R In R Out Access Westbound			Gulph Rd Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15										
07:15	0	229	229	0	1	1	50	1	51	281
07:30	0	**240**	**240**	0	0	0	**60**	3	63	**303**
07:45	0	211	211	0	0	0	53	**11**	**64**	275
08:00	**1**	191	192	0	1	1	60	4	64	257
Total Volume	1	871	872	0	2	2	223	19	242	1116
% App. Total	0.1	99.9		0	100		92.1	7.9		
PHF	.250	.907	.908	.000	.500	.500	.929	.432	.945	.921

10 = 1% 0 = 0% 15 = 6%



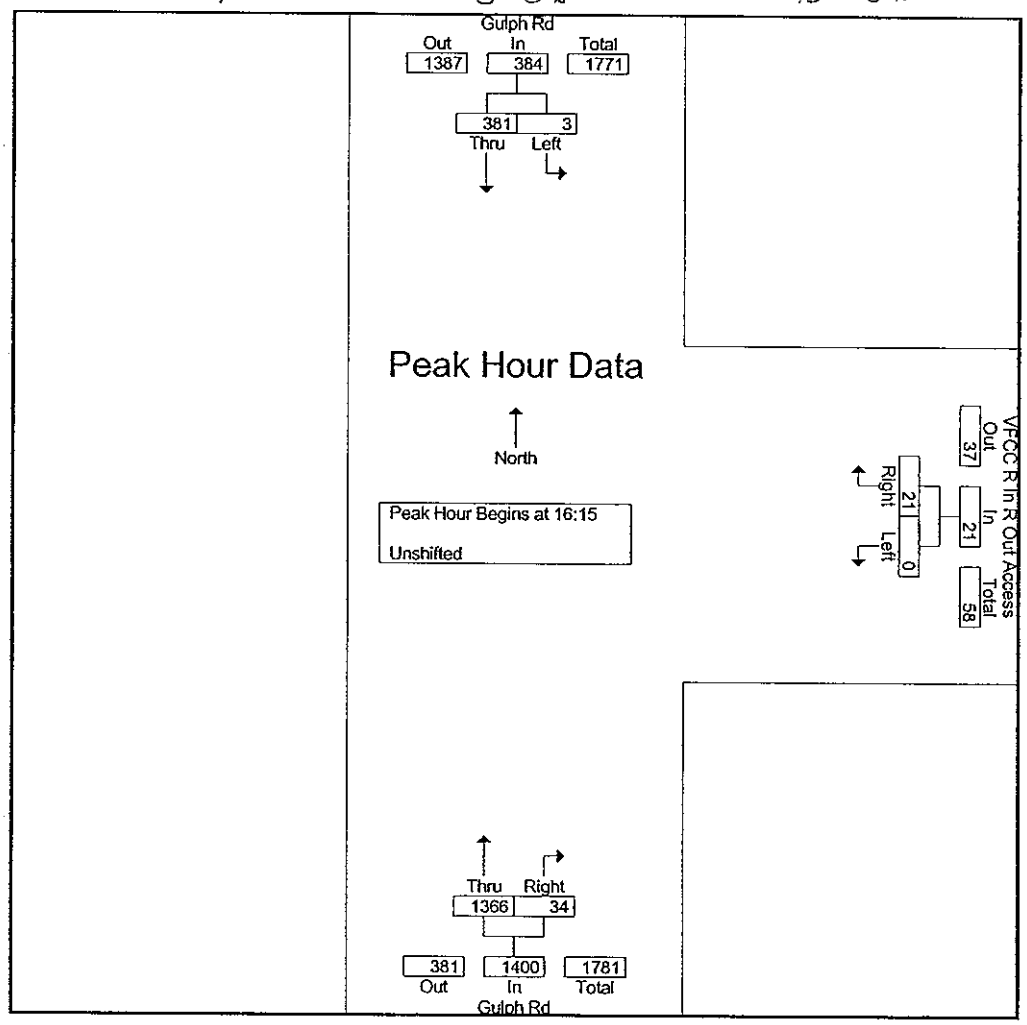
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Right In Right Out Access
Counter/Board #: GH/2284

File Name : vforge01w
Site Code : 00000000
Start Date : 2/2/2007
Page No : 3

	Gulph Rd Southbound			VFCC R In R Out Access Westbound			Gulph Rd Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:15										
16:15	1	103	104	0	2	2	332	4	336	442
16:30	0	**106**	**106**	0	**7**	**7**	**371**	2	**373**	**486**
16:45	**2**	90	92	0	7	7	330	**28**	358	457
17:00	0	82	82	0	5	5	333	0	333	420
Total Volume	3	381	384	0	21	21	1366	34	1400	1805
% App. Total	0.8	99.2		0	100		97.6	2.4		
PHF	.375	.899	.906	.000	.750	.750	.920	.304	.938	.928
	8 = 2%			0 = 0%			10 = 0%			



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Right In Right Out Access
Counter/Board #: CC/0987

File Name : vforge01s
Site Code : 80681901
Start Date : 2/3/2007
Page No : 1

Groups Printed- Unshifted

	Gulph Rd Southbound			VFCC Access Westbound			Gulph Rd Northbound					
Start Time	Left	Thru	HV	Left	Right	HV	Thru	Right	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	0	40	0	0	4	0	105	7	0	0	156	156
12:15	0	112	0	0	2	0	152	2	0	0	268	268
12:30	0	125	0	0	4	0	148	4	1	1	281	282
12:45	0	123	0	0	4	0	167	1	0	0	295	295
Total	0	400	0	0	14	0	572	14	1	1	1000	1001
13:00	0	108	0	0	1	0	157	4	0	0	270	270
13:15	0	110	0	0	5	0	165	4	0	0	284	284
13:30	0	105	0	0	1	0	191	3	2	2	300	302
13:45	0	94	0	0	0	0	199	1	0	0	294	294
Total	0	417	0	0	7	0	712	12	2	2	1148	1150
14:00	0	117	0	0	6	0	236	4	1	1	363	364
14:15	0	123	1	0	4	0	190	1	0	1	318	319
14:30	0	113	0	0	5	0	227	3	1	1	348	349
14:45	0	105	0	0	2	0	211	2	1	1	320	321
Total	0	458	1	0	17	0	864	10	3	4	1349	1353
Grand Total	0	1275	1	0	38	0	2148	36	6	7	3497	3504
Apprch %	0	100		0	100		98.4	1.6				
Total %	0	36.5		0	1.1		61.4	1		0.2	99.8	

McMahon Associates, Inc.

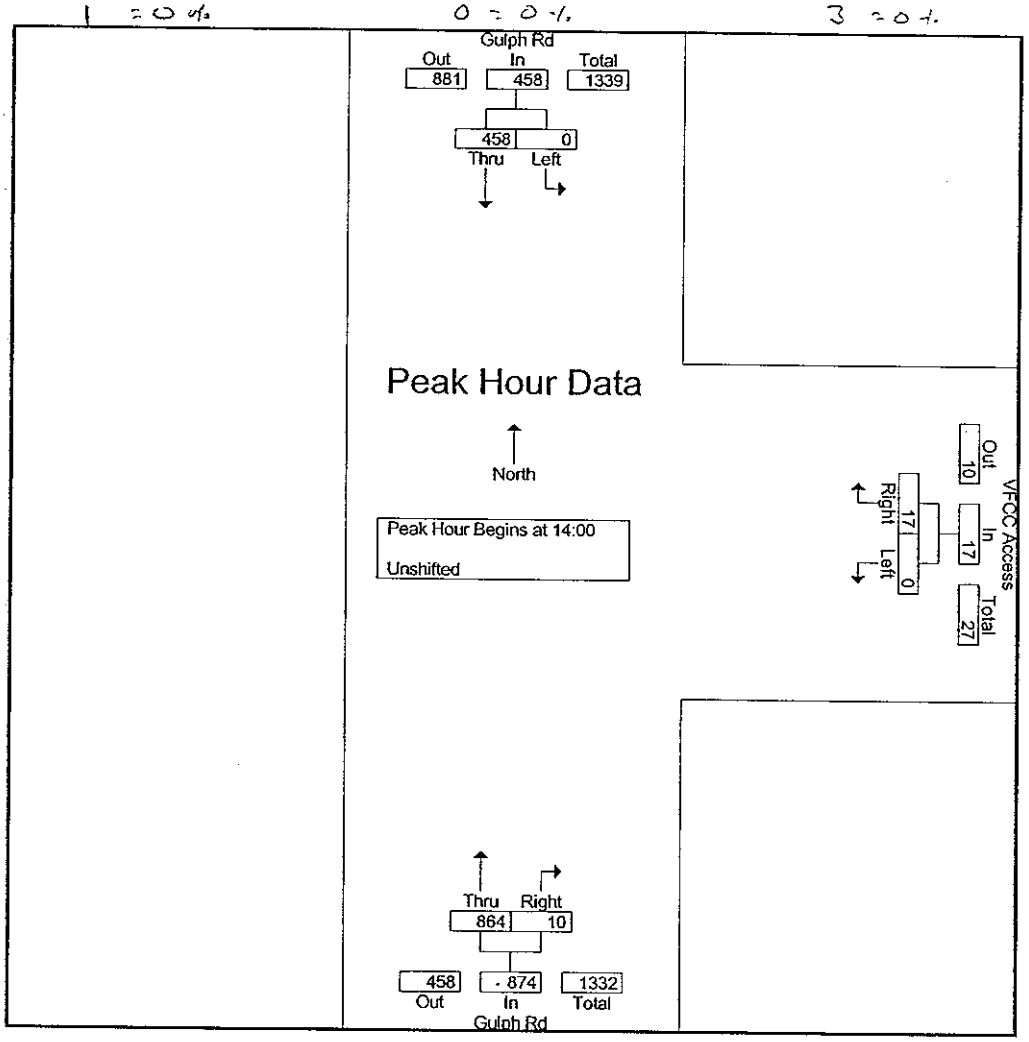
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Right In Right Out Access
Counter/Board #: CC/0987

File Name : vforge01s
Site Code : 80681901
Start Date : 2/3/2007
Page No : 2

	Gulph Rd Southbound			VFCC Access Westbound			Gulph Rd Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 14:00										
14:00	0	117	117	0	6	6	236	4	240	363
14:15	0	123	123	0	4	4	190	1	191	318
14:30	0	113	113	0	5	5	227	3	230	348
14:45	0	105	105	0	2	2	211	2	213	320
Total Volume	0	458	458	0	17	17	864	10	874	1349
% App. Total	0	100		0	100		98.9	1.1		
PHF	.000	.931	.931	.000	.708	.708	.915	.625	.910	.929

1 = 0 % 0 = 0 % 3 = 0 %



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Main Access
Counter/Board #: KR&CC/4094+0987

File Name : vforge02w
Site Code : 80681902
Start Date : 2/2/2007
Page No : 1

Groups Printed- Unshifted

	Gulph Rd Southbound			VFCC Main Access Westbound			Gulph Rd Northbound					
Start Time	Left	Thru	HV	Left	Right	HV	Thru	Right	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	6	179	2	1	1	0	70	3	3	5	260	265
07:15	7	189	0	4	1	1	42	7	3	4	250	254
07:30	6	212	1	7	0	0	65	4	3	4	294	298
07:45	3	187	1	4	0	2	60	9	2	5	263	268
Total	22	767	4	16	2	3	237	23	11	18	1067	1085
08:00	10	182	3	9	0	2	68	3	4	9	272	281
08:15	12	187	2	7	0	2	56	4	3	7	266	273
08:30	16	205	1	7	0	1	72	9	5	7	309	316
08:45	17	135	2	6	2	4	61	10	3	9	231	240
Total	55	709	8	29	2	9	257	26	15	32	1078	1110
16:15	5	96	2	8	10	2	292	2	2	6	413	419
16:30	3	93	1	8	10	1	385	2	3	5	501	506
16:45	1	104	0	11	6	3	384	5	0	3	511	514
Total	9	293	3	27	26	6	1061	9	5	14	1425	1439
17:00	1	69	1	6	11	1	359	7	2	4	453	457
17:15	5	105	1	16	12	2	288	2	1	4	428	432
17:30	2	97	1	3	7	0	317	4	1	2	430	432
17:45	2	65	0	3	5	1	332	2	1	2	409	411
Total	10	336	3	28	35	4	1296	15	5	12	1720	1732
Grand Total	96	2105	18	100	65	22	2851	73	36	76	5290	5366
Apprch %	4.4	95.6		60.6	39.4		97.5	2.5				
Total %	1.8	39.8		1.9	1.2		53.9	1.4		1.4	98.6	

McMahon Associates, Inc.

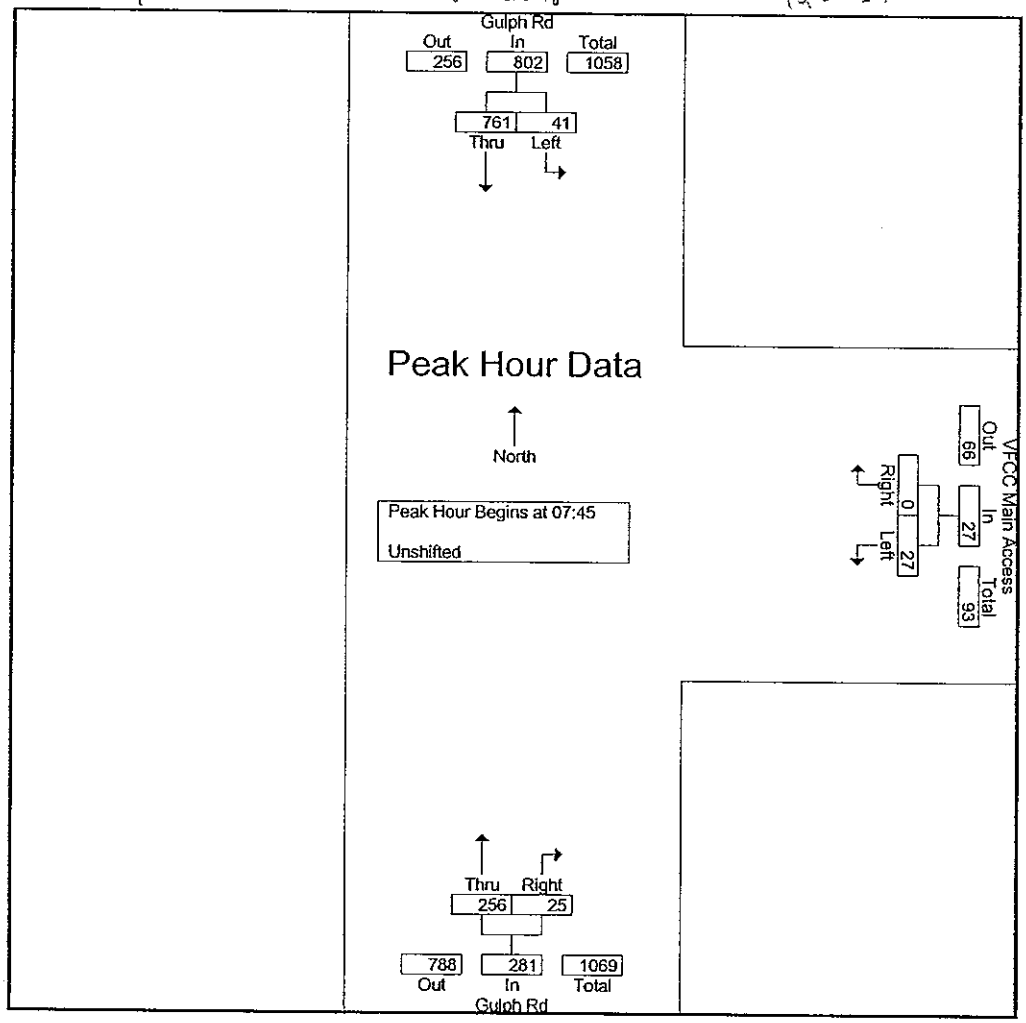
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Main Access
Counter/Board #: KR&CC/4094+0987

File Name : vforge02w
Site Code : 80681902
Start Date : 2/2/2007
Page No : 2

	Gulph Rd Southbound			VFCC Main Access Westbound			Gulph Rd Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45										
07:45	3	187	190	4	0	4	60	9	69	263
08:00	10	182	192	9	0	9	68	3	71	272
08:15	12	187	199	7	0	7	56	4	60	266
08:30	**16**	**205**	**221**	7	0	7	**72**	9	**81**	**309**
Total Volume	41	761	802	27	0	27	256	25	281	1110
% App. Total	5.1	94.9		100	0		91.1	8.9		
PHF	.641	.928	.907	.750	.000	.750	.889	.694	.867	.898

7 = 0 % 7 = 26 % 14 = 5 %



McMahon Associates, Inc.

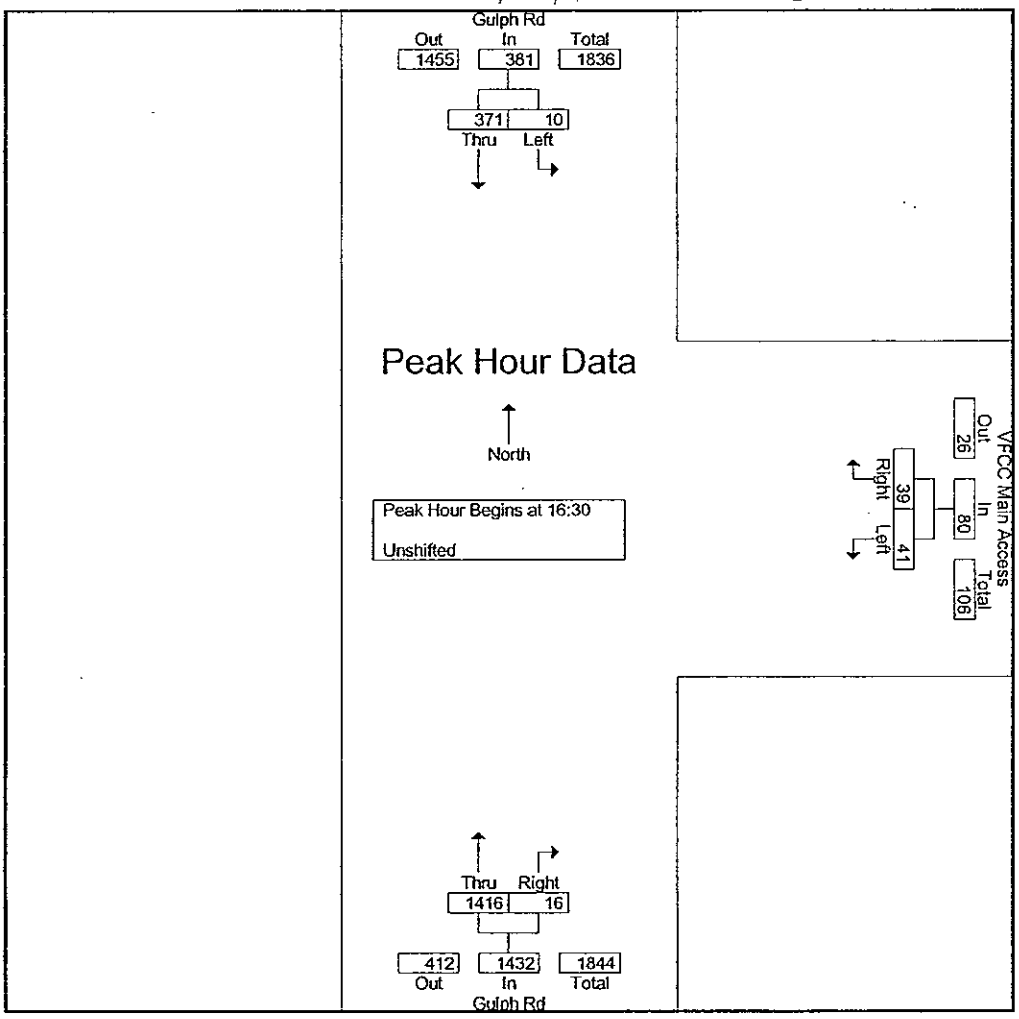
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Main Access
Counter/Board #: KR&CC/4094+0987

File Name : vforge02w
Site Code : 80681902
Start Date : 2/2/2007
Page No : 3

	Gulph Rd Southbound			VFCC Main Access Westbound			Gulph Rd Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:30										
16:30	3	93	96	8	10	18	**385**	2	387	501
16:45	1	104	105	11	6	17	384	5	**389**	**511**
17:00	1	69	70	6	11	17	359	7	366	453
17:15	**5**	**105**	**110**	**16**	**12**	**28**	288	2	290	428
Total Volume	10	371	381	41	39	80	1416	16	1432	1893
% App. Total	2.6	97.4		51.2	48.8		98.9	1.1		
PHF	.500	.883	.866	.641	.813	.714	.919	.571	.920	.926

3.0 % 7.9 % 6.0 %



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Main Access
Counter/Board #: KR/4094

File Name : vforge02s
Site Code : 80681902
Start Date : 2/3/2007
Page No : 1

Groups Printed- Unshifted

	Gulph Rd Southbound			VFCC Access Westbound			Gulph Rd Northbound					
Start Time	Left	Thru	HV	Left	Right	HV	Thru	Right	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	5	100	0	5	2	1	153	7	0	1	272	273
12:15	1	130	0	10	3	2	145	5	0	2	294	296
12:30	5	139	0	7	2	2	165	8	1	3	326	329
12:45	0	122	0	7	3	1	155	5	0	1	292	293
Total	11	491	0	29	10	6	618	25	1	7	1184	1191
13:00	3	113	0	9	1	3	149	3	0	3	278	281
13:15	6	98	1	11	0	1	166	5	0	2	286	288
13:30	5	99	0	10	0	2	194	4	2	4	312	316
13:45	5	107	0	5	1	0	176	1	0	0	295	295
Total	19	417	1	35	2	6	685	13	2	9	1171	1180
14:00	4	112	0	5	5	1	218	3	1	2	347	349
14:15	4	107	0	12	1	2	174	6	0	2	304	306
14:30	6	111	0	13	2	1	219	3	1	2	354	356
14:45	6	117	0	7	1	3	193	4	1	4	328	332
Total	20	447	0	37	9	7	804	16	3	10	1333	1343
Grand Total	50	1355	1	101	21	19	2107	54	6	26	3688	3714
Apprch %	3.6	96.4		82.8	17.2		97.5	2.5				
Total %	1.4	36.7		2.7	0.6		57.1	1.5		0.7	99.3	

McMahon Associates, Inc.

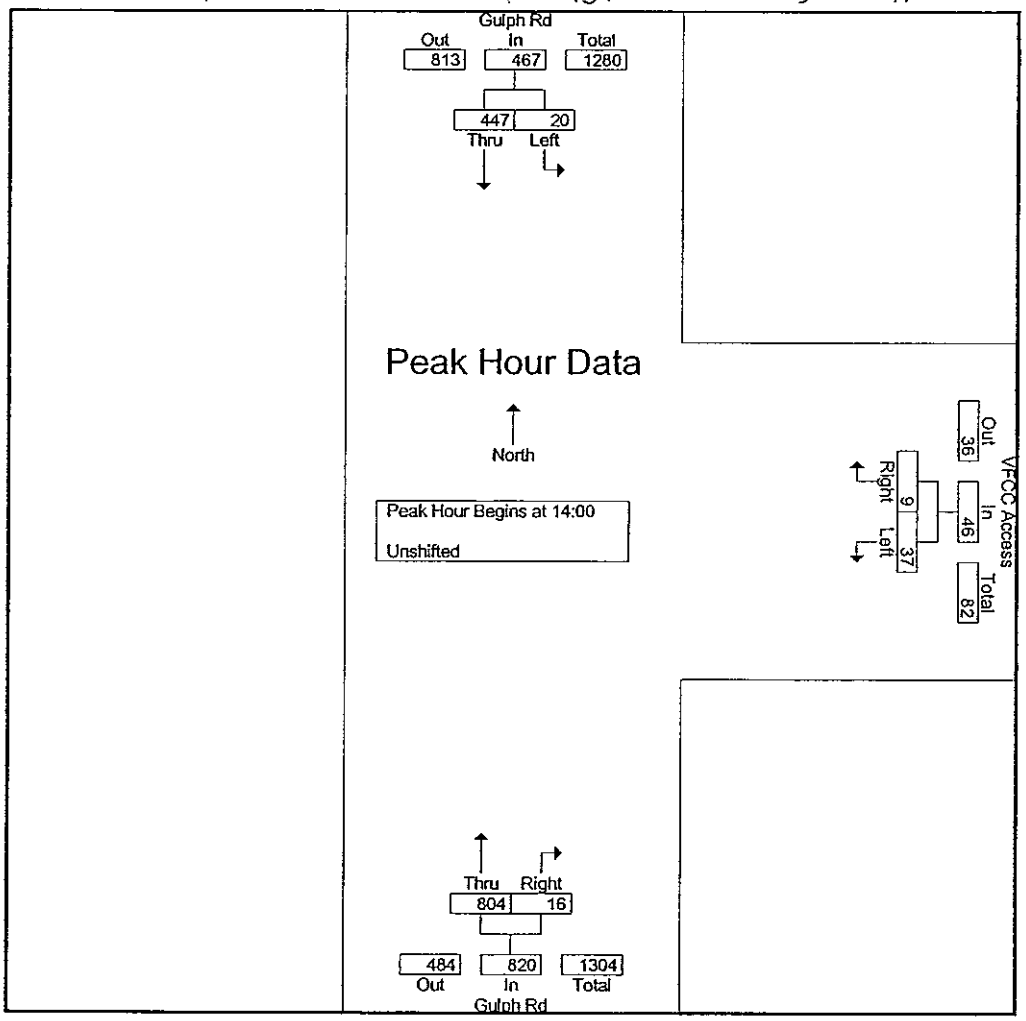
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
VFCC Main Access
Counter/Board #: KR/4094

File Name : vforge02s
Site Code : 80681902
Start Date : 2/3/2007
Page No : 2

	Gulph Rd Southbound			VFCC Access Westbound			Gulph Rd Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 14:00										
14:00	4	112	116	5	5	10	218	3	221	347
14:15	4	107	111	12	1	13	174	6	180	304
14:30	6	111	117	13	2	15	219	3	222	354
14:45	6	117	123	7	1	8	193	4	197	328
Total Volume	20	447	467	37	9	46	804	16	820	1333
% App. Total	4.3	95.7		80.4	19.6		98	2		
PHF	.833	.955	.949	.712	.450	.767	.918	.667	.923	.941

0 = 0 % 7 = 15 % 3 = 0 %



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
First Avenue / Rt 422 EB Ramps
Counter/Board #: BH/2285

File Name : vforge03w
Site Code : 80681903
Start Date : 2/2/2007
Page No : 1

Groups Printed- Unshifted

	Gulph Rd Southbound				First Ave Westbound					Gulph Rd Northbound					Rt 422 EB Ramps Eastbound							
Start Time	Left	Thru	Right	HV	Left	Thru	ROR	Right	HV	Left	Thru	ROR	Right	HV	Left	Thru	ROR	Right	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	20	153	1	1	17	14	2	7	8	1	61	7	87	7	0	64	30	30	2	18	494	512
07:15	19	176	2	1	23	17	1	4	7	1	49	8	154	6	0	58	14	55	5	19	581	600
07:30	30	207	0	1	39	24	3	6	6	0	57	3	149	8	0	73	7	55	6	21	653	674
07:45	22	153	15	3	31	18	5	6	8	1	61	14	192	8	1	73	23	58	5	24	673	697
Total	91	689	18	6	110	73	11	23	29	3	228	32	582	29	1	268	74	198	18	82	2401	2483
08:00	30	146	2	6	26	26	4	6	3	1	56	10	180	10	0	70	14	62	4	23	633	656
08:15	29	131	0	7	29	29	1	7	4	2	43	16	190	7	0	63	16	46	4	22	602	624
08:30	32	159	1	2	29	21	2	8	6	0	67	3	196	8	2	91	9	61	2	18	681	699
08:45	20	101	3	5	38	26	0	6	7	4	57	2	226	11	1	61	12	53	3	26	610	636
Total	111	537	6	20	122	102	7	27	20	7	223	31	792	36	3	285	51	222	13	89	2526	2615
16:00	6	86	2	2	121	89	6	23	3	7	279	3	76	3	1	23	20	31	1	9	773	782
16:15	10	97	1	3	127	80	0	28	1	3	304	4	74	7	0	23	19	40	0	11	810	821
16:30	13	96	1	6	132	111	5	38	5	4	285	0	81	4	0	25	24	44	3	18	859	877
16:45	11	79	2	2	117	93	11	38	5	2	311	0	83	5	1	13	31	41	2	14	833	847
Total	40	358	6	13	497	373	22	127	14	16	1179	7	314	19	2	84	94	156	6	52	3275	3327
17:00	3	87	2	2	125	104	5	55	5	5	291	0	71	5	0	17	22	36	1	13	823	836
17:15	11	107	1	3	144	119	11	53	4	2	195	0	73	6	0	18	18	48	1	14	800	814
17:30	11	70	2	2	121	101	7	64	3	7	179	0	92	4	2	18	14	44	0	9	732	741
17:45	7	64	1	2	123	68	6	50	5	6	196	0	76	7	4	18	13	30	1	15	662	677
Total	32	328	6	9	513	392	29	222	17	20	861	0	312	22	6	71	67	158	3	51	3017	3068
Grand Total	274	1912	36	48	1242	940	69	399	80	46	2491	70	2000	{\fs 15 10 6}	12	708	286	734	40	274	11219	11493
Apprch %	12.3	86	1.6		46.9	35.5	2.6	15.1		1	54.1	1.5	43.4		0.7	40.7	16.4	42.2				
Total %	2.4	17	0.3		11.1	8.4	0.6	3.6		0.4	22.2	0.6	17.8		0.1	6.3	2.5	6.5		2.4	97.6	

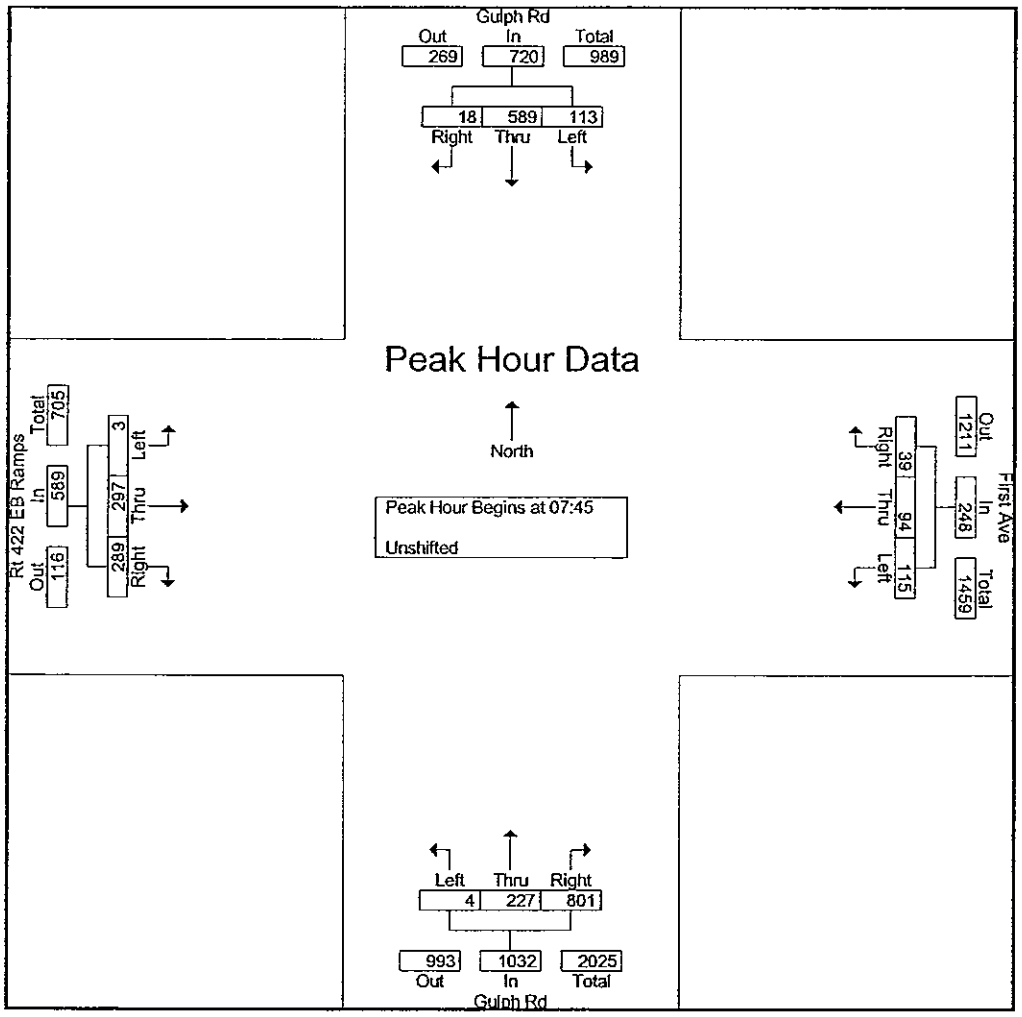
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
First Avenue / Rt 422 EB Ramps
Counter/Board #: BH/2285

File Name : vforge03w
Site Code : 80681903
Start Date : 2/2/2007
Page No : 2

	Gulph Rd Southbound				First Ave Westbound					Gulph Rd Northbound					Rt 422 EB Ramps Eastbound					
Start Time	Left	Thru	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																				
Peak Hour for Entire Intersection Begins at 07:45																				
07:45	22	153	15	190	31	18	5	6	60	1	61	14	192	268	1	73	23	58	155	673
08:00	30	146	2	178	26	26	4	6	62	1	56	10	180	247	0	70	14	62	146	633
08:15	29	131	0	160	29	29	1	7	66	2	43	16	190	251	0	63	16	46	125	602
08:30	32	159	1	192	29	21	2	8	60	0	67	3	196	266	2	91	9	61	163	681
Total Volume	113	589	18	720	115	94	12	27	248	4	227	43	758	1032	3	297	62	227	589	2589
% App. Total	15.7	81.8	2.5		46.4	37.9	4.8	10.9		0.4	22	4.2	73.4		0.5	50.4	10.5	38.5		
PHF	.883	.926	.300	.938	.927	.810	.600	.844	.939	.500	.847	.672	.967	.963	.375	.816	.674	.915	.903	.950
	18 = 3%				21 = 3%					33 = 3%					15 = 3%					



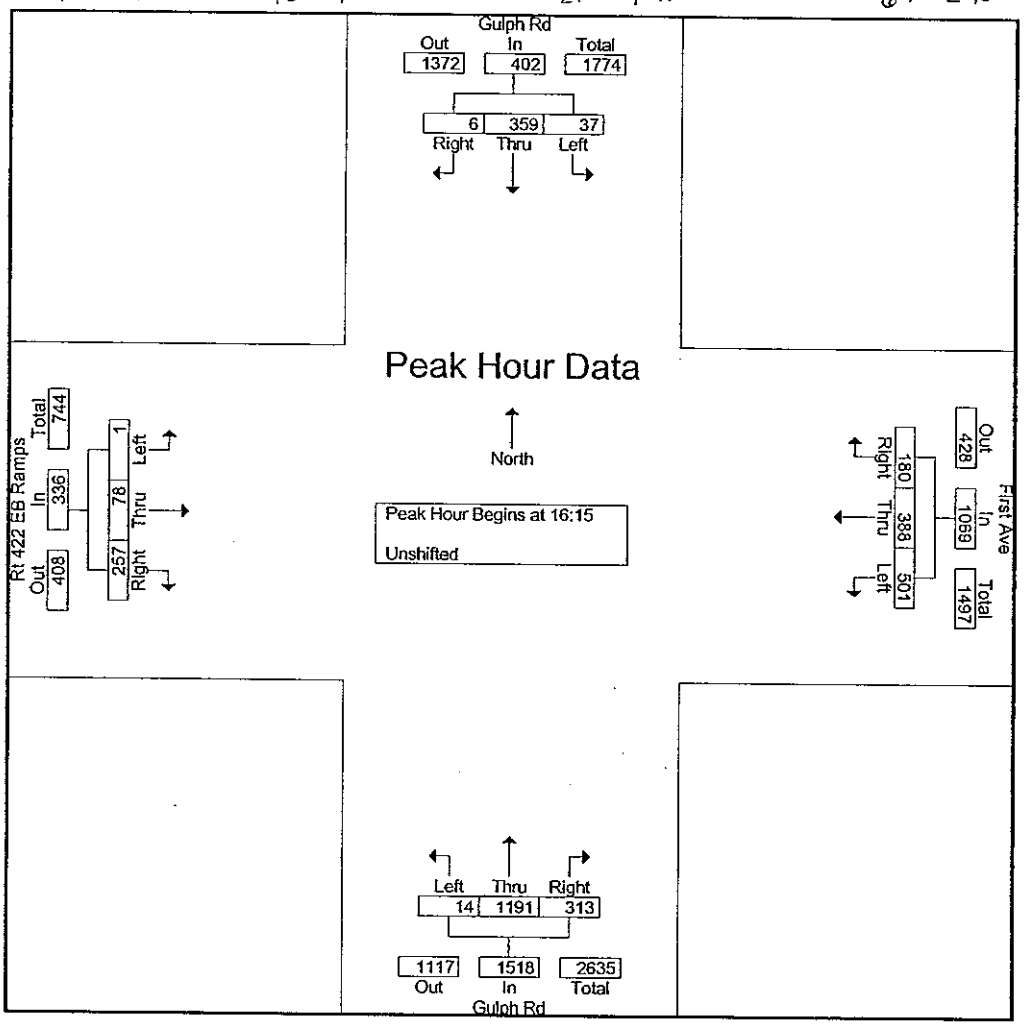
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
First Avenue / Rt 422 EB Ramps
Counter/Board #: BH/2285

File Name : vforge03w
Site Code : 80681903
Start Date : 2/2/2007
Page No : 3

	Gulph Rd Southbound				First Ave Westbound					Gulph Rd Northbound					Rt 422 EB Ramps Eastbound					
Start Time	Left	Thru	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																				
Peak Hour for Entire Intersection Begins at 16:15																				
16:15	10	**97**	1	108	127	80	0	28	235	3	304	**4**	74	385	0	23	19	40	82	810
16:30	**13**	96	1	**110**	**132**	**111**	5	38	286	4	285	0	81	370	0	**25**	24	**44**	**93**	**859**
16:45	11	79	**2**	92	117	93	**11**	38	259	2	**311**	0	**83**	**396**	**1**	13	**31**	41	86	833
17:00	3	87	2	92	125	104	5	**55**	**289**	**5**	291	0	71	367	0	17	22	36	75	823
Total Volume	37	359	6	402	501	388	21	159	1069	14	1191	4	309	1518	1	78	96	161	336	3325
% App. Total	9.2	89.3	1.5		46.9	36.3	2	14.9		0.9	78.5	0.3	20.4		0.3	23.2	28.6	47.9		
PHF	.712	.925	.750	.914	.949	.874	.477	.723	.925	.700	.957	.250	.931	.958	.250	.780	.774	.915	.903	.968
	13 - 3%				16 - 1%					21 - 1%					6 - 2%					



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
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File Name : vforge03s
Site Code : 80681903
Start Date : 2/3/2007
Page No : 1

Groups Printed- Unshifted

	Gulph Rd Southbound				First Ave Westbound					Gulph Rd Northbound					Rt 422 EB Ramps Eastbound							
Start Time	Left	Thru	Right	HV	Left	Thru	ROR	Right	HV	Left	Thru	ROR	Right	HV	Left	Thru	ROR	Right	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	4	94	3	1	44	10	1	3	1	3	148	0	42	4	3	14	42	37	0	6	448	454
12:15	8	132	2	1	41	4	4	6	2	2	148	2	32	2	1	22	31	44	2	7	479	486
12:30	6	129	2	4	36	12	4	6	3	1	139	2	27	2	0	27	36	49	2	11	476	487
12:45	8	124	2	1	30	12	4	4	3	2	166	1	38	2	1	22	46	52	0	6	512	518
Total	26	479	9	7	151	38	13	19	9	8	601	5	139	10	5	85	155	182	4	30	1915	1945
13:00	7	107	0	3	41	13	6	3	0	1	141	1	22	3	2	18	50	35	0	6	447	453
13:15	1	116	3	3	27	9	4	5	0	1	157	2	38	2	1	20	54	36	1	6	474	480
13:30	10	95	3	2	33	10	3	7	6	2	186	2	36	9	1	28	34	41	3	20	491	511
13:45	6	91	3	1	30	8	3	9	1	1	176	0	33	2	0	27	49	36	3	7	472	479
Total	24	409	9	9	131	40	16	24	7	5	660	5	129	16	4	93	187	148	7	39	1884	1923
14:00	8	111	1	4	34	10	4	7	2	4	201	0	31	3	1	19	41	30	0	9	502	511
14:15	5	121	4	3	38	10	9	7	1	6	175	0	30	2	0	22	60	19	6	12	506	518
14:30	4	105	3	2	45	7	2	7	4	3	209	0	32	2	3	17	46	36	1	9	519	528
14:45	12	103	5	4	39	7	6	8	3	0	186	0	41	5	0	15	57	18	1	13	497	510
Total	29	440	13	13	156	34	21	29	10	13	771	0	134	12	4	73	204	103	8	43	2024	2067
Grand Total	79	1328	31	29	438	112	50	72	26	26	2032	10	402	38	13	251	546	433	19	112	5823	5935
Apprch %	5.5	92.4	2.2		65.2	16.7	7.4	10.7		1.1	82.3	0.4	16.3		1	20.2	43.9	34.8				
Total %	1.4	22.8	0.5		7.5	1.9	0.9	1.2		0.4	34.9	0.2	6.9		0.2	4.3	9.4	7.4		1.9	98.1	

McMahon Associates, Inc.

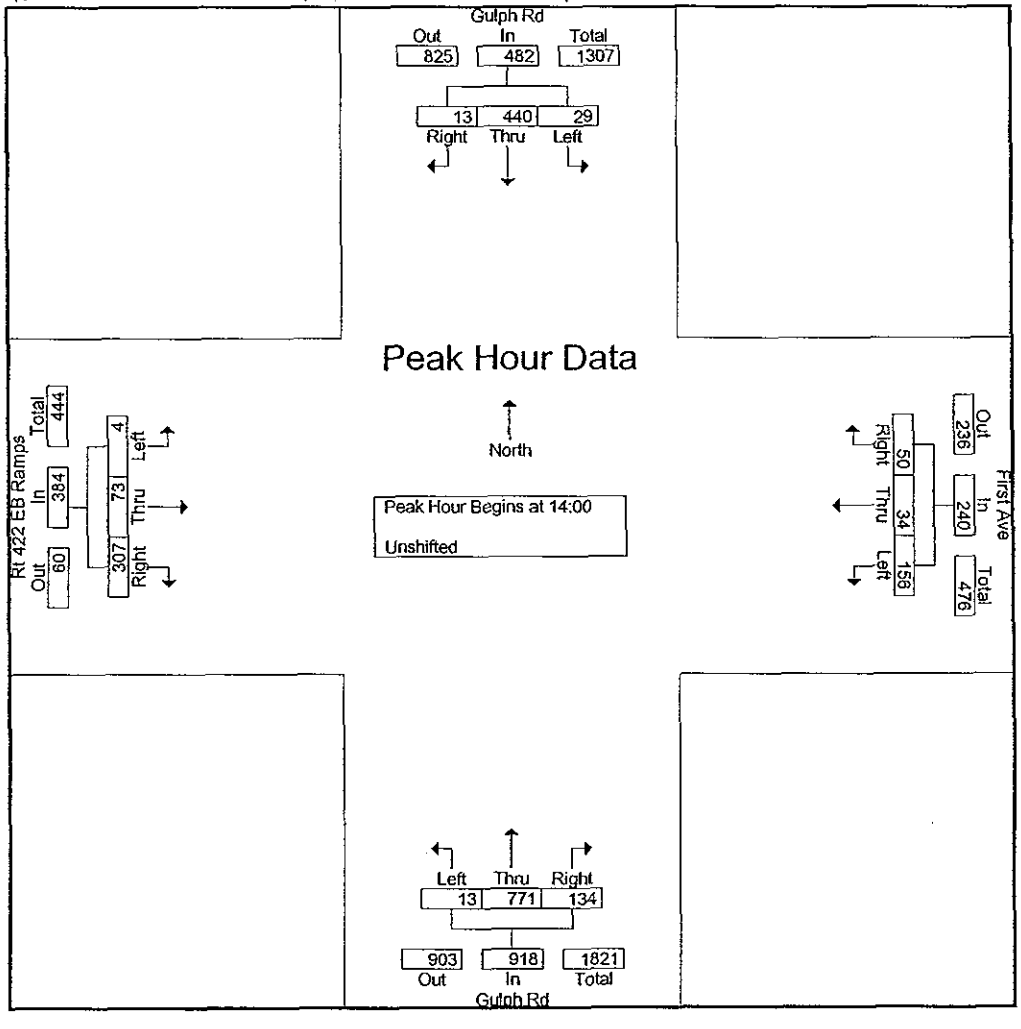
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Gulph Road &
First Avenue / Route 422 EB Ramps
Counter/Board #: BH/2285

File Name : vforge03s
Site Code : 80681903
Start Date : 2/3/2007
Page No : 2

	Gulph Rd Southbound				First Ave Westbound					Gulph Rd Northbound					Rt 422 EB Ramps Eastbound					
Start Time	Left	Thru	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1																				
Peak Hour for Entire Intersection Begins at 14:00																				
14:00	8	111	1	120	34	10	4	7	55	4	201	0	31	236	1	19	41	30	91	502
14:15	5	121	4	130	38	10	9	7	64	6	175	0	30	211	0	22	60	19	101	506
14:30	4	105	3	112	45	7	2	7	61	3	209	0	32	244	3	17	46	36	102	519
14:45	12	103	5	120	39	7	6	8	60	0	186	0	41	227	0	15	57	18	90	497
Total Volume	29	440	13	482	156	34	21	29	240	13	771	0	134	918	4	73	204	103	384	2024
% App. Total	6	91.3	2.7		65	14.2	8.8	12.1		1.4	84	0	14.6		1	19	53.1	26.8		
PHF	.604	.909	.650	.927	.867	.850	.583	.906	.938	.542	.922	.000	.817	.941	.333	.830	.850	.715	.941	.975

13 - 3 % 10 - 4 % 12 - 1 % 8 - 2 %



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Main Access / Office Access
Counter/Board #: LB/314

File Name : vforge04w
Site Code : 80681904
Start Date : 2/2/2007
Page No : 1

Groups Printed- Unshifted

	VFCC Main Access Southbound				First Avenue Westbound				Office Access Northbound				First Avenue Eastbound						
Start Time	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	7	1	6	0	0	31	4	7	0	0	0	0	10	161	4	6	13	224	237
07:15	2	0	9	2	0	42	8	7	0	0	0	0	12	228	9	7	16	310	326
07:30	4	0	12	0	0	67	13	5	0	0	0	0	25	250	11	7	12	382	394
07:45	8	0	11	0	0	61	17	4	0	0	2	0	38	286	15	10	14	438	452
Total	21	1	38	2	0	201	42	23	0	0	2	0	85	925	39	30	55	1354	1409
08:00	6	0	9	0	0	58	13	4	0	0	1	0	29	282	7	7	11	405	416
08:15	4	0	8	0	0	62	1	3	0	0	0	0	27	322	11	10	13	435	448
08:30	5	0	19	0	0	65	11	6	0	0	4	0	36	327	17	4	10	484	494
08:45	7	0	9	0	1	64	14	5	0	0	0	0	48	288	14	12	17	445	462
Total	22	0	45	0	1	249	39	18	0	0	5	0	140	1219	49	33	51	1769	1820
16:00	5	0	17	1	2	236	7	4	0	0	0	0	14	84	0	3	8	365	373
16:15	8	0	22	0	0	199	11	1	0	0	12	0	13	88	1	5	6	354	360
16:30	3	0	15	1	0	218	1	4	0	0	4	0	12	73	2	5	10	328	338
16:45	9	1	28	0	1	257	5	5	0	0	8	0	15	91	0	5	10	415	425
Total	25	1	82	2	3	910	24	14	0	0	24	0	54	336	3	18	34	1462	1496
17:00	4	0	28	0	0	318	4	2	0	0	4	0	15	79	1	3	5	453	458
17:15	8	1	32	0	1	346	6	2	0	0	3	0	17	87	3	6	8	504	512
17:30	6	1	47	0	0	307	4	2	0	0	0	0	17	88	1	4	6	471	477
17:45	11	2	52	0	0	230	6	3	0	0	0	0	12	76	0	4	7	389	396
Total	29	4	159	0	1	1201	20	9	0	0	7	0	61	330	5	17	26	1817	1843
Grand Total	97	6	324	4	5	2561	125	64	0	0	38	0	340	2810	96	98	166	6402	6568
Apprch %	22.7	1.4	75.9		0.2	95.2	4.6		0	0	100		10.5	86.6	3				
Total %	1.5	0.1	5.1		0.1	40	2		0	0	0.6		5.3	43.9	1.5		2.5	97.5	

McMahon Associates, Inc.

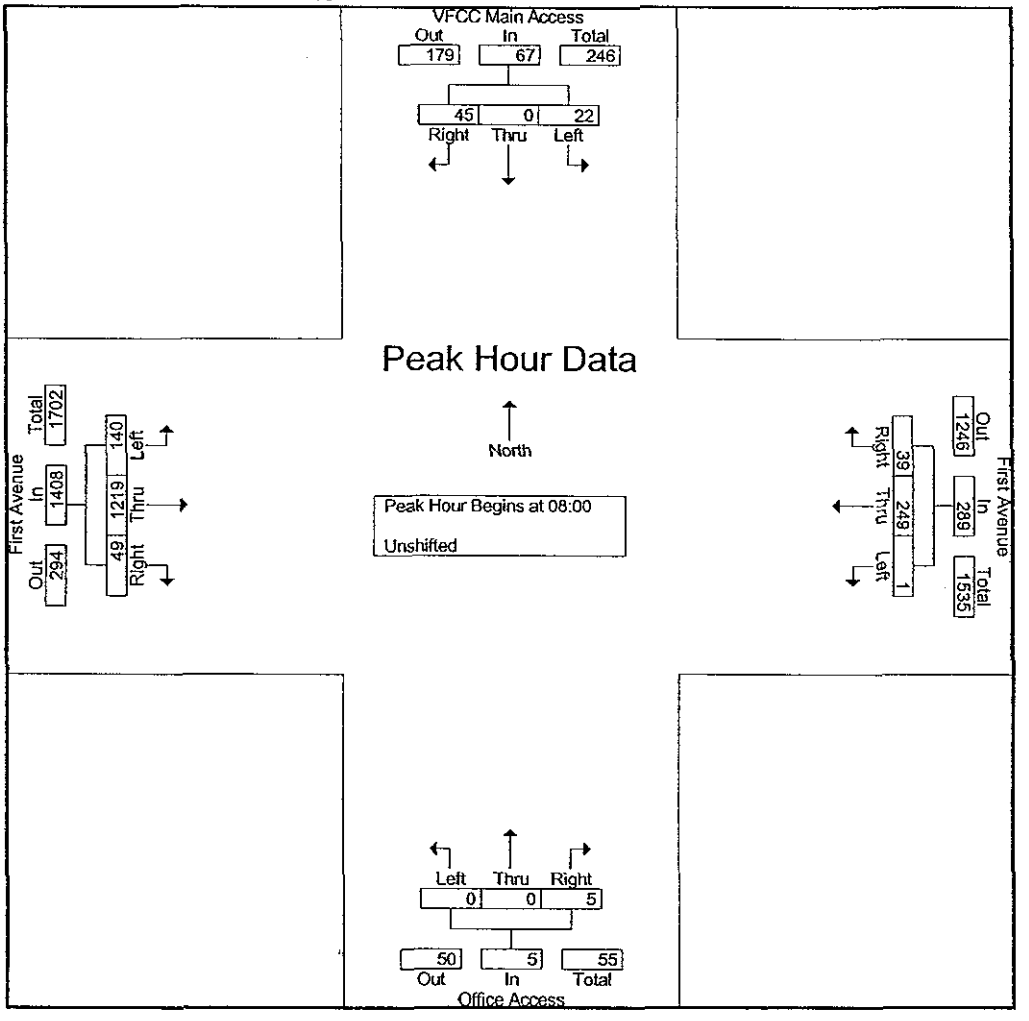
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Main Access / Office Access
Counter/Board #: LB/314

File Name : vforge04w
Site Code : 80681904
Start Date : 2/2/2007
Page No : 2

	VFCC Main Access Southbound				First Avenue Westbound				Office Access Northbound				First Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	6	0	9	15	0	58	13	71	0	0	1	1	29	282	7	318	405
08:15	4	0	8	12	0	62	1	63	0	0	0	0	27	322	11	360	435
08:30	5	0	**19**	**24**	0	**65**	11	76	0	0	**4**	**4**	36	**327**	**17**	**380**	**484**
08:45	**7**	0	9	16	**1**	64	**14**	**79**	0	0	0	0	**48**	288	14	350	445
Total Volume	22	0	45	67	1	249	39	289	0	0	5	5	140	1219	49	1408	1769
% App. Total	32.8	0	67.2		0.3	86.2	13.5		0	0	100		9.9	86.6	3.5		
PHF	.786	.000	.592	.698	.250	.958	.696	.915	.000	.000	.313	.313	.729	.932	.721	.926	.914

0 - 0 % 18 - 6 % 0 : 0 % 33 - 24



McMahon Associates, Inc.

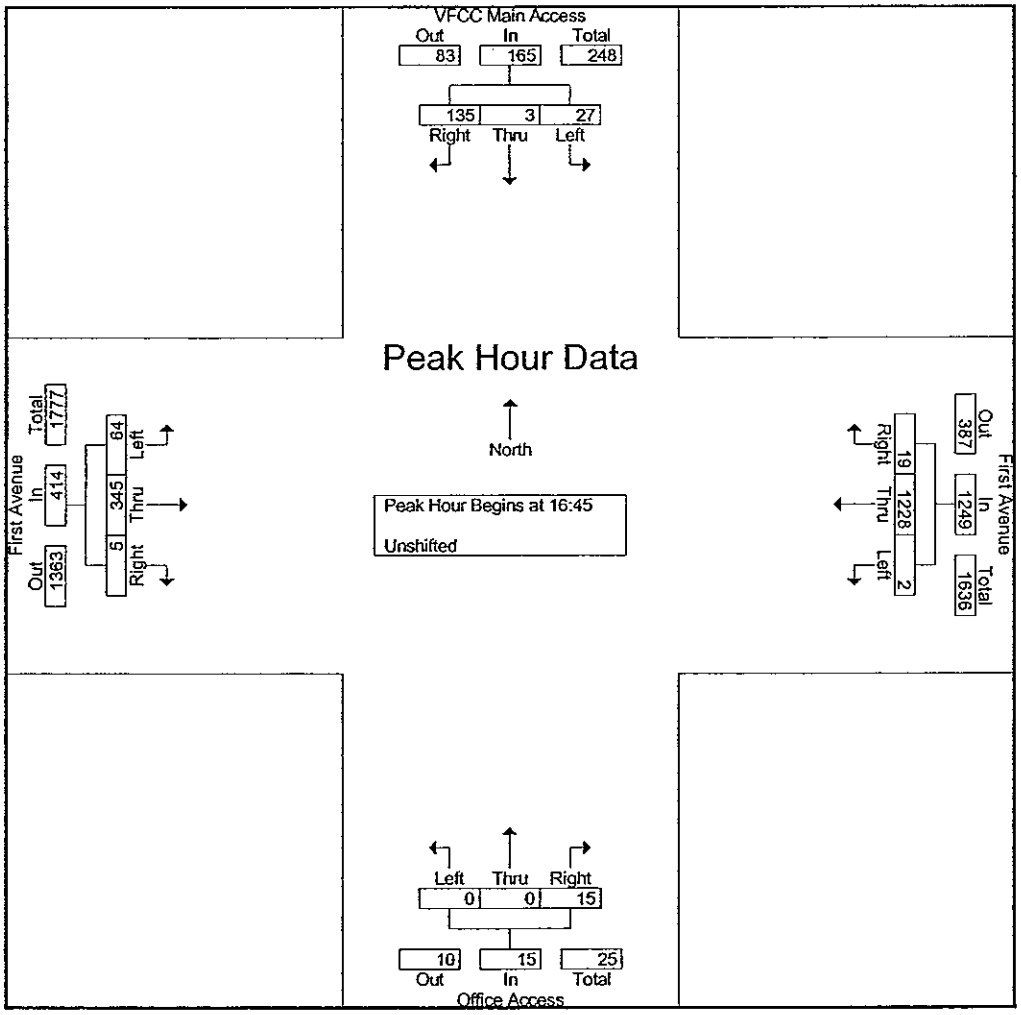
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Main Access / Office Access
Counter/Board #: LB/314

File Name : vforge04w
Site Code : 80681904
Start Date : 2/2/2007
Page No : 3

	VFCC Main Access Southbound				First Avenue Westbound				Office Access Northbound				First Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	9	1	28	38	1	257	5	263	0	0	8	8	15	91	0	106	415
17:00	4	0	28	32	0	318	4	322	0	0	4	4	15	79	1	95	453
17:15	8	1	32	41	1	346	6	353	0	0	3	3	17	87	3	107	504
17:30	6	1	47	54	0	307	4	311	0	0	0	0	17	88	1	106	471
Total Volume	27	3	135	165	2	1228	19	1249	0	0	15	15	64	345	5	414	1843
% App..Total	16.4	1.8	81.8		0.2	98.3	1.5		0	0	100		15.5	83.3	1.2		
PHF	.750	.750	.718	.764	.500	.887	.792	.885	.000	.000	.469	.469	.941	.948	.417	.967	.914

0 = 0 % 11 = 0 % 0 = 0 % 19 = 4 %



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Main Access / Office Access
Counter/Board #: LB/314

File Name : vforge04s
Site Code : 80681904
Start Date : 2/3/2007
Page No : 1

Groups Printed- Unshifted

	VFCC Main Access Southbound				First Ave Westbound				Office Access Northbound				First Ave Eastbound						
Start Time	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	10	0	26	0	0	39	3	1	0	0	0	0	18	41	0	0	1	137	138
12:15	7	0	24	1	0	27	6	0	0	0	0	0	14	43	0	5	6	121	127
12:30	6	0	23	1	0	28	0	1	0	0	0	0	17	40	1	3	5	115	120
12:45	5	0	19	0	0	32	4	3	0	0	0	0	18	46	0	3	6	124	130
Total	28	0	92	2	0	126	13	5	0	0	0	0	67	170	1	11	18	497	515
13:00	8	0	21	0	0	39	6	0	0	0	0	0	11	50	0	3	3	135	138
13:15	2	0	18	0	0	23	3	0	0	0	1	0	15	37	0	1	1	99	100
13:30	7	0	23	0	1	40	3	3	0	0	0	0	19	55	0	6	9	148	157
13:45	2	0	16	0	0	29	4	2	0	0	0	0	18	48	0	3	5	117	122
Total	19	0	78	0	1	131	16	5	0	0	1	0	63	190	0	13	18	499	517
14:00	4	0	19	1	0	39	4	0	0	0	0	0	12	52	0	7	8	130	138
14:15	6	0	24	0	0	34	1	3	0	0	1	0	13	45	0	3	6	124	130
14:30	6	0	30	1	0	30	2	3	0	0	2	0	9	40	1	5	9	120	129
14:45	5	0	22	0	0	33	0	3	0	0	0	0	16	56	0	2	5	132	137
Total	21	0	95	2	0	136	7	9	0	0	3	0	50	193	1	17	28	506	534
Grand Total	68	0	265	4	1	393	36	19	0	0	4	0	180	553	2	41	64	1502	1566
Apprch %	20.4	0	79.6		0.2	91.4	8.4		0	0	100		24.5	75.2	0.3				
Total %	4.5	0	17.6		0.1	26.2	2.4		0	0	0.3		12	36.8	0.1		4.1	95.9	

McMahon Associates, Inc.

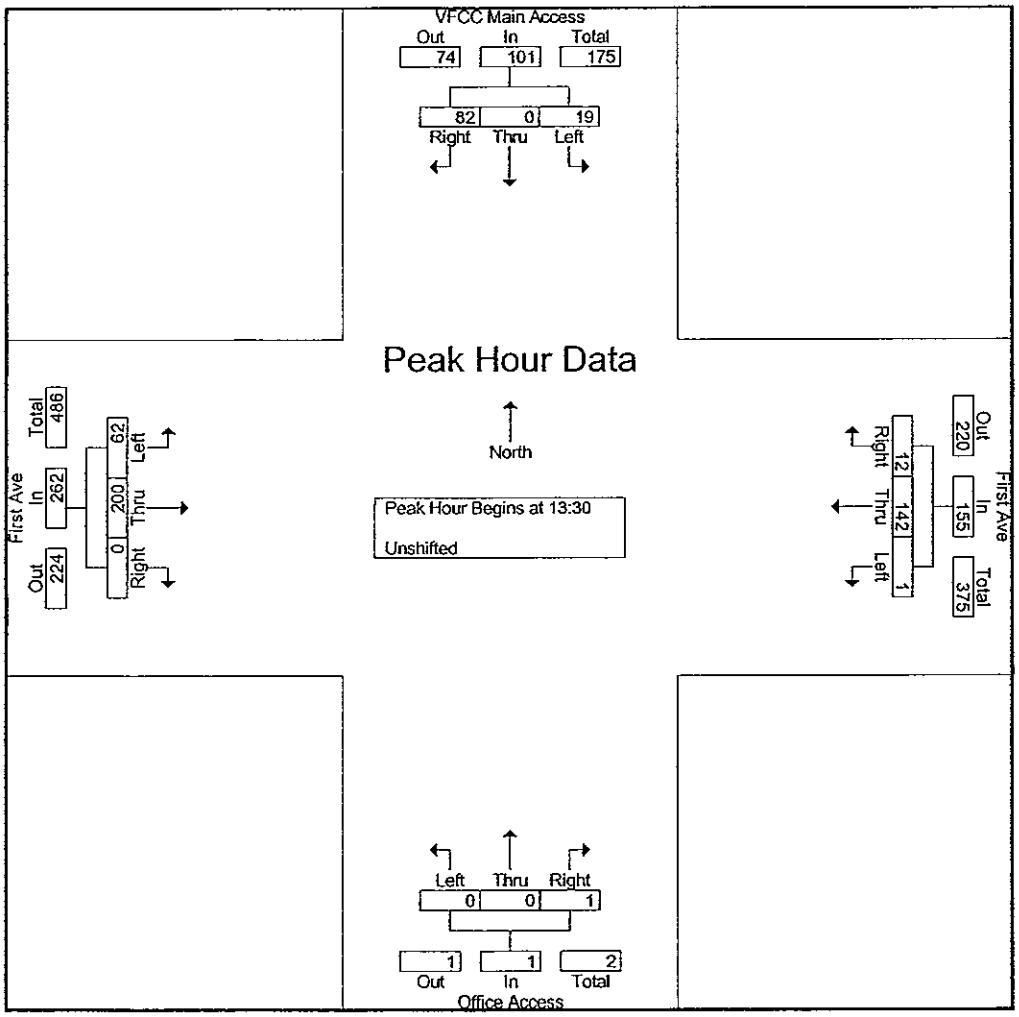
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Main Access / Office Access
Counter/Board #: LB/314

File Name : vforge04s
Site Code : 80681904
Start Date : 2/3/2007
Page No : 2

	VFCC Main Access Southbound				First Ave Westbound				Office Access Northbound				First Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 13:30																	
13:30	7	0	23	30	1	40	3	44	0	0	0	0	19	55	0	74	148
13:45	2	0	16	18	0	29	4	33	0	0	0	0	18	48	0	66	117
14:00	4	0	19	23	0	39	4	43	0	0	0	0	12	52	0	64	130
14:15	6	0	24	30	0	34	1	35	0	0	1	1	13	45	0	58	124
Total Volume	19	0	82	101	1	142	12	155	0	0	1	1	62	200	0	262	519
% App. Total	18.8	0	81.2		0.6	91.6	7.7		0	0	100		23.7	76.3	0		
PHF	.679	.000	.854	.842	.250	.888	.750	.881	.000	.000	.250	.250	.816	.909	.000	.885	.877

1 - 1 % 8 - 5 % 0 - 0 % 19 - 7 %



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Eastern and Center Accesses
Counter/Board #: EW/2161

File Name : vforge05w
Site Code : 80681905
Start Date : 2/2/2007
Page No : 1

Groups Printed- Eastern Access

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound					
Start Time	Left	Right	HV	Thru	Right	HV	Left	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	0	1	0	0	1	0	0	0	0	0	2	2
07:15	0	1	0	0	0	0	0	0	0	0	1	1
07:30	0	1	0	0	0	0	0	0	0	0	1	1
07:45	0	0	0	0	2	0	0	0	0	0	2	2
Total	0	3	0	0	3	0	0	0	0	0	6	6
08:00	0	1	0	0	2	0	0	0	0	0	3	3
08:15	0	0	0	0	8	0	0	0	0	0	8	8
08:30	0	3	1	0	2	0	0	0	0	1	5	6
08:45	0	0	0	0	3	0	1	0	0	0	4	4
Total	0	4	1	0	15	0	1	0	0	1	20	21
		1-25%		0-0%			0-0%					
16:00	1	8	0	0	2	1	0	0	0	1	11	12
16:15	0	6	0	0	0	0	0	0	0	0	6	6
16:30	0	4	1	0	1	0	0	0	0	1	5	6
16:45	2	7	0	0	2	0	0	0	0	0	11	11
Total	3	25	1	0	5	1	0	0	0	2	33	35
17:00	0	24	0	0	1	0	0	0	0	0	25	25
17:15	1	6	0	0	4	1	0	0	0	1	11	12
17:30	0	1	0	0	1	2	0	0	0	2	2	4
17:45	0	6	0	0	0	0	0	0	0	0	6	6
Total	1	37	0	0	6	3	0	0	0	3	44	47
Grand Total	4	69	2	0	29	4	1	0	0	6	103	109
Apprch %	5.5	94.5		0	100		100	0				
Total %	3.9	67		0	28.2		1	0		5.5	94.5	

0 %

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Eastern and Center Accesses
Counter/Board #: EW/2161

File Name : vforge05w
Site Code : 80681905
Start Date : 2/2/2007
Page No : 1

Groups Printed- Center Access

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound					
Start Time	Left	Right	HV	Thru	Right	HV	Left	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	2	0	1	0	0	0	3	3
07:15	1	0	0	0	2	0	2	0	0	0	5	5
07:30	1	1	0	0	3	0	3	0	1	1	8	9
07:45	0	1	0	0	1	0	11	0	1	1	13	14
Total	2	2	0	0	8	0	17	0	2	2	29	31
08:00	1	0	0	0	3	0	19	0	0	0	23	23
08:15	1	2	1	0	5	0	19	0	0	1	27	28
08:30	1	0	0	0	2	0	13	0	0	0	16	16
08:45	1	1	1	0	2	0	12	0	0	1	16	17
Total	4	3	2	0	12	0	63	0	0	2	82	84
		2- 29%.										
16:00	3	11	0	0	0	0	3	0	0	0	17	17
16:15	1	8	0	0	0	0	0	0	0	0	9	9
16:30	1	5	0	0	0	0	0	0	0	0	6	6
16:45	0	9	0	0	0	0	2	0	0	0	11	11
Total	5	33	0	0	0	0	5	0	0	0	43	43
17:00	5	17	0	0	0	0	1	0	1	1	23	24
17:15	4	12	1	0	0	0	0	0	0	1	16	17
17:30	3	10	0	0	1	0	0	0	0	0	14	14
17:45	0	4	0	0	0	0	2	0	0	0	6	6
Total	12	43	1	0	1	0	3	0	1	2	59	61
Grand Total	23	81	3	0	21	0	88	0	3	6	213	219
Apprch %	22.1	77.9		0	100		100	0				
Total %	10.8	38		0	9.9		41.3	0		2.7	97.3	

.2 40

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Eastern and Center Accesses
Counter/Board #: EW/2161

File Name : vforge05w
Site Code : 80681905
Start Date : 2/2/2007
Page No : 1

Groups Printed- Eastern Access - Center Access

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound					
Start Time	Left	Right	HV	Thru	Right	HV	Left	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	0	1	0	0	3	0	1	0	0	0	5	5
07:15	1	1	0	0	2	0	2	0	0	0	6	6
07:30	1	2	0	0	3	0	3	0	1	1	9	10
07:45	0	1	0	0	3	0	11	0	1	1	15	16
Total	2	5	0	0	11	0	17	0	2	2	35	37
08:00	1	1	0	0	5	0	19	0	0	0	26	26
08:15	1	2	1	0	13	0	19	0	0	1	35	36
08:30	1	3	1	0	4	0	13	0	0	1	21	22
08:45	1	1	1	0	5	0	13	0	0	1	20	21
Total	4	7	3	0	27	0	64	0	0	3	102	105
16:00	4	19	0	0	2	1	3	0	0	1	28	29
16:15	1	14	0	0	0	0	0	0	0	0	15	15
16:30	1	9	1	0	1	0	0	0	0	1	11	12
16:45	2	16	0	0	2	0	2	0	0	0	22	22
Total	8	58	1	0	5	1	5	0	0	2	76	78
17:00	5	41	0	0	1	0	1	0	1	1	48	49
17:15	5	18	1	0	4	1	0	0	0	2	27	29
17:30	3	11	0	0	2	2	0	0	0	2	16	18
17:45	0	10	0	0	0	0	2	0	0	0	12	12
Total	13	80	1	0	7	3	3	0	1	5	103	108
Grand Total	27	150	5	0	50	4	89	0	3	12	316	328
Apprch %	15.3	84.7		0	100		100	0				
Total %	8.5	47.5		0	15.8		28.2	0		3.7	96.3	
Eastern Access	4	69		0	29		1	0		0	0	109
% Eastern Access	14.8	46	40	0	58	100	1.1	0	0	0	0	33.2
Center Access	23	81		0	21		88	0		0	0	219
% Center Access	85.2	54	60	0	42	0	98.9	0	100	0	0	66.8

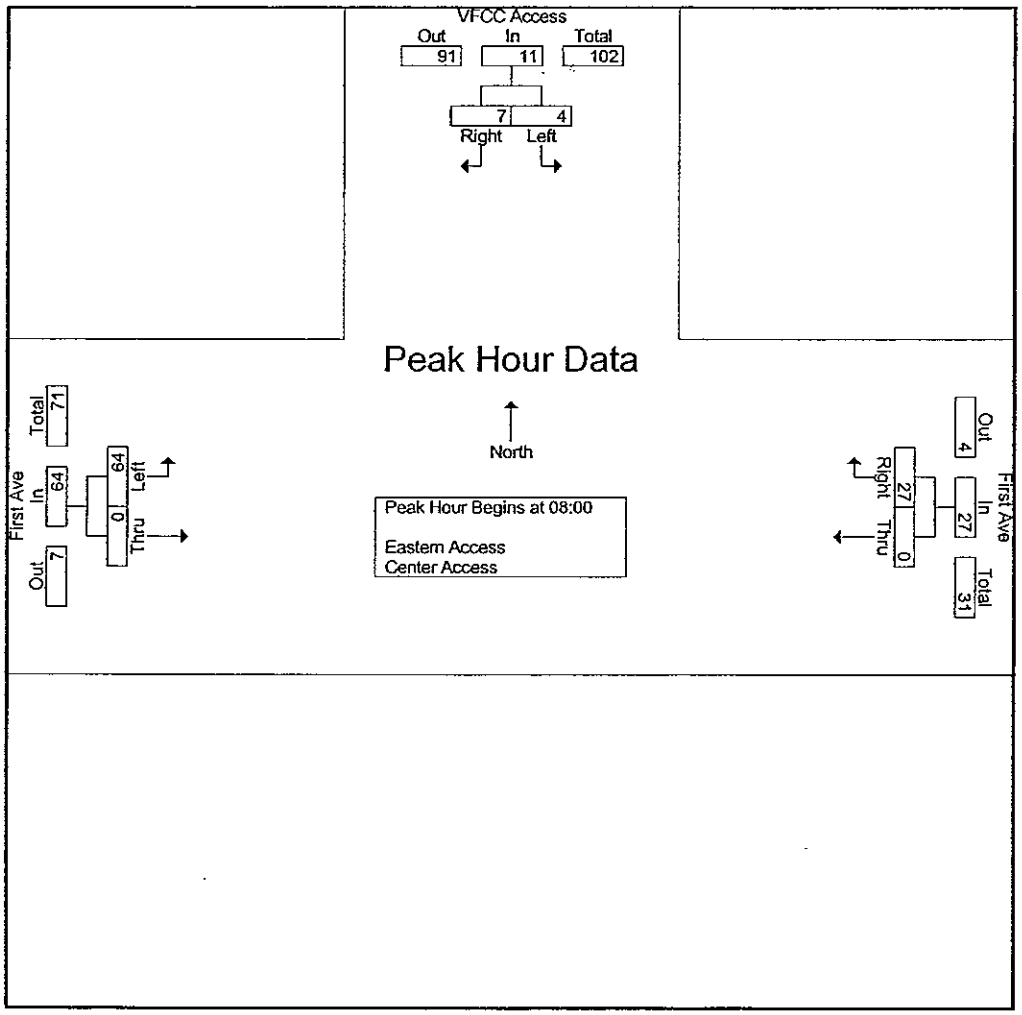
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Eastern and Center Accesses
Counter/Board #: EW/2161

File Name : vforge05w
Site Code : 80681905
Start Date : 2/2/2007
Page No : 2

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00										
08:00	1	1	2	0	5	5	19	0	19	26
08:15	1	2	3	0	13	13	19	0	19	35
08:30	1	3	4	0	4	4	13	0	13	21
08:45	1	1	2	0	5	5	13	0	13	20
Total Volume	4	7	11	0	27	27	64	0	64	102
% App. Total	36.4	63.6		0	100		100	0		
PHF	1.000	.583	.688	.000	.519	.519	.842	.000	.842	.729



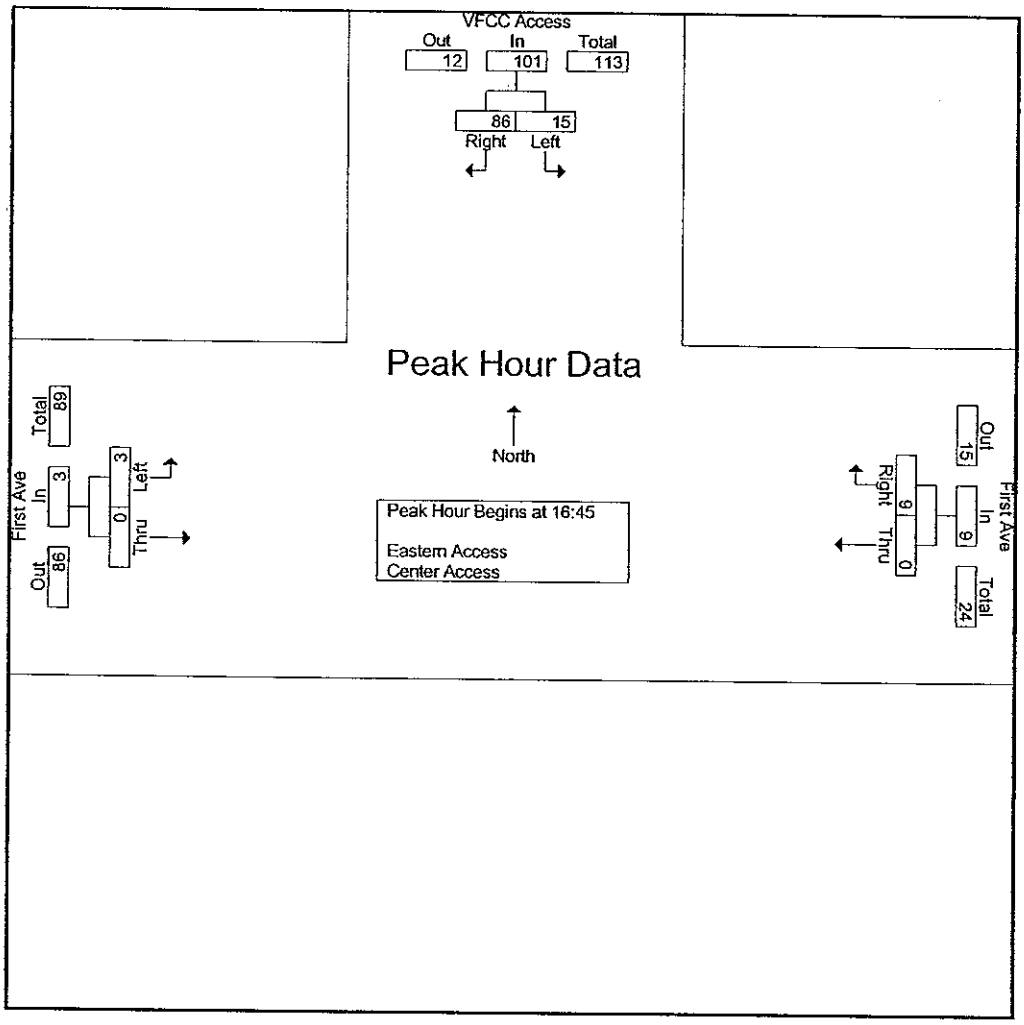
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Eastern and Center Accesses
Counter/Board #: EW/2161

File Name : vforge05w
Site Code : 80681905
Start Date : 2/2/2007
Page No : 3

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:45										
16:45	2	16	18	0	2	2	2	0	2	22
17:00	5	41	46	0	1	1	1	0	1	48
17:15	5	18	23	0	4	4	0	0	0	27
17:30	3	11	14	0	2	2	0	0	0	16
Total Volume	15	86	101	0	9	9	3	0	3	113
% App. Total	14.9	85.1		0	100		100	0		
PHF	.750	.524	.549	.000	.563	.563	.375	.000	.375	.589



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Center and Eastern Accessess
Counter/Board #: EW/2161

File Name : vforge05s
Site Code : 80681905
Start Date : 2/3/2007
Page No : 1

Groups Printed- Eastern Access

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound					
Start Time	Left	Right	HV	Thru	Right	HV	Left	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
12:30	0	1	0	0	0	0	0	0	0	0	1	1
12:45	0	2	0	0	0	0	0	0	0	0	2	2
Total	0	3	0	0	0	0	0	0	0	0	3	3
13:15	0	1	0	0	1	0	0	0	0	0	2	2
13:30	0	3	0	0	1	0	0	0	0	0	4	4
13:45	0	0	0	0	1	0	0	0	0	0	1	1
Total	0	4	0	0	3	0	0	0	0	0	7	7
14:00	0	2	0	0	0	0	0	0	0	0	2	2
14:45	0	2	0	0	1	0	0	0	0	0	3	3
Total	0	4	0	0	1	0	0	0	0	0	5	5
Grand Total	0	11	0	0	4	0	0	0	0	0	15	15
Apprch %	0	100		0	100		0	0				
Total %	0	73.3		0	26.7		0	0		0	100	

0 %

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Center and Eastern Accessess
Counter/Board #: EW/2161

File Name : vforge05s
Site Code : 80681905
Start Date : 2/3/2007
Page No : 1

Groups Printed- Center Access

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound					
Start Time	Left	Right	HV	Thru	Right	HV	Left	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	0	5	0	0	0	0	2	0	0	0	7	7
12:15	0	1	0	0	0	0	0	0	0	0	1	1
12:30	0	0	0	0	0	0	1	0	0	0	1	1
12:45	0	1	0	0	2	0	0	0	0	0	3	3
Total	0	7	0	0	2	0	3	0	0	0	12	12
13:00	0	1	0	0	0	0	0	0	0	0	1	1
13:15	0	0	0	0	0	0	1	0	0	0	1	1
13:30	0	1	0	0	0	0	2	0	0	0	3	3
13:45	0	2	0	0	0	0	0	0	0	0	2	2
Total	0	4	0	0	0	0	3	0	0	0	7	7
14:00	1	0	0	0	0	0	0	0	0	0	1	1
14:15	0	1	0	0	0	0	0	0	0	0	1	1
14:30	0	0	0	0	0	0	1	0	0	0	1	1
14:45	0	3	0	0	0	0	1	0	0	0	4	4
Total	1	4	0	0	0	0	2	0	0	0	7	7
Grand Total	1	15	0	0	2	0	8	0	0	0	26	26
Apprch %	6.2	93.8		0	100		100	0				
Total %	3.8	57.7		0	7.7		30.8	0		0	100	

0 ✓

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Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Center and Eastern Accessess
Counter/Board #: EW/2161

File Name : vforge05s
Site Code : 80681905
Start Date : 2/3/2007
Page No : 1

Groups Printed- Eastern Access - Center Access

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound					
Start Time	Left	Right	HV	Thru	Right	HV	Left	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	0	5	0	0	0	0	2	0	0	0	7	7
12:15	0	1	0	0	0	0	0	0	0	0	1	1
12:30	0	1	0	0	0	0	1	0	0	0	2	2
12:45	0	3	0	0	2	0	0	0	0	0	5	5
Total	0	10	0	0	2	0	3	0	0	0	15	15
13:00	0	1	0	0	0	0	0	0	0	0	1	1
13:15	0	1	0	0	1	0	1	0	0	0	3	3
13:30	0	4	0	0	1	0	2	0	0	0	7	7
13:45	0	2	0	0	1	0	0	0	0	0	3	3
Total	0	8	0	0	3	0	3	0	0	0	14	14
14:00	1	2	0	0	0	0	0	0	0	0	3	3
14:15	0	1	0	0	0	0	0	0	0	0	1	1
14:30	0	0	0	0	0	0	1	0	0	0	1	1
14:45	0	5	0	0	1	0	1	0	0	0	7	7
Total	1	8	0	0	1	0	2	0	0	0	12	12
Grand Total	1	26	0	0	6	0	8	0	0	0	41	41
Apprch %	3.7	96.3		0	100		100	0				
Total %	2.4	63.4		0	14.6		19.5	0		0	100	
Eastern Access	0	11		0	4		0	0		0	0	15
% Eastern Access	0	42.3	0	0	66.7	0	0	0	0	0	0	36.6
Center Access	1	15		0	2		8	0		0	0	26
% Center Access	100	57.7	0	0	33.3	0	100	0	0	0	0	63.4

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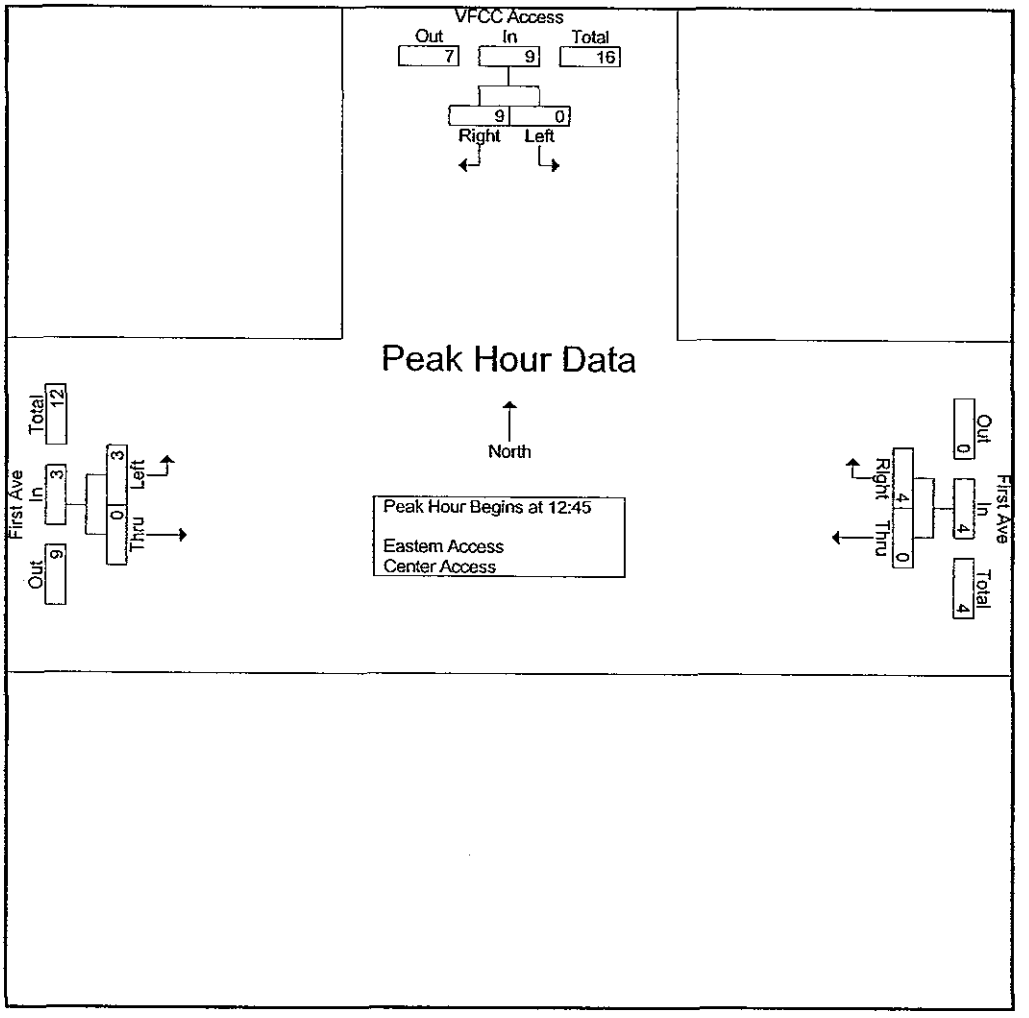
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: First Avenue &
VFCC Center and Eastern Accessess
Counter/Board #: EW/2161

File Name : vforge05s
Site Code : 80681905
Start Date : 2/3/2007
Page No : 2

	VFCC Access Southbound			First Ave Westbound			First Ave Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:45										
12:45	0	3	3	0	2	2	0	0	0	5
13:00	0	1	1	0	0	0	0	0	0	1
13:15	0	1	1	0	1	1	1	0	1	3
13:30	0	4	4	0	1	1	2	0	2	7
Total Volume	0	9	9	0	4	4	3	0	3	16
% App. Total	0	100		0	100		100	0		
PHF	.000	.563	.563	.000	.500	.500	.375	.000	.375	.571



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: VFFC Parking Lot &
Driveway to Additional Parking Lot
Counter/Board #: BD/2283

File Name : vforge06w
Site Code : 80681911
Start Date : 2/2/2007
Page No : 1

Groups Printed- Unshifted

	Additional Lot Westbound		VFFC Parking Lot Eastbound				
Start Time	Thru	HV	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
07:00	1	0	2	0	0	3	3
07:15	2	0	1	1	1	3	4
07:30	2	0	0	0	0	2	2
07:45	3	0	2	0	0	5	5
Total	8	0	5	1	1	13	14
08:00	4	0	5	0	0	9	9
08:15	8	0	0	0	0	8	8
08:30	7	0	1	0	0	8	8
08:45	1	0	1	0	0	2	2
Total	20	0	7	0	0	27	27
16:00	0	0	5	0	0	5	5
16:15	0	0	3	0	0	3	3
16:30	1	0	7	0	0	8	8
16:45	4	0	12	0	0	16	16
Total	5	0	27	0	0	32	32
17:00	8	0	15	0	0	23	23
17:15	0	0	10	0	0	10	10
17:30	0	0	4	0	0	4	4
17:45	1	0	5	0	0	6	6
Total	9	0	34	0	0	43	43
Grand Total	42	0	73	1	1	115	116
Apprch %	100		100				
Total %	36.5		63.5		0.9	99.1	

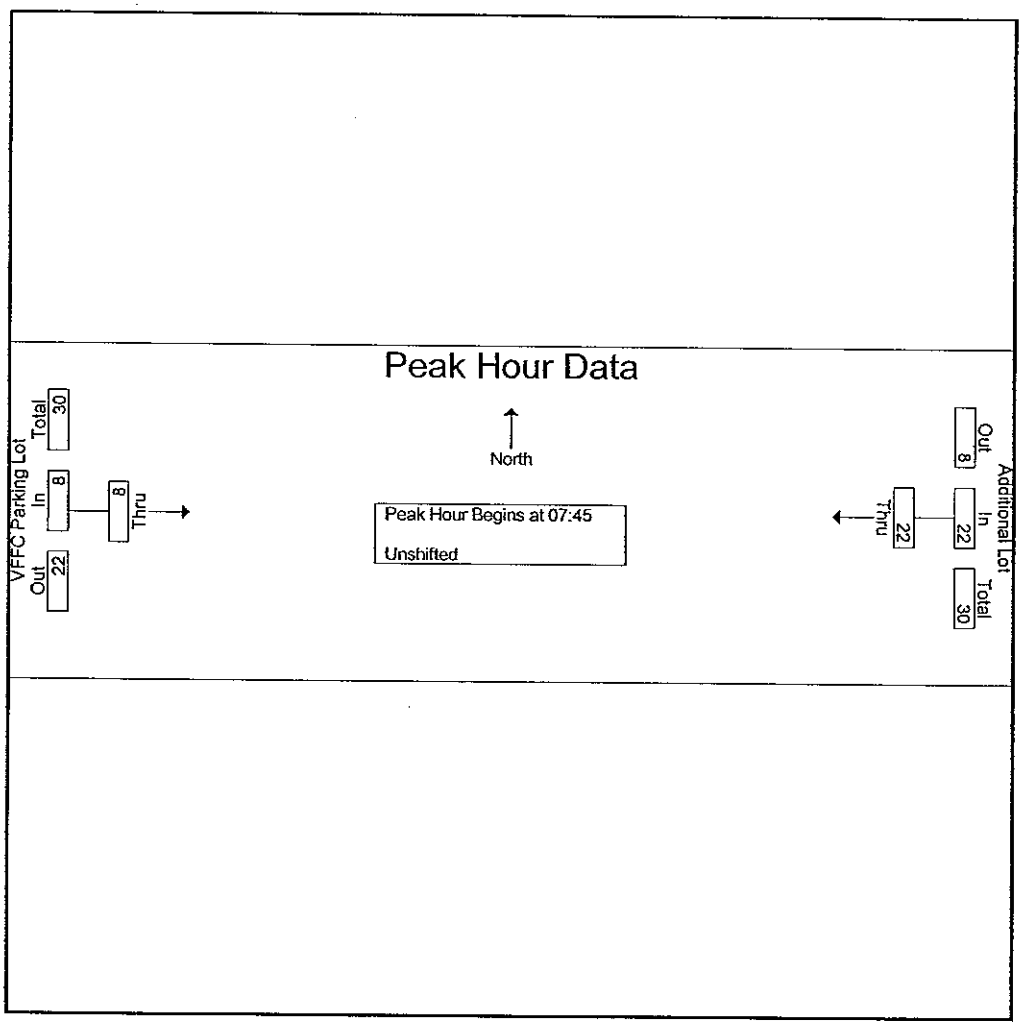
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: VFFC Parking Lot &
Driveway to Additional Parking Lot
Counter/Board #: BD/2283

File Name : vforge06w
Site Code : 80681911
Start Date : 2/2/2007
Page No : 2

	Additional Lot Westbound		VFFC Parking Lot Eastbound		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 07:45					
07:45	3	3	2	2	5
08:00	4	4	5	5	9
08:15	8	8	0	0	8
08:30	7	7	1	1	8
Total Volume	22	22	8	8	30
% App. Total	100		100		
PHF	.688	.688	.400	.400	.833



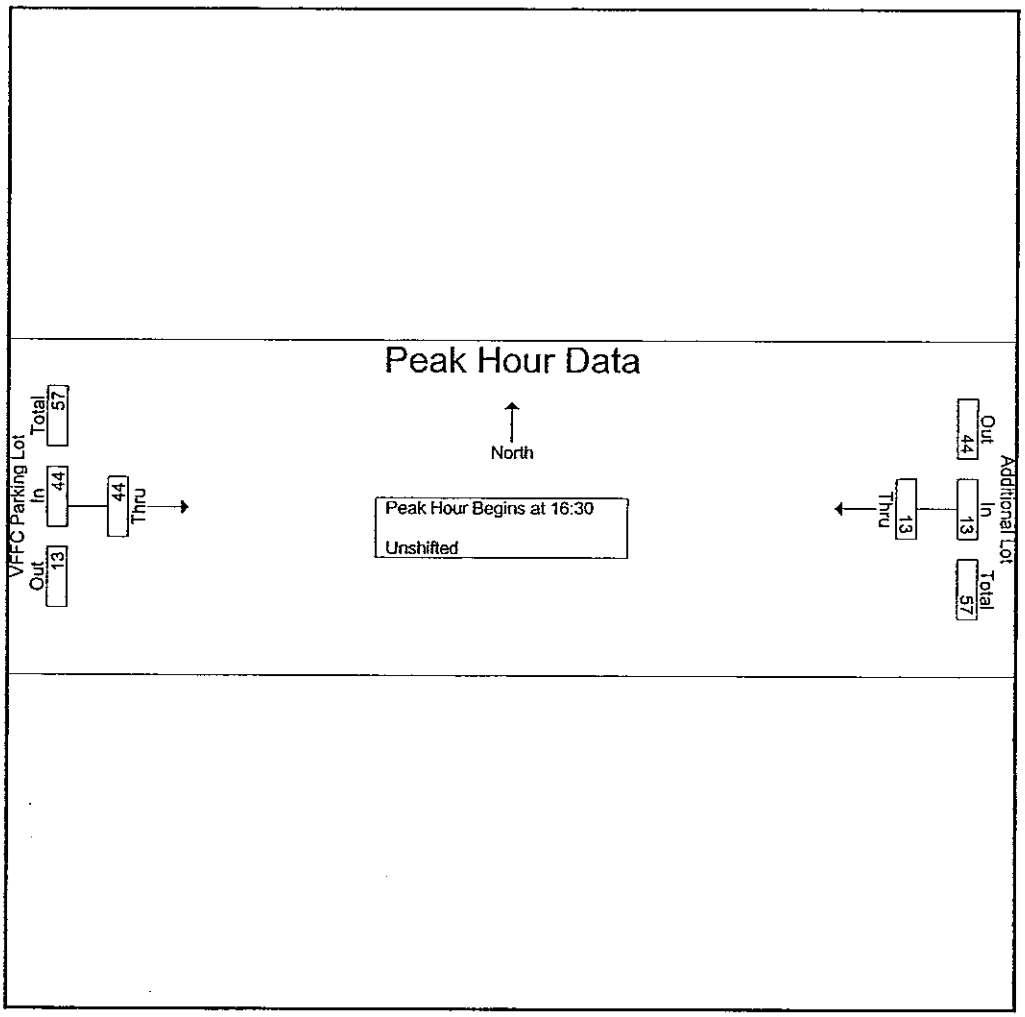
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: VFFC Parking Lot &
Driveway to Additional Parking Lot
Counter/Board #: BD/2283

File Name : vforge06w
Site Code : 80681911
Start Date : 2/2/2007
Page No : 3

	Additional Lot Westbound		VFFC Parking Lot Eastbound		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 16:30					
16:30	1	1	7	7	8
16:45	4	4	12	12	16
17:00	8	8	15	15	23
17:15	0	0	10	10	10
Total Volume	13	13	44	44	57
% App. Total	100		100		
PHF	.406	.406	.733	.733	.620



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: VFFC Parking Lot &
Driveway to Additional Parking lot
Counter/Board #: BD/2283

File Name : vforge06s
Site Code : 80681906
Start Date : 2/3/2007
Page No : 1

Groups Printed- Unshifted

	Additional Parking Lot Westbound		VFFC Parking Lot Eastbound				
Start Time	Thru	HV	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
12:00	0	0	1	0	0	1	1
12:15	0	0	0	0	0	0	0
12:30	2	0	3	0	0	5	5
12:45	0	0	0	0	0	0	0
Total	2	0	4	0	0	6	6
13:00	1	0	2	0	0	3	3
13:15	0	0	1	0	0	1	1
13:30	1	0	0	0	0	1	1
13:45	0	0	0	0	0	0	0
Total	2	0	3	0	0	5	5
14:00	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	4	0	7	0	0	11	11
Apprch %	100		100				
Total %	36.4		63.6		0	100	

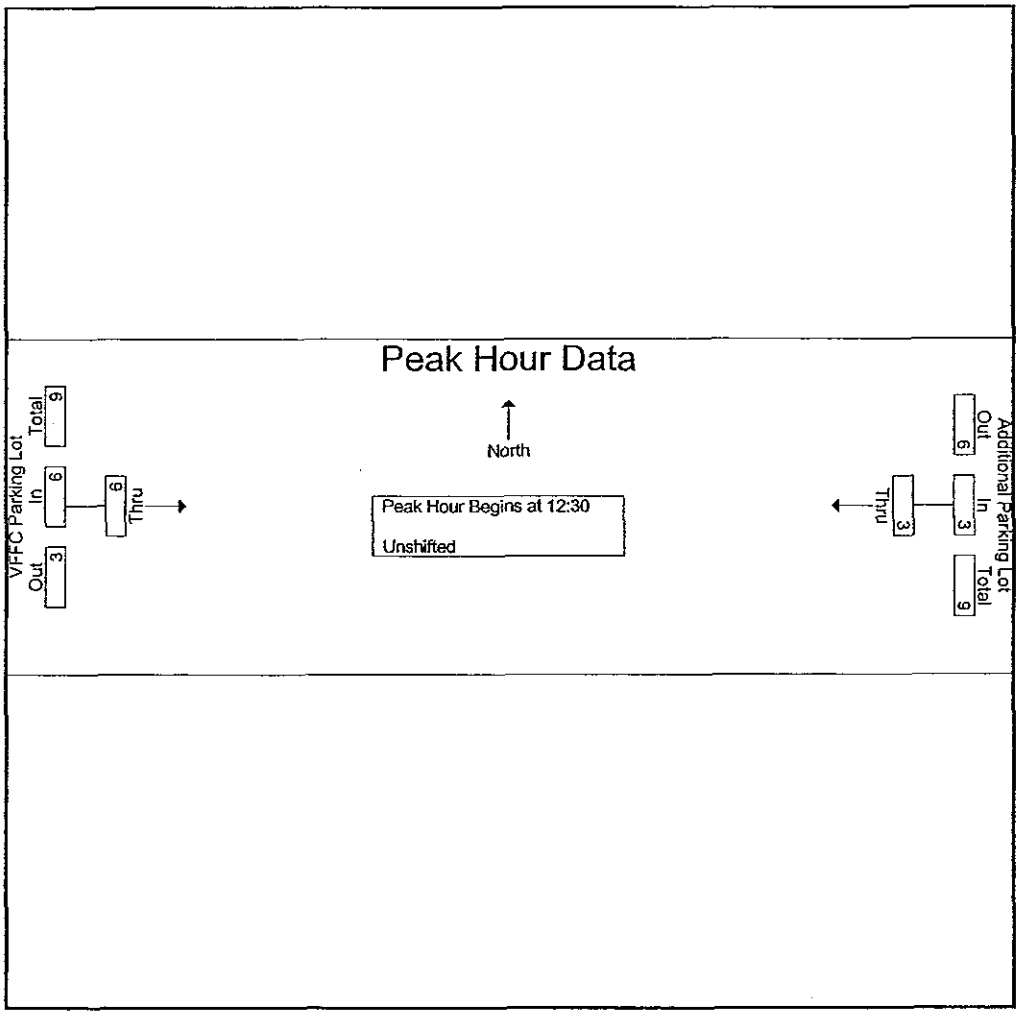
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: VFFC Parking Lot &
Driveway to Additional Parking lot
Counter/Board #: BD/2283

File Name : vforge06s
Site Code : 80681906
Start Date : 2/3/2007
Page No : 2

	Additional Parking Lot Westbound		VFFC Parking Lot Eastbound		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 12:30					
12:30	2	2	3	3	5
12:45	0	0	0	0	0
13:00	1	1	2	2	3
13:15	0	0	1	1	1
Total Volume	3	3	6	6	9
% App. Total	100		100		
PHF	.375	.375	.500	.500	.450



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Eighth Avenue &
VFCC Access
Counter/Board #: ED/4093

File Name : vforge07w
Site Code : 80681907
Start Date : 2/2/2007
Page No : 1

Groups Printed- Unshifted

	Eighth Ave Westbound		VFCC Parking Lot Eastbound				
Start Time	Thru	HV	Thru	HV	Exclu. Total	Inclu. Total	Int. Total
08:00	1	0	0	0	0	1	1
Total	1	0	0	0	0	1	1
16:00	3	0	1	0	0	4	4
16:15	0	1	1	1	2	1	3
16:30	1	0	1	0	0	2	2
16:45	2	0	1	0	0	3	3
Total	6	1	4	1	2	10	12
17:30	0	0	1	0	0	1	1
Total	0	0	1	0	0	1	1
Grand Total	7	1	5	1	2	12	14
Apprch %	100		100				
Total %	58.3		41.7		14.3	85.7	

McMahon Associates, Inc.

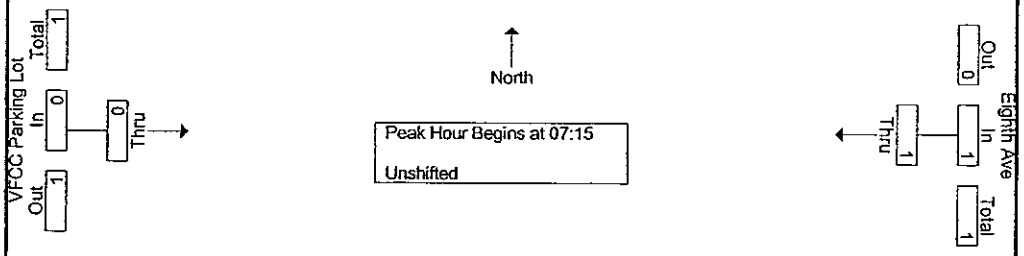
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Eighth Avenue &
VFCC Access
Counter/Board #: ED/4093

File Name : vforge07w
Site Code : 80681907
Start Date : 2/2/2007
Page No : 2

	Eighth Ave Westbound		VFCC Parking Lot Eastbound		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 07:15					
07:15	0	0	0	0	0
07:30	0	0	0	0	0
07:45	0	0	0	0	0
08:00	**1**	**1**	0	0	**1**
Total Volume	1	1	0	0	1
% App. Total	100		0		
PHF	.250	.250	.000	.000	.250

Peak Hour Data



McMahon Associates, Inc.

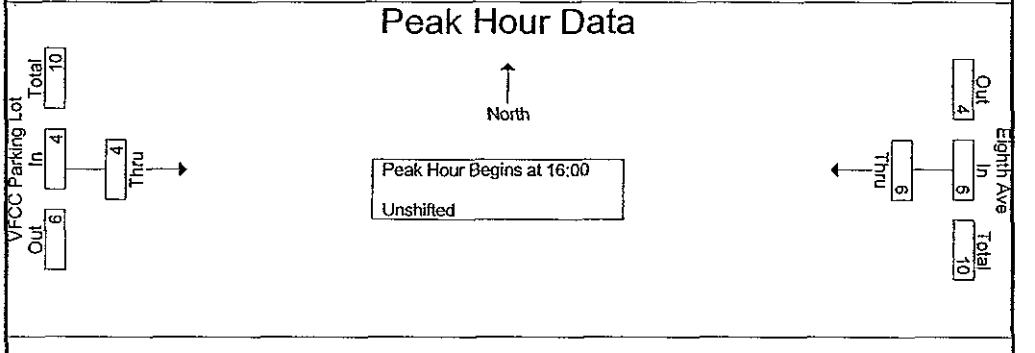
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Eighth Avenue &
VFCC Access
Counter/Board #: ED/4093

File Name : vforge07w
Site Code : 80681907
Start Date : 2/2/2007
Page No : 3

	Eighth Ave Westbound		VFCC Parking Lot Eastbound		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 16:00					
16:00	3	3	1	1	4
16:15	0	0	1	1	1
16:30	1	1	1	1	2
16:45	2	2	1	1	3
Total Volume	6	6	4	4	10
% App. Total	100		100		
PHF	.500	.500	1.000	1.000	.625

Peak Hour Data



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Eighth Avenue &
VFCC Access
Counter/Board #: ED/4093

File Name : vforge07s
Site Code : 80681907
Start Date : 2/3/2007
Page No : 1

Groups Printed- Unshifted

	Eighth Ave Westbound		VFCC Access Eastbound		
Start Time	Thru	HV	Thru	HV	Int. Total
12:00	1	0	1	0	2
Total	1	0	1	0	2
14:15	1	0	0	0	1
14:45	0	0	1	0	1
Total	1	0	1	0	2
Grand Total	2	0	2	0	4
Apprch %	100	0	100	0	
Total %	50	0	50	0	

McMahon Associates, Inc.

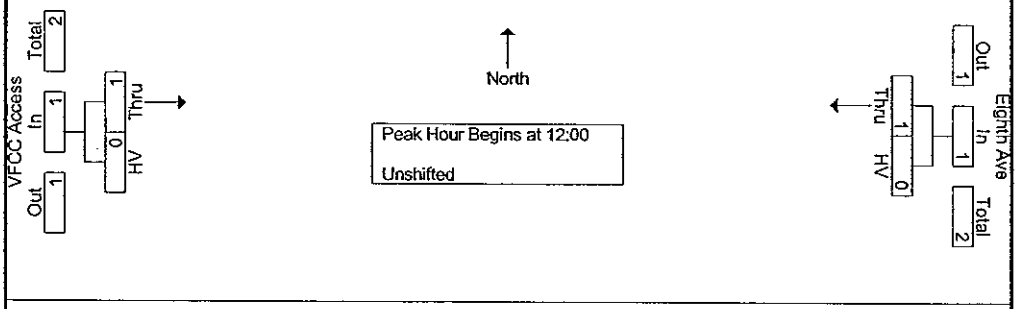
Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Merion Twp
Location: Eighth Avenue &
VFCC Access
Counter/Board #: ED/4093

File Name : vforge07s
Site Code : 80681907
Start Date : 2/3/2007
Page No : 2

	Eighth Ave Westbound			VFCC Access Eastbound			
Start Time	Thru	HV	App. Total	Thru	HV	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 14:45 - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 12:00							
12:00	1	0	1	1	0	1	2
12:15	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0
Total Volume	1	0	1	1	0	1	2
% App. Total	100	0		100	0		
PHF	.250	.000	.250	.250	.000	.250	.250

Peak Hour Data



APPENDIX C

Other Development Trip Assignment

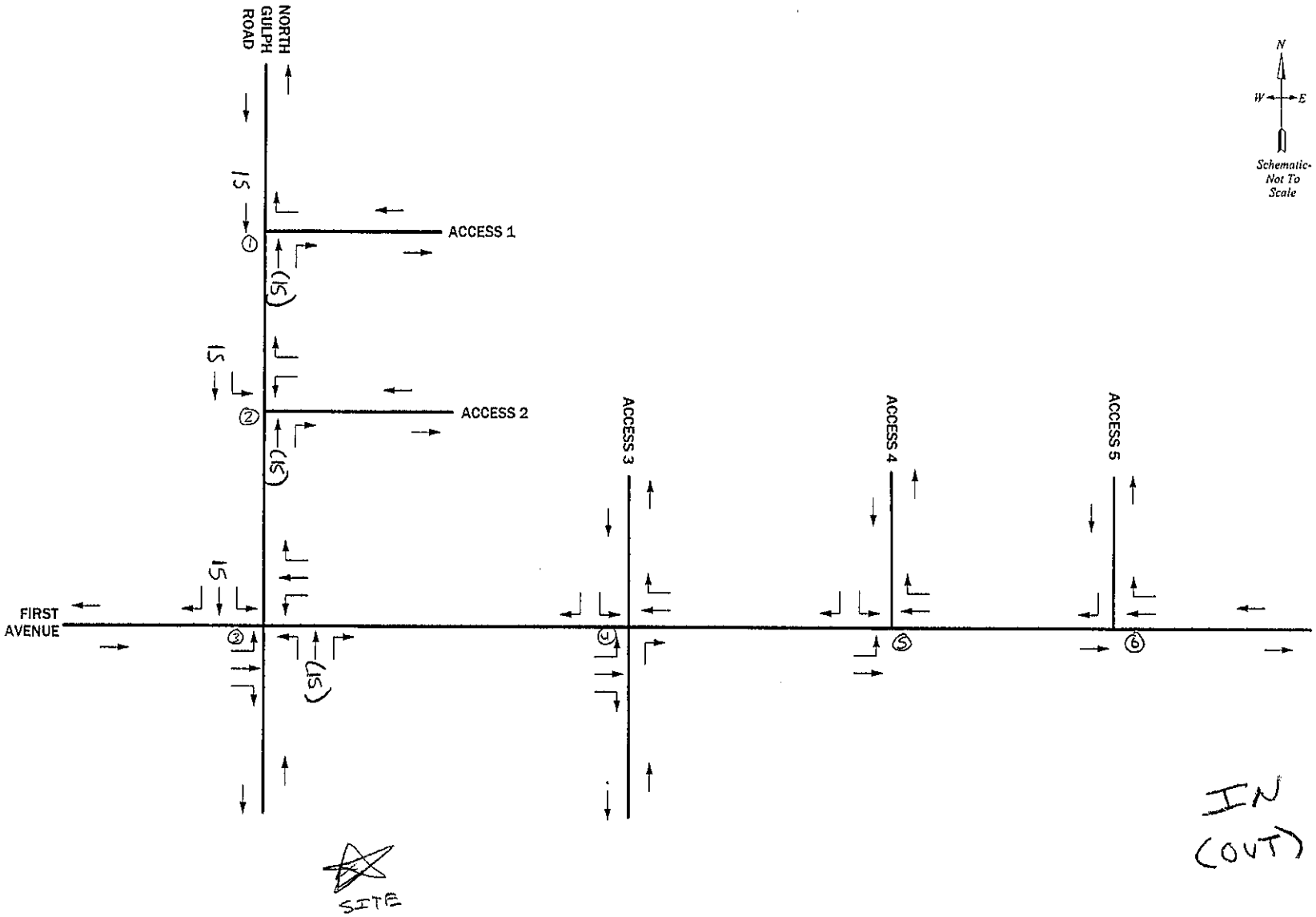
BMJ 2/20/07

"OTHER" DEVELOPMENT TRIP GENERATION

Valley Forge Convention Center
I:eng/806819/Traffic/Analysis/SDS/SDSbase
Opening Year

TRIP VOLUMES

Land Use	Size	Units	Daily	Weekday 7-9 AM In	Out	Total	Weekday 4-6 PM In	Out	Total	Saturday 12-3 PM In	Out	Total
Village at Valley Forge		Sq. Ft.	0	541	738	1,279	1,430	1,331	2,761	1,670	1,503	3,173
- Pass-By Trips		%	0	20	20	40	177	177	354	192	192	384
"New" Trips			0	521	718	1,239	1,253	1,154	2,407	1,478	1,311	2,789
Preferred Construction Advisors		Sq. Ft.	0	55	12	67	13	38	51	6	3	9
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	55	12	67	13	38	51	6	3	9
LMC Properties		Sq. Ft.	0	182	25	207	35	170	205	22	19	41
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	182	25	207	35	170	205	22	19	41
Rita's Water Ice		Sq. Ft.	0	0	0	0	10	10	20	27	28	55
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	0	0	0	10	10	20	27	28	55
Cypress Equities		Sq. Ft.	0	95	63	158	164	191	355	417	388	805
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	95	63	158	164	191	355	417	388	805
Development 6		Sq. Ft.	0	0	0	0	0	0	0	0	0	0
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	0	0	0	0	0	0	0	0	0
Development 7		Sq. Ft.	0	0	0	0	0	0	0	0	0	0
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	0	0	0	0	0	0	0	0	0
Development 8		Sq. Ft.	0	0	0	0	0	0	0	0	0	0
- Pass-By Trips		%	0	0	0	0	0	0	0	0	0	0
"New" Trips			0	0	0	0	0	0	0	0	0	0
TOTAL TRIPS:			**0**	**873**	**838**	**1,711**	**1,652**	**1,740**	**3,392**	**2,142**	**1,941**	**4,083**
	0	%	0	0	0	0	0	0	0	0	0	0
- Pass-By Trips			0	20	20	40	177	177	354	192	192	384
OTAL "NEW" TRIPS:			**0**	**853**	**818**	**1,671**	**1,475**	**1,563**	**3,038**	**1,950**	**1,749**	**3,699**



FIGURE

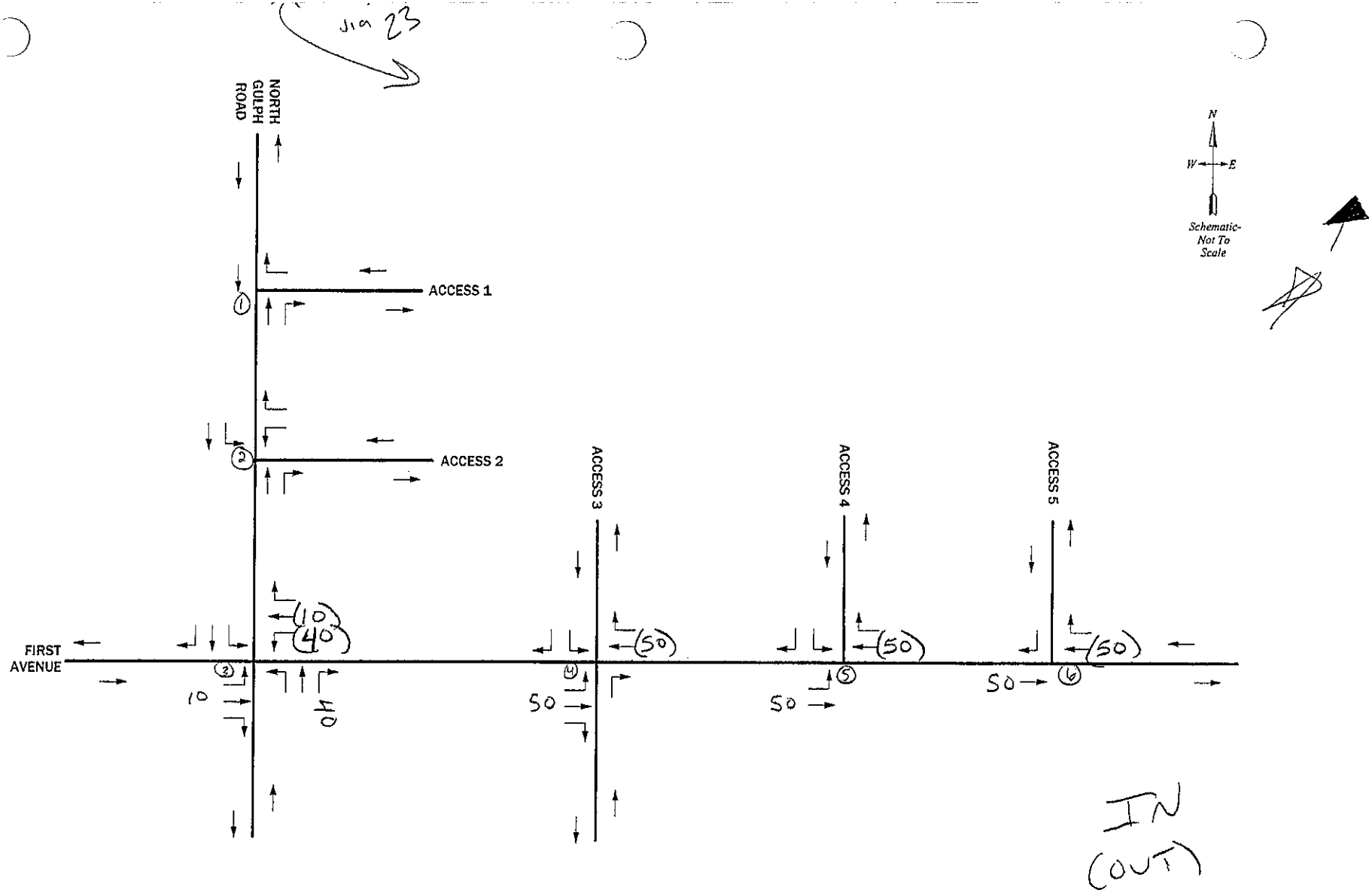
Village at Valley Forge (Per TRD Study)

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figures\Figure1.dwg



FIGURE

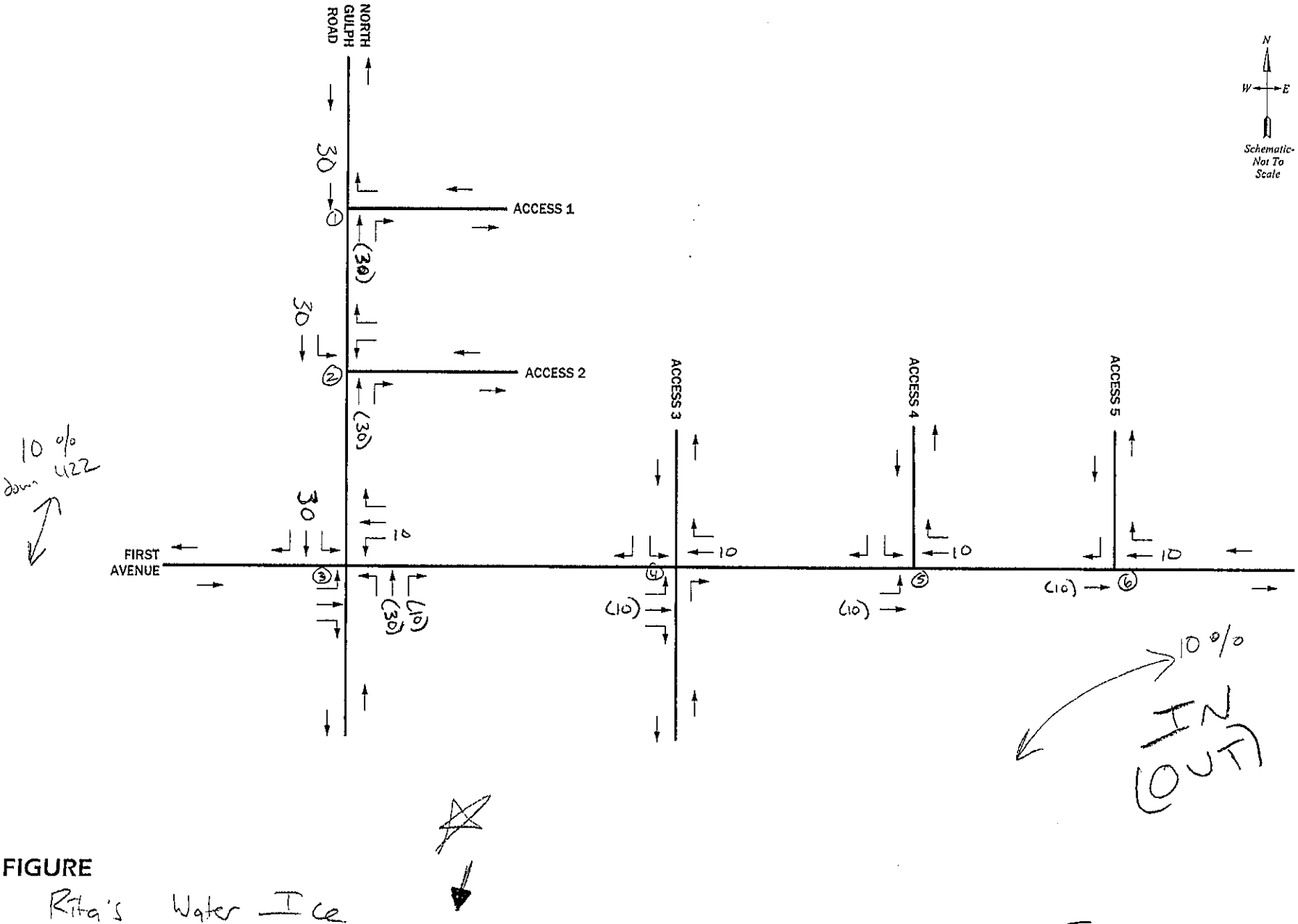
Preferred Construction Advisors (Third Avenue) + LMC Properties (4000 Gearhart Blvd)

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figures\Figure1.dwg



FIGURE

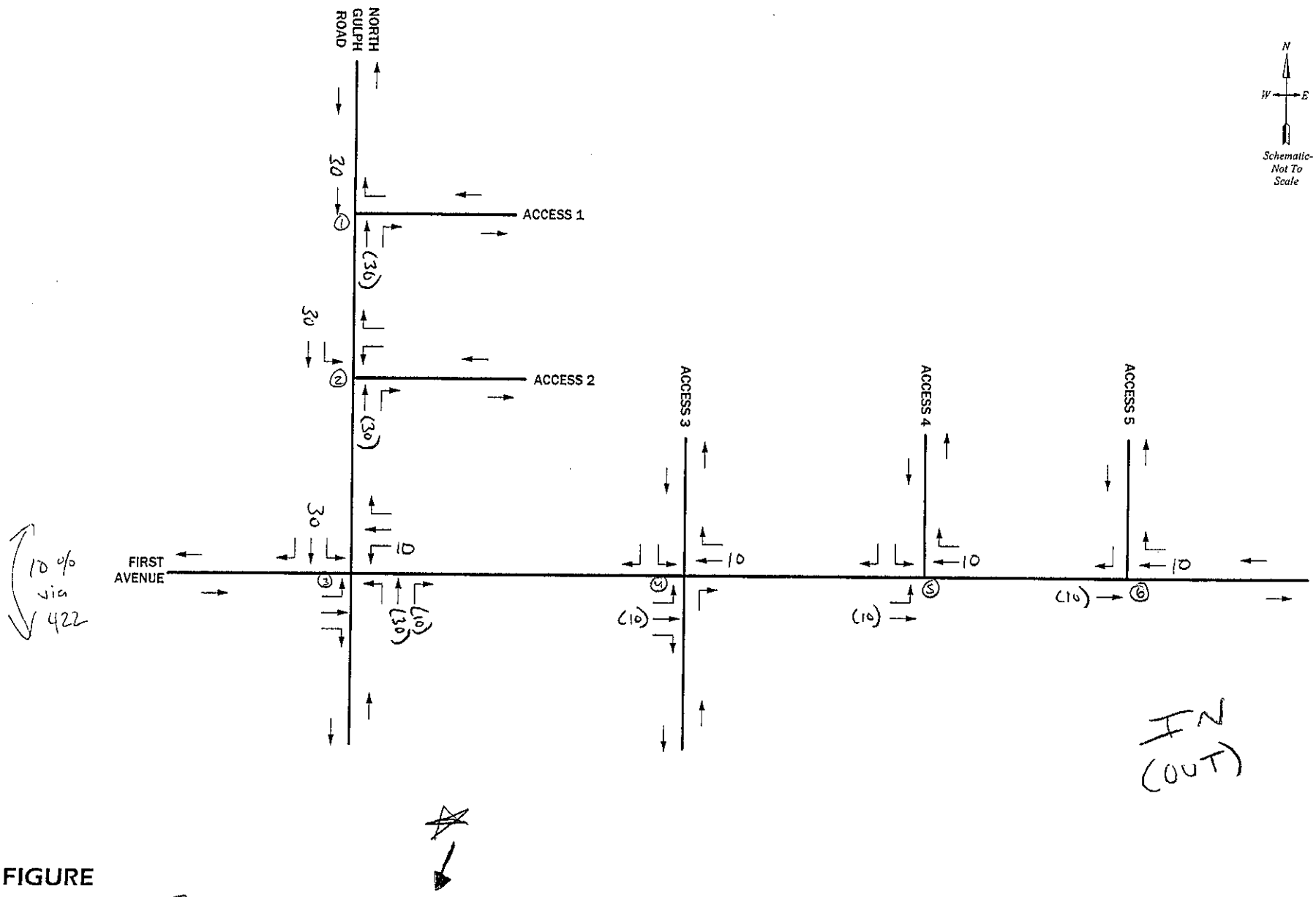
Rita's Water Ice

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) I:\Eng\806819\Dwg\Figures\Figure1.dwg



FIGURE

Cypress Equities

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

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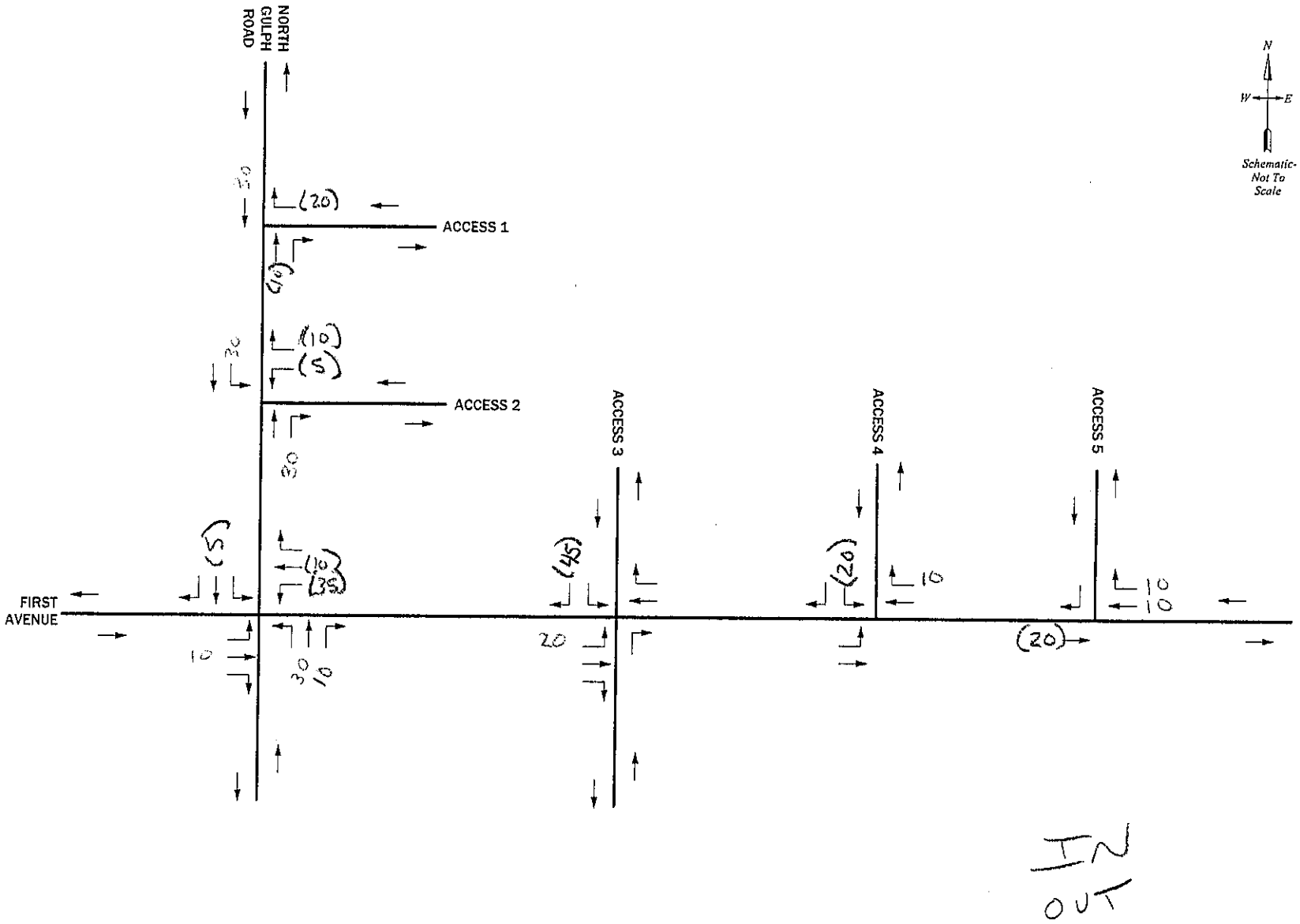
TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figures\Figure1.dwg

APPENDIX D

Site Trip Distribution



FIGURE

Site In/Site Out

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figures\Figure1.dwg

FIGURE

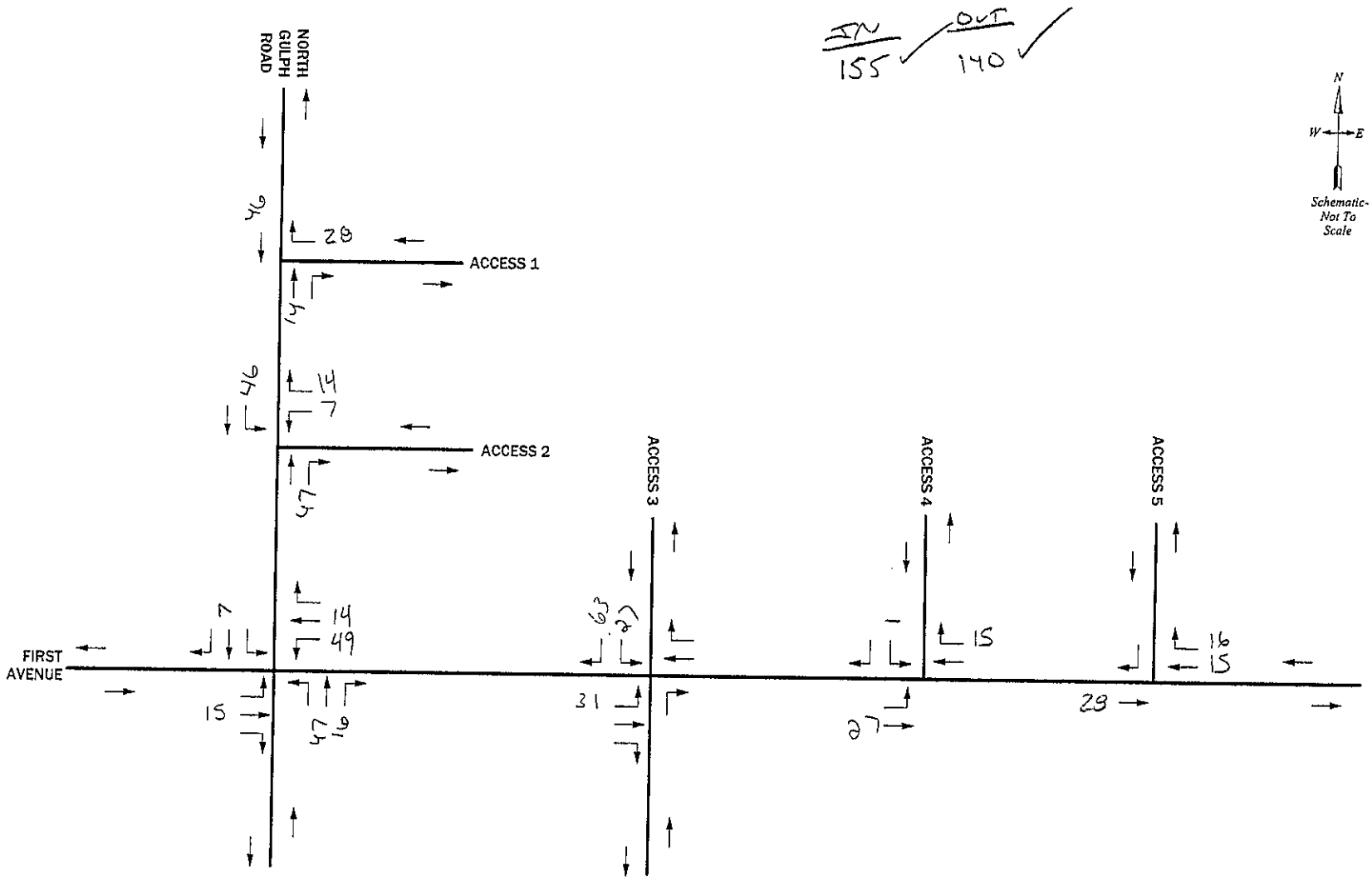
Site Trips - AM

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figure1.dwg



FIGURE

Site Trips - PM

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figures\Figure1.dwg

FIGURE

Site Trips - SAT

VALLEY FORGE CONVENTION CENTER

UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

(2/15/07-LBK) i:\Eng\806819\Dwg\Figu ure1.dwg

APPENDIX E

Level of Service Methodology

CAPACITY/LEVEL-OF-SERVICE ANALYSIS METHODOLOGY

The detailed capacity/level-of-service analysis contained in this traffic impact study was performed in accordance with the standard techniques contained in the "Highway Capacity Manual".[1] By definition, capacity represents "the maximum rate of flow that can reasonably be expected to pass a point on a uniform section of a lane or roadway under prevailing roadway, traffic, and control conditions." The level of functioning of an intersection or a uniform section of a lane or roadway can be expressed in terms of levels of service. Level of service (LOS) is defined as "a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers". Such measures include "speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety."

At unsignalized intersections, a methodology for evaluating the relative functioning of intersections controlled by stop or yield signs has been developed, and is based on several assumptions, including:

- Major street flows are not affected by the minor (stop-sign controlled) street movements.
- Left turns from the major street to the minor street are influenced only by opposing major street through flow.
- Minor street left turns are impeded by all major street traffic plus opposing minor street traffic.
- Minor street through traffic is impeded by all major street traffic.
- Minor street right turns are impeded only by the major street traffic coming from the left.

The concept of stop-controlled or yield-controlled intersection analysis is based on the estimate of average total delay on minor streets. The methodology of analysis relies on three elements: the size and distribution of gaps in the major traffic stream, the usefulness of these gaps to the minor stream drivers, and the relative priority of the various traffic streams at the intersection. The results of the analysis provide an estimate of average total delay for the various critical movements at the unsignalized intersections. Correlation between average total delay and the respective levels of service are provided for unsignalized intersections as follows:

Unsignalized Intersections

Level of Service	Description	Control Delay Per Vehicle (seconds)
A	Little or no delay	$\leq$ 10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Demand exceeds capacity of the lane or approach	> 50.0

(1) *Transportation Research Board, Special Report 209, Highway Capacity Manual, published by the Transportation Research Board, Washington, DC, Updated December 1997.*

At signalized intersections, an additional element must be considered: time allocation. Level of service is based primarily on the average control delay per vehicle for various movements within the intersection. Volume/capacity relationships also affect level of service. Thus, both volume/capacity and delay must be considered to evaluate the overall operation of a signalized intersection. Correlation between average delay per vehicle and the respective levels of service are provided for signalized intersections as follows:

Signalized Intersections

Level of Service	**Description**	**Control Delay Per Vehicle (seconds)**
A	Very low delay, high quality flow	$\leq$ 10.0
B	Low delay, good traffic flow	10.1 to 20.0
C	Average delay, stable traffic flow	20.1 to 35.0
D	Longer delay, approach capacity flow	35.1 to 55.0
E	Limit of acceptable delay, capacity flow	55.1 to 80.0
F	Unacceptable delay, forced flow	> 80.0

APPENDIX F

Existing (2007) Capacity/Level-of-Service Analysis Worksheets

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↱	↑↑↳			↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.988			
Flt Protected						
Satd. Flow (prot)	0	1698	3365	0	0	3574
Flt Permitted						
Satd. Flow (perm)	0	1698	3365	0	0	3574
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	348		320			895
Travel Time (s)	9.5		6.2			17.4
Volume (vph)	0	2	223	19	0	871
Peak Hour Factor	0.50	0.50	0.95	0.95	0.91	0.91
Heavy Vehicles (%)	0%	0%	6%	6%	1%	1%
Adj. Flow (vph)	0	4	235	20	0	957
Lane Group Flow (vph)	0	4	255	0	0	957
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	2	223	19	0	871
Peak Hour Factor	0.50	0.50	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	0	4	235	20	0	957
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked						
vC, conflicting volume	723	127			255	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	723	127			255	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	365	905			1315	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	156	98	479	479
Volume Left	0	0	0	0	0
Volume Right	4	0	20	0	0
cSH	905	1700	1700	1700	1700
Volume to Capacity	0.00	0.09	0.06	0.28	0.28
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	9.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt			0.987			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1528	1709	3444	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1528	1709	3444	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	334		420			320
Travel Time (s)	9.1		8.2			6.2
Volume (vph)	27	0	256	25	41	761
Peak Hour Factor	0.75	0.75	0.87	0.87	0.91	0.91
Heavy Vehicles (%)	26%	26%	5%	5%	0%	0%
Adj. Flow (vph)	36	0	294	29	45	836
Lane Group Flow (vph)	36	0	323	0	45	836
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	27	0	256	25	41	761
Peak Hour Factor	0.75	0.75	0.87	0.87	0.91	0.91
Hourly flow rate (vph)	36	0	294	29	45	836
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	817	161			323	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	772	91			259	
tC, single (s)	7.3	7.4			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.6			2.2	
p0 queue free %	87	100			96	
cM capacity (veh/h)	270	844			1269	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	36	0	196	127	45	418	418
Volume Left	36	0	0	0	45	0	0
Volume Right	0	0	0	29	0	0	0
cSH	270	1700	1700	1700	1269	1700	1700
Volume to Capacity	0.13	0.00	0.12	0.07	0.04	0.25	0.25
Queue Length 95th (ft)	11	0	0	0	3	0	0
Control Delay (s)	20.4	0.0	0.0	0.0	7.9	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	20.4		0.0		0.4		
Approach LOS	C						

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.980				0.865		0.909	
Flt Protected	0.950										0.984	
Satd. Flow (prot)	1652	3401	0	0	3354	0	0	0	1808	0	1786	0
Flt Permitted	0.950										0.984	
Satd. Flow (perm)	1652	3401	0	0	3354	0	0	0	1808	0	1786	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			366	
Travel Time (s)		9.4			7.4			33.2			10.0	
Volume (vph)	140	1219	49	0	249	39	0	0	5	22	0	45
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	151	1311	53	0	271	42	0	0	16	31	0	64
Lane Group Flow (vph)	151	1364	0	0	313	0	0	0	16	0	95	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	140	1219	49	0	249	39	0	0	5	22	0	45
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Hourly flow rate (vph)	151	1311	53	0	271	42	0	0	16	31	0	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	313			1363			1838	1951	682	1264	1956	157
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	313			1363			1838	1951	682	1264	1956	157
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			100			100	100	96	72	100	93
cM capacity (veh/h)	1244			479			40	57	397	111	57	867

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	151	874	490	180	133	16	96
Volume Left	151	0	0	0	0	0	31
Volume Right	0	0	53	0	42	16	64
cSH	1244	1700	1700	1700	1700	397	269
Volume to Capacity	0.12	0.51	0.29	0.11	0.08	0.04	0.36
Queue Length 95th (ft)	10	0	0	0	0	3	39
Control Delay (s)	8.3	0.0	0.0	0.0	0.0	14.4	25.6
Lane LOS	A					B	D
Approach Delay (s)	0.8			0.0		14.4	25.6
Approach LOS						B	D

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.994		0.946	
Flt Protected	0.950				0.971	
Satd. Flow (prot)	1652	3421	3385	0	1308	0
Flt Permitted	0.950				0.971	
Satd. Flow (perm)	1652	3421	3385	0	1308	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		355	
Travel Time (s)		7.4	2.5		9.7	
Volume (vph)	63	1183	285	12	4	3
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Heavy Vehicles (%)	2%	2%	6%	6%	29%	29%
Adj. Flow (vph)	68	1272	310	13	6	4
Lane Group Flow (vph)	68	1272	323	0	10	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	63	1183	285	12	4	3
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Hourly flow rate (vph)	68	1272	310	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	323				1088	161
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	323				1088	161
tC, single (s)	4.1				7.4	7.5
tC, 2 stage (s)						
tF (s)	2.2				3.8	3.6
p0 queue free %	95				96	99
cM capacity (veh/h)	1234				162	776

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	68	636	636	207	116	10
Volume Left	68	0	0	0	0	6
Volume Right	0	0	0	0	13	4
cSH	1234	1700	1700	1700	1700	245
Volume to Capacity	0.05	0.37	0.37	0.12	0.07	0.04
Queue Length 95th (ft)	4	0	0	0	0	3
Control Delay (s)	8.1	0.0	0.0	0.0	0.0	20.3
Lane LOS	A					C
Approach Delay (s)	0.4			0.0		20.3
Approach LOS						C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.993			0.865
Flt Protected						
Satd. Flow (prot)	0	3539	3382	0	0	1271
Flt Permitted						
Satd. Flow (perm)	0	3539	3382	0	0	1271
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1361		334	
Travel Time (s)		2.5	26.5		9.1	
Volume (vph)	0	1187	293	15	0	4
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Heavy Vehicles (%)	2%	2%	6%	6%	25%	25%
Adj. Flow (vph)	0	1276	318	16	0	6
Lane Group Flow (vph)	0	1276	334	0	0	6
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↳			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1187	293	15	0	4
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Hourly flow rate (vph)	0	1276	318	16	0	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	335				965	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	335				965	167
tC, single (s)	4.1				7.3	7.4
tC, 2 stage (s)						
tF (s)	2.2				3.8	3.6
p0 queue free %	100				100	99
cM capacity (veh/h)	1221				215	780

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	638	638	212	122	6
Volume Left	0	0	0	0	0
Volume Right	0	0	0	16	6
cSH	1700	1700	1700	1700	780
Volume to Capacity	0.38	0.38	0.12	0.07	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.7
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.7
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.926				0.850			0.850		0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1869	3354	0	3119	1692	1537	1636	3505	1620	1636	3491	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1869	3354	0	3119	1692	1537	1636	3505	1620	1636	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		216				41			285		3	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	3	297	289	115	94	39	4	227	801	113	589	18
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.96	0.96	0.96	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	3	330	321	122	100	41	4	236	834	120	627	19
Lane Group Flow (vph)	3	651	0	122	100	41	4	236	834	120	646	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	21.0	43.0	0.0	21.0	43.0	17.0	17.0	39.0	21.0	17.0	39.0	0.0
Total Split (%)	17.5%	35.8%	0.0%	17.5%	35.8%	14.2%	14.2%	32.5%	17.5%	14.2%	32.5%	0.0%
Maximum Green (s)	16.0	38.0		16.0	38.0	10.0	10.0	32.0	16.0	10.0	32.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.03	0.82		0.23	0.16	0.05	0.03	0.18	0.80	0.50	0.35	
Control Delay	53.7	39.7		45.0	26.5	3.6	51.8	28.3	21.8	53.5	18.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	53.7	39.7		45.0	26.5	3.6	51.8	28.3	21.8	53.5	18.8	
Queue Length 50th (ft)	2	176		42	49	0	3	65	334	86	142	
Queue Length 95th (ft)	13	227		74	99	17	15	107	#731	142	245	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	265	1236		528	625	864	177	1283	1044	243	1829	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.01	0.53		0.23	0.16	0.05	0.02	0.18	0.80	0.49	0.35	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 36 (30%), Referenced to phase 2:NBT and 6:SBT, Start of Green

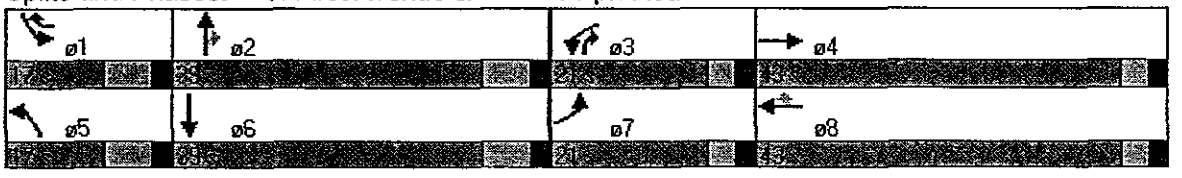
Natural Cycle: 70

Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1869	3354		3119	1692	1537	1636	3505	1620	1636	3489	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1869	3354		3119	1692	1537	1636	3505	1620	1636	3489	
Volume (vph)	3	297	289	115	94	39	4	227	801	113	589	18
Peak-hour factor, PHF	0.90	0.90	0.90	0.94	0.94	0.94	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	3	330	321	122	100	41	4	236	834	120	627	19
RTOR Reduction (vph)	0	169	0	0	0	20	0	0	142	0	2	0
Lane Group Flow (vph)	3	482	0	122	100	21	4	236	692	120	644	0
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	3%	3%	3%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	1.3	25.1		19.3	43.1	57.8	1.4	36.9	56.2	14.7	50.2	
Effective Green, g (s)	2.3	26.1		20.3	44.1	61.8	4.4	39.9	60.2	17.7	53.2	
Actuated g/C Ratio	0.02	0.22		0.17	0.37	0.52	0.04	0.33	0.50	0.15	0.44	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	36	729		528	622	843	60	1165	867	241	1547	
v/s Ratio Prot	0.00	c0.14		0.04	0.06	0.00	0.00	0.07	c0.14	c0.07	0.18	
v/s Ratio Perm						0.01			0.29			
v/c Ratio	0.08	0.66		0.23	0.16	0.03	0.07	0.20	0.80	0.50	0.42	
Uniform Delay, d1	57.8	42.9		43.1	25.5	14.3	55.8	28.7	24.8	47.1	22.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	2.3		0.2	0.1	0.0	0.5	0.4	5.2	1.6	0.8	
Delay (s)	58.8	45.2		43.3	25.6	14.3	56.3	29.1	30.0	48.7	23.6	
Level of Service	E	D		D	C	B	E	C	C	D	C	
Approach Delay (s)		45.2			32.1			29.9			27.6	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	33.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.996			
Flt Protected						
Satd. Flow (prot)	0	1698	3596	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1698	3596	0	0	3539
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	310		320			900
Travel Time (s)	8.5		6.2			17.5
Volume (vph)	0	21	1366	34	0	381
Peak Hour Factor	0.75	0.75	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	2%	2%
Adj. Flow (vph)	0	28	1453	36	0	419
Lane Group Flow (vph)	0	28	1489	0	0	419
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	21	1366	34	0	381
Peak Hour Factor	0.75	0.75	0.94	0.94	0.91	0.91
Hourly flow rate (vph)	0	28	1453	36	0	419
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.67	0.67			0.67	
vC, conflicting volume	1681	745			1489	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1524	129			1239	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	74	606			374	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	28	969	521	209	209
Volume Left	0	0	0	0	0
Volume Right	28	0	36	0	0
cSH	606	1700	1700	1700	1700
Volume to Capacity	0.05	0.57	0.31	0.12	0.12
Queue Length 95th (ft)	4	0	0	0	0
Control Delay (s)	11.2	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.2	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑↳		↰	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1766	1679	3657	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1766	1679	3657	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	303		420			320
Travel Time (s)	8.3		8.2			6.2
Volume (vph)	41	39	1416	16	10	371
Peak Hour Factor	0.71	0.71	0.92	0.92	0.87	0.87
Heavy Vehicles (%)	9%	9%	0%	0%	0%	0%
Adj. Flow (vph)	58	55	1539	17	11	426
Lane Group Flow (vph)	58	55	1556	0	11	426
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	41	39	1416	16	10	371
Peak Hour Factor	0.71	0.71	0.92	0.92	0.87	0.87
Hourly flow rate (vph)	58	55	1539	17	11	426
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.66	0.66			0.66	
vC, conflicting volume	1784	1778			1557	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1672	143			1326	
tC, single (s)	7.0	7.1			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	0	90			97	
cM capacity (veh/h)	51	564			347	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	58	55	1026	530	11	213	213
Volume Left	58	0	0	0	11	0	0
Volume Right	0	55	0	17	0	0	0
cSH	51	564	1700	1700	347	1700	1700
Volume to Capacity	1.13	0.10	0.60	0.31	0.03	0.13	0.13
Queue Length 95th (ft)	127	8	0	0	3	0	0
Control Delay (s)	294.4	12.1	0.0	0.0	15.7	0.0	0.0
Lane LOS	F	B			C		
Approach Delay (s)	156.8		0.0		0.4		
Approach LOS	F						

Intersection Summary			
Average Delay	8.5		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.998				0.865		0.888	
Flt Protected	0.950										0.992	
Satd. Flow (prot)	1620	3349	0	0	3621	0	0	0	1808	0	1759	0
Flt Permitted	0.950										0.992	
Satd. Flow (perm)	1620	3349	0	0	3621	0	0	0	1808	0	1759	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			263	
Travel Time (s)		9.4			7.4			33.2			7.2	
Volume (vph)	64	345	5	0	1228	19	0	0	15	27	0	135
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	66	356	5	0	1380	21	0	0	32	36	0	178
Lane Group Flow (vph)	66	361	0	0	1401	0	0	0	32	0	214	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	64	345	5	0	1228	19	0	0	15	27	0	135
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Hourly flow rate (vph)	66	356	5	0	1380	21	0	0	32	36	0	178
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	1401			361			1358	1891	180	1732	1883	701
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1401			361			1358	1891	180	1732	1883	701
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			100			100	100	96	28	100	54
cM capacity (veh/h)	473			1209			53	61	838	49	61	386

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	66	237	124	920	481	32	213
Volume Left	66	0	0	0	0	0	36
Volume Right	0	0	5	0	21	32	178
cSH	473	1700	1700	1700	1700	838	181
Volume to Capacity	0.14	0.14	0.07	0.54	0.28	0.04	1.18
Queue Length 95th (ft)	12	0	0	0	0	3	280
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	9.5	176.1
Lane LOS	B					A	F
Approach Delay (s)	2.1			0.0		9.5	176.1
Approach LOS						A	F

Intersection Summary			
Average Delay	18.7		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt					0.892	
Flt Protected	0.950				0.990	
Satd. Flow (prot)	1620	3355	3610	0	1590	0
Flt Permitted	0.950				0.990	
Satd. Flow (perm)	1620	3355	3610	0	1590	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		273	
Travel Time (s)		7.4	2.5		7.4	
Volume (vph)	3	384	1199	1	12	48
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Heavy Vehicles (%)	4%	4%	0%	0%	2%	2%
Adj. Flow (vph)	3	427	1347	1	22	87
Lane Group Flow (vph)	3	427	1348	0	109	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	384	1199	1	12	48
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Hourly flow rate (vph)	3	427	1347	1	22	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	1348				1568	674
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1348				1568	674
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				78	78
cM capacity (veh/h)	496				101	397

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	213	213	898	450	109
Volume Left	3	0	0	0	0	22
Volume Right	0	0	0	0	1	87
cSH	496	1700	1700	1700	1700	250
Volume to Capacity	0.01	0.13	0.13	0.53	0.26	0.44
Queue Length 95th (ft)	1	0	0	0	0	52
Control Delay (s)	12.3	0.0	0.0	0.0	0.0	30.0
Lane LOS	B					D
Approach Delay (s)	0.1			0.0		30.0
Approach LOS						D

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.999			0.865
Flt Protected						
Satd. Flow (prot)	0	3471	3606	0	0	1589
Flt Permitted						
Satd. Flow (perm)	0	3471	3606	0	0	1589
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1074		266	
Travel Time (s)		2.5	20.9		7.3	
Volume (vph)	0	396	1162	8	0	38
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Heavy Vehicles (%)	4%	4%	0%	0%	0%	0%
Adj. Flow (vph)	0	440	1306	9	0	69
Lane Group Flow (vph)	0	440	1315	0	0	69
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	396	1162	8	0	38
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Hourly flow rate (vph)	0	440	1306	9	0	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	1315				1530	657
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1315				1530	657
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	83
cM capacity (veh/h)	511				110	412

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	220	220	870	444	69
Volume Left	0	0	0	0	0
Volume Right	0	0	0	9	69
cSH	1700	1700	1700	1700	412
Volume to Capacity	0.13	0.13	0.51	0.26	0.17
Queue Length 95th (ft)	0	0	0	0	15
Control Delay (s)	0.0	0.0	0.0	0.0	15.5
Lane LOS					C
Approach Delay (s)	0.0		0.0		15.5
Approach LOS					C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			-1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.885				0.850			0.850		0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1888	3237	0	3335	1809	1644	1668	3574	1652	1636	3494	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1888	3237	0	3335	1809	1644	1668	3574	1652	1636	3494	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		262				194			326		2	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	1	78	257	501	388	180	14	1191	313	37	359	6
Peak Hour Factor	0.90	0.90	0.90	0.93	0.93	0.93	0.96	0.96	0.96	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	1	87	286	539	417	194	15	1241	326	41	395	7
Lane Group Flow (vph)	1	373	0	539	417	194	15	1241	326	41	402	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	32.0	27.0	0.0	32.0	27.0	14.0	14.0	47.0	32.0	14.0	47.0	0.0
Total Split (%)	26.7%	22.5%	0.0%	26.7%	22.5%	11.7%	11.7%	39.2%	26.7%	11.7%	39.2%	0.0%
Maximum Green (s)	27.0	22.0		27.0	22.0	7.0	7.0	40.0	27.0	7.0	40.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.01	0.47		0.77	0.57	0.20	0.11	0.89	0.28	0.28	0.25	
Control Delay	54.0	16.1		52.5	32.6	2.8	53.1	43.3	1.5	56.2	21.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	54.0	16.1		52.5	32.6	2.8	53.1	43.3	1.5	56.2	21.1	
Queue Length 50th (ft)	1	41		200	254	0	11	445	0	30	80	
Queue Length 95th (ft)	7	83		259	376	38	33	#646	33	68	160	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	441	876		778	727	957	140	1398	1198	149	1629	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.00	0.43		0.69	0.57	0.20	0.11	0.89	0.27	0.28	0.25	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green

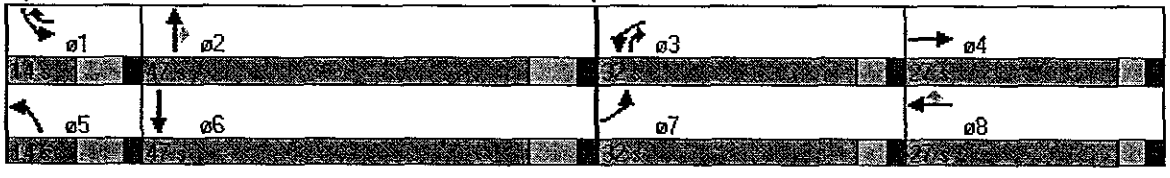
Natural Cycle: 80

Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1888	3237		3335	1809	1644	1668	3574	1652	1636	3496	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1888	3237		3335	1809	1644	1668	3574	1652	1636	3496	
Volume (vph)	1	78	257	501	388	180	14	1191	313	37	359	6
Peak-hour factor, PHF	0.90	0.90	0.90	0.93	0.93	0.93	0.96	0.96	0.96	0.91	0.91	0.91
Adj. Flow (vph)	1	87	286	539	417	194	15	1241	326	41	395	7
RTOR Reduction (vph)	0	207	0	0	0	99	0	0	141	0	1	0
Lane Group Flow (vph)	1	166	0	539	417	95	15	1241	185	41	401	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	1.2	24.3		24.1	47.2	54.8	2.9	40.0	64.1	7.6	44.7	
Effective Green, g (s)	2.2	25.3		25.1	48.2	58.8	5.9	43.0	68.1	10.6	47.7	
Actuated g/C Ratio	0.02	0.21		0.21	0.40	0.49	0.05	0.36	0.57	0.09	0.40	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	35	682		698	727	860	82	1281	993	145	1390	
v/s Ratio Prot	0.00	0.05		c0.16	c0.23	0.01	0.01	c0.35	0.04	c0.03	0.11	
v/s Ratio Perm						0.05			0.07			
v/c Ratio	0.03	0.24		0.77	0.57	0.11	0.18	0.97	0.19	0.28	0.29	
Uniform Delay, d1	57.9	39.4		44.8	27.9	16.5	54.7	37.8	12.6	51.1	24.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.2		5.3	1.1	0.1	1.1	18.7	0.1	1.1	0.5	
Delay (s)	58.2	39.6		50.1	29.0	16.6	55.8	56.5	12.6	52.2	25.1	
Level of Service	E	D		D	C	B	E	E	B	D	C	
Approach Delay (s)		39.6			36.8			47.5			27.6	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.998			
Flt Protected						
Satd. Flow (prot)	0	1698	3603	0	0	3610
Flt Permitted						
Satd. Flow (perm)	0	1698	3603	0	0	3610
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	352		320			865
Travel Time (s)	9.6		6.2			16.9
Volume (vph)	0	17	864	10	0	458
Peak Hour Factor	0.71	0.71	0.91	0.91	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	24	949	11	0	492
Lane Group Flow (vph)	0	24	960	0	0	492
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	17	864	10	0	458
Peak Hour Factor	0.71	0.71	0.91	0.91	0.93	0.93
Hourly flow rate (vph)	0	24	949	11	0	492
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1201	480			960	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1053	199			768	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	190	688			721	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	633	327	246	246
Volume Left	0	0	0	0	0
Volume Right	24	0	11	0	0
cSH	688	1700	1700	1700	1700
Volume to Capacity	0.03	0.37	0.19	0.14	0.14
Queue Length 95th (ft)	3	0	0	0	0
Control Delay (s)	10.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.4	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.997			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1674	1592	3653	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1674	1592	3653	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	310		420			320
Travel Time (s)	8.5		8.2			6.2
Volume (vph)	37	9	804	16	20	447
Peak Hour Factor	0.77	0.77	0.92	0.92	0.95	0.95
Heavy Vehicles (%)	15%	15%	0%	0%	0%	0%
Adj. Flow (vph)	48	12	874	17	21	471
Lane Group Flow (vph)	48	12	891	0	21	471
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	37	9	804	16	20	447
Peak Hour Factor	0.77	0.77	0.92	0.92	0.95	0.95
Hourly flow rate (vph)	48	12	874	17	21	471
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1160	446			891	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	996	142			675	
tC, single (s)	7.1	7.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	73	98			97	
cM capacity (veh/h)	179	703			775	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	48	12	583	309	21	235	235
Volume Left	48	0	0	0	21	0	0
Volume Right	0	12	0	17	0	0	0
cSH	179	703	1700	1700	775	1700	1700
Volume to Capacity	0.27	0.02	0.34	0.18	0.03	0.14	0.14
Queue Length 95th (ft)	26	1	0	0	2	0	0
Control Delay (s)	32.4	10.2	0.0	0.0	9.8	0.0	0.0
Lane LOS	D	B			A		
Approach Delay (s)	28.0		0.0		0.4		
Approach LOS	D						

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.988				0.865		0.891	
Flt Protected	0.950										0.991	
Satd. Flow (prot)	1574	3261	0	0	3414	0	0	0	1808	0	1745	0
Flt Permitted	0.950										0.991	
Satd. Flow (perm)	1574	3261	0	0	3414	0	0	0	1808	0	1745	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			361	
Travel Time (s)		9.4			7.4			33.2			9.8	
Volume (vph)	62	200	0	0	142	12	0	0	4	19	0	82
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	70	225	0	0	161	14	0	0	4	23	0	98
Lane Group Flow (vph)	70	225	0	0	175	0	0	0	4	0	121	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	62	200	0	0	142	12	0	0	1	19	0	82
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Hourly flow rate (vph)	70	225	0	0	161	14	0	0	4	23	0	98
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	175			225			542	539	112	424	532	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	175			225			542	539	112	424	532	88
tC, single (s)	4.2			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			100			100	100	100	95	100	90
cM capacity (veh/h)	1363			1319			369	429	926	494	430	957

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	70	150	75	108	67	4	120
Volume Left	70	0	0	0	0	0	23
Volume Right	0	0	0	0	14	4	98
cSH	1363	1700	1700	1700	1700	926	813
Volume to Capacity	0.05	0.09	0.04	0.06	0.04	0.00	0.15
Queue Length 95th (ft)	4	0	0	0	0	0	13
Control Delay (s)	7.8	0.0	0.0	0.0	0.0	8.9	10.2
Lane LOS	A					A	B
Approach Delay (s)	1.8			0.0		8.9	10.2
Approach LOS						A	B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.998		0.865	
Flt Protected	0.950					
Satd. Flow (prot)	1589	3292	3431	0	1589	0
Flt Permitted	0.950					
Satd. Flow (perm)	1589	3292	3431	0	1589	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		350	
Travel Time (s)		7.4	2.5		9.5	
Volume (vph)	3	217	151	2	0	3
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Heavy Vehicles (%)	6%	6%	5%	5%	0%	0%
Adj. Flow (vph)	3	244	172	2	0	5
Lane Group Flow (vph)	3	244	174	0	5	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	217	151	2	0	3
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Hourly flow rate (vph)	3	244	172	2	0	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	174				301	87
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	174				301	87
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1371				670	961

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	122	122	114	59	5
Volume Left	3	0	0	0	0	0
Volume Right	0	0	0	0	2	5
cSH	1371	1700	1700	1700	1700	961
Volume to Capacity	0.00	0.07	0.07	0.07	0.03	0.01
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	8.8
Lane LOS	A					A
Approach Delay (s)	0.1			0.0		8.8
Approach LOS						A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.997			0.865
Flt Protected						
Satd. Flow (prot)	0	3406	3428	0	0	1589
Flt Permitted						
Satd. Flow (perm)	0	3406	3428	0	0	1589
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1494		343	
Travel Time (s)		2.5	29.1		9.4	
Volume (vph)	0	217	147	3	0	6
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Heavy Vehicles (%)	6%	6%	5%	5%	0%	0%
Adj. Flow (vph)	0	244	167	3	0	11
Lane Group Flow (vph)	0	244	170	0	0	11
Sign Control		Free	Free		Stop	

Intersection Summary
Area Type: Other
Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	217	147	3	0	6
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Hourly flow rate (vph)	0	244	167	3	0	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	170				291	85
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	170				291	85
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1375				682	963

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	122	122	111	59	11
Volume Left	0	0	0	0	0
Volume Right	0	0	0	3	11
cSH	1700	1700	1700	1700	963
Volume to Capacity	0.07	0.07	0.07	0.03	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	8.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.8
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	14.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.879				0.850			0.850		0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1888	3215	0	3239	1757	1597	1668	3574	1652	1636	3491	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1888	3215	0	3239	1757	1597	1668	3574	1652	1636	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		327				53			143		3	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	4	73	307	156	34	50	13	771	134	29	440	13
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	4	78	327	166	36	53	14	820	143	31	473	14
Lane Group Flow (vph)	4	405	0	166	36	53	14	820	143	31	487	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	25.0	24.0	10.0	25.0	24.0	16.0	16.0	25.0	25.0	16.0	25.0	0.0
Total Split (%)	27.8%	26.7%	0.0%	27.8%	26.7%	17.8%	17.8%	27.8%	27.8%	17.8%	27.8%	0.0%
Maximum Green (s)	20.0	19.0		20.0	19.0	9.0	9.0	18.0	20.0	9.0	18.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.03	0.65		0.43	0.08	0.08	0.08	0.45	0.12	0.16	0.23	
Control Delay	38.8	13.6		39.9	26.8	5.0	37.1	16.9	1.8	37.3	10.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	38.8	13.6		39.9	26.8	5.0	37.1	16.9	1.8	37.3	10.1	
Queue Length 50th (ft)	2	22		45	16	0	7	153	0	16	52	
Queue Length 95th (ft)	12	62		74	42	22	25	253	23	42	137	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	441	969		756	430	702	222	1835	1337	220	2137	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.01	0.42		0.22	0.08	0.08	0.06	0.45	0.11	0.14	0.23	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 46 (51%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Splits and Phases: 6: First Avenue & North Gulph Road

ø1	ø2	ø3	ø4
16	24	16	24
ø5	ø6	ø7	ø8
16	24	16	24

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1888	3214		3239	1757	1597	1668	3574	1652	1636	3490	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1888	3214		3239	1757	1597	1668	3574	1652	1636	3490	
Volume (vph)	4	73	307	156	34	50	13	771	134	29	440	13
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	4	78	327	166	36	53	14	820	143	31	473	14
RTOR Reduction (vph)	0	279	0	0	0	35	0	0	61	0	1	0
Lane Group Flow (vph)	4	126	0	166	36	18	14	820	82	31	486	0
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	1.3	12.3		9.7	20.7	26.9	1.6	37.8	47.5	6.2	42.4	
Effective Green, g (s)	2.3	13.3		10.7	21.7	30.9	4.6	40.8	51.5	9.2	45.4	
Actuated g/C Ratio	0.03	0.15		0.12	0.24	0.34	0.05	0.45	0.57	0.10	0.50	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	48	475		385	424	619	85	1620	1019	167	1761	
v/s Ratio Prot	0.00	c0.04		c0.05	0.02	0.00	0.01	c0.23	0.01	c0.02	c0.14	
v/s Ratio Perm						0.01			0.04			
v/c Ratio	0.08	0.27		0.43	0.08	0.03	0.16	0.51	0.08	0.19	0.28	
Uniform Delay, d1	42.8	34.0		36.8	26.5	19.6	40.9	17.5	8.6	37.0	12.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.3		0.8	0.1	0.0	0.9	1.1	0.0	0.5	0.4	
Delay (s)	43.6	34.3		37.6	26.5	19.6	41.8	18.6	8.7	37.5	13.2	
Level of Service	D	C		D	C	B	D	B	A	D	B	
Approach Delay (s)		34.4			32.3			17.5			14.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.980			0.865			0.909	
Flt Protected	0.950										0.984	
Satd. Flow (prot)	1652	3401	0	0	3354	0	0	1808	0	0	1786	0
Flt Permitted	0.561										0.916	
Satd. Flow (perm)	975	3401	0	0	3354	0	0	1808	0	0	1662	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			30			77			64	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			366	
Travel Time (s)		9.4			7.4			33.2			10.0	
Volume (vph)	140	1219	49	0	249	39	0	0	5	22	0	45
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	151	1311	53	0	271	42	0	0	16	31	0	64
Lane Group Flow (vph)	151	1364	0	0	313	0	0	16	0	0	95	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	83.0	83.0	0.0	83.0	83.0	0.0	37.0	37.0	0.0	37.0	37.0	0.0
Total Split (%)	69.2%	69.2%	0.0%	69.2%	69.2%	0.0%	30.8%	30.8%	0.0%	30.8%	30.8%	0.0%
Maximum Green (s)	77.0	77.0		77.0	77.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.18	0.46			0.11			0.06			0.41	
Control Delay	1.5	2.0			1.7			0.4			25.6	
Queue Delay	0.0	0.4			0.0			0.0			0.0	
Total Delay	1.5	2.4			1.7			0.4			25.6	
Queue Length 50th (ft)	9	72			15			0			22	
Queue Length 95th (ft)	m17	109			26			0			46	
Internal Link Dist (ft)		400			300			1136			286	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	842	2936			2899			553			503	
Starvation Cap Reductn	0	932			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.18	0.68			0.11			0.03			0.19	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 84 (70%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access

ø2	ø4
83%	37%
ø6	ø8
83%	37%

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	0.99			0.98			0.86			0.91	
Flt Protected	0.95	1.00			1.00			1.00			0.98	
Satd. Flow (prot)	1652	3401			3354			1808			1786	
Flt Permitted	0.56	1.00			1.00			1.00			0.88	
Satd. Flow (perm)	977	3401			3354			1808			1606	
Volume (vph)	140	1219	49	0	249	39	0	0	5	22	0	45
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Adj. Flow (vph)	151	1311	53	0	271	42	0	0	16	31	0	64
RTOR Reduction (vph)	0	1	0	0	5	0	0	15	0	0	58	0
Lane Group Flow (vph)	151	1363	0	0	308	0	0	1	0	0	37	0
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	99.6	99.6			99.6			8.4			8.4	
Effective Green, g (s)	101.6	101.6			101.6			10.4			10.4	
Actuated g/C Ratio	0.85	0.85			0.85			0.09			0.09	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	827	2880			2840			157			139	
v/s Ratio Prot		c0.40			0.09			0.00				
v/s Ratio Perm	0.15										c0.02	
v/c Ratio	0.18	0.47			0.11			0.01			0.26	
Uniform Delay, d1	1.7	2.4			1.6			50.1			51.2	
Progression Factor	0.56	0.61			1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.4			0.1			0.0			1.0	
Delay (s)	1.3	1.9			1.6			50.1			52.2	
Level of Service	A	A			A			D			D	
Approach Delay (s)		1.8			1.6			50.1			52.2	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	4.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.998			0.865			0.888	
Flt Protected	0.950										0.992	
Satd. Flow (prot)	1620	3349	0	0	3621	0	0	1808	0	0	1759	0
Flt Permitted	0.130										0.950	
Satd. Flow (perm)	222	3349	0	0	3621	0	0	1808	0	0	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			3			540			64	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			263	
Travel Time (s)		9.4			7.4			33.2			7.2	
Volume (vph)	64	345	5	0	1228	19	0	0	15	27	0	135
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	66	356	5	0	1380	21	0	0	32	36	0	178
Lane Group Flow (vph)	66	361	0	0	1401	0	0	32	0	0	214	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	82.0	82.0	0.0	82.0	82.0	0.0	38.0	38.0	0.0	38.0	38.0	0.0
Total Split (%)	68.3%	68.3%	0.0%	68.3%	68.3%	0.0%	31.7%	31.7%	0.0%	31.7%	31.7%	0.0%
Maximum Green (s)	76.0	76.0		76.0	76.0		32.0	32.0		32.0	32.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.38	0.14			0.49			0.04			0.70	
Control Delay	11.8	3.3			5.8			0.1			45.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	11.8	3.3			5.8			0.1			45.2	
Queue Length 50th (ft)	10	24			163			0			112	
Queue Length 95th (ft)	40	43			267			0			142	
Internal Link Dist (ft)		400			300			1136			183	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	174	2624			2838			899			523	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.38	0.14			0.49			0.04			0.41	

Intersection Summary

Area Type: Other

Cycle Length: 120

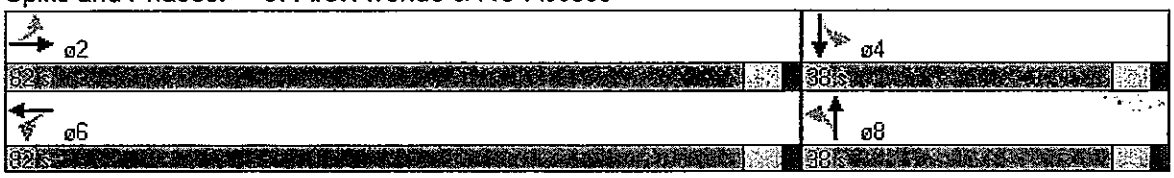
Actuated Cycle Length: 120

Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 3: First Avenue & RO Access



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			1.00			0.86			0.89	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1620	3348			3620			1808			1757	
Flt Permitted	0.16	1.00			1.00			1.00			0.94	
Satd. Flow (perm)	278	3348			3620			1808			1668	
Volume (vph)	64	345	5	0	1228	19	0	0	15	27	0	135
Peak-hour factor, PHF	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Adj. Flow (vph)	66	356	5	0	1380	21	0	0	32	36	0	178
RTOR Reduction (vph)	0	0	0	0	1	0	0	27	0	0	54	0
Lane Group Flow (vph)	66	361	0	0	1400	0	0	5	0	0	160	0
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	92.0	92.0			92.0			16.0			16.0	
Effective Green, g (s)	94.0	94.0			94.0			18.0			18.0	
Actuated g/C Ratio	0.78	0.78			0.78			0.15			0.15	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	218	2623			2836			271			250	
v/s Ratio Prot		0.11			c0.39			0.00				
v/s Ratio Perm	0.24										c0.10	
v/c Ratio	0.30	0.14			0.49			0.02			0.64	
Uniform Delay, d1	3.7	3.2			4.6			43.5			47.9	
Progression Factor	0.89	0.89			1.00			1.00			1.00	
Incremental Delay, d2	3.4	0.1			0.6			0.0			5.3	
Delay (s)	6.7	2.9			5.2			43.5			53.2	
Level of Service	A	A			A			D			D	
Approach Delay (s)		3.5			5.2			43.5			53.2	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.988			0.865			0.891	
Flt Protected	0.950										0.991	
Satd. Flow (prot)	1574	3261	0	0	3414	0	0	1808	0	0	1745	0
Flt Permitted	0.641										0.961	
Satd. Flow (perm)	1062	3261	0	0	3414	0	0	1808	0	0	1692	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					13			579			98	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			361	
Travel Time (s)		9.4			7.4			33.2			9.8	
Volume (vph)	62	200	0	0	142	12	0	0	1	19	0	82
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	70	225	0	0	161	14	0	0	4	23	0	98
Lane Group Flow (vph)	70	225	0	0	175	0	0	4	0	0	121	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%
Maximum Green (s)	39.0	39.0		39.0	39.0		39.0	39.0		39.0	39.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		Min	Min		Min	Min	
v/c Ratio	0.08	0.09			0.07			0.01			0.39	
Control Delay	3.5	3.1			2.3			0.0			15.0	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	3.5	3.1			2.3			0.0			15.0	
Queue Length 50th (ft)	7	11			8			0			12	
Queue Length 95th (ft)	m18	23			15			0			52	
Internal Link Dist (ft)		400			300			1136			281	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	825	2532			2654			1139			824	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.08	0.09			0.07			0.00			0.15	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

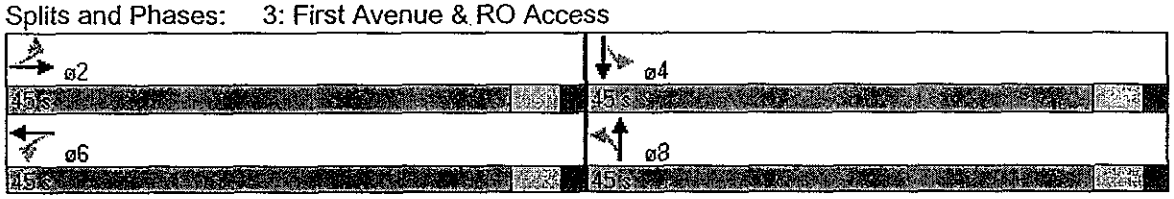
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			0.99			0.86			0.89	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1574	3261			3414			1808			1744	
Flt Permitted	0.64	1.00			1.00			1.00			0.94	
Satd. Flow (perm)	1063	3261			3414			1808			1656	
Volume (vph)	62	200	0	0	142	12	0	0	1	19	0	82
Peak-hour factor, PHF	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Adj. Flow (vph)	70	225	0	0	161	14	0	0	4	23	0	98
RTOR Reduction (vph)	0	0	0	0	3	0	0	3	0	0	85	0
Lane Group Flow (vph)	70	225	0	0	172	0	0	1	0	0	36	0
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	67.9	67.9			67.9			10.1			10.1	
Effective Green, g (s)	69.9	69.9			69.9			12.1			12.1	
Actuated g/C Ratio	0.78	0.78			0.78			0.13			0.13	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	826	2533			2652			243			223	
v/s Ratio Prot		c0.07			0.05			0.00				
v/s Ratio Perm	0.07										c0.02	
v/c Ratio	0.08	0.09			0.06			0.00			0.16	
Uniform Delay, d1	2.4	2.4			2.4			33.7			34.5	
Progression Factor	1.32	1.26			1.00			1.00			1.00	
Incremental Delay, d2	0.2	0.1			0.0			0.0			0.3	
Delay (s)	3.4	3.1			2.4			33.7			34.8	
Level of Service	A	A			A			C			C	
Approach Delay (s)		3.2			2.4			33.7			34.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX G

Future (2009) Capacity/Level-of-Service Analysis Without Development Worksheets

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.992			
Flt Protected						
Satd. Flow (prot)	0	1698	3378	0	0	3574
Flt Permitted						
Satd. Flow (perm)	0	1698	3378	0	0	3574
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	408		320			933
Travel Time (s)	11.1		6.2			18.2
Volume (vph)	0	2	359	19	0	1015
Peak Hour Factor	0.50	0.50	0.95	0.95	0.91	0.91
Heavy Vehicles (%)	0%	0%	6%	6%	1%	1%
Adj. Flow (vph)	0	4	378	20	0	1115
Lane Group Flow (vph)	0	4	398	0	0	1115
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	2	359	19	0	1015
Peak Hour Factor	0.50	0.50	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	0	4	378	20	0	1115
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	946	199			398	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	876	79			291	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	274	911			1195	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	252	146	558	558
Volume Left	0	0	0	0	0
Volume Right	4	0	20	0	0
cSH	911	1700	1700	1700	1700
Volume to Capacity	0.00	0.15	0.09	0.33	0.33
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	9.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt			0.991			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1528	1709	3458	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1528	1709	3458	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	401		420			320
Travel Time (s)	10.9		8.2			6.2
Volume (vph)	27	0	394	25	41	900
Peak Hour Factor	0.75	0.75	0.87	0.87	0.91	0.91
Heavy Vehicles (%)	26%	26%	5%	5%	0%	0%
Adj. Flow (vph)	36	0	453	29	45	989
Lane Group Flow (vph)	36	0	482	0	45	989
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	27	0	394	25	41	900
Peak Hour Factor	0.75	0.75	0.87	0.87	0.91	0.91
Hourly flow rate (vph)	36	0	453	29	45	989
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	1052	241			482	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	952	56			322	
tC, single (s)	7.3	7.4			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.6			2.2	
p0 queue free %	81	100			96	
cM capacity (veh/h)	189	838			1130	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	36	0	302	180	45	495	495
Volume Left	36	0	0	0	45	0	0
Volume Right	0	0	0	29	0	0	0
cSH	189	1700	1700	1700	1130	1700	1700
Volume to Capacity	0.19	0.00	0.18	0.11	0.04	0.29	0.29
Queue Length 95th (ft)	17	0	0	0	3	0	0
Control Delay (s)	28.4	0.0	0.0	0.0	8.3	0.0	0.0
Lane LOS	D	A			A		
Approach Delay (s)	28.4		0.0		0.4		
Approach LOS	D						

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.982				0.865		0.909	
Flt Protected	0.950										0.984	
Satd. Flow (prot)	1652	3404	0	0	3361	0	0	0	1808	0	1786	0
Flt Permitted	0.950										0.984	
Satd. Flow (perm)	1652	3404	0	0	3361	0	0	0	1808	0	1786	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			501	
Travel Time (s)		9.4			7.4			33.2			13.7	
Volume (vph)	140	1396	49	0	288	39	0	0	5	22	0	45
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	151	1501	53	0	313	42	0	0	16	31	0	64
Lane Group Flow (vph)	151	1554	0	0	355	0	0	0	16	0	95	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	140	1396	49	0	288	39	0	0	5	22	0	45
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Hourly flow rate (vph)	151	1501	53	0	313	42	0	0	16	31	0	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	355			1554			2049	2184	777	1402	2189	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	355			1554			2049	2184	777	1402	2189	178
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	87			100			100	100	95	64	100	92
cM capacity (veh/h)	1200			404			28	41	344	87	40	841

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	151	1001	553	209	147	16	96
Volume Left	151	0	0	0	0	0	31
Volume Right	0	0	53	0	42	16	64
cSH	1200	1700	1700	1700	1700	344	219
Volume to Capacity	0.13	0.59	0.33	0.12	0.09	0.05	0.44
Queue Length 95th (ft)	11	0	0	0	0	4	51
Control Delay (s)	8.4	0.0	0.0	0.0	0.0	16.0	33.6
Lane LOS	A					C	D
Approach Delay (s)	0.7			0.0		16.0	33.6
Approach LOS						C	D

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.995		0.946	
Flt Protected	0.950				0.971	
Satd. Flow (prot)	1652	3421	3389	0	1308	0
Flt Permitted	0.950				0.971	
Satd. Flow (perm)	1652	3421	3389	0	1308	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		469	
Travel Time (s)		7.4	2.5		12.8	
Volume (vph)	63	1358	325	12	4	3
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Heavy Vehicles (%)	2%	2%	6%	6%	29%	29%
Adj. Flow (vph)	68	1460	353	13	6	4
Lane Group Flow (vph)	68	1460	366	0	10	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	63	1358	325	12	4	3
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Hourly flow rate (vph)	68	1460	353	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	366				1225	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	366				1225	183
tC, single (s)	4.1				7.4	7.5
tC, 2 stage (s)						
tF (s)	2.2				3.8	3.6
p0 queue free %	94				96	99
cM capacity (veh/h)	1189				129	750

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	68	730	730	236	131	10
Volume Left	68	0	0	0	0	6
Volume Right	0	0	0	0	13	4
cSH	1189	1700	1700	1700	1700	200
Volume to Capacity	0.06	0.43	0.43	0.14	0.08	0.05
Queue Length 95th (ft)	5	0	0	0	0	4
Control Delay (s)	8.2	0.0	0.0	0.0	0.0	23.9
Lane LOS	A					C
Approach Delay (s)	0.4			0.0		23.9
Approach LOS						C

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.994			0.865
Flt Protected						
Satd. Flow (prot)	0	3539	3385	0	0	1271
Flt Permitted						
Satd. Flow (perm)	0	3539	3385	0	0	1271
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1417		469	
Travel Time (s)		2.5	27.6		12.8	
Volume (vph)	0	1362	333	15	0	4
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Heavy Vehicles (%)	2%	2%	6%	6%	25%	25%
Adj. Flow (vph)	0	1465	362	16	0	6
Lane Group Flow (vph)	0	1465	378	0	0	6
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1362	333	15	0	4
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Hourly flow rate (vph)	0	1465	362	16	0	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	378				1102	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	378				1102	189
tC, single (s)	4.1				7.3	7.4
tC, 2 stage (s)						
tF (s)	2.2				3.8	3.6
p0 queue free %	100				100	99
cM capacity (veh/h)	1177				173	754

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	732	732	241	137	6
Volume Left	0	0	0	0	0
Volume Right	0	0	0	16	6
cSH	1700	1700	1700	1700	754
Volume to Capacity	0.43	0.43	0.14	0.08	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.8
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.929				0.850			0.850		0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1869	3365	0	3119	1692	1537	1636	3505	1620	1636	3491	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1869	3365	0	3119	1692	1537	1636	3505	1620	1636	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		166				44			91		2	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	3	334	301	144	102	41	4	364	936	118	721	19
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.96	0.96	0.96	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	3	371	334	153	109	44	4	379	975	126	767	20
Lane Group Flow (vph)	3	705	0	153	109	44	4	379	975	126	787	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	8.0	26.0	0.0	51.0	69.0	16.0	10.0	27.0	51.0	16.0	33.0	0.0
Total Split (%)	6.7%	21.7%	0.0%	42.5%	57.5%	13.3%	8.3%	22.5%	42.5%	13.3%	27.5%	0.0%
Maximum Green (s)	3.0	21.0		46.0	64.0	9.0	3.0	20.0	46.0	9.0	26.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.05	0.94		0.13	0.11	0.04	0.04	0.53	0.94	0.76	0.70	
Control Delay	58.0	58.2		24.2	11.7	1.8	55.5	46.4	37.6	80.5	40.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	58.0	58.2		24.2	11.7	1.8	55.5	46.4	37.6	80.5	40.7	
Queue Length 50th (ft)	2	224		38	33	0	3	141	608	97	277	
Queue Length 95th (ft)	13	#343		61	70	12	15	193	#962	#197	#436	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	62	752		1222	985	1114	89	713	1052	166	1123	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.05	0.94		0.13	0.11	0.04	0.04	0.53	0.93	0.76	0.70	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 36 (30%), Referenced to phase 2:NBT and 6:SBT, Start of Green

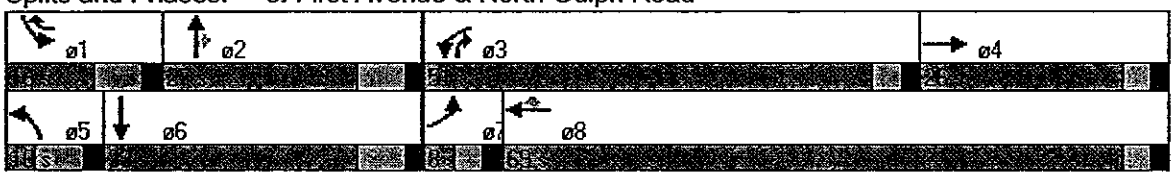
Natural Cycle: 70

Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1869	3364		3119	1692	1537	1636	3505	1620	1636	3491	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1869	3364		3119	1692	1537	1636	3505	1620	1636	3491	
Volume (vph)	3	334	301	144	102	41	4	364	936	118	721	19
Peak-hour factor, PHF	0.90	0.90	0.90	0.94	0.94	0.94	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	3	371	334	153	109	44	4	379	975	126	767	20
RTOR Reduction (vph)	0	130	0	0	0	14	0	0	41	0	2	0
Lane Group Flow (vph)	3	575	0	153	109	30	4	379	934	126	785	0
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	3%	3%	3%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	0.6	24.9		44.5	68.8	78.0	0.6	17.4	61.9	9.2	26.0	
Effective Green, g (s)	1.6	25.9		45.5	69.8	82.0	3.6	20.4	65.9	12.2	29.0	
Actuated g/C Ratio	0.01	0.22		0.38	0.58	0.68	0.03	0.17	0.55	0.10	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	25	726		1183	984	1102	49	596	944	166	844	
v/s Ratio Prot	0.00	c0.17		0.05	0.06	0.00	0.00	0.11	c0.38	c0.08	c0.22	
v/s Ratio Perm						0.02			0.20			
v/c Ratio	0.12	0.79		0.13	0.11	0.03	0.08	0.64	0.99	0.76	0.93	
Uniform Delay, d1	58.5	44.5		24.3	11.2	6.1	56.6	46.3	26.7	52.5	44.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	5.9		0.0	0.1	0.0	0.7	5.1	26.4	17.9	18.1	
Delay (s)	60.7	50.4		24.4	11.3	6.1	57.3	51.5	53.1	70.4	62.6	
Level of Service	E	D		C	B	A	E	D	D	E	E	
Approach Delay (s)		50.4			17.1			52.6			63.7	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM Average Control Delay	51.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.997			
Flt Protected						
Satd. Flow (prot)	0	1698	3599	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1698	3599	0	0	3539
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	387		320			802
Travel Time (s)	10.6		6.2			15.6
Volume (vph)	0	21	1657	34	0	637
Peak Hour Factor	0.75	0.75	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	2%	2%
Adj. Flow (vph)	0	28	1763	36	0	700
Lane Group Flow (vph)	0	28	1799	0	0	700
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	21	1657	34	0	637
Peak Hour Factor	0.75	0.75	0.94	0.94	0.91	0.91
Hourly flow rate (vph)	0	28	1763	36	0	700
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.58	0.58			0.58	
vC, conflicting volume	2131	899			1799	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2224	112			1655	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	22	540			225	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	28	1175	624	350	350
Volume Left	0	0	0	0	0
Volume Right	28	0	36	0	0
cSH	540	1700	1700	1700	1700
Volume to Capacity	0.05	0.69	0.37	0.21	0.21
Queue Length 95th (ft)	4	0	0	0	0
Control Delay (s)	12.0	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.0	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%		0%	4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.999			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1766	1679	3660	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1766	1679	3660	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	373		420			320
Travel Time (s)	10.2		8.2			6.2
Volume (vph)	41	39	1709	16	10	627
Peak Hour Factor	0.71	0.71	0.92	0.92	0.87	0.87
Heavy Vehicles (%)	9%	9%	0%	0%	0%	0%
Adj. Flow (vph)	58	55	1858	17	11	721
Lane Group Flow (vph)	58	55	1875	0	11	721
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	41	39	1709	16	10	627
Peak Hour Factor	0.71	0.71	0.92	0.92	0.87	0.87
Hourly flow rate (vph)	58	55	1858	17	11	721
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.57	0.57			0.57	
vC, conflicting volume	2250	938			1875	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2437	139			1781	
tC, single (s)	7.0	7.1			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	0	89			94	
cM capacity (veh/h)	13	492			202	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	58	55	1238	637	11	360	360
Volume Left	58	0	0	0	11	0	0
Volume Right	0	55	0	17	0	0	0
cSH	13	492	1700	1700	202	1700	1700
Volume to Capacity	4.53	0.11	0.73	0.37	0.06	0.21	0.21
Queue Length 95th (ft)	Err	9	0	0	4	0	0
Control Delay (s)	Err	13.2	0.0	0.0	23.9	0.0	0.0
Lane LOS	F	B			C		
Approach Delay (s)	5130.9		0.0		0.4		
Approach LOS	F						

Intersection Summary			
Average Delay	212.7		
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.998				0.865		0.888	
Flt Protected	0.950										0.992	
Satd. Flow (prot)	1620	3349	0	0	3621	0	0	0	1808	0	1759	0
Flt Permitted	0.950										0.992	
Satd. Flow (perm)	1620	3349	0	0	3621	0	0	0	1808	0	1759	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			368	
Travel Time (s)		9.4			7.4			33.2			10.0	
Volume (vph)	64	404	5	0	1401	19	0	0	15	27	0	135
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	66	416	5	0	1574	21	0	0	32	36	0	178
Lane Group Flow (vph)	66	421	0	0	1595	0	0	0	32	0	214	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	64	404	5	0	1401	19	0	0	15	27	0	135
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Hourly flow rate (vph)	66	416	5	0	1574	21	0	0	32	36	0	178
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	1596			422			1516	2147	211	1957	2138	798
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1596			422			1516	2147	211	1957	2138	798
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			100			100	100	96	0	100	47
cM capacity (veh/h)	398			1148			34	41	801	33	41	333

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	66	278	144	1049	546	32	213
Volume Left	66	0	0	0	0	0	36
Volume Right	0	0	5	0	21	32	178
cSH	398	1700	1700	1700	1700	801	131
Volume to Capacity	0.17	0.16	0.08	0.62	0.32	0.04	1.62
Queue Length 95th (ft)	15	0	0	0	0	3	386
Control Delay (s)	15.8	0.0	0.0	0.0	0.0	9.7	372.2
Lane LOS	C					A	F
Approach Delay (s)	2.1			0.0		9.7	372.2
Approach LOS						A	F

Intersection Summary			
Average Delay	34.7		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt					0.892	
Flt Protected	0.950				0.990	
Satd. Flow (prot)	1620	3355	3610	0	1590	0
Flt Permitted	0.950				0.990	
Satd. Flow (perm)	1620	3355	3610	0	1590	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		357	
Travel Time (s)		7.4	2.5		9.7	
Volume (vph)	3	444	1371	1	12	48
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Heavy Vehicles (%)	4%	4%	0%	0%	2%	2%
Adj. Flow (vph)	3	493	1540	1	22	87
Lane Group Flow (vph)	3	493	1541	0	109	0
Sign Control		Free	Free		Stop	

Intersection Summary
Area Type: Other
Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	444	1371	1	12	48
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Hourly flow rate (vph)	3	493	1540	1	22	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	1542				1794	771
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1542				1794	771
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				69	75
cM capacity (veh/h)	417				71	343

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	247	247	1027	515	109
Volume Left	3	0	0	0	0	22
Volume Right	0	0	0	0	1	87
cSH	417	1700	1700	1700	1700	194
Volume to Capacity	0.01	0.15	0.15	0.60	0.30	0.56
Queue Length 95th (ft)	1	0	0	0	0	75
Control Delay (s)	13.7	0.0	0.0	0.0	0.0	44.9
Lane LOS	B					E
Approach Delay (s)	0.1			0.0		44.9
Approach LOS						E

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.999			0.865
Flt Protected						
Satd. Flow (prot)	0	3471	3606	0	0	1589
Flt Permitted						
Satd. Flow (perm)	0	3471	3606	0	0	1589
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1403		357	
Travel Time (s)		2.5	27.3		9.7	
Volume (vph)	0	457	1332	8	0	38
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Heavy Vehicles (%)	4%	4%	0%	0%	0%	0%
Adj. Flow (vph)	0	508	1497	9	0	69
Lane Group Flow (vph)	0	508	1506	0	0	69
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↳			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	457	1332	8	0	38
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Hourly flow rate (vph)	0	508	1497	9	0	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	1506				1755	753
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1506				1755	753
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	81
cM capacity (veh/h)	431				78	357

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	254	254	998	508	69
Volume Left	0	0	0	0	0
Volume Right	0	0	0	9	69
cSH	1700	1700	1700	1700	357
Volume to Capacity	0.15	0.15	0.59	0.30	0.19
Queue Length 95th (ft)	0	0	0	0	18
Control Delay (s)	0.0	0.0	0.0	0.0	17.5
Lane LOS					C
Approach Delay (s)	0.0		0.0		17.5
Approach LOS					C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.887				0.850			0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1888	3244	0	3335	1809	1644	1668	3574	1652	1636	3498	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1888	3244	0	3335	1809	1644	1668	3574	1652	1636	3498	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		167				68			323		1	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	1	86	268	623	425	188	15	1475	365	39	614	6
Peak Hour Factor	0.90	0.90	0.90	0.93	0.93	0.93	0.96	0.96	0.96	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	1	96	298	670	457	202	16	1536	380	43	675	7
Lane Group Flow (vph)	1	394	0	670	457	202	16	1536	380	43	682	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	8.0	16.0	0.0	32.0	40.0	10.0	10.0	62.0	32.0	10.0	62.0	0.0
Total Split (%)	6.7%	13.3%	0.0%	26.7%	33.3%	8.3%	8.3%	51.7%	26.7%	8.3%	51.7%	0.0%
Maximum Green (s)	3.0	11.0		27.0	35.0	3.0	3.0	55.0	27.0	3.0	55.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.01	0.96dr		0.88	0.73	0.27	0.18	0.88	0.29	0.48	0.36	
Control Delay	57.0	47.5		59.1	42.9	15.7	59.4	35.2	1.4	73.7	17.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	57.0	47.5		59.1	42.9	15.7	59.4	35.2	1.4	73.7	17.2	
Queue Length 50th (ft)	1	92		258	297	61	12	551	10	33	142	
Queue Length 95th (ft)	7	#171		#352	#506	129	36	663	33	#82	221	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	71	475		778	624	750	90	1741	1325	89	1895	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.01	0.83		0.86	0.73	0.27	0.18	0.88	0.29	0.48	0.36	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

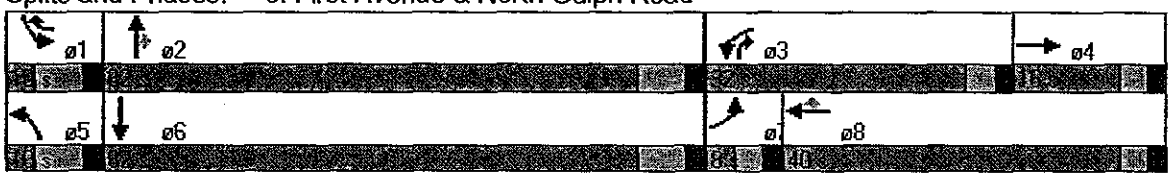
Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1888	3242		3335	1809	1644	1668	3574	1652	1636	3499	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1888	3242		3335	1809	1644	1668	3574	1652	1636	3499	
Volume (vph)	1	86	268	623	425	188	15	1475	365	39	614	6
Peak-hour factor, PHF	0.90	0.90	0.90	0.93	0.93	0.93	0.96	0.96	0.96	0.91	0.91	0.91
Adj. Flow (vph)	1	96	298	670	457	202	16	1536	380	43	675	7
RTOR Reduction (vph)	0	145	0	0	0	41	0	0	103	0	1	0
Lane Group Flow (vph)	1	249	0	670	457	161	16	1536	277	43	681	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	0.6	14.7		26.3	40.4	43.9	1.2	51.5	77.8	3.5	53.8	
Effective Green, g (s)	1.6	15.7		27.3	41.4	47.9	4.2	54.5	81.8	6.5	56.8	
Actuated g/C Ratio	0.01	0.13		0.23	0.34	0.40	0.04	0.45	0.68	0.05	0.47	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	25	424		759	624	711	58	1623	1181	89	1656	
v/s Ratio Prot	0.00	0.08		c0.20	c0.25	0.01	0.01	c0.43	0.05	c0.03	0.19	
v/s Ratio Perm						0.09			0.11			
v/c Ratio	0.04	0.96dr		0.88	0.73	0.23	0.28	0.95	0.23	0.48	0.41	
Uniform Delay, d1	58.4	49.1		44.8	34.4	23.8	56.4	31.4	7.2	55.1	20.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	2.1		11.8	4.4	0.2	2.6	12.8	0.1	4.1	0.8	
Delay (s)	59.1	51.2		56.6	38.9	24.0	59.0	44.1	7.3	59.2	21.4	
Level of Service	E	D		E	D	C	E	D	A	E	C	
Approach Delay (s)		51.2			45.5			37.0			23.7	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	38.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.999			
Flt Protected						
Satd. Flow (prot)	0	1698	3606	0	0	3610
Flt Permitted						
Satd. Flow (perm)	0	1698	3606	0	0	3610
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	401		320			872
Travel Time (s)	10.9		6.2			17.0
Volume (vph)	0	17	1222	10	0	832
Peak Hour Factor	0.71	0.71	0.91	0.91	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	24	1343	11	0	895
Lane Group Flow (vph)	0	24	1354	0	0	895
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	17	1222	10	0	832
Peak Hour Factor	0.71	0.71	0.91	0.91	0.93	0.93
Hourly flow rate (vph)	0	24	1343	11	0	895
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.70	0.70			0.70	
vC, conflicting volume	1796	677			1354	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1710	120			1082	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	59	644			459	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	895	459	447	447
Volume Left	0	0	0	0	0
Volume Right	24	0	11	0	0
cSH	644	1700	1700	1700	1700
Volume to Capacity	0.04	0.53	0.27	0.26	0.26
Queue Length 95th (ft)	3	0	0	0	0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.8	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1674	1592	3657	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1674	1592	3657	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	380		420			320
Travel Time (s)	10.4		8.2			6.2
Volume (vph)	37	9	1159	16	20	821
Peak Hour Factor	0.77	0.77	0.92	0.92	0.95	0.95
Heavy Vehicles (%)	15%	15%	0%	0%	0%	0%
Adj. Flow (vph)	48	12	1260	17	21	864
Lane Group Flow (vph)	48	12	1277	0	21	864
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	37	9	1159	16	20	821
Peak Hour Factor	0.77	0.77	0.92	0.92	0.95	0.95
Hourly flow rate (vph)	48	12	1260	17	21	864
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.71	0.71			0.71	
vC, conflicting volume	1743	639			1277	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1636	73			977	
tC, single (s)	7.1	7.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	12	98			96	
cM capacity (veh/h)	54	660			505	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	48	12	840	437	21	432	432
Volume Left	48	0	0	0	21	0	0
Volume Right	0	12	0	17	0	0	0
cSH	54	660	1700	1700	505	1700	1700
Volume to Capacity	0.88	0.02	0.49	0.26	0.04	0.25	0.25
Queue Length 95th (ft)	97	1	0	0	3	0	0
Control Delay (s)	209.8	10.6	0.0	0.0	12.4	0.0	0.0
Lane LOS	F	B			B		
Approach Delay (s)	170.8		0.0		0.3		
Approach LOS	F						

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.865		0.891	
Flt Protected	0.950										0.991	
Satd. Flow (prot)	1574	3261	0	0	3424	0	0	0	1808	0	1745	0
Flt Permitted	0.950										0.991	
Satd. Flow (perm)	1574	3261	0	0	3424	0	0	0	1808	0	1745	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			396	
Travel Time (s)		9.4			7.4			33.2			10.8	
Volume (vph)	62	264	0	0	203	12	0	0	1	19	0	82
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	70	297	0	0	231	14	0	0	4	23	0	98
Lane Group Flow (vph)	70	297	0	0	245	0	0	0	4	0	121	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	62	264	0	0	203	12	0	0	1	19	0	82
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Hourly flow rate (vph)	70	297	0	0	231	14	0	0	4	23	0	98
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	244			297			649	680	148	529	673	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244			297			649	680	148	529	673	122
tC, single (s)	4.2			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			100			100	100	100	95	100	89
cM capacity (veh/h)	1283			1240			307	355	878	414	356	909

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	70	198	99	154	91	4	120
Volume Left	70	0	0	0	0	0	23
Volume Right	0	0	0	0	14	4	98
cSH	1283	1700	1700	1700	1700	878	742
Volume to Capacity	0.05	0.12	0.06	0.09	0.05	0.00	0.16
Queue Length 95th (ft)	4	0	0	0	0	0	14
Control Delay (s)	8.0	0.0	0.0	0.0	0.0	9.1	10.8
Lane LOS	A					A	B
Approach Delay (s)	1.5			0.0		9.1	10.8
Approach LOS						A	B

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.999		0.865	
Flt Protected	0.950					
Satd. Flow (prot)	1589	3292	3435	0	1589	0
Flt Permitted	0.950					
Satd. Flow (perm)	1589	3292	3435	0	1589	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		385	
Travel Time (s)		7.4	2.5		10.5	
Volume (vph)	3	282	212	2	0	3
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Heavy Vehicles (%)	6%	6%	5%	5%	0%	0%
Adj. Flow (vph)	3	317	241	2	0	5
Lane Group Flow (vph)	3	317	243	0	5	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	282	212	2	0	3
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Hourly flow rate (vph)	3	317	241	2	0	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	243				407	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	243				407	122
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1292				576	913

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	158	158	161	83	5
Volume Left	3	0	0	0	0	0
Volume Right	0	0	0	0	2	5
cSH	1292	1700	1700	1700	1700	913
Volume to Capacity	0.00	0.09	0.09	0.09	0.05	0.01
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	7.8	0.0	0.0	0.0	0.0	9.0
Lane LOS	A					A
Approach Delay (s)	0.1			0.0		9.0
Approach LOS						A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	3406	3431	0	0	1589
Flt Permitted						
Satd. Flow (perm)	0	3406	3431	0	0	1589
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1431		371	
Travel Time (s)		2.5	27.9		10.1	
Volume (vph)	0	282	208	3	0	6
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Heavy Vehicles (%)	6%	6%	5%	5%	0%	0%
Adj. Flow (vph)	0	317	236	3	0	11
Lane Group Flow (vph)	0	317	239	0	0	11
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	282	208	3	0	6
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Hourly flow rate (vph)	0	317	236	3	0	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	240				396	120
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240				396	120
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1295				586	915

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	158	158	158	32	11
Volume Left	0	0	0	0	0
Volume Right	0	0	0	3	11
cSH	1700	1700	1700	1700	915
Volume to Capacity	0.09	0.09	0.09	0.05	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.0
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.880				0.850			0.850		0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1888	3218	0	3239	1757	1597	1668	3574	1652	1636	3494	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1888	3218	0	3239	1757	1597	1668	3574	1652	1636	3494	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		154				55			205		2	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	4	79	320	216	37	52	14	1125	193	30	814	14
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	4	84	340	230	39	55	15	1197	205	32	875	15
Lane Group Flow (vph)	4	424	0	230	39	55	15	1197	205	32	890	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	8.0	19.0	0.0	15.0	26.0	10.0	10.0	46.0	15.0	10.0	46.0	0.0
Total Split (%)	8.9%	21.1%	0.0%	16.7%	28.9%	11.1%	11.1%	51.1%	16.7%	11.1%	51.1%	0.0%
Maximum Green (s)	3.0	14.0		10.0	21.0	3.0	3.0	39.0	10.0	3.0	39.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.03	0.92dr		0.58	0.08	0.08	0.11	0.68	0.18	0.23	0.44	
Control Delay	41.8	29.6		43.4	23.7	5.6	41.1	20.8	1.4	43.7	12.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	41.8	29.6		43.4	23.7	5.6	41.1	20.8	1.4	43.7	12.8	
Queue Length 50th (ft)	2	75		62	15	0	8	300	0	17	143	
Queue Length 95th (ft)	13	124		102	43	24	28	354	23	47	240	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	117	665		411	519	711	140	1805	1170	140	2012	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.03	0.64		0.56	0.08	0.08	0.11	0.66	0.18	0.23	0.44	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

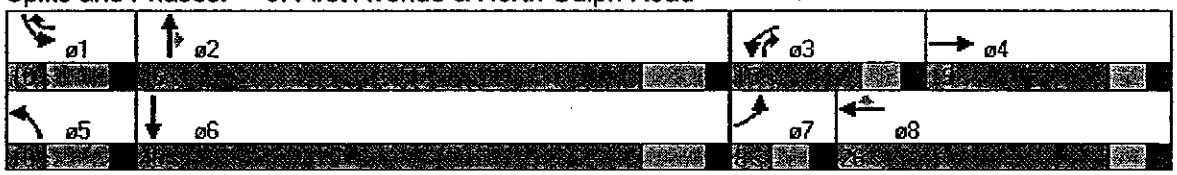
Offset: 46 (51%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1888	3217		3239	1757	1597	1668	3574	1652	1636	3496	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1888	3217		3239	1757	1597	1668	3574	1652	1636	3496	
Volume (vph)	4	79	320	216	37	52	14	1125	193	30	814	14
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	4	84	340	230	39	55	15	1197	205	32	875	15
RTOR Reduction (vph)	0	125	0	0	0	35	0	0	90	0	1	0
Lane Group Flow (vph)	4	299	0	230	39	20	15	1197	115	32	889	0
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	0.6	16.1		10.1	25.6	29.2	0.6	36.2	46.3	3.6	39.2	
Effective Green, g (s)	1.6	17.1		11.1	26.6	33.2	3.6	39.2	50.3	6.6	42.2	
Actuated g/C Ratio	0.02	0.19		0.12	0.30	0.37	0.04	0.44	0.56	0.07	0.47	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	34	611		399	519	660	67	1557	997	120	1639	
v/s Ratio Prot	0.00	c0.09		c0.07	0.02	0.00	0.01	c0.33	0.01	c0.02	c0.25	
v/s Ratio Perm						0.01			0.06			
v/c Ratio	0.12	0.92dr		0.58	0.08	0.03	0.22	0.77	0.11	0.27	0.54	
Uniform Delay, d1	43.5	32.6		37.2	22.8	18.1	41.8	21.6	9.4	39.4	17.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.5	0.6		2.0	0.1	0.0	1.7	3.7	0.1	1.2	1.3	
Delay (s)	45.1	33.2		39.2	22.9	18.1	43.5	25.3	9.4	40.6	18.3	
Level of Service	D	C		D	C	B	D	C	A	D	B	
Approach Delay (s)		33.3			33.7			23.2			19.1	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.982			0.865			0.909	
Flt Protected	0.950										0.984	
Satd. Flow (prot)	1652	3404	0	0	3361	0	0	1808	0	0	1786	0
Flt Permitted	0.534										0.916	
Satd. Flow (perm)	928	3404	0	0	3361	0	0	1808	0	0	1662	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			25			51			64	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			501	
Travel Time (s)		9.4			7.4			33.2			13.7	
Volume (vph)	140	1396	49	0	288	39	0	0	5	22	0	45
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	151	1501	53	0	313	42	0	0	16	31	0	64
Lane Group Flow (vph)	151	1554	0	0	355	0	0	16	0	0	95	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	83.0	83.0	0.0	83.0	83.0	0.0	37.0	37.0	0.0	37.0	37.0	0.0
Total Split (%)	69.2%	69.2%	0.0%	69.2%	69.2%	0.0%	30.8%	30.8%	0.0%	30.8%	30.8%	0.0%
Maximum Green (s)	77.0	77.0		77.0	77.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.19	0.53			0.12			0.07			0.41	
Control Delay	2.0	2.7			1.7			0.6			25.6	
Queue Delay	0.0	0.8			0.0			0.0			0.0	
Total Delay	2.0	3.5			1.7			0.6			25.6	
Queue Length 50th (ft)	14	110			18			0			22	
Queue Length 95th (ft)	m21	m178			30			0			46	
Internal Link Dist (ft)		400			300			1136			421	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	801	2939			2905			534			503	
Starvation Cap Reductn	0	965			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.19	0.79			0.12			0.03			0.19	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

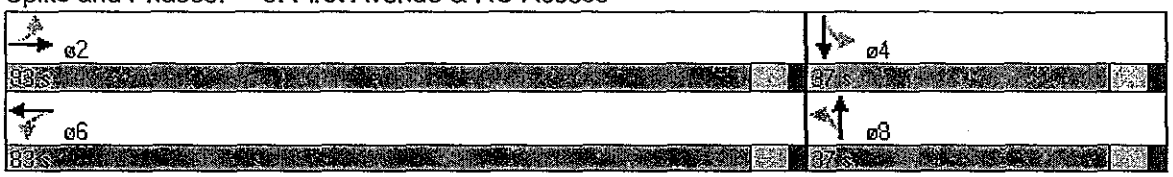
Offset: 84 (70%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	0.99			0.98			0.86			0.91	
Flt Protected	0.95	1.00			1.00			1.00			0.98	
Satd. Flow (prot)	1652	3404			3362			1808			1786	
Flt Permitted	0.54	1.00			1.00			1.00			0.88	
Satd. Flow (perm)	938	3404			3362			1808			1606	
Volume (vph)	140	1396	49	0	288	39	0	0	5	22	0	45
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Adj. Flow (vph)	151	1501	53	0	313	42	0	0	16	31	0	64
RTOR Reduction (vph)	0	1	0	0	4	0	0	15	0	0	58	0
Lane Group Flow (vph)	151	1553	0	0	351	0	0	1	0	0	37	0
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	99.6	99.6			99.6			8.4			8.4	
Effective Green, g (s)	101.6	101.6			101.6			10.4			10.4	
Actuated g/C Ratio	0.85	0.85			0.85			0.09			0.09	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	794	2882			2846			157			139	
v/s Ratio Prot		c0.46			0.10			0.00				
v/s Ratio Perm	0.16										c0.02	
v/c Ratio	0.19	0.54			0.12			0.01			0.26	
Uniform Delay, d1	1.7	2.6			1.6			50.1			51.2	
Progression Factor	0.81	0.80			1.00			1.00			1.00	
Incremental Delay, d2	0.3	0.4			0.1			0.0			1.0	
Delay (s)	1.7	2.5			1.7			50.1			52.2	
Level of Service	A	A			A			D			D	
Approach Delay (s)		2.4			1.7			50.1			52.2	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	4.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.998			0.865			0.888	
Flt Protected	0.950										0.992	
Satd. Flow (prot)	1620	3349	0	0	3621	0	0	1808	0	0	1759	0
Flt Permitted	0.091										0.950	
Satd. Flow (perm)	155	3349	0	0	3621	0	0	1808	0	0	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			2			479			42	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			368	
Travel Time (s)		9.4			7.4			33.2			10.0	
Volume (vph)	64	404	5	0	1401	19	0	0	15	27	0	135
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	66	416	5	0	1574	21	0	0	32	36	0	178
Lane Group Flow (vph)	66	421	0	0	1595	0	0	32	0	0	214	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	82.0	82.0	0.0	82.0	82.0	0.0	38.0	38.0	0.0	38.0	38.0	0.0
Total Split (%)	68.3%	68.3%	0.0%	68.3%	68.3%	0.0%	31.7%	31.7%	0.0%	31.7%	31.7%	0.0%
Maximum Green (s)	76.0	76.0		76.0	76.0		32.0	32.0		32.0	32.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.55	0.16			0.57			0.05			0.71	
Control Delay	25.6	3.7			7.0			0.1			50.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	25.6	3.7			7.1			0.1			50.2	
Queue Length 50th (ft)	16	33			219			0			128	
Queue Length 95th (ft)	m#99	m50			348			0			157	
Internal Link Dist (ft)		400			300			1136			288	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	120	2593			2804			856			507	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			63			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.55	0.16			0.58			0.04			0.42	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access

ø2	ø4
82 s	38 s
ø6	ø8
82 s	38 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			1.00			0.86			0.89	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1620	3349			3621			1808			1757	
Flt Permitted	0.12	1.00			1.00			1.00			0.94	
Satd. Flow (perm)	212	3349			3621			1808			1670	
Volume (vph)	64	404	5	0	1401	19	0	0	15	27	0	135
Peak-hour factor, PHF	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Adj. Flow (vph)	66	416	5	0	1574	21	0	0	32	36	0	178
RTOR Reduction (vph)	0	0	0	0	0	0	0	27	0	0	35	0
Lane Group Flow (vph)	66	421	0	0	1595	0	0	5	0	0	179	0
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	90.9	90.9			90.9			17.1			17.1	
Effective Green, g (s)	92.9	92.9			92.9			19.1			19.1	
Actuated g/C Ratio	0.77	0.77			0.77			0.16			0.16	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	164	2593			2803			288			266	
v/s Ratio Prot		0.13			c0.44			0.00				
v/s Ratio Perm	0.31										c0.11	
v/c Ratio	0.40	0.16			0.57			0.02			0.67	
Uniform Delay, d1	4.4	3.5			5.5			42.5			47.5	
Progression Factor	0.77	0.90			1.00			1.00			1.00	
Incremental Delay, d2	6.7	0.1			0.8			0.0			6.5	
Delay (s)	10.1	3.3			6.3			42.6			54.0	
Level of Service	B	A			A			D			D	
Approach Delay (s)		4.2			6.3			42.6			54.0	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991			0.865			0.891	
Flt Protected	0.950										0.991	
Satd. Flow (prot)	1574	3261	0	0	3424	0	0	1808	0	0	1745	0
Flt Permitted	0.600										0.961	
Satd. Flow (perm)	994	3261	0	0	3424	0	0	1808	0	0	1692	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9			471			98	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			396	
Travel Time (s)		9.4			7.4			33.2			10.8	
Volume (vph)	62	264	0	0	203	12	0	0	1	19	0	82
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	70	297	0	0	231	14	0	0	4	23	0	98
Lane Group Flow (vph)	70	297	0	0	245	0	0	4	0	0	121	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%
Maximum Green (s)	39.0	39.0		39.0	39.0		39.0	39.0		39.0	39.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.09	0.11			0.09			0.01			0.39	
Control Delay	4.2	3.7			2.2			0.0			15.0	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	4.2	3.7			2.2			0.0			15.0	
Queue Length 50th (ft)	12	27			13			0			12	
Queue Length 95th (ft)	m23	m38			21			0			52	
Internal Link Dist (ft)		400			300			1136			316	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	816	2677			2812			1080			824	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.09	0.11			0.09			0.00			0.15	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

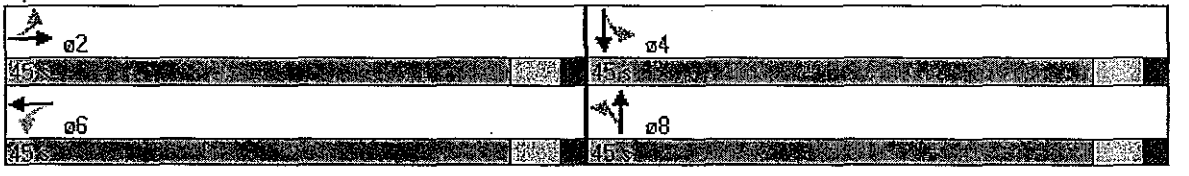
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			0.99			0.86			0.89	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1574	3261			3426			1808			1744	
Flt Permitted	0.60	1.00			1.00			1.00			0.94	
Satd. Flow (perm)	994	3261			3426			1808			1646	
Volume (vph)	62	264	0	0	203	12	0	0	1	19	0	82
Peak-hour factor, PHF	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Adj. Flow (vph)	70	297	0	0	231	14	0	0	4	23	0	98
RTOR Reduction (vph)	0	0	0	0	2	0	0	4	0	0	87	0
Lane Group Flow (vph)	70	297	0	0	243	0	0	0	0	0	34	0
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	69.9	69.9			69.9			8.1			8.1	
Effective Green, g (s)	71.9	71.9			71.9			10.1			10.1	
Actuated g/C Ratio	0.80	0.80			0.80			0.11			0.11	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	794	2605			2737			203			185	
v/s Ratio Prot		c0.09			0.07			0.00				
v/s Ratio Perm	0.07										c0.02	
v/c Ratio	0.09	0.11			0.09			0.00			0.18	
Uniform Delay, d1	2.0	2.0			2.0			35.5			36.2	
Progression Factor	1.59	1.61			1.00			1.00			1.00	
Incremental Delay, d2	0.2	0.1			0.1			0.0			0.5	
Delay (s)	3.3	3.3			2.0			35.5			36.7	
Level of Service	A	A			A			D			D	
Approach Delay (s)		3.3			2.0			35.5			36.7	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX H

Future (2009) Capacity/Level-of-Service Analysis With Development Worksheets

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.993			
Flt Protected						
Satd. Flow (prot)	0	1698	3382	0	0	3574
Flt Permitted						
Satd. Flow (perm)	0	1698	3382	0	0	3574
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	408		320			933
Travel Time (s)	11.1		6.2			18.2
Volume (vph)	0	24	370	19	0	1057
Peak Hour Factor	0.50	0.50	0.95	0.95	0.91	0.91
Heavy Vehicles (%)	0%	0%	6%	6%	1%	1%
Adj. Flow (vph)	0	48	389	20	0	1162
Lane Group Flow (vph)	0	48	409	0	0	1162
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	24	370	19	0	1057
Peak Hour Factor	0.50	0.50	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	0	48	389	20	0	1162
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	980	205			409	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	921	100			317	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	258	890			1179	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	48	260	150	581	581
Volume Left	0	0	0	0	0
Volume Right	48	0	20	0	0
cSH	890	1700	1700	1700	1700
Volume to Capacity	0.05	0.15	0.09	0.34	0.34
Queue Length 95th (ft)	4	0	0	0	0
Control Delay (s)	9.3	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.3	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.978			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1528	1453	3413	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1528	1453	3413	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	401		420			320
Travel Time (s)	10.9		8.2			6.2
Volume (vph)	33	11	394	67	83	900
Peak Hour Factor	0.75	0.75	0.87	0.87	0.91	0.91
Heavy Vehicles (%)	26%	26%	5%	5%	0%	0%
Adj. Flow (vph)	44	15	453	77	91	989
Lane Group Flow (vph)	44	15	530	0	91	989
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	33	11	394	67	83	900
Peak Hour Factor	0.75	0.75	0.87	0.87	0.91	0.91
Hourly flow rate (vph)	44	15	453	77	91	989
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.90	0.90			0.90	
vC, conflicting volume	1168	265			530	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1072	64			359	
tC, single (s)	7.3	7.4			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.6			2.2	
p0 queue free %	70	98			92	
cM capacity (veh/h)	148	820			1085	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	44	15	302	228	91	495	495
Volume Left	44	0	0	0	91	0	0
Volume Right	0	15	0	77	0	0	0
cSH	148	820	1700	1700	1085	1700	1700
Volume to Capacity	0.30	0.02	0.18	0.13	0.08	0.29	0.29
Queue Length 95th (ft)	29	1	0	0	7	0	0
Control Delay (s)	39.4	9.5	0.0	0.0	8.6	0.0	0.0
Lane LOS	E	A			A		
Approach Delay (s)	31.9		0.0		0.7		
Approach LOS	D						

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.982				0.865		0.900	
Flt Protected	0.950										0.987	
Satd. Flow (prot)	1652	3404	0	0	3361	0	0	0	1808	0	1773	0
Flt Permitted	0.950										0.987	
Satd. Flow (perm)	1652	3404	0	0	3361	0	0	0	1808	0	1773	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			501	
Travel Time (s)		9.4			7.4			33.2			13.7	
Volume (vph)	168	1396	49	0	288	39	0	0	5	33	0	94
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	181	1501	53	0	313	42	0	0	16	47	0	134
Lane Group Flow (vph)	181	1554	0	0	355	0	0	0	16	0	181	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	168	1396	49	0	288	39	0	0	5	33	0	94
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Hourly flow rate (vph)	181	1501	53	0	313	42	0	0	16	47	0	134
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	355			1554			2180	2244	777	1462	2249	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	355			1554			2180	2244	777	1462	2249	178
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			100			100	100	95	39	100	84
cM capacity (veh/h)	1200			404			20	36	344	77	36	841

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	181	1001	553	209	147	16	181
Volume Left	181	0	0	0	0	0	47
Volume Right	0	0	53	0	42	16	134
cSH	1200	1700	1700	1700	1700	344	235
Volume to Capacity	0.15	0.59	0.33	0.12	0.09	0.05	0.77
Queue Length 95th (ft)	13	0	0	0	0	4	139
Control Delay (s)	8.5	0.0	0.0	0.0	0.0	16.0	58.1
Lane LOS	A					C	F
Approach Delay (s)	0.9			0.0		16.0	58.1
Approach LOS						C	F

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.989		0.979	
Flt Protected	0.950				0.959	
Satd. Flow (prot)	1652	3421	3368	0	1337	0
Flt Permitted	0.950				0.959	
Satd. Flow (perm)	1652	3421	3368	0	1337	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		469	
Travel Time (s)		7.4	2.5		12.8	
Volume (vph)	63	1369	325	26	15	3
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Heavy Vehicles (%)	2%	2%	6%	6%	29%	29%
Adj. Flow (vph)	68	1472	353	28	22	4
Lane Group Flow (vph)	68	1472	381	0	26	0
Sign Control		Free	Free		Stop	

Intersection Summary
Area Type: Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	63	1369	325	26	15	3
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Hourly flow rate (vph)	68	1472	353	28	22	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	382				1239	191
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382				1239	191
tC, single (s)	4.1				7.4	7.5
tC, 2 stage (s)						
tF (s)	2.2				3.8	3.6
p0 queue free %	94				83	99
cM capacity (veh/h)	1174				126	741

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	68	736	736	236	146	26
Volume Left	68	0	0	0	0	22
Volume Right	0	0	0	0	28	4
cSH	1174	1700	1700	1700	1700	147
Volume to Capacity	0.06	0.43	0.43	0.14	0.09	0.18
Queue Length 95th (ft)	5	0	0	0	0	16
Control Delay (s)	8.3	0.0	0.0	0.0	0.0	34.8
Lane LOS	A					D
Approach Delay (s)	0.4			0.0		34.8
Approach LOS						D

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.988			0.865
Flt Protected						
Satd. Flow (prot)	0	3539	3365	0	0	1271
Flt Permitted						
Satd. Flow (perm)	0	3539	3365	0	0	1271
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1417		469	
Travel Time (s)		2.5	27.6		12.8	
Volume (vph)	0	1384	347	29	0	4
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Heavy Vehicles (%)	2%	2%	6%	6%	25%	25%
Adj. Flow (vph)	0	1488	377	32	0	6
Lane Group Flow (vph)	0	1488	409	0	0	6
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1384	347	29	0	4
Peak Hour Factor	0.93	0.93	0.92	0.92	0.69	0.69
Hourly flow rate (vph)	0	1488	377	32	0	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	409				1137	204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409				1137	204
tC, single (s)	4.1				7.3	7.4
tC, 2 stage (s)						
tF (s)	2.2				3.8	3.6
p0 queue free %	100				100	99
cM capacity (veh/h)	1147				163	736

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	744	744	251	157	6
Volume Left	0	0	0	0	0
Volume Right	0	0	0	32	6
cSH	1700	1700	1700	1700	736
Volume to Capacity	0.44	0.44	0.15	0.09	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.9
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.9
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.931				0.850			0.850		0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1869	3372	0	3119	1692	1537	1636	3505	1620	1636	3491	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1869	3372	0	3119	1692	1537	1636	3505	1620	1636	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		158				44			96		4	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	3	348	301	182	113	41	4	406	950	118	727	19
Peak Hour Factor	0.90	0.90	0.90	0.94	0.94	0.94	0.96	0.96	0.96	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	3	387	334	194	120	44	4	423	990	126	773	20
Lane Group Flow (vph)	3	721	0	194	120	44	4	423	990	126	793	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	23.1	25.1	0.0	10.0	12.0	16.0	12.0	68.9	10.0	16.0	72.9	0.0
Total Split (%)	19.3%	20.9%	0.0%	8.3%	10.0%	13.3%	10.0%	57.4%	8.3%	13.3%	60.8%	0.0%
Maximum Green (s)	18.1	20.1		5.0	7.0	9.0	5.0	61.9	5.0	9.0	65.9	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.03	1.00		0.18	0.13	0.04	0.04	0.51	0.95	0.77	0.65	
Control Delay	54.0	71.6		28.7	16.4	3.4	53.2	41.1	37.2	82.0	35.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	54.0	71.6		28.7	16.4	3.4	53.2	41.1	37.2	82.0	35.3	
Queue Length 50th (ft)	2	238		53	42	0	3	150	615	97	260	
Queue Length 95th (ft)	13	#378		89	101	18	15	185	#976	#197	317	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	297	723		1101	920	1054	109	1896	1047	164	2006	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.01	1.00		0.18	0.13	0.04	0.04	0.22	0.95	0.77	0.40	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

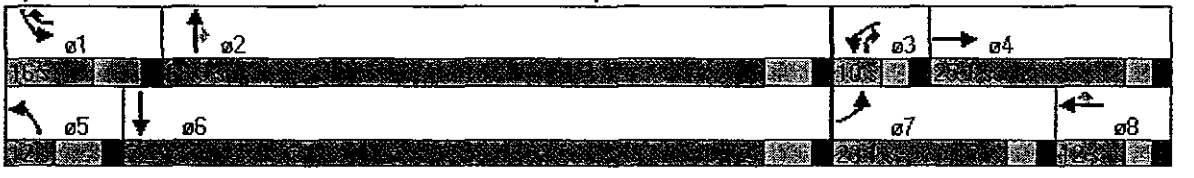
Natural Cycle: 75

Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1869	3370		3119	1692	1537	1636	3505	1620	1636	3492	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1869	3370		3119	1692	1537	1636	3505	1620	1636	3492	
Volume (vph)	3	348	301	182	113	41	4	406	950	118	727	19
Peak-hour factor, PHF	0.90	0.90	0.90	0.94	0.94	0.94	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	3	387	334	194	120	44	4	423	990	126	773	20
RTOR Reduction (vph)	0	125	0	0	0	16	0	0	42	0	3	0
Lane Group Flow (vph)	3	596	0	194	120	28	4	423	948	126	790	0
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	3%	3%	3%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	1.3	24.1		41.4	64.2	73.2	1.0	21.5	62.9	9.0	29.5	
Effective Green, g (s)	2.3	25.1		42.4	65.2	77.2	4.0	24.5	66.9	12.0	32.5	
Actuated g/C Ratio	0.02	0.21		0.35	0.54	0.64	0.03	0.20	0.56	0.10	0.27	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	36	705		1102	919	1040	55	716	957	164	946	
v/s Ratio Prot	0.00	c0.18		0.06	0.07	0.00	0.00	0.12	c0.35	c0.08	0.23	
v/s Ratio Perm						0.02			0.24			
v/c Ratio	0.08	0.85		0.18	0.13	0.03	0.07	0.59	0.99	0.77	0.84	
Uniform Delay, d1	57.8	45.6		26.8	13.5	7.8	56.2	43.2	26.2	52.6	41.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	9.2		0.1	0.1	0.0	0.6	3.6	26.6	19.2	8.6	
Delay (s)	58.8	54.8		26.8	13.5	7.8	56.8	46.8	52.8	71.8	49.9	
Level of Service	E	D		C	B	A	E	D	D	E	D	
Approach Delay (s)		54.8			20.0			51.0			52.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.997			
Flt Protected						
Satd. Flow (prot)	0	1698	3599	0	0	3539
Flt Permitted						
Satd. Flow (perm)	0	1698	3599	0	0	3539
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	387		320			802
Travel Time (s)	10.6		6.2			15.6
Volume (vph)	0	49	1671	34	0	683
Peak Hour Factor	0.75	0.75	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	2%	2%
Adj. Flow (vph)	0	65	1778	36	0	751
Lane Group Flow (vph)	0	65	1814	0	0	751
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	49	1671	34	0	683
Peak Hour Factor	0.75	0.75	0.94	0.94	0.91	0.91
Hourly flow rate (vph)	0	65	1778	36	0	751
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.58	0.58			0.58	
vC, conflicting volume	2171	907			1814	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2296	108			1678	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	88			100	
cM capacity (veh/h)	19	538			218	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	65	1185	629	375	375
Volume Left	0	0	0	0	0
Volume Right	65	0	36	0	0
cSH	538	1700	1700	1700	1700
Volume to Capacity	0.12	0.70	0.37	0.22	0.22
Queue Length 95th (ft)	10	0	0	0	0
Control Delay (s)	12.6	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.6	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		-3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1766	1679	3646	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1766	1679	3646	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	373		420			320
Travel Time (s)	10.2		8.2			6.2
Volume (vph)	48	53	1709	63	56	627
Peak Hour Factor	0.71	0.71	0.92	0.92	0.87	0.87
Heavy Vehicles (%)	9%	9%	0%	0%	0%	0%
Adj. Flow (vph)	68	75	1858	68	64	721
Lane Group Flow (vph)	68	75	1926	0	64	721
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	48	53	1709	63	56	627
Peak Hour Factor	0.71	0.71	0.92	0.92	0.87	0.87
Hourly flow rate (vph)	68	75	1858	68	64	721
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.56	0.56			0.56	
vC, conflicting volume	2381	963			1926	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2677	157			1869	
tC, single (s)	7.0	7.1			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	0	84			65	
cM capacity (veh/h)	6	472			184	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	68	75	1238	688	64	360	360
Volume Left	68	0	0	0	64	0	0
Volume Right	0	75	0	68	0	0	0
cSH	6	472	1700	1700	184	1700	1700
Volume to Capacity	11.53	0.16	0.73	0.40	0.35	0.21	0.21
Queue Length 95th (ft)	Err	14	0	0	37	0	0
Control Delay (s)	Err	14.1	0.0	0.0	34.8	0.0	0.0
Lane LOS	F	B			D		
Approach Delay (s)	4759.4		0.0		2.9		
Approach LOS	F						

Intersection Summary			
Average Delay	238.1		
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.998				0.865		0.894	
Flt Protected	0.950										0.989	
Satd. Flow (prot)	1620	3349	0	0	3621	0	0	0	1808	0	1765	0
Flt Permitted	0.950										0.989	
Satd. Flow (perm)	1620	3349	0	0	3621	0	0	0	1808	0	1765	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			368	
Travel Time (s)		9.4			7.4			33.2			10.0	
Volume (vph)	95	404	5	0	1401	19	0	0	15	55	0	198
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	98	416	5	0	1574	21	0	0	32	72	0	261
Lane Group Flow (vph)	98	421	0	0	1595	0	0	0	32	0	333	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	95	404	5	0	1401	19	0	0	15	55	0	198
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Hourly flow rate (vph)	98	416	5	0	1574	21	0	0	32	72	0	261
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	1596			422			1663	2210	211	2021	2202	798
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1596			422			1663	2210	211	2021	2202	798
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	75			100			100	100	96	0	100	22
cM capacity (veh/h)	398			1148			11	34	801	27	34	833

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	98	278	144	1049	546	32	333
Volume Left	98	0	0	0	0	0	72
Volume Right	0	0	5	0	21	32	261
cSH	398	1700	1700	1700	1700	801	96
Volume to Capacity	0.25	0.16	0.08	0.62	0.32	0.04	3.46
Queue Length 95th (ft)	24	0	0	0	0	3	Err
Control Delay (s)	17.0	0.0	0.0	0.0	0.0	9.7	Err
Lane LOS	C					A	F
Approach Delay (s)	3.2			0.0		9.7	Err
Approach LOS						A	F

Intersection Summary			
Average Delay	1343.0		
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.998		0.892	
Flt Protected	0.950				0.990	
Satd. Flow (prot)	1620	3355	3603	0	1590	0
Flt Permitted	0.950				0.990	
Satd. Flow (perm)	1620	3355	3603	0	1590	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		357	
Travel Time (s)		7.4	2.5		9.7	
Volume (vph)	3	472	1371	16	12	48
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Heavy Vehicles (%)	4%	4%	0%	0%	2%	2%
Adj. Flow (vph)	3	524	1540	18	22	87
Lane Group Flow (vph)	3	524	1558	0	109	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	472	1371	16	12	48
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Hourly flow rate (vph)	3	524	1540	18	22	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	1558				1818	779
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1558				1818	779
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				68	74
cM capacity (veh/h)	411				69	338

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	262	262	1027	531	109
Volume Left	3	0	0	0	0	22
Volume Right	0	0	0	0	18	87
cSH	411	1700	1700	1700	1700	189
Volume to Capacity	0.01	0.15	0.15	0.60	0.31	0.58
Queue Length 95th (ft)	1	0	0	0	0	78
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	47.1
Lane LOS	B					E
Approach Delay (s)	0.1			0.0		47.1
Approach LOS						E

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.997			0.865
Flt Protected						
Satd. Flow (prot)	0	3471	3599	0	0	1589
Flt Permitted						
Satd. Flow (perm)	0	3471	3599	0	0	1589
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1403		357	
Travel Time (s)		2.5	27.3		9.7	
Volume (vph)	0	485	1347	24	0	38
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Heavy Vehicles (%)	4%	4%	0%	0%	0%	0%
Adj. Flow (vph)	0	539	1513	27	0	69
Lane Group Flow (vph)	0	539	1540	0	0	69
Sign Control		Free	Free		Stop	

Intersection Summary
Area Type: Other
Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	485	1347	24	0	38
Peak Hour Factor	0.90	0.90	0.89	0.89	0.55	0.55
Hourly flow rate (vph)	0	539	1513	27	0	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	1540				1796	770
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1540				1796	770
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	80
cM capacity (veh/h)	418				73	348

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	269	269	1009	531	69
Volume Left	0	0	0	0	0
Volume Right	0	0	0	27	69
cSH	1700	1700	1700	1700	348
Volume to Capacity	0.16	0.16	0.59	0.31	0.20
Queue Length 95th (ft)	0	0	0	0	18
Control Delay (s)	0.0	0.0	0.0	0.0	17.9
Lane LOS					C
Approach Delay (s)	0.0		0.0		17.9
Approach LOS					C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.891				0.850			0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1888	3259	0	3335	1809	1644	1668	3574	1652	1636	3498	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1888	3259	0	3335	1809	1644	1668	3574	1652	1636	3498	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		163				66			276		1	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	1	101	268	672	439	188	15	1522	381	39	621	6
Peak Hour Factor	0.90	0.90	0.90	0.93	0.93	0.93	0.96	0.96	0.96	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	1	112	298	723	472	202	16	1585	397	43	682	7
Lane Group Flow (vph)	1	410	0	723	472	202	16	1585	397	43	689	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	8.0	16.0	0.0	32.0	40.0	10.0	10.0	62.0	32.0	10.0	62.0	0.0
Total Split (%)	6.7%	13.3%	0.0%	26.7%	33.3%	8.3%	8.3%	51.7%	26.7%	8.3%	51.7%	0.0%
Maximum Green (s)	3.0	11.0		27.0	35.0	3.0	3.0	55.0	27.0	3.0	55.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.01	0.96dr		0.93	0.74	0.27	0.18	0.92	0.30	0.48	0.37	
Control Delay	57.0	51.7		64.5	43.0	15.8	59.4	39.5	2.0	73.7	17.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	57.0	51.7		64.5	43.0	15.8	59.4	39.5	2.0	73.7	17.6	
Queue Length 50th (ft)	1	101		284	311	62	12	583	22	33	144	
Queue Length 95th (ft)	7	#188		#398	#531	130	36	#721	48	#82	223	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	71	473		778	637	761	90	1727	1303	89	1870	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.01	0.87		0.93	0.74	0.27	0.18	0.92	0.30	0.48	0.37	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

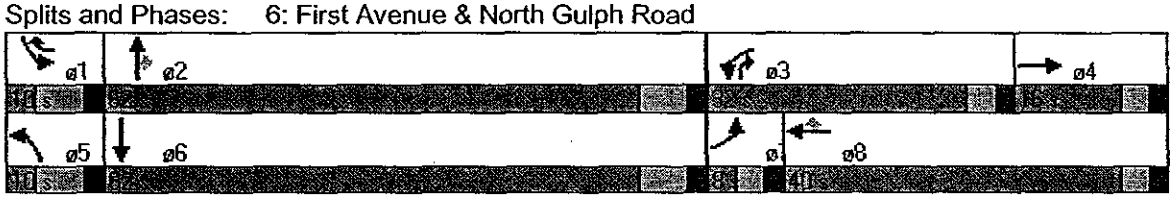
Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 6: First Avenue & North Gulph Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1888	3258		3335	1809	1644	1668	3574	1652	1636	3500	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1888	3258		3335	1809	1644	1668	3574	1652	1636	3500	
Volume (vph)	1	101	268	672	439	188	15	1522	381	39	621	6
Peak-hour factor, PHF	0.90	0.90	0.90	0.93	0.93	0.93	0.96	0.96	0.96	0.91	0.91	0.91
Adj. Flow (vph)	1	112	298	723	472	202	16	1585	397	43	682	7
RTOR Reduction (vph)	0	141	0	0	0	39	0	0	88	0	1	0
Lane Group Flow (vph)	1	269	0	723	472	163	16	1585	309	43	688	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	0.6	14.9		27.0	41.3	44.8	1.2	50.6	77.6	3.5	52.9	
Effective Green, g (s)	1.6	15.9		28.0	42.3	48.8	4.2	53.6	81.6	6.5	55.9	
Actuated g/C Ratio	0.01	0.13		0.23	0.35	0.41	0.04	0.45	0.68	0.05	0.47	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	25	432		778	638	723	58	1596	1178	89	1630	
v/s Ratio Prot	0.00	0.08		c0.22	c0.26	0.01	0.01	c0.44	0.06	c0.03	0.20	
v/s Ratio Perm						0.09			0.13			
v/c Ratio	0.04	0.96dr		0.93	0.74	0.23	0.28	0.99	0.26	0.48	0.42	
Uniform Delay, d1	58.4	49.2		45.0	34.0	23.3	56.4	33.0	7.5	55.1	21.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	2.8		17.2	4.5	0.2	2.6	21.0	0.1	4.1	0.8	
Delay (s)	59.1	52.0		62.2	38.5	23.4	59.0	54.0	7.6	59.2	22.1	
Level of Service	E	D		E	D	C	E	D	A	E	C	
Approach Delay (s)		52.0			48.6			44.8			24.3	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	43.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	12	12	12
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.865	0.999			
Flt Protected						
Satd. Flow (prot)	0	1698	3606	0	0	3610
Flt Permitted						
Satd. Flow (perm)	0	1698	3606	0	0	3610
Headway Factor	0.96	0.96	1.00	1.00	1.00	1.00
Link Speed (mph)	25		35			35
Link Distance (ft)	401		320			872
Travel Time (s)	10.9		6.2			17.0
Volume (vph)	0	47	1237	10	0	883
Peak Hour Factor	0.71	0.71	0.91	0.91	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	66	1359	11	0	949
Lane Group Flow (vph)	0	66	1370	0	0	949
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	47	1237	10	0	883
Peak Hour Factor	0.71	0.71	0.91	0.91	0.93	0.93
Hourly flow rate (vph)	0	66	1359	11	0	949
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			740			
pX, platoon unblocked	0.69	0.69			0.69	
vC, conflicting volume	1840	685			1370	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1767	94			1087	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			100	
cM capacity (veh/h)	53	656			448	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	66	906	464	475	475
Volume Left	0	0	0	0	0
Volume Right	66	0	11	0	0
cSH	656	1700	1700	1700	1700
Volume to Capacity	0.10	0.53	0.27	0.28	0.28
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.1	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	16	12	12	11	11
Grade (%)	0%		3%			4%
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	1		0	1	
Turning Speed (mph)	15	9		9	15	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.992			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1674	1592	3635	0	1710	3420
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1674	1592	3635	0	1710	3420
Headway Factor	0.92	0.85	0.98	0.98	1.07	1.07
Link Speed (mph)	25		35			35
Link Distance (ft)	380		420			320
Travel Time (s)	10.4		8.2			6.2
Volume (vph)	45	24	1159	67	71	821
Peak Hour Factor	0.77	0.77	0.92	0.92	0.95	0.95
Heavy Vehicles (%)	15%	15%	0%	0%	0%	0%
Adj. Flow (vph)	58	31	1260	73	75	864
Lane Group Flow (vph)	58	31	1333	0	75	864
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		-3%			4%
Volume (veh/h)	45	24	1159	67	71	821
Peak Hour Factor	0.77	0.77	0.92	0.92	0.95	0.95
Hourly flow rate (vph)	58	31	1260	73	75	864
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			420			
pX, platoon unblocked	0.68	0.68			0.68	
vC, conflicting volume	1878	666			1333	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1821	49			1024	
tC, single (s)	7.1	7.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	0	95			84	
cM capacity (veh/h)	34	662			469	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	58	31	840	493	75	432	432
Volume Left	58	0	0	0	75	0	0
Volume Right	0	31	0	73	0	0	0
cSH	34	662	1700	1700	469	1700	1700
Volume to Capacity	1.71	0.05	0.49	0.29	0.16	0.25	0.25
Queue Length 95th (ft)	161	4	0	0	14	0	0
Control Delay (s)	594.9	10.7	0.0	0.0	14.1	0.0	0.0
Lane LOS	F	B			B		
Approach Delay (s)	391.7		0.0		1.1		
Approach LOS	F						

Intersection Summary			
Average Delay	15.3		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.865		0.881	
Flt Protected	0.950										0.994	
Satd. Flow (prot)	1574	3261	0	0	3424	0	0	0	1808	0	1731	0
Flt Permitted	0.950										0.994	
Satd. Flow (perm)	1574	3261	0	0	3424	0	0	0	1808	0	1731	0
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			396	
Travel Time (s)		9.4			7.4			33.2			10.8	
Volume (vph)	96	264	0	0	203	12	0	0	1	19	0	149
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	108	297	0	0	231	14	0	0	4	23	0	177
Lane Group Flow (vph)	108	297	0	0	245	0	0	0	4	0	200	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			-1%			0%			3%	
Volume (veh/h)	96	264	0	0	203	12	0	0	1	19	0	149
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Hourly flow rate (vph)	108	297	0	0	231	14	0	0	4	23	0	177
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		480										
pX, platoon unblocked												
vC, conflicting volume	244			297			805	757	148	606	750	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244			297			805	757	148	606	750	122
tC, single (s)	4.2			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			100	100	100	94	100	80
cM capacity (veh/h)	1283			1240			209	311	878	357	312	909

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	108	198	99	154	91	4	200
Volume Left	108	0	0	0	0	0	23
Volume Right	0	0	0	0	14	4	177
cSH	1283	1700	1700	1700	1700	878	774
Volume to Capacity	0.08	0.12	0.06	0.09	0.05	0.00	0.26
Queue Length 95th (ft)	7	0	0	0	0	0	26
Control Delay (s)	8.1	0.0	0.0	0.0	0.0	9.1	11.3
Lane LOS	A					A	B
Approach Delay (s)	2.2			0.0		9.1	11.3
Approach LOS						A	B

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	12	11	11
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.987		0.989	
Flt Protected	0.950				0.956	
Satd. Flow (prot)	1589	3292	3393	0	1737	0
Flt Permitted	0.950				0.956	
Satd. Flow (perm)	1589	3292	3393	0	1737	0
Headway Factor	1.09	1.04	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		380	130		385	
Travel Time (s)		7.4	2.5		10.5	
Volume (vph)	3	282	212	19	30	3
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Heavy Vehicles (%)	6%	6%	5%	5%	0%	0%
Adj. Flow (vph)	3	317	241	22	54	5
Lane Group Flow (vph)	3	317	263	0	59	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	282	212	19	30	3
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Hourly flow rate (vph)	3	317	241	22	54	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		860				
pX, platoon unblocked						
vC, conflicting volume	262				417	131
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	262				417	131
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				91	99
cM capacity (veh/h)	1270				568	900

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	158	158	161	102	59
Volume Left	3	0	0	0	0	54
Volume Right	0	0	0	0	22	5
cSH	1270	1700	1700	1700	1700	587
Volume to Capacity	0.00	0.09	0.09	0.09	0.06	0.10
Queue Length 95th (ft)	0	0	0	0	0	8
Control Delay (s)	7.8	0.0	0.0	0.0	0.0	11.8
Lane LOS	A					B
Approach Delay (s)	0.1			0.0		11.8
Approach LOS						B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑↱			↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	11
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.988			0.865
Flt Protected						
Satd. Flow (prot)	0	3406	3397	0	0	1589
Flt Permitted						
Satd. Flow (perm)	0	3406	3397	0	0	1589
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.04
Link Speed (mph)		35	35		25	
Link Distance (ft)		130	1431		371	
Travel Time (s)		2.5	27.9		10.1	
Volume (vph)	0	312	225	20	0	6
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Heavy Vehicles (%)	6%	6%	5%	5%	0%	0%
Adj. Flow (vph)	0	351	256	23	0	11
Lane Group Flow (vph)	0	351	279	0	0	11
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	312	225	20	0	6
Peak Hour Factor	0.89	0.89	0.88	0.88	0.56	0.56
Hourly flow rate (vph)	0	351	256	23	0	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		990				
pX, platoon unblocked						
vC, conflicting volume	278				442	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	278				442	139
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1253				549	890

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	175	175	170	108	11
Volume Left	0	0	0	0	0
Volume Right	0	0	0	23	11
cSH	1700	1700	1700	1700	890
Volume to Capacity	0.10	0.10	0.10	0.06	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	9.1
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.1
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	16.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Storage Length (ft)	0		0	150		0	275		200	170		0
Storage Lanes	1		0	2		1	1		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	35	35		35	35	35	35	50	50	35	50	
Trailing Detector (ft)	-5	-5		-5	-5	-5	-5	0	0	-5	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.885				0.850			0.850		0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1888	3237	0	3239	1757	1597	1668	3574	1652	1636	3494	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1888	3237	0	3239	1757	1597	1668	3574	1652	1636	3494	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		148				55			223		2	
Headway Factor	0.92	0.96	0.96	1.05	1.05	0.96	1.09	1.00	0.96	1.09	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1728			480			2080			420	
Travel Time (s)		33.7			9.4			40.5			8.2	
Volume (vph)	4	96	320	268	52	52	14	1176	210	30	822	14
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	4	102	340	285	55	55	15	1251	223	32	884	15
Lane Group Flow (vph)	4	442	0	285	55	55	15	1251	223	32	899	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Detector Phases	7	4		3	8	1	5	2	3	1	6	
Minimum Initial (s)	3.0	3.0		3.0	3.0	3.0	3.0	18.0	3.0	3.0	18.0	
Minimum Split (s)	8.0	8.0		8.0	8.0	10.0	10.0	25.0	8.0	10.0	25.0	
Total Split (s)	8.0	19.0	0.0	15.0	26.0	10.0	10.0	46.0	15.0	10.0	46.0	0.0
Total Split (%)	8.9%	21.1%	0.0%	16.7%	28.9%	11.1%	11.1%	51.1%	16.7%	11.1%	51.1%	0.0%
Maximum Green (s)	3.0	14.0		10.0	21.0	3.0	3.0	39.0	10.0	3.0	39.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	5.0	5.0	5.0	3.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min	None	None	C-Min	
v/c Ratio	0.04	0.92dr		0.69	0.10	0.08	0.11	0.71	0.19	0.24	0.45	
Control Delay	42.0	31.2		47.5	23.8	5.6	41.7	21.6	1.4	44.7	13.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	42.0	31.2		47.5	23.8	5.6	41.7	21.6	1.4	44.7	13.1	
Queue Length 50th (ft)	2	82		80	21	0	8	300	0	18	143	
Queue Length 95th (ft)	13	134		#133	55	24	28	377	24	47	243	
Internal Link Dist (ft)		1648			400			2000			340	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)				150			275		200	170		
Base Capacity (vph)	109	663		415	533	715	131	1791	1174	131	1984	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.04	0.67		0.69	0.10	0.08	0.11	0.70	0.19	0.24	0.45	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 46 (51%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 6: First Avenue & North Gulph Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	13	13	11	11	13	10	12	13	10	12	12
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1888	3235		3239	1757	1597	1668	3574	1652	1636	3496	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1888	3235		3239	1757	1597	1668	3574	1652	1636	3496	
Volume (vph)	4	96	320	268	52	52	14	1176	210	30	822	14
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	4	102	340	285	55	55	15	1251	223	32	884	15
RTOR Reduction (vph)	0	119	0	0	0	35	0	0	98	0	1	0
Lane Group Flow (vph)	4	323	0	285	55	20	15	1251	125	32	898	0
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	0.6	16.5		10.4	26.3	29.4	0.6	36.0	46.4	3.1	38.5	
Effective Green, g (s)	1.6	17.5		11.4	27.3	33.4	3.6	39.0	50.4	6.1	41.5	
Actuated g/C Ratio	0.02	0.19		0.13	0.30	0.37	0.04	0.43	0.56	0.07	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	5.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	34	629		410	533	664	67	1549	999	111	1612	
v/s Ratio Prot	0.00	c0.10		c0.09	0.03	0.00	0.01	c0.35	0.02	c0.02	0.26	
v/s Ratio Perm						0.01			0.06			
v/c Ratio	0.12	0.92dr		0.70	0.10	0.03	0.22	0.81	0.13	0.29	0.56	
Uniform Delay, d1	43.5	32.4		37.6	22.5	18.0	41.8	22.2	9.4	39.9	17.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.5	0.7		5.1	0.1	0.0	1.7	4.6	0.1	1.4	1.4	
Delay (s)	45.1	33.1		42.7	22.6	18.0	43.5	26.9	9.4	41.3	19.0	
Level of Service	D	C		D	C	B	D	C	A	D	B	
Approach Delay (s)		33.3			36.5			24.4			19.7	
Approach LOS		C			D			C			B	

Intersection Summary			
HCM Average Control Delay	25.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.982			0.865			0.900	
Flt Protected	0.950										0.987	
Satd. Flow (prot)	1652	3404	0	0	3361	0	0	1808	0	0	1773	0
Flt Permitted	0.534										0.923	
Satd. Flow (perm)	928	3404	0	0	3361	0	0	1808	0	0	1658	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			25			51			118	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			501	
Travel Time (s)		9.4			7.4			33.2			13.7	
Volume (vph)	168	1396	49	0	288	39	0	0	5	33	0	94
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	181	1501	53	0	313	42	0	0	16	47	0	134
Lane Group Flow (vph)	181	1554	0	0	355	0	0	16	0	0	181	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	83.0	83.0	0.0	83.0	83.0	0.0	37.0	37.0	0.0	37.0	37.0	0.0
Total Split (%)	69.2%	69.2%	0.0%	69.2%	69.2%	0.0%	30.8%	30.8%	0.0%	30.8%	30.8%	0.0%
Maximum Green (s)	77.0	77.0		77.0	77.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.24	0.56			0.13			0.06			0.61	
Control Delay	3.7	5.4			2.3			0.4			27.8	
Queue Delay	0.0	1.6			0.0			0.0			0.0	
Total Delay	3.7	7.0			2.3			0.4			27.8	
Queue Length 50th (ft)	25	180			18			0			46	
Queue Length 95th (ft)	m40	m271			39			0			65	
Internal Link Dist (ft)		400			300			1136			421	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	759	2785			2753			534			542	
Starvation Cap Reductn	0	991			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.24	0.87			0.13			0.03			0.33	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 84 (70%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access

ø2	ø4
83 s	37 s
ø6	ø8
83 s	37 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	0.99			0.98			0.86			0.90	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1652	3404			3362			1808			1774	
Flt Permitted	0.54	1.00			1.00			1.00			0.91	
Satd. Flow (perm)	938	3404			3362			1808			1628	
Volume (vph)	168	1396	49	0	288	39	0	0	5	33	0	94
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.31	0.31	0.31	0.70	0.70	0.70
Adj. Flow (vph)	181	1501	53	0	313	42	0	0	16	47	0	134
RTOR Reduction (vph)	0	1	0	0	5	0	0	14	0	0	104	0
Lane Group Flow (vph)	181	1553	0	0	350	0	0	2	0	0	77	0
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	0%	0%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	96.1	96.1			96.1			11.9			11.9	
Effective Green, g (s)	98.1	98.1			98.1			13.9			13.9	
Actuated g/C Ratio	0.82	0.82			0.82			0.12			0.12	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	767	2783			2748			209			189	
v/s Ratio Prot		c0.46			0.10			0.00				
v/s Ratio Perm	0.19										c0.05	
v/c Ratio	0.24	0.56			0.13			0.01			0.41	
Uniform Delay, d1	2.5	3.7			2.2			47.0			49.2	
Progression Factor	1.14	1.25			1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.4			0.1			0.0			1.4	
Delay (s)	3.2	5.0			2.3			47.0			50.6	
Level of Service	A	A			A			D			D	
Approach Delay (s)		4.8			2.3			47.0			50.6	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.998			0.865			0.894	
Flt Protected	0.950										0.989	
Satd. Flow (prot)	1620	3349	0	0	3621	0	0	1808	0	0	1765	0
Flt Permitted	0.083										0.925	
Satd. Flow (perm)	142	3349	0	0	3621	0	0	1808	0	0	1651	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			2			463			37	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			368	
Travel Time (s)		9.4			7.4			33.2			10.0	
Volume (vph)	95	404	5	0	1401	19	0	0	15	55	0	198
Peak Hour Factor	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	98	416	5	0	1574	21	0	0	32	72	0	261
Lane Group Flow (vph)	98	421	0	0	1595	0	0	32	0	0	333	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	79.0	79.0	0.0	79.0	79.0	0.0	41.0	41.0	0.0	41.0	41.0	0.0
Total Split (%)	65.8%	65.8%	0.0%	65.8%	65.8%	0.0%	34.2%	34.2%	0.0%	34.2%	34.2%	0.0%
Maximum Green (s)	73.0	73.0		73.0	73.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.99	0.18			0.63			0.04			0.80	
Control Delay	106.6	5.6			12.1			0.1			52.5	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	106.6	5.6			12.2			0.1			52.5	
Queue Length 50th (ft)	41	41			314			0			219	
Queue Length 95th (ft)	m#179	m68			476			0			235	
Internal Link Dist (ft)		400			300			1136			288	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	99	2342			2532			878			535	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			63			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.99	0.18			0.65			0.04			0.62	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access

ø2 (79 s)	ø4 (41 s)
ø6 (79 s)	ø8 (41 s)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			-1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			1.00			0.86			0.89	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1620	3349			3621			1808			1766	
Flt Permitted	0.11	1.00			1.00			1.00			0.92	
Satd. Flow (perm)	180	3349			3621			1808			1645	
Volume (vph)	95	404	5	0	1401	19	0	0	15	55	0	198
Peak-hour factor, PHF	0.97	0.97	0.97	0.89	0.89	0.89	0.47	0.47	0.47	0.76	0.76	0.76
Adj. Flow (vph)	98	416	5	0	1574	21	0	0	32	72	0	261
RTOR Reduction (vph)	0	1	0	0	1	0	0	25	0	0	28	0
Lane Group Flow (vph)	98	420	0	0	1594	0	0	7	0	0	305	0
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	81.9	81.9			81.9			26.1			26.1	
Effective Green, g (s)	83.9	83.9			83.9			28.1			28.1	
Actuated g/C Ratio	0.70	0.70			0.70			0.23			0.23	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	126	2342			2532			423			385	
v/s Ratio Prot		0.13			0.44			0.00				
v/s Ratio Perm	c0.54										c0.19	
v/c Ratio	0.78	0.18			0.63			0.02			0.79	
Uniform Delay, d1	11.9	6.2			9.7			35.3			43.2	
Progression Factor	0.74	0.78			1.00			1.00			1.00	
Incremental Delay, d2	34.2	0.2			1.2			0.0			10.6	
Delay (s)	43.0	5.0			10.9			35.4			53.8	
Level of Service	D	A			B			D			D	
Approach Delay (s)		12.2			10.9			35.4			53.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991			0.865			0.881	
Flt Protected	0.950										0.994	
Satd. Flow (prot)	1574	3261	0	0	3424	0	0	1808	0	0	1731	0
Flt Permitted	0.600										0.976	
Satd. Flow (perm)	994	3261	0	0	3424	0	0	1808	0	0	1700	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9			471			177	
Headway Factor	1.09	1.04	1.04	0.99	0.99	0.99	0.88	0.88	0.88	0.94	0.94	0.94
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		480			380			1216			396	
Travel Time (s)		9.4			7.4			33.2			10.8	
Volume (vph)	96	264	0	0	203	12	0	0	1	19	0	149
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	108	297	0	0	231	14	0	0	4	23	0	177
Lane Group Flow (vph)	108	297	0	0	245	0	0	4	0	0	200	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	2	2		6	6		8	8		4	4	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%
Maximum Green (s)	39.0	39.0		39.0	39.0		39.0	39.0		39.0	39.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
v/c Ratio	0.14	0.12			0.09			0.01			0.52	
Control Delay	5.2	4.4			2.6			0.0			13.0	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	5.2	4.4			2.6			0.0			13.0	
Queue Length 50th (ft)	21	29			13			0			12	
Queue Length 95th (ft)	m39	m45			23			0			59	
Internal Link Dist (ft)		400			300			1136			316	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	100											
Base Capacity (vph)	768	2520			2648			1080			871	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.14	0.12			0.09			0.00			0.23	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: First Avenue & RO Access

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	12	15	15	15	14	14	14
Grade (%)		0%			1%			0%			3%	
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			0.99			0.86			0.88	
Flt Protected	0.95	1.00			1.00			1.00			0.99	
Satd. Flow (prot)	1574	3261			3426			1808			1730	
Flt Permitted	0.60	1.00			1.00			1.00			0.96	
Satd. Flow (perm)	994	3261			3426			1808			1677	
Volume (vph)	96	264	0	0	203	12	0	0	1	19	0	149
Peak-hour factor, PHF	0.89	0.89	0.89	0.88	0.88	0.88	0.25	0.25	0.25	0.84	0.84	0.84
Adj. Flow (vph)	108	297	0	0	231	14	0	0	4	23	0	177
RTOR Reduction (vph)	0	0	0	0	2	0	0	3	0	0	153	0
Lane Group Flow (vph)	108	297	0	0	243	0	0	1	0	0	47	0
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	0%	0%	0%	1%	1%	1%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	67.6	67.6			67.6			10.4			10.4	
Effective Green, g (s)	69.6	69.6			69.6			12.4			12.4	
Actuated g/C Ratio	0.77	0.77			0.77			0.14			0.14	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	769	2522			2649			249			231	
v/s Ratio Prot		0.09			0.07			0.00				
v/s Ratio Perm	c0.11										c0.03	
v/c Ratio	0.14	0.12			0.09			0.00			0.21	
Uniform Delay, d1	2.6	2.5			2.5			33.5			34.4	
Progression Factor	1.71	1.64			1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.1			0.1			0.0			0.4	
Delay (s)	4.8	4.3			2.6			33.5			34.9	
Level of Service	A	A			A			C			C	
Approach Delay (s)		4.4			2.6			33.5			34.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

EXHIBIT C

VALLEY FORGE CONVENTION CENTER

VALLEY FORGE ENTERTAINMENT CENTER

Aerial View of Site

NTS

May 24, 2007

N

sk-2

EXHIBIT D

Nave Newell
Where Ideas Get Down To Earth.

June 16, 2007

Mr. Joseph Sweeney
Valley Forge Convention Center Partners, LP
P. O. Box 634
Harrisburg, PA 17108

Reference: ***Valley Forge Entertainment Center – Sewer and Water Capacity***
Nave Newell No. 2007-020

Dear Mr. Sweeney:

Upper Merion Township currently provides sewer service to the Valley Forge Entertainment Complex. They have sufficient capacity to service the site. It is my understanding that the proposed renovations to the Entertainment Center will not increase the building square footage or sewer flow. Therefore, the system has the capacity to handle the proposed project.

Aqua America, Inc. currently provides water service to the Valley Forge Entertainment Complex. They have sufficient capacity to service the site. It is my understanding that the proposed renovations to the Entertainment Center will not increase the building square footage or water flow. Therefore, the system has the capacity to handle the proposed project.

Sincerely,

Gregory C. Newell

Gregory C. Newell, PE

/lok

Enclosure

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