



MORGANTOWN PLANNING COMMISSION

March 12, 2015
6:30 PM
City Council Chambers

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Vice-President:

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Ken Martis, Admin.

Bill Kawecky, City Councilor

STAFF REPORT

CASE NO: S15-04-III / American Campus Communities / University Avenue and Jones Avenue

REQUEST and LOCATION:

Request by Lisa Mardis of Project Management Services, on behalf of American Campus Communities, for Type III Major Development of Significant Impact Site Plan approval.

TAX MAP NUMBER(s) and ZONING DESCRIPTION:

Tax Map 14A, Parcels 1 thru and including 10.2 and Tax Map 20, Parcels 200 thru and including 208; R-3, Multi-Family Residential District

SURROUNDING ZONING:

North and East: R-1A, Single-Family Residential District

South and West: R-3, Multi-Family Residential District

BACKGROUND:

The petitioner seeks to construct three (3) buildings that will include a total of 134 multi-family dwelling units with 536 beds. Addendum A of this report illustrates the location of the subject site.

Proposed Development Program

The following generally summarizes the proposed development program illustrated in the petitioner's application documents.

- The principle development site is comprised of Parcels 1 thru and including 10.2 of Tax Map 14A and is approximately 5.5 acres. The off-site parking site is comprised of Parcels 200 thru and including 208 of Tax Map 20 and is approximately 0.5 acres.
- The zoning classification for both sites is R-3, Multi-Family Residential District. The majority of the principle development site is located within the Sunnyside Central Overlay District while a small portion is located within the Sunnyside South Overlay District. The off-site parking site is located within the Sunnyside Central Overlay District.
- The redevelopment program provides for razing and removing all existing structures, which currently includes 170 beds within the existing *Sunnyside Commons* development.
- The proposed development includes three stand-alone buildings. Building "A" has staggered four (4) and five (5) stories, is adjacent to University Avenue, and has an attached four (4) story community center near the University Avenue and 3rd Street intersection. Building "B" is also adjacent to University Avenue, though

Development Services

Christopher Fletcher, AICP
Director

Planning Division

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further towards Evansdale, and has four (4) floors. Building “C” is located between Building “A” and Jones Avenue and has four (4) floors. Also proposed is a detached accessory maintenance structure.

- The three (3) buildings will include a total of 134 multi-family dwelling units with 536 beds.
- Parking will be primarily on-site with 227 spaces, with an additional 41 parking spaces off-site on property that will be transferred to the petitioner from West Virginia University.

Required Planning and Zoning Code Approvals

The following approvals are required for the development program as proposed with modifications noted in the attached Planning and Zoning Code Conformity Report. Each case number is followed with a brief description.

Case Nos.	Code Issues
Major Development of Significant Impact:	
S15-04-III	The proposed residential development includes more than 100 dwelling units, which requires MDSI Site Plan approval by the Planning Commission.
Minor Subdivision:	
MNS15-03	The proposed development requires the assembly of parcels for the principle development site and for the off-premise parking site, which requires minor subdivision approval by the Planning Commission.
Conditional Use:	
CU15-03	“Private Parking Lot” uses require conditional use approval in the R-3 District [Article 1331.05]. Utilizing an off-site parking facility within 300 feet of the development site to meet minimum parking standards requires conditional use approval.
Variances:	
V15-11	Variance relief to permit the planting of trees along University Avenue with less than ten (10) to fifteen (15) feet tree trunk clearance from structures, building overhangs, walls, etc. [Article 1367.06(C)]. Variance relief from reserving at least five (5) percent of the parking areas (upper parking area, parking area between Buildings “A” and “C”, or the off-site parking facility) for landscaping [Article 1367.08(B)(2)]. Variance relief from providing terminal landscape island(s) [Article 1367.08(D)(2)]. Variance relief from providing landscaped islands of at least 130 square feet every ten (10) parking spaces [Article 1367.08(D)(3)].
V15-12	Variance relief from constructing any sidewalk (6-foot minimum width) along the site’s Highview Place frontage [Article 1339.07(F)]. Variance relief from constructing a sidewalk the length of the principle site’s University Avenue frontage and to permit a portion of the sidewalk (pedestrian way) along the front of Building “B” to be used as a fire lane [Article 1361.03(L)].

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Case Nos.	Code Issues
V15-13	Variance relief to exceed the maximum building height requirement in number of stories for portions of Building "A" [Article 1339.06(A)].
V15-14	Variance relief to permit Building "C" to be oriented toward the parking area [Article 1361.03(C)].
V15-15	Variance relief from natural material standards and ratios [Article 1361.03(P)(1)]; variance relief to use cement fiber paneling and lap siding and brick/stone veneer [Article 1361.03(P)(2)]
V15-16	Variance relief to permit the development of a surface parking lot at the intersections of Jones Avenue / Highview Place, Jones Avenue / Overhill Street, and Overhill Street / Quay Street [Article 1361.03(Q)(4)].
V15-17	Variance relief from meeting ground floor transparency [Article 1361.03(E)]; meeting fenestration ratio standards for front façade and ground floor [Article 1361.03(O)(1)]; and, recessing windows 4-8 inches [Article 1361.03(O)(6)].
V15-18	Variance relief to access parking areas from the primary street of University Avenue [Article 1361.03(Q)(7)].
V15-19	Variance relief from dedicating at least sixty (60) percent of the ground floor space along University Avenue for commercial use [Article 1361.03(Q)(1)].

ANALYSIS:

Comprehensive Plan Concurrence

As recommended in Chapter 9 "Implementation" of the 2013 Comprehensive Plan Update, Addendum B of this report identifies how the proposed development program relates to the land management intent, location, and pattern and character principles of the current Comprehensive Plan. Staff encourages the Planning Commission to review the Comprehensive Plan for guidance as Addendum B is not intended to represent a complete comparative assessment.

It should be noted that "shall" statements within the Comprehensive Plan must be understood as desired objectives and strategies that do not have the force or effect of law unless incorporated into the City's Planning and Zoning Code.

The subject site is located within Comprehensive Plan concept areas characterized as "Encouraged Growth," "Neighborhood Revitalization," and "Corridor Enhancement."

It is the opinion of the Planning Division, as expounded in Addendum B, that the proposed development program appears to be in concurrence with the Plan's principles for land management and desired development pattern and character.

Traffic Impact Analysis

A memorandum of the City's Engineer's evaluation of the petitioner's Transportation Impact Study prepared by French Engineering, LLC and dated OCT 2014 will be distributed to the Planning Commission prior to or at the 12 MAR 2015 hearing.

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The Planning Division understands that the City Engineer's evaluation will concur with the Study's findings and recommendations in terms of the proposed development's impact on neighboring streets. The memorandum will also note that a second phase project of the Sunnyside Tax Increment Financing District will fund significant roadway improvements and traffic control at the intersection of University Avenue and Third Street. Said roadway improvements are anticipated during the 2015 construction year and will serve to improve public safety related to left-turn movements and pedestrian crossing within the corridor given the scale of development within the immediate area.

STAFF RECOMMENDATION:

Staff recommends approval of Case No. S14-04-III with the following conditions:

1. That minor subdivision petition Case No. MNS15-03 must be approved combining Parcels 1 thru and including 10.2 of Tax Map 14A that arranges the principle development site and combining Parcels 200 thru and including 208 of Tax Map 20 that arranges the off-premise parking site.
2. That requisite conditional use and variance approvals be granted by the Board of Zoning Appeals.
3. That the petitioner continue to work with City Administration during building permit application concerning the planning, design, and siting of street trees along University Avenue to ensure best urban landscape practices and coordination with planned public roadway improvements.
4. That the petitioner continue to work with City Administration during building permit application concerning the planning and design of ingress and egress for emergency responders throughout the site.
5. That the development must meet all applicable federal Fair Housing and Americans with Disabilities Act standards to the satisfaction of the City's Chief Building Code Official.

Development Services

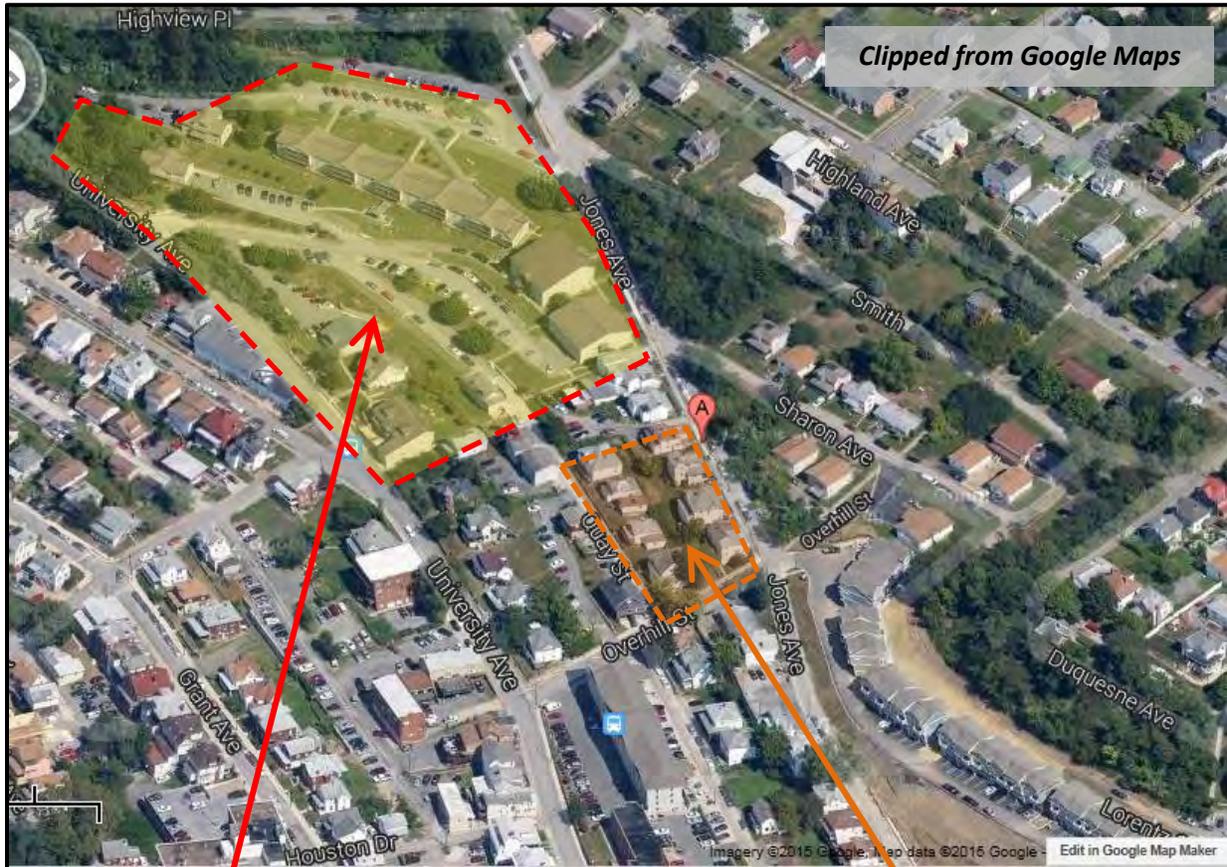
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STAFF REPORT ADDENDUM A

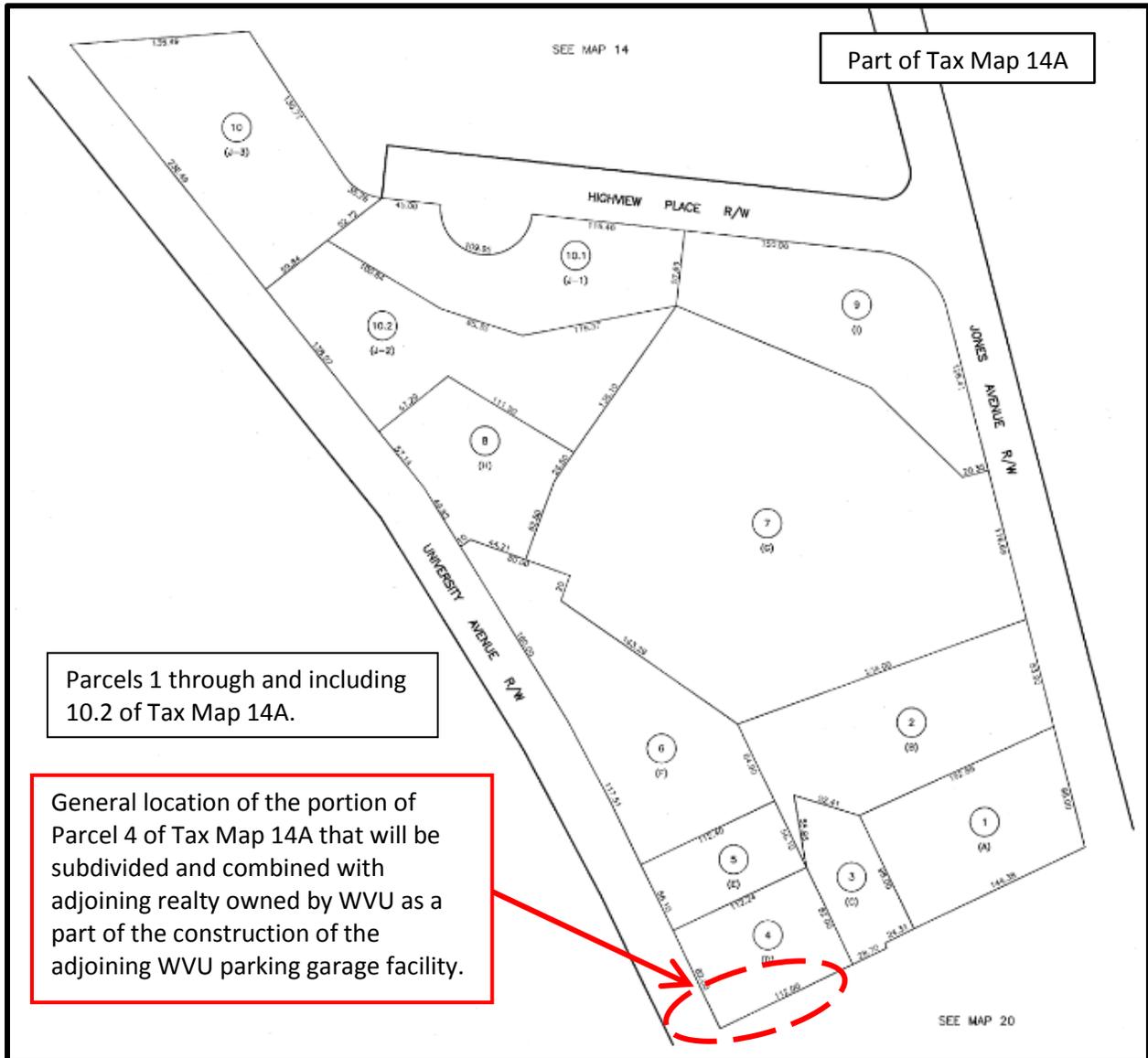
S15-04-III / American Campus Communities / University Avenue & Jones Avenue



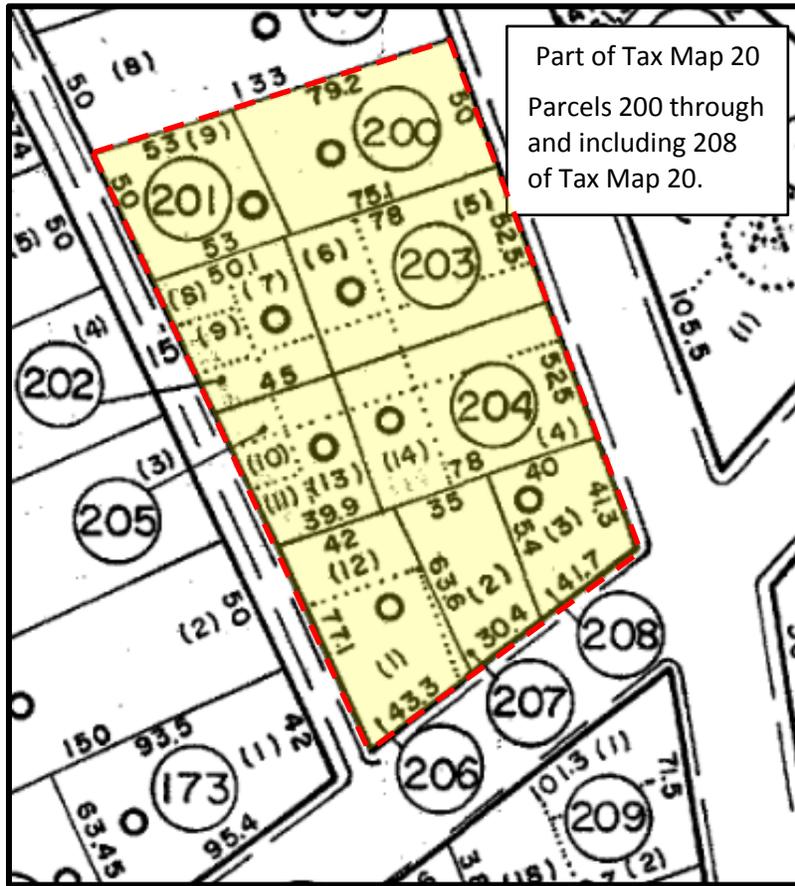
Main Development Site

Off-Site Parking

Main Development Site



Off-Site Parking



STAFF REPORT ADDENDUM B

S15-04-III / American Campus Communities / University Avenue & Jones Avenue

Concurrence with the 2013 Comprehensive Plan Update

The following narrative identifies where, in the opinion of the Planning Division, the subject development of significant impact is in concurrence and/or is inconsistent with the 2013 Comprehensive Plan Update.

INTENT	Development proposals will reflect the spirit and values expressed in the Plan's principals.
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Principles for Land Management

Principal 1	Infill development and redevelopment of underutilized and/or deteriorating sites takes priority over development in green field locations at the city's edge.	<input checked="" type="checkbox"/> Concurrence <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<i>The existing multi-family dwelling structures on the principle development site will be razed and removed. The single-family dwelling structures that were converted into multiple units on the off-premise parking site have already been razed and removed. The proposed development will yield a net gain of approximately 366 beds.</i>		
Principal 2	Expansion of the urban area will occur in a contiguous pattern that favors areas already served by existing infrastructure.	<input checked="" type="checkbox"/> Concurrence <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<i>The proposed development does not represent an expansion of the urban area but rather an increase in density within the urban core and appears to be well served by existing public and utility infrastructure.</i>		
Principal 3	Downtown, adjacent neighborhoods and the riverfront will be the primary focus for revitalizations efforts.	<input checked="" type="checkbox"/> Concurrence <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<i>The site is strategically situated along the University Avenue corridor between WVU's Downtown and Evansdale campuses and adjoins a large student housing stock located to the west and south of the site.</i>		
Principal 4	Existing neighborhoods throughout the city will be maintained and/or enhanced.	<input checked="" type="checkbox"/> Concurrence <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<i>The project consists of the redevelopment of an existing multi-family development known as "Sunnyside Commons." Existing driveway entrances from the site to Jones Avenue will be eliminated thereby increasing the functional buffer between the site and the adjoining Wiles Hill Neighborhood located to the north and east of the site.</i>		

Principal 5	Quality design is emphasized for all uses to create an attractive, distinctive public and private realm and promote positive perceptions of the region.	<input checked="" type="checkbox"/> Concurrency <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<p><i>The proposed development increases the site's massing and density along the University Avenue corridor in a similar manner as WVU's University Place and related parking garage which should serve to create a strong sense of place. Additionally, the development provides for new sidewalks and street trees along the east side of University Avenue.</i></p>		
Principal 6	Development that integrates mixed-uses (residential, commercial, institutional, civic, etc.) and connects with the existing urban fabric is encouraged.	<input type="checkbox"/> Concurrency <input type="checkbox"/> Inconsistent <input checked="" type="checkbox"/> Other
<p><i>Although the proposed development program does not include nonresidential uses, its increase in residential density within the Sunnyside area of the University Avenue corridor should serve to bolster a critical mass of potential pedestrian customers to existing and developing commercial uses between the subject site and WVU's Downtown Campus.</i></p>		
Principal 7	Places will be better connected to improve the function of the street network and create more opportunities to walk, bike and access public transportation throughout the region.	<input checked="" type="checkbox"/> Concurrency <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<p><i>The proposed development will provide for sidewalks along the east side of University Avenue where none currently exist. There appears to be a strong network of on-site sidewalks linking buildings, parking areas, and the sidewalk network within the immediate area. A fixed transit stop is proposed at the of the development site along University Avenue which should serve to promote transit ridership.</i></p>		
Principal 8	A broad range of housing types, price levels and occupancy types will provide desirable living options for a diverse population.	<input checked="" type="checkbox"/> Concurrency <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<p><i>Four-bedroom dwelling units including some double-occupancy units are proposed, which should serve to diversify the housing stock within the immediate area that currently includes a mix of single-family, two-family, lodging or rooming house, and one- and two-bedroom multi-family dwelling types. According to the petitioner, the proposed double-occupancy units are intended to diversify rent price levels within the proposed development.</i></p>		
Principal 9	Residential development will support the formation of complete neighborhoods with diverse housing, pedestrian-scaled complete streets, integrated public spaces, connection to adjacent neighborhoods, and access to transportation alternative and basic retail needs.	<input checked="" type="checkbox"/> Concurrency <input type="checkbox"/> Inconsistent <input type="checkbox"/> Other
<p><i>The proposed development will provide a community center amenity for residents; new sidewalks and street trees along University Avenue where none currently exist; a new fixed transit stop; and, on-site sidewalk networking linking buildings, parking areas, and the sidewalk network within the immediate area.</i></p>		

Principal 10 Parks, open space, and recreational areas are incorporated as part of future development. Concurrence
 Inconsistent
 Other

A community center is included as an amenity for the development's residents, which will include meetings, study, and gathering spaces, fitness facilities, and an outdoor swimming pool.

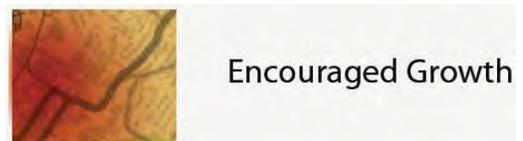
Principal 11 Environmentally sensitive and sustainable practices will be encouraged in future developments. Concurrence
 Inconsistent
 Other

The developer's goals and objectives concerning sustainable design and construction techniques and industry accepted best practices have not been fully developed.

LOCATION

Development proposals will be consistent with the Land Management Map. If the proposal applies to an area intended for growth, infill, revitalization, or redevelopment, then it should be compatible with that intent and with any specific expectations within Areas of Opportunity. If the proposal applies to an area of conservation or preservation, it should be compatible with and work to enhance the existing character of the immediate surroundings.

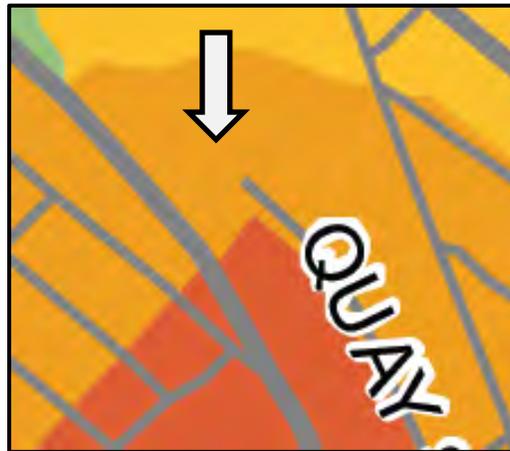
The following graphic is clipped from the **Conceptual Growth Framework Map** included on Page 19 of the 2013 Comprehensive Plan Update. The subject development site is located within the “**Encouraged Growth**” area.



**PATTERN
AND
CHARACTER**

Development proposals in growth areas will be consistent with preferred development types. Development in areas where growth is not intended should be compatible with the relevant Character Areas description and expectations for how those areas should evolve in the future.

The following graphic is clipped from **Map 3 – Pattern and Character** included on Page 27 of the 2013 Comprehensive Plan Update. The subject development site is located within the “**Neighborhood 1**” and “**Neighborhood Corridor**” pattern and character areas.



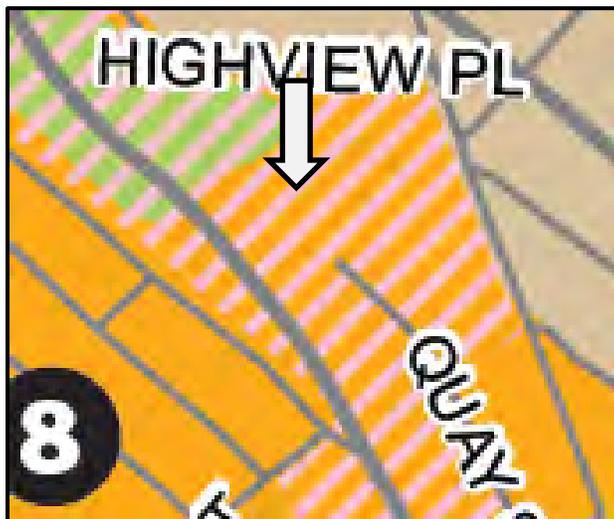
Neighborhood 1. Neighborhood 1 includes the oldest residential areas in the city surrounding Downtown and WVU's campus. It encompasses most of the city's historic neighborhoods as well as areas dominated by student renters. This neighborhood type has the highest density of buildings on the smallest lots. The district contains a mix of housing types ranging from older single family homes to four-six unit apartment buildings to newly constructed multi-story apartment buildings – often with multiple housing types in the same block. Small-scale commercial or civic uses are also integrated into the neighborhood fabric. The blocks are small and generally follow a grid street pattern. This is the most walkable neighborhood area.



Neighborhood Corridor. Neighborhood Corridors are transitional areas between neighborhoods and more intensely developed commercial or urban corridors. The development pattern reflects the lot sizes and block structure of the surrounding neighborhood, but includes a mix of building types such as small residential buildings along the street and suburban-style buildings set back behind a surface parking lot. Uses also vary and include commercial, office, and multi-family residential. Since they share a neighborhood block structure, these corridors are more walkable than a Commercial Corridor. Due to the high levels of traffic, these areas will continue to face redevelopment pressure.



The following graphic is clipped from **Map 4 – Land Management** included on Page 39 of the the 2013 Comprehensive Plan Update. The subject development site is located within the “**Neighborhood Revitalization**” and “**Corridor Enhancement**” concept areas.



Neighborhood Revitalization: Stabilization and reinvestment in existing neighborhoods that includes improvements to public and private buildings and infrastructure, and support for infill development, adaptive reuse and redevelopment that offers a mix of residential types and supporting uses.

Corridor Enhancement:** Improving development along corridors with a mix of uses, increased intensity at major nodes or intersections and roadway improvements to improve traffic flow, pedestrian and biking experience.

The following graphics are clipped from Pages 41 through 43 of the 2013 Comprehensive Plan Update and identify the development types desired within the “Core Enhancement” concept area.

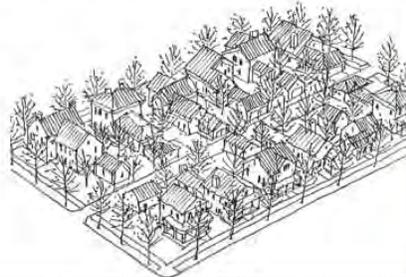
CONCEPT AREA	Appropriate Development Types											
	SF	TF	MF	C	NX	UC	CC	O	I	CD	OS	
 Neighborhood Revitalization	•	•	•	•	•							•
 Corridor Enhancement*			•	•	•		•	•				•

DEVELOPMENT TYPE DESCRIPTIONS

PATTERN AND CHARACTER EXAMPLES

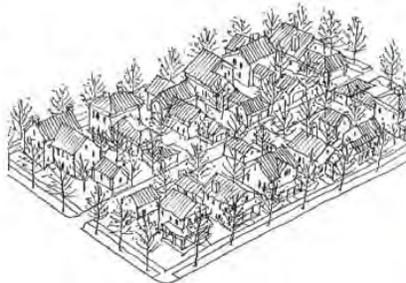
SF Single Family Residential

Detached 1-2.5 story residential structures each intended for one family. Densities range from six to twelve units per acre.



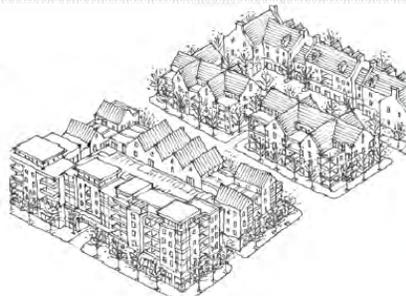
TF Two Family Residential

Detached structures that each contain two separate residential dwellings and townhouse dwelling types. May be built in a similar pattern as single-family structures and integrated in neighborhoods with other single-family structures and/or at the edge of single-family neighborhoods. Densities range from six to twenty units per acre.



MF Multi-family Residential

Includes various forms such as apartment buildings where three or more separate residential dwelling units are contained with a structure and townhouse dwelling types. They vary considerably in form and density depending on the context – from four-story or larger buildings set close to the street in and at the edge of the downtown core and along major corridors, to smaller two- to four-story buildings with greater street setbacks in areas between the downtown core and single-family neighborhoods.



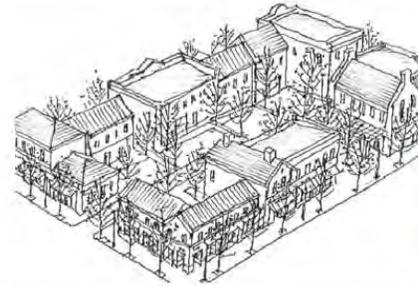
C Civic and Institutional

These sites include both public uses (government buildings, libraries, community recreation centers, police and fire stations, and schools) and semi-public or private uses (universities, churches, hospital campuses). Public uses should be strategically located and integrated with surrounding development. Civic and Institutional sites may be distinctive from surrounding buildings in their architecture or relationship to the street.



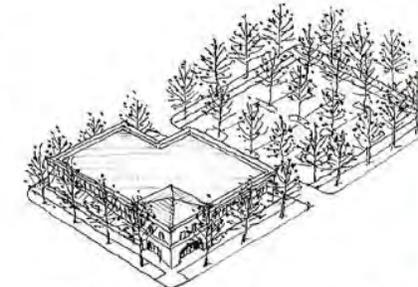
NX Neighborhood Center Mixed-Use

A mix of housing, office, commercial, and civic uses adjacent to one another or contained within the same structure (such as offices or apartments above ground-floor retail). Such uses should be compatible with and primarily serve nearby neighborhoods (within 1/2 mile). Parking should be located behind or to the side of buildings and may be shared between multiple uses.



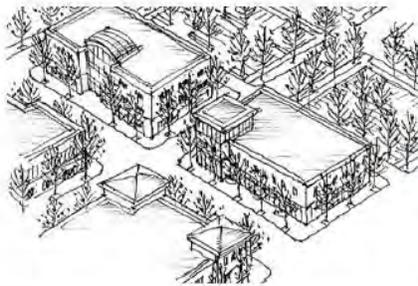
CC Community Commercial

Larger scale, primarily retail, restaurant and accommodation uses that serve the broader community. Buildings should be located close to the street with parking to the rear or side and should be well-connected to surrounding development and pedestrian infrastructure.



O Office / Research

Larger-scale 2-6 story buildings generally housing professional offices or research/development activities with single or multiple tenants. May involve multiple large-scale buildings in a campus setting, but buildings should be in a walkable configuration with shared parking typically behind or to the side. Supportive retail establishments may occupy the lower levels of a multistory building. Supportive retail uses include coffee shops, delicatessens, barbers, and bookstores among others.



OS Greenspace

Includes formal parks, recreation areas, trails, and natural open space.



A. Goal

Efficient and attractive use of land resources that strengthens the quality, character, and upkeep of the built environment while balancing redevelopment and strategic expansion with open space preservation.

Objective 2. Promote strategic infill and redevelopment of underutilized or functionally obsolete areas.

LM 2.1 Identify and prioritize sites for infill and redevelopment.

LM 2.3 Develop incentives to encourage the consolidation of parcels for redevelopment.

LM 2.6 Prioritize capital improvements near infill or redevelopment sites to encourage private investment.

Objective 3. Facilitate the creation of residential areas with strong neighborhood qualities.

LM 3.1 Update development standards to require high-quality pedestrian-scaled complete streets with sidewalks, street trees, adequate lighting, and tree lawns in newly developed residential areas.

LM 3.2 Require major residential subdivisions to create a master plan that incorporates the principles of traditional neighborhood design.

LM 3.4 Require street or multi-use path connections between new residential neighborhoods and existing developed areas wherever practical.

LM 5.2 Permit higher density development in areas that are well-supported by existing or planned transportation infrastructure or transit services.

Objective 6. Improve community appearance, particularly at city gateways.

- LM 6.1 Strengthen design standards (architectural appearance, building materials, landscaping, signage) and their enforcement in the zoning code.
- LM 6.5 Encourage major redevelopment projects to relocate utilities from view of primary corridors, arterials, and collectors with emphasis on underground placement.

OBJECTIVES AND STRATEGIES **Neighborhoods and Housing**

A. Goal
Attractive, well-maintained neighborhoods that offer a broad mix of desirable housing options and convenient access to services and amenities.

Objective 3. Improve the safety and appearance of all neighborhoods.

- NH 3.1 Require adequate and attractive street lighting to be incorporated as part of all new multi-family residential development, major subdivisions created for residential and/or mixed-use developments, and planned unit developments.

Objective 4. Promote the development of a broad range of housing types and prices.

- NH 4.1 Provide incentives to developers to encourage development of alternative housing types (i.e. higher density, live-work, mixed-use) in designated growth areas.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Redevelopment of “Sunnyside Commons” by American Campus Communities

The following information identifies Planning and Zoning (P&Z) Code provisions related to the above referenced development. Plans reviewed herein are dated 06 FEB 2015 and prepared by Paradigm Architecture and Potesta & Associates. The purpose of this review is to identify whether or not the subject development meets related P&Z requirements; whether additional information is required; or, whether variance(s) and/or conditional use approval(s) are necessary.

CONTEMPLATED DEVELOPMENT PROGRAM

- The principle development site is comprised of Parcels 1 thru and including 10.2 of Tax Map 14A and is approximately 5.5 acres. The off-site parking site is comprised of Parcels 200 thru and including 208 of Tax Map 20 and is approximately 0.5 acres.
- The zoning classification for both sites is R-3, Multi-Family Residential District. The majority of the principle development site is located within the Sunnyside Central Overlay District while a small portion is located within the Sunnyside South Overlay District. The off-site parking site is located within the Sunnyside Central Overlay District.
- The redevelopment program provides for razing and removing all existing structures, which currently includes 170 beds within the existing *Sunnyside Commons* development.
- The proposed development includes three stand-alone buildings. Building “A” has staggered four (4) and five (5) stories, is adjacent to University Avenue, and has an attached four (4) story community center near the University Avenue and 3rd Street intersection. Building “B” is also adjacent to University Avenue, though further towards Evansdale, and has four (4) floors. Building “C” is located between Building “A” and Jones Avenue and has four (4) floors. Also proposed is a detached accessory maintenance structure.
- The three (3) buildings will include a total of 134 multi-family dwelling units with 536 beds.
- Parking will be primarily on-site with 227 spaces, with an additional 41 parking spaces off-site on property that will be transferred to the petitioner from West Virginia University.

SUMMARY OF CONFORMITY OBSERVATIONS

Planning and Zoning Code Reference	
Conformity (Y, N , TBD)	Planning and Zoning Code standard (either verbatim or paraphrased).
	Conformity review observations. Required approvals noted in bold highlighted (yellow) font .

R-3, MULTI-FAMILY RESIDENTIAL DISTRICT

1339.02 Permitted and Conditional Uses	
Y	“Multi-Family Dwellings” are permitted by-right in the R-3 District [Article 1331.05].
TBD-1	The “Private Parking Lot” use, proposed as an off-site parking facility at the corner of Overhill Street, Quay Street, and Jones Avenue, is permitted with conditional use approval. However, see comments under Article 1361.03(Q)(4) below.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

1339.03 Lot Provisions	
Y	(A) Minimum lot size – 4,000 sq. ft. NOTE – Minor Subdivision approval will be required to combine the several parcels that comprise the two (2) development sites.
Y	(B) Minimum lot frontage – 40 ft.
Y	(C) Maximum lot coverage – 60%. The proposed lot coverage for the principle development site is approximately 23%.

1339.04 Setbacks			
	Provision	Requirement	Proposed (approx.)
Y	(A)(1) Minimum Front	10 ft.	10 ft.
Y	(A)(2) Maximum Front	20 ft.	12 ft.
Y	(A)(3) Minimum Side	5 ft.	North side of Building “B” is approx. 27 ft. South side of Building “A” is than 5 ft.
Y	(A)(4) Minimum Rear	20 ft.	Approx. 24 ft. (Building “B”)
N/A	(B) Corner lot provision.		

1339.05 Encroachments into Setbacks	
Y	(A)(1) Fire escapes, chimneys, cornices, awnings, canopies, eaves, sills, pilasters, lintels, gutters or other similar features may extend into a setback a distance not exceeding three (3) feet, except that such features shall not extend closer than three (3) feet from the property line.
Y	(A)(2) Uncovered stairs, landings and porches shall not extend closer than three (3) feet from the property line. Such porches may not subsequently be enclosed unless the normal setback requirements for the district are met.
N/A	(A)(3) Open and covered, but un-enclosed front porches attached to single family or two-family dwellings may extend into the required front setback a distance equal to fifty (50) percent of the setback depth.
Y	(B) No permitted encroachment shall extend to within 3 feet of an accessory structure.
Y	(C) Fences, walls, terraces, steps or other similar features may encroach into a required setback, except as provided in Section 1363.03, Safety and Vision. Such appurtenances shall not be located within access, drainage, or utility easements.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Y	(D) HVAC mechanical units may be located no closer than five (5) feet to a side lot line.
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1339.06 Building Height			
	Provision	Requirement	Proposed
N*-2	(A) Maximum Height	4 stories or 55 ft., whichever is less. Conditional use approval in excess of 55 ft. but less than 80 ft.	4 and 5 stories Comm. Cntr.54'-6" Building "A"41'-5" Building "B"31'-10" Building "C"31'-10"
TBD**	(B) Maximum Height of an accessory structure	18 ft.	20'-0"
Y	(C) Minimum height for a two-family dwelling or multi-family dwelling	2 Stories	More than 2 stories
	<p>* Variance relief is required for those portions of Building "A" that contain 5 stories along the front elevation. Specifically, the lowest level along the 5-story portion of Building "A" cannot be considered a basement, as defined in Article 1329.02, because said space does not have one-half or more of its floor-to-ceiling height below the average level of the adjoining grade.</p> <p>**Design modifications should be made to lower the building height by two (2) feet; otherwise, variance relief will be required.</p>		

1339.07 Performance Standards	
Y	<p>(A) All residential construction shall substantially conform in street orientation and massing to adjacent structures.</p> <p>NOTE: Street orientation and massing appear to be similar in form to existing multi-family residential development and recently completed and planned projects along adjacent University Avenue corridor.</p>
N/A	<p>(B) Civic buildings such as private schools, churches should be built so that they terminate street vistas whenever possible, and should be of sufficient design to create visual anchors for the community.</p>
N/A	<p>(C)(1) Materials. Residential buildings shall be clad in wood siding, vinyl siding, composite siding (cement board), stone, or brick.</p> <p>NOTE: These standards are superseded by Article 1361.03(P) [see comments below].</p>
Y	<p>(C)(2) Materials. Garden walls shall not be made from cinderblocks unless of the ornamental variety designed for use in landscaping projects.</p> <p>NOTE: Although materials for the several retaining walls included in the development where not identified in plans reviewed herein, relative retaining wall system specification requirements are assumed to preclude the use of cinderblocks.</p>



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Y	<p>(C)(3) Materials. Principal building roofs should have a pitch that substantially conforms to the roof pitches of adjacent homes.</p> <p>NOTE: The term “should” is a desired design element but not required. Additionally, flat roof systems are used for several multi-family and nonresidential buildings within the adjacent University Avenue corridor.</p>
N/A	(D) Front porches on two-family dwellings.
N/A	(E) Garages.
N-3	<p>(F) Sidewalks shall be constructed along the frontage of a lot upon which a use is to be constructed. New sidewalks shall be at least six (6) feet wide, or the same width as an existing but incomplete sidewalk along the same side of the street.</p> <p>NOTE: Sidewalk requirements and standards along the University Avenue frontage are superseded by Article 1361.03(L) [see comments below].</p> <p>Any portions of existing sidewalks along the Jones Avenue and Overhill Street (principle development site and off-site parking site) frontages that are in poor condition must be repaired, replaced, and/or reconstructed to the satisfaction of the City Engineer.</p> <p>The existing driveway aprons (approximately six locations) along Jones Avenue that will be closed will most likely require reconstruction to eliminate the driveway entrance.</p> <p>Sidewalks are not proposed along the Highview Place frontage, which requires variance relief.</p>

ARTICLE 1361.03 – SUNNYSIDE OVERLAY DISTRICTS

Design and performance standards that apply to all Sunnyside Overlay Districts.

Consistent (Y or N)	Design and Performance Standard
	Consistency Review Comment
Y	(A) Buildings shall be oriented with the front facing the lot’s primary street, or the Monongahela River if the parcel has frontage on the river.
	Street orientation for all three buildings appears to be similar in form to existing multi-family residential development and recently completed and planned projects along the adjacent University Avenue corridor.
Y	(B) Buildings should be designed to overlook streets and public open spaces so as to create a “self-policing” environment.
	No observation.
N-4	(C) Buildings shall not be oriented with the front facing parking or service areas.
	Building “C” is oriented toward the parking area, which requires variance relief.
Y	(D) On primary streets, street trees shall be provided at a minimum of thirty-five (35) feet on center.
	Twenty-two (22) street trees are shown along the site’s University Avenue (primary street) frontage at 35-foot intervals, which satisfies (D) above. Consultation with the City Engineer is required to carefully plan existing edge of University Avenue pavement, right-of-way boundary, retaining wall, elevation of ground floor, transition slopes, placement of



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

	<p>sidewalks, utilities, etc. Two (2) or more of these trees may need to be eliminated to ensure site vision exiting the University Avenue driveway entrance is not obstructed.</p> <p>NOTE: Article 1367.06(C) requires that a 10- to 15-foot clearance between tree trunk and structures, building overhangs, walls, fences, and other trees [see comments below].</p>
N-5	<p>(E) Building facades that are adjacent to public streets and/or open spaces shall have a high degree of ground floor transparency [at least sixty (60) percent].</p> <p>Variance relief will be required given the lack of commercial uses on the ground floor along University Avenue.</p>
Y	<p>(F) The siting of buildings should avoid the creation of unusable open spaces and should respect and complement view corridors to and from the hillside and the riverfront.</p> <p>The stepped nature of building location and massing appears to be complementary to the viewshed toward Monongahela River. Specifically, the grade of the Highview Place / Jones Avenue intersection appears to be approximately 30 to 40 feet above the roof of Building "C".</p>
N/A	<p>(G) Building massing should be the tallest at street corners. In order to achieve this, buildings constructed on a corner of two primary streets should be at least five (5) stories in height, provided that all other requirements of the zoning ordinance are adhered to.</p>
N/A	<p>(H) Ground floor retail and service-type uses located within mixed-use buildings along primary streets shall not be included in height calculations.</p> <p>Ground floor retail is not included in the contemplated development program.</p>
Y	<p>(I) For buildings taller than four (4) stories or seventy-five (75) feet in height, any additional floors in excess of four (4) stories shall be recessed or set back at least twelve (12) feet from the build-to line.</p> <p>A build-to-line has not been established for University Avenue or Jones Avenue.</p>
N/A	<p>(J) A maximum of seventy-five (75) percent of the length of a building face shall be constructed along the build-to line or right-of-way of a primary street. The remaining twenty-five (25) percent may be setback a maximum of ten (10) feet from the build-to line.</p> <p>A build-to-line has not been established for University Avenue or Jones Avenue.</p>
Y	<p>(K) Land between the front facade of a building and a public street shall be landscaped to integrate with the neighborhood's sidewalk system. In any area or setback between a building and sidewalk, one or a combination of the following shall be provided:</p> <ol style="list-style-type: none"> (1) Landscaping/planting beds consisting of shrubbery and /or trees, or (2) Special paving areas designed as plaza space. No grass or sod areas shall be allowed in this space. <p>NOTE: Consultation with the City Engineer is required to carefully plan existing edge of University Avenue pavement, right-of-way boundary, retaining wall, elevation of ground floor, transition slopes, placement of sidewalks, utilities, etc. Two (2) or more of the street trees illustrated along University Avenue may need to be eliminated to ensure site vision exiting the University Avenue driveway entrance is not obstructed.</p>



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

N-6	(L) On primary streets, sidewalks shall be a minimum of eight (8) feet in width.
	This provision supersedes the minimum sidewalk width standard that is provided under Article 1339.07(F) [R-3 District] along University Avenue. The proposed eight-foot sidewalk along the principle site's University Avenue frontage does not extend north past Building "B" to the end of the development site. Additionally, a portion of the sidewalk along the front of Building "B" is proposed as a fire lane. These proposed design elements require variance relief.
N/A	(M) Front yard setbacks along secondary streets shall be a minimum of five (5) feet, and a maximum of fifteen (15) feet.
	No observation.
N/A	(N) Within areas of single-family and two-family dwellings, front yard setbacks of in-fill development shall not deviate by more than five (5) feet from the average front yard setbacks of the neighboring residences.
	No observation.
	(O) Building Form and Scale:
N-7	(1) Total fenestration shall be at least fifty (50) percent for building facades facing primary streets and/or public open spaces. For the ground floor, the ratio shall be at least sixty (60) percent.
	The front elevations of Buildings "A" and "B" do not appear to meet minimum fenestration ratios, which requires variance relief.
N/A	(2) All ground floor retail areas along primary streets and/or public open spaces shall have awnings over entrances and ground floor windows, extending out at least four (4) feet from the facade. Such awnings may be extended to cover public sidewalks, provided they are set back at least eighteen (18) inches from the curb line of the street.
	Ground floor retail is not included in the contemplated development program; variance relief for which is addressed under Article 1361.03(Q) below. "N/A" here assumes said variance relief is granted.
Y	(3) Overall building widths along primary streets may vary, but building facades shall be designed in ten (10) to twenty (20) foot increments, so as to achieve the appearance of a series of distinct, adjoining buildings.
	Requisite façade increments are illustrated in the building elevation and floor plan drawings reviewed herein and appear to be accomplished through recessing and vertical materiality articulation.
Y	(4) The articulation of buildings, and window proportions, shall be vertical for buildings constructed along primary streets.
	No observation.
Y	(5) The minimum building height for a parcel on a primary street shall be three (3) stories. On secondary streets, the minimum building height shall be two (2) stories.
	No observation.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

N-8	(6) The majority of window openings shall be slightly recessed (4-8 inches) from the exterior building wall to create a distinct and uniform shadow line for the building's primary facade.
	Building elevation drawings and floor plans reviewed herein do not appear to illustrate requisite window recessing. Variance relief is anticipated.
Y	(7) Unless no feasible alternative exists, fire escapes shall not be constructed on or attached to the front facade of any building or structure. The City of Morgantown Fire Department shall be the determining authority as to whether a feasible alternative exists.
	Building elevation and floor plan drawings reviewed herein do not illustrate fire escapes on the front façade of any of the three (3) proposes structures.
	(P) Building Materials:
N-9	(1) Except for single and two family dwellings, the first two (2) floors of a building shall be constructed of natural materials. Natural materials include stone, brick, and wood siding, but do not include materials such as, or similar to, wood roof shingles, reflective glass, split faced concrete block, imitation stone, and imitation stucco or Drivit. Thirty-five (35) percent of the remaining building facade(s) on the public right-of-way or any facade(s) facing a single-family residence shall also be constructed of natural materials.
	Building elevation drawings reviewed herein identify fiber cement panel, fiber cement lap siding, and brick/stone veneer, which require variance relief.
N-10	(2) Vinyl siding or other composite materials shall not exceed thirty-five (35) percent of a building face that abuts a right-of-way.
	Building elevation drawings reviewed herein identify fiber cement panel, fiber cement lap siding, and brick/stone veneer, which require variance relief.
Y	(3) In general, brick and a recessed window vocabulary should predominate along the northern end of Beechurst and along University Avenue. Materials should transition into a mixed palette of brick, metal and glass toward the southern end of Beechurst. The Riverfront should utilize more contemporary materials such as metal and glass.
	The term "should" is a desired design element but not required. Additionally, flat roof systems are used for several multi-family and nonresidential buildings within the adjacent University Avenue corridor. Assuming variance relief is granted relating to the use of brick/stone veneer cladding materials and permitting windows to not be recessed, it appears that the desired design objective is partially incorporated; however, variance relief is not required.
Y	(4) Building materials which promote energy efficiency and sustainability should constitute a minimum of thirty-five (35) percent of the total materials used to construct a building.
	The term "should" is a desired design element but not required.
	(Q) Street Hierarchies and Land Use:
N-11	(1) Except for single- and two-family dwellings, buildings constructed along primary streets shall have sixty (60) percent or more of their ground floor space dedicated to retail, restaurant, office or personal service uses. Residential uses shall be permitted on the ground floor in the remaining space, but shall not enfront the primary street.
	University Avenue is considered a primary street. Because commercial space on the



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

	ground floor is not included in the contemplated development program AND because residential uses will be located on the ground floor and enfront University Avenue, variance relief is required.
N/A	<p>(2) On-street parking spaces immediately adjacent to a land use shall be counted toward fulfilling parking requirements for the use.</p> <p>Parking is not permitted along the site's University Avenue frontage. The Jones Avenue right-of-way along the development site is not included in the Overlay District. Further, existing parking spaces along Jones Avenue are a part of a Permit Parking District, the boundaries of which do not allow residents of the redeveloped Sunnyside Commons site to obtain parking permits to parking with the subject Permit Parking District.</p>
N-12	<p>(3) The minimum number of off-street parking spaces for multi-family dwellings shall be one-half a space (0.5) per occupant as determined by the West Virginia State Building Code and adopted and implemented by the City. The minimum number of off-street parking spaces for mixed-use and over-store dwellings shall be one-half a space (0.5) per occupant as determined by the West Virginia State Building Code and adopted and implemented by the City plus required spaces for commercial use(s).</p> <p>This minimum parking requirement supersedes Article 1365.03(J). At least 268 parking spaces are required for the proposed 536 occupants. Only 227 spaces are illustrated on-site on the site plan. The remaining 41 spaces planned for the noted off-site parking facility requires conditional use [see comments under Article 1365.07].</p>
N-13	<p>(4) Surface parking lots between buildings shall be designed as interior landscaped courtyards where cars are screened from the right-of-way; surface lots shall not be constructed where two (2) public rights-of-way intersect.</p> <p>The upper parking area is located at the corner of Jones Avenue and Highview Place, which requires variance relief. Additionally, the off-site surface parking lot proposed at the intersection of Jones Avenue / Overhill Street and intersection of Overhill Street / Quay Street requires variance relief along with conditional use approval as a standalone use and as an off-site parking facility.</p>
N/A	<p>(5) Parking structures abutting open spaces or fronting on primary streets shall be designed with building-like facades.</p> <p>No observation.</p>
N/A	<p>(6) Parking garages three (3) stories or higher shall provide ground floor retail or service uses in an amount not less than thirty-five (35) percent of the ground floor area, located along the frontage of the garage.</p> <p>No observation.</p>
N-14	<p>(7) Private parking areas shall be accessed from secondary streets and/or alleys. Access from primary streets shall only be utilized when other options are not available.</p> <p>Although there is an existing driveway from the site onto University Avenue, variance relief for the new driveway entrance will be required.</p>



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

N/A	(8) To minimize curb cuts along primary and secondary streets, residential garages or car ports or driveways shall be located at the rear of the property and accessed from an alley, when available.
	No observation.
Y	(9) Parking areas and properties containing multifamily or commercial buildings shall provide linkages of similar design and quality to adjacent off-site pedestrian amenities such as sidewalks, bike paths, etc.
	There are a number of internal sidewalks that link the buildings, parking areas, and frontage sidewalks.
Y	(10) Parking areas containing ten (10) or more stalls shall be lighted to create safe, attractive nighttime environments. Such lighting shall not be designed or situated in such a manner as to cause spillover glare onto adjoining properties. Building entrances and significant architectural or landscape features should be illuminated with low-intensity, indirect lighting sources directed toward the feature.
	Light standard details and photometric plans (ground and affixed to buildings) appear to meet required and desired lighting provisions.

ARTICLE 1361.04(A) – SUNNYSIDE SOUTH OVERLAY DISTRICT

Design and performance standards that apply to specific Sunnyside Overlay Districts.

NOTE: It appears that only all or portions of the following parcels are within the Sunnyside South Overlay District – Parcels 2, 3, 4, 5, and 6.

Consistent (Y or N)	Design and Performance Standard
	Consistency Review Comment
N/A	(1) Buildings that contain non-residential uses on the ground floor may have a maximum height of eighty-eight (88) feet, provided all other requirements of the zoning ordinance are met.
	The maximum building height bonus is not applicable as ground floor retail is not included in the contemplated development program.
N/A	(2) Buildings taller than fifty-five (55) feet shall not require a conditional use permit.
	This provision supersedes Article 1339.06(A) only for that portion of the development site (see parcels noted above) that is located within the Sunnyside South Overlay District but not for that portion of the property that is located within the Central Sunnyside Overlay District. Variance relief is required under Article 1339.06(A) relating to Building “A” exceeding 4 stories within the Central Sunnyside Overlay District [see comment under Article 1339.06(A) above].
N/A	(3) Minimum rear setbacks shall be one-half (1/2) of that ordinarily required in the underlying zoning district.
	It appears that the rear of the development site is along Jones Avenue, which is located within the Central Sunnyside Overlay District.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Y	(4) Maximum lot coverage may be ten (10) percentage points higher than ordinarily permitted in the underlying zoning district.
	This lot coverage bonus supersedes Article 1339.03(C) for that portion of the property that is located within the Sunnyside South Overlay District but not that portion of the property that is located within the Central Sunnyside Overlay District. However, maximum lot coverage does not appear to be an issue for the proposed development program [see comment under Article 1339.03(C) above].
N/A	(5) Primary materials for buildings along the riverfront should be metal and glass. Secondary materials along the riverfront should be brick, pre-cast concrete and stone.
	The subject development site is not located along the riverfront.

ARTICLE 1361.04(B) – SUNNYSIDE CENTRAL OVERLAY DISTRICT

Design and performance standards that apply to specific Sunnyside Overlay Districts.

Consistent (Y or N)	Design and Performance Standard
	Consistency Review Comment
N/A	(1) Front porches shall be required on all single- and two-family dwelling...
	Single- and two-family dwelling units not included in contemplated development program.
N/A	(2) Reserved.
	No observation.

ARTICLE 1363 HEIGHT, BULK, AREA AND DENSITY REGULATIONS

TBD	1363.03 Safety and Vision. The following regulations provide for the maximum safety of persons using sidewalks and streets: on any corner lot, a wall, fence, sign, structure, display of merchandise or any plant growth which obstructs sight lines at elevations between two and one-half (2 -1/2) feet and eight (8) feet above the crown of the adjacent roadway shall not be placed or maintained within a clear vision triangle of the area of the lot twenty-five (25) feet along the property line from the street right-of-way at intersections.
	Conformity with this element will be evaluated at building permit application so that consultation with the City Engineer and the Urban Landscape Commission can be performed.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Y	1363.04(A) Structures on a Lot. Only one principal building and its accessory structures may be located on a lot unless development is approved as a planned unit development, shopping center, office park, research and development center, townhouse dwellings, or multi-family dwellings as permitted in Table 1331.05.01 "Permitted Land Uses".
	More than one principal structure is permitted on a lot for multi-family development.

ARTICLE 1365 PARKING, LOADING AND INTERNAL ROADWAYS

N-15	1365.03(A) Off-street parking and loading spaces shall be provided on the same lot as the use served, except as otherwise provided in this Code, and may be situated as one or more individual areas.
	At least 268 parking spaces are required for the proposed 536 occupants. Only 227 on-site spaces are illustrated on the site plan. The remaining 41 spaces planned for the noted off-site parking facility requires conditional use [see comments under Article 1365.07].
N/A	1365.04(B) Shared Parking Facilities
	Shared parking in the adjacent WVU parking garage is not proposed.
N/A	1365.04(J) Table 1365.04.01 "Minimum Off-Street Parking Requirements" provides the minimum standard of 1 bedroom dwelling unit - 1 space per unit 2 or more bedroom dwelling unit - 0.75 spaces per occupant as determined by the West Virginia State Building Code and adopted and implemented by the City.
	This standard is superseded by Article 1361.03(Q)(3) and related comments are provided under that section of the report.
Y	1365.04(N) Any land use which requires a minimum of 50 parking spaces shall be required to provide a pedestrian circulation plan for the proposed site.
	There are a number of internal sidewalks that link the buildings, parking areas, and frontage sidewalks.
Y	1365.06 Accessible parking spaces.
	The number of on-site parking spaces is 227, which requires at least 7 accessible parking spaces; 2 of which must be designed as van or universal parking spaces.
TBD-16	1365.07 Off-Site Parking Facilities.
	The proposed off-site parking facility is located within 300 feet of the principal use and within a district that permits commercial parking lots as a principal or conditional use. "Commercial Parking Lot" uses are permitted in the R-3 District with conditional use approval.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

	1365.09 Parking Development Standards – Dimensions
Y	(A)(1) Each required off-street standard parking space shall be at least eight and one half (8.5) feet in width and at least eighteen (18) feet in depth, exclusive of access drives or aisles, ramps, columns, or office or work areas. Such space shall have adequate vertical clearance.
	No observation.
Y	(A)(2) Up to ten (10) percent of the total number of required parking spaces may be designed for compact cars; provided, compact spaces are limited to employees or residents only and the property owner/manager assigns and enforces such spaces accordingly. Compact spaces shall be grouped together and identified as “compact cars only” with pavement stenciling and/or signage. Compact spaces should be located furthest from building entrances to discourage use by noncompact vehicles. Each compact space shall be at least eight (8) feet in width and at least fifteen (15) feet in depth, exclusive of access drives or aisles, ramps, columns, or office or work areas. Such space shall have adequate vertical clearance.
	No observation.
Y	(A)(3) Except on lots occupied by one and two-family dwellings, each off-street parking space shall open directly upon an aisle or driveway at least twelve (12) feet wide or such additional width and design in accordance with Table 1365.09.01, so as to provide safe and efficient means of vehicular access to such parking space. Such aisle or driveway shall be unobstructed and allow for the passage of emergency vehicles at all times. This requirement may be waived by the Planning Director where such waiver will not cause a hazard.
	No observation.
Y	(A)(4) All required parking spaces and aisles shall be provided wholly within the property lines and shall not extend into any public right-of-way.
	No observation.
	1365.09 Parking Development Standards – Layout and Design.
Y	(B)(1) All off-street parking or loading facilities shall be designed with appropriate means of vehicular access to a street or an alley in a manner which will least interfere with traffic movement.
	AutoTURN modeling that illustrates fire apparatus ingress and egress provided.
Y	(B)(2) Driveway entrances or exits shall be no closer than 15 feet to an adjoining residential property line or five (5) feet to an adjoining non-residential property line or designed in such a manner as to least interfere with traffic movement. No driveway across public property at the right-of-way line of the street shall exceed a width of 22 feet, unless a greater width is specifically approved by the City Engineer. No driveway shall be located closer than 30 feet of the nearest point of the intersection of two streets.
	No observation.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

N/A	(B)(3) Connections between parking lots or reservations of land for future such connections may be required at the discretion of the Planning Director.
	This provision is intended to create cross access driveways, which is not applicable here.
	(B)(4) Required off-street parking spaces shall be so designed, arranged and regulated so that:
Y	(a) Such parking areas are lined or designated to insure the most efficient use of the parking spaces.
	No observation.
Y	(b) Individual spaces on lots with 5 percent average slope or greater are provided with anchored bumper guards or wheel guards. Under no circumstances shall parking spaces be provided on lots in excess of 10 percent slope.
	The steepest slope within the upper parking lot appears to be approximately 10 percent. NOTE: The perpendicular relation between the direction of the 10 percent slope and the orientation of the parking spaces will lead to a lot of door dents.
Y	(c) Parking spaces are unobstructed and have access to an aisle or driveway so that any automobile may be moved without moving another, and so that no maneuvering directly incidental to entering or leaving a parking space shall be on any public right-of-way or walkway, unless otherwise permitted at the direction of the Planning Director.
	Tandem parking spaces are not contemplated in the plans reviewed herein but have been suggested as possible considerations in the design of the off-site parking lot.
Y	(d) With the exception of drive-through windows and related stacking lanes, all parking spaces and maneuvering aisles shall be physically separated from any wall of a building by a vertical curb, maintained planting strip, and/or other suitable barrier.
	No observation.
N/A	(B)(5) Off-street parking spaces may be open to the sky or enclosed in a building. In any instance when a building is constructed or used for parking facilities on the lot, said building shall be treated as any major structure and subject to all requirements thereof.
	No observation.
	(B)(6) All parking lots abutting residential uses or districts, and all parking lots in any district containing more than four (4) spaces shall be subject to the landscaping and screening requirements for such parking lots as set forth in Article 1367, Landscaping and Screening.
	See related comments below under Article 1367.
Y	(B)(7) Any lighting facilities used to illuminate off-street parking areas shall be so located, shielded and directed upon the parking area in such a manner that they do not reflect or cause glare onto adjacent properties or interfere with street traffic. In no instance shall bare, unshaded bulbs be used for such illumination.
	No observation.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

	1365.09 Parking Development Standards – Surfacing and Drainage.
Y	(C)(1) All open off-street parking areas shall be surfaced with an all-weather, dust-free concrete or asphalt material, and shall be maintained in good condition and free of weeds, dirt, trash and debris; except that, a gravel surface may be used for a period not exceeding six months after the date of granting the Certificate of Occupancy where ground conditions are not immediately suitable for permanent surfacing as specified above. Paving will be required for all parking areas. Paving design along with stormwater management will be reviewed and approved by the Morgantown Utility Board (MUB) and the City Engineer at building permit application.
N/A	(C)(2) A gravel surface in the area of storage or handling may be used permanently in association with industries that handle liquids or chemicals which create a potential hazard if containment should be lost and where absorption into the ground through a loose surface material would eliminate or alleviate such hazard. No observation.
Y	(C)(3) Such parking areas shall be graded and properly drained in such a manner that there will be no free flow of water onto either adjacent property or public sidewalks. Further, any run-off generated by such improved areas shall be disposed of in accordance with the stormwater management ordinance and other City regulations. Stormwater management plans will be reviewed and approved by the Morgantown Utility Board (MUB) at building permit application.
N/A	(C)(4) Other surface materials and designs may be utilized when specifically approved by the City Engineer, for purposes of reducing stormwater runoff or other environmental and aesthetic considerations. No observation.
N/A	1365.10 Loading Requirements. The proposed multi-family dwelling use will not receive or transmit goods or wares by truck.

ARTICLE 1367 LANDSCAPING AND SCREENING

	1367.06 General Landscaping Requirements.
N-17	(C) Trees shall be planted to maintain a minimum of ten (10) to fifteen (15) feet clearance between the tree trunk and structures, building overhangs, walls, fences, and other trees. Variance relief should be sought to provide design flexibility concerning the placement of the proposed tree pits along University Avenue given planned improvements to the University Avenue / Third Street intersection.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Y	(D) Plantings should be arranged to promote energy conservation wherever practicable; e.g. use of tall deciduous trees on the south and west sides of buildings to provide shade from the summer sun and planting evergreens on the north of buildings to dissipate the effect of winter winds.
	This appears to be accomplished for Buildings "A" and "B" but not for Building "C". However, the term "should" is a desired design element but not required.
Y	(E) All trash dumpsters, trash pads, loading areas consisting of two or more loading spaces, loading docks, building service and outside storage areas shall be screened from land in a residential zone and must be screened if visible from a public street. Such screening may be achieved by using a minimum six feet high, completely opaque fence or wall, a six feet high berm, or a six foot high evergreen screen. Height of screen shall be measured from the grade of the nearest street.
	No observation.
Y	(F) Grass and other vegetative ground cover shall be used for all open space, including parking lot islands, except for: (1) Decorative mulch planting beds containing tree and/or shrubs; (2) Inert stabilization in areas subject to severe runoff, erosion, or ponding.
	No observation.
Y	(G) Where stone or other inert materials are to be used for ground cover, they shall be specifically identified on the landscape plan. Any area not so designated shall be required to have grass or vegetative ground cover.
	No observation.
Y	(H) All landscaping shall conform to the regulations established for visibility triangles to maintain safe sight distances and intersections and points of access.
	Consultation with the City Engineer will be completed at building permit application.
Y	(I) All landscaped areas at the front line of off-street parking spaces shall be protected from encroachment or intrusion of vehicles.
	Wheel stops will be required for all parking spaces.
Y	(J) In no case may a tree or shrub be planted within a drainage, sewer, or utility easement.
	No observation.
N/A	1367.07 Bufferyard Landscaping Requirements.
	1367.08 Parking Lot Landscaping Requirements.



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Y	<p>1367.08(B)(1) Development with No Parking Between Building Line and Street. A four (4) foot perimeter buffer shall be provided, along the sides and rear yard of the property, that contains at least one two inch (2") caliper tree every twenty (20) feet and at least three (3) shrubs of at least three (3) gallons in size clustered between each two (2) trees.</p>
	No observation.
N-18	<p>1367.08(B)(2) Development with No Parking Between Building Line and Street. If the proposed parking lot contains twenty (20) stalls or more, an additional five (5) percent of the parking lot area shall be reserved for interior landscaping. Planting beds running adjacent to and parallel with the building, perimeter landscaping and buffer requirements shall not count towards this requirement.</p>
	<p>Very little, if any, of the proposed parking areas (upper parking area, parking area between Buildings "A" and "C", or the off-site parking facility) include interior landscaping, which requires variance relief.</p>
N/A	1367.08(C) Development with Parking Between Building Line and Street.
N-19	<p>1367.08(D)(2) All rows of parking spaces, when a lot contains 20 or more parking stalls, shall provide a terminal island with concrete curbs and at least 130 square feet of area to protect parked vehicles, provide visibility, confine moving traffic to aisles and driveways, and provide space for landscaping. These islands may count toward fulfilling the 5 percent internal landscaping requirement.</p>
	<p>A terminal island flanking the parking stall that is parallel with Quay Street is not provided, which requires variance relief.</p>
N-20	<p>1367.08(D)(3) Landscaped islands with concrete curbs and at least 130 square feet of area shall be provided every ten spaces or less within a row of spaces for multi-family residential sites... Planting islands should be evenly spaced throughout the parking lot to consistently shade paved areas. Islands shall be utilized where needed to control vehicular circulation and define major drives. These islands may count toward fulfilling the 5 percent internal landscaping requirement. To prevent cars from parking too close to trees or damaging shrubs, an extended curb or wheel stop must be provided. Planting islands parallel to parking spaces must be a minimum of five feet wide to allow car doors to swing open.</p>
	<p>No landscaped islands are provided in requisite intervals within any of the on-site or off-site parking areas, which requires variance relief.</p>



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

SUMMARY OF REQUIREMENT PLANNING COMMISSION APPROVALS

- Case No. S15-04-III..... Major Development of Significant Impact Site Plan
- Case No. MNS15-03 Minor Subdivision

SUMMARY OF REQUIRED BZA APPROVALS

The requisite approvals identified above (**highlighted in yellow**) are grouped below into specific applications that must be submitted for the development as proposed. The numbers below associate with the superscript numbers above in the left column.

Notations Case Nos.	Code Issues
Conditional Use:	
1, 12, 15, 16 Case No. CU15-03	Private Parking Lot” uses require conditional use approval in the R-3 District [Article 1331.05]. Utilizing an off-site parking facility within 300 feet of the development site to meet minimum parking standards requires conditional use approval.
Variances:	
2 Case No. V15-13	Variance relief to exceed the maximum building height requirement in stories for Building “A” [Article 1339.06(A)].
3, 6 Case No. V15-12	Variance relief from constructing any sidewalk (6-foot minimum width) along the site’s Highview Place frontage [Article 1339.07(F)]. Variance relief from constructing sidewalk the length of the principle site’s University Avenue frontage and to permit a portion of the sidewalk along the front of Building “B” to be used as a fire lane [Article 1361.03(L)].
4 Case No. V15-14	Variance relief to permit Building “C” to be oriented toward the parking area [Article 1361.03(C)].
5, 7, 8 Case No. V15-17	Variance relief from meeting ground floor transparency [Article 1361.03(E)]; meeting fenestration ratio standards for front façade and ground floor [Article 1361.03(O)(1)]; and, recessing windows 4-8 inches [Article 1361.03(O)(6)].
9, 10 Case No. V15-15	Variance relief from natural material standards and ratios [Article 1361.03(P)(1)]; variance relief to use cement fiber paneling and lap siding and brick/stone veneer [Article 1361.03(P)(2)]
11 Case No. V15-19	Variance relief from dedicating at least sixty (60) percent of the ground floor space along University Avenue for commercial use [Article 1361.03(Q)(1)].
13 Case No. V15-16	Variance relief to permit the development of a surface parking lot at the intersections of Jones Avenue / Highview Place, Jones Avenue / Overhill Street, and Overhill Street / Quay Street [Article 1361.03(Q)(4)].
14 Case No. V15-18	Variance relief to access parking areas from the primary street of University Avenue [Article 1361.03(Q)(7)].



PLANNING AND ZONING CODE CONFORMITY REPORT

Planning Division

Notations Case Nos.	Code Issues
17, 18, 19, 20 Case No. V15-11	Variance relief to permit the planting of trees along University Avenue with less than ten (10) to fifteen (15) feet tree trunk clearance from structures, building overhangs, walls, etc. [Article 1367.06(C)]. Variance relief from reserving at least five (5) percent of the parking areas (upper parking area, parking area between Buildings "A" and "C", or the off-site parking facility) for landscaping [Article 1367.08(B)(2)]. Variance relief from providing terminal landscape island(s) [Article 1367.08(D)(2)]. Variance relief from providing landscaped islands of at least 130 square feet every ten (10) parking spaces [Article 1367.08(D)(3)].

Prepared by:

Digitally signed by Christopher M. Fletcher, AICP
Date: 2015.03.06 11:40:57 -05'00'

Director of Development Services
304-284-7431
cfletcher@cityofmorgantown.org



City of Morgantown, West Virginia

APPLICATION FOR TYPE III SITE PLAN REVIEW

CK 10314

OFFICE USE	
CASE NO.	S15-04-111
RECEIVED:	2/6/15
COMPLETE:	

The Morgantown Planning Commission is responsible for approving Type III Site Plan Review Applications. There are two categories of Type III Site Plans Review Applications, 1) Developments of Significant Impact and 2) Major Developments of Significant Impact. Please check the category that best describes your proposed development:

Developments of Significant Impact (DSI):

- Residential Projects:..... 12 to 99 dwelling units
- Commercial Projects: 15,000 square feet of gross floor area
- Office / Institution Projects:.... 15,000 square feet of gross floor area
- Industrial Projects.....0 square feet to 99,999 square feet of gross floor area
- Mixed Use Projects 15,000 square feet of gross floor area

Major Developments of Significant Impact (Major DSI):

- Residential Projects:..... 100 or dwelling units
- Commercial Projects: 100,000 or more square feet of gross floor area
- Office / Institution Projects:.... 100,000 or more square feet of gross floor area
- Industrial Projects..... 100,000 or more square feet of gross floor area
- Mixed Use Projects 100,000 or more square feet of gross floor area

PAID BY: FEB 06 2015 DB

(PLEASE TYPE OR PRINT IN BLACK INK)

I. APPLICANT			
Name:	American Campus Communities	Phone:	512-732-1000
Mailing Address:	12700 Hill Country Blvd, Suite T-200	Mobile:	
	Street Austin Texas 78738	Email:	jdelacruz@americancampus.com
	City State Zip		
II. AGENT / CONTACT INFORMATION			
Name:	Project Management Services / Lisa Mardis	Phone:	304-212-5256
Mailing Address:	160 Fayette Street, Suite 101	Mobile:	304-692-7116
	Street Morgantown WV 26505	Email:	pms160@comcast.net
	City State Zip		
Mailings –	Send all correspondence to (check one): <input checked="" type="checkbox"/> Applicant OR <input type="checkbox"/> Agent/Contact		
III. PROPERTY			
Owner:	American Campus Communities	Phone:	512-732-1000
Mailing Address:	12700 Hill Country Blvd, Suite T-200	Mobile:	
	Street Austin Texas 78738	Email:	jdelacruz@americancampus.com
	City State Zip		



City of Morgantown, West Virginia

APPLICATION FOR TYPE III SITE PLAN REVIEW

OFFICE USE	
CASE NO.	S15-04-III
RECEIVED:	2/16/15
COMPLETE:	

IV. SITE			
Street Address (if assigned):	235 Jones Avenue	Zoning:	R-3 / CSOD / SSOD
Tax Map(s) #:	20 / 14 A	Parcel(s) #:	184, 184.01, 185, 186, 187 / 193
Existing Use of Structure or Land:	Multi-family Residential	MAP 14 A, PARCELS 1 THRU 10.2 MAP 20, PARCELS 200 THRU 208	
Proposed Use of Structure of Land:	Multi-family Residential		
V. STRUCTURE			
Proposed Setbacks: Front:	ft.	Rear:	ft.
Side A:	ft.	Side B:	ft.
Proposed Height of Structure:		No. of Proposed Off-Street Parking Spaces:	227/41
No. of Dwelling Units (if applicable):	134	No. of Bedrooms:	536
No. of Employees:	TBD		
Square Footage of all Proposed Structures (please explain): Building A: 25,332 SF / Building B: 11,276 SF / Building C: 14,139 SF / Community Center: 3,228 SF / Maintenance Building: 910 SF Setbacks and height of each structure: found on plans / all setbacks comply with the zoning regulations			
VI. SITE PLAN REQUIREMENTS			
All applications for Type III Site Plan Review must be accompanied by complete and accurate site plan exhibits that meet the requirements set forth in Article 510.08 of the Zoning Ordinance and provided herein as: Addendum A.....Developments of Significant Impact Addendum B.....Major Developments of Significant Impact			
IX. ATTEST			
I hereby certify that I am the owner of record of the named property, or that this application is authorized by the owner of record and that I have been authorized by the owner to make this application as his/her authorized agent and I agree to conform to all applicable laws of this jurisdiction. I certify that the information submitted herein and attached hereto is true and accurate and understand that if found otherwise may result in the denial of this request or subsequent revocation of any and all related approvals. The undersigned has the power to authorize and does hereby authorize City of Morgantown representatives on official business to enter the subject property as necessary to process the application and enforce related approvals and conditions.			
Lisa Mardis		02/03/2015	
Type/Print Name of Applicant/Agent	Signature of Applicant/Agent	Date	

cyf

- Applicants will be advised of the Technical Review Committee meeting date/time.
- Site Plan Review Fee – \$75 for first \$200,000 in construction costs; \$10 for each additional \$100,000



City of Morgantown, West Virginia
TYPE III SITE PLAN REVIEW ADDENDUM A
DEVELOPMENTS OF SIGNIFICANT IMPACT

Developments of Significant Impact are those that have a citywide impact. Such impacts would typically involve the transportation network, environmental features such as parks or stream corridor, and local schools.

- (1) All applications for a Development of Significant Impact shall be accompanied by the following:
- (a) A site plan (14 copies), drawn to scale, that includes the following for the use of the Planning Director:
 - (i) The actual dimensions, size, square footage, and shape of the lot to be built upon as shown on an actual survey by a licensed land surveyor or registered design professional licensed by the State of West Virginia and as authorized by West Virginia State law, said survey to be provided by the applicant.
 - (ii) The exact sizes and locations on the lot of existing structures, if any.
 - (iii) The location, square footage, and dimensions of the proposed structure or alteration.
 - (iv) The location of the lot with respect to adjacent rights-of-way.
 - (v) The existing and proposed uses of the structure and land.
 - (vi) The number of employees, families, housekeeping units, bedrooms, or rental units the structure is designed to accommodate.
 - (vii) The location and dimensions of off-street parking and means of ingress and egress for such space.
 - (viii) Height of structure;
 - (ix) Setbacks;
 - (x) Buffer yard and screening, if applicable;
 - (xi) Location of garbage collection area and screening;
 - (xii) Location of sign;
 - (xiii) Layout of all internal roadways;
 - (xiv) Location of stormwater management facilities;
 - (xv) Utility lines and easements; and
 - (xvi) Signature of applicant.
 - (b) Grading plans and drainage plans and calculations are not required for Planning Commission site plan review, but shall be required prior to issuance of any building permits. Such plans shall be prepared by a registered design professional licensed by the State of West Virginia, and as authorized by West Virginia State law; and shall also meet all applicable local, state and federal regulations.
 - (c) Parking plan
 - (d) Landscaping plan
 - (e) Sign plan
 - (f) Approved WV Division of Highways Access Permit, if applicable
 - (g) Any other such information concerning the lot or neighboring lots as may be required by the Planning Director to determine conformance with, and provide for the enforcement of, this ordinance; where deemed necessary, the Planning Director may require that in



City of Morgantown, West Virginia
TYPE III SITE PLAN REVIEW ADDENDUM A
DEVELOPMENTS OF SIGNIFICANT IMPACT

the case of accessory structures or minor additions, all dimensions shown on plans relating to the size of the lot and the location of the structure(s) thereon be based on an actual survey by a registered land surveyor or registered design professional licensed by the State of West Virginia and as authorized by West Virginia State law, said survey to be provided by the applicant.

- (3) The Planning Director may require that the lot and location of the building(s) thereon shall be staked out on the ground before construction.
- (4) For uses which, in the opinion of the City Engineer, may create excessive negative traffic impacts on dedicated City streets in the immediate vicinity that serve the use, the City may require an analysis of the proposed development's impact on current or future traffic flows, at the developer's expense, prepared by a qualified professional engineer. The Planning Commission may also table consideration of a development and refer such development to the City Engineer to ask his or her opinion as to whether a traffic study may be warranted. If the study indicates that the projected traffic impact of the use would result in a two (2) full letter grade decline in the existing Level of Service (e.g., going from a Level of Service B to a Level of Service D) of any dedicated City street directly serving the use, such finding *may* be considered sufficient grounds for denial of the project, or a requirement that sufficient improvements be made to said streets, at the developer's expense, or that the project be reduced in size and scope to the point where no such negative impact on the Level of Service results. Level of Service refers to the traffic grading system described in the latest edition of the Highway Capacity Manual, published by the Transportation Research Board.
- (5) Site plans approved by the Planning Commission authorize only the use, arrangement, and construction set forth in such approved site plans and no other use, arrangement or construction. Furthermore, the approval of a site plan shall not be construed to be approval of any violation of the provisions of this ordinance. The issuance of a building permit based upon site plans given approval by the Planning Commission shall not prevent the Planning Director from thereafter requiring the correction of errors in said site plans or from preventing operations from being carried on thereunder when in violation with this ordinance. Site plan approval does not eliminate the need to obtain an approved building permit and the applicant's responsibility to meet all other requirements established by local, state and federal regulations.
- (6) One copy of the site plan submitted for a permit to the Planning Department shall be returned to the applicant after the Planning Director has marked such copy as either approved or disapproved as to the provisions of this ordinance and attested to same by his signature on such copy. The original, similarly marked, shall be retained by the Planning Director.

I hereby certify that I have read the site plan submission requirements provided herein and understand that failure to submit said exhibits constitutes an incomplete application which will result in application review delays.		
Lisa Mardis		02/03/2015
Type/Print Name of Applicant/Agent	Signature of Applicant/Agent	Date



City of Morgantown, West Virginia

**TYPE III SITE PLAN REVIEW ADDENDUM B
MAJOR DEVELOPMENTS OF SIGNIFICANT IMPACT**

The review process for all **Major Developments of Significant Impact** shall be identical to that for Developments of Significant Impact, except as otherwise noted in the plan submission requirements listed below.

Major Developments of Significant Impact are those that are of such scope and scale that they have an impact on the region in terms of the transportation network, the environment, the schools, etc. Such projects could include regional shopping centers and large scale residential developments. **All** applications for a **Major Development of Significant Impact** shall be accompanied by a site plan submitted under the seal and signature of a registered design professional licensed by the State of West Virginia and as authorized by West Virginia State law. All sheets shall be 24" x 36" size drawn to scale at a minimum 1"=50' and a maximum 1"=10' with the exception of the maps on Sheet One, unless otherwise approved by the City Engineer. Eighteen (18) copies of the site plans shall be submitted for review and shall observe the following format:

(1) Sheet One (Title Sheet)

The following information shall be submitted as part of Sheet One:

- (a) Full legal description with sufficient reference to section corners and boundary map of the subject project, including appropriate benchmark references;
- (b) Name of the project;
- (c) Name and address of the owner, developer, and person who prepared the plans;
- (d) Total acreage within the project and the number of residential dwelling units or the gross square footage of non-residential buildings whichever is applicable;
- (e) Existing zoning of the subject land and all adjacent lands;
- (f) Boundary lines of adjacent tracts of land, showing owners of record;
- (g) A key or vicinity map at a scale of one inch equals four hundred feet or less, showing the boundaries of the proposed project and covering the general area within which it is to be located;
- (h) A statement of the proposed uses, stating the type and size of residential and non-residential buildings, and the type of business, commercial or industry, so as to reveal the effect of the project on traffic, fire hazards, or congestion of population;
- (i) Any existing or proposed covenants and restrictions affecting property owners and/or homeowners associations; and
- (j) Statement of proposed starting and completion dates for the project, including any proposed phasing and sequencing.

(2) Sheet Two (Existing Site Conditions)

The following information shall be submitted as part of Sheet Two:

- (a) Location, widths, and type of construction of all existing streets, street names, alleys, or other public ways and easements, street classifications as per the approved regional transportation plan, railroad and utility rights-of-way or easements, parks, wooded areas, cemeteries, watercourses, drainage ditches, designated wetlands, low areas subject to



City of Morgantown, West Virginia

**TYPE III SITE PLAN REVIEW ADDENDUM B
MAJOR DEVELOPMENTS OF SIGNIFICANT IMPACT**

flooding, permanent buildings, bridges, and other data considered pertinent by the Planning Commission or the Planning Director for the subject land, and within three hundred (300) feet of the proposed project;

- (b) Existing water mains, fire hydrants, storm sewers, sanitary sewers, culverts, bridges, and other utility structures or facilities within, adjacent to, or serving the subject land, including pipe sizes, grades, and exact locations, as can best be obtained from public or private records;
- (c) Existing contours based in U.S.G.S. datum with intervals of not more than two (2) feet. Elevations shall be based on sea level datum; and
- (d) The water elevation at the date of the survey of rivers, lakes, streams, or designated wetlands within the project or affecting it, as well as the approximate high and low water elevation of such rivers, lakes, streams, or designated wetlands. The plan shall also show the boundary line of the regulatory 100-year flood. The plan shall also show the base flood elevation of the regulatory 100-year flood at any building location along with the elevation of the lowest finished floor. All elevations shall be based on sea level datum;

(3) Sheet Three (Proposed Site Conditions)

The following information shall be submitted as part of Sheet Three:

- (a) Location, widths, and type of construction of all existing and proposed streets, street names, alleys, or other public ways and easements, railroad and utility rights-of-way or easements, parks, wooded areas, cemeteries, watercourses, drainage ditches, designated wetlands, low areas subject to flooding, permanent buildings, bridges, and other data considered pertinent by the Planning Commission or the Planning Director for the subject land, and within three hundred (300) feet of the proposed project;
- (b) Existing and proposed water mains, fire hydrants, storm sewers, sanitary sewers, culverts, bridges, and other utility structures or facilities within, adjacent to, or serving the subject land, including pipe sizes, grades, and exact locations, as can best be obtained from public or private records;
- (c) Building setback lines, showing dimensions;
- (d) Full description and details, including engineering calculations, for provision of storm water drainage plans and facilities, as required by the City's stormwater management ordinance;
- (e) Internal and perimeter sidewalk system/pedestrian circulation plan; and
- (f) Proposed contours with intervals of not more than two (2) feet. The plan shall also show the contour line for the floodway fringe boundary.
- (g) Show the location and detail plans for all trash dumpsters.



City of Morgantown, West Virginia
TYPE III SITE PLAN REVIEW ADDENDUM B
MAJOR DEVELOPMENTS OF SIGNIFICANT IMPACT

(4) Sheet Four (Erosion Control Plan)

The following information shall be submitted as part of Sheet Four and shall be reviewed prior to issuance of a building permit:

- (a) Location, widths, and type of construction of all existing and proposed streets, street names, alleys, or other public ways and easements, railroad and utility rights-of-way or easements, parks, wooded areas, cemeteries, watercourses, drainage ditches, designated wetlands, low areas subject to flooding, permanent buildings, bridges, and other data considered pertinent by the Planning Commission or the Planning Director for the subject land, and within three hundred (300) feet of the proposed project;
- (b) Proposed contours with intervals of not more than two (2) feet.
- (c) Details of terrain and area drainage, including the identity and location of watercourses, intermittent and perennial streams, receiving waters, and springs, and the total acreage of land that will be disturbed.
- (d) The direction of drainage flow and the approximate grade of all existing or proposed streets.
- (e) Detailed plans and locations of all surface and subsurface drainage devices, walls, dams, sediment basins, storage reservoirs, and other protective devices to be constructed with, or as part of, the proposed project, together with a map showing drainage area, the complete drainage network, including outfall lines and natural drainage ways which may be affected by the proposed development, and the estimated runoff of the area served by the drains.
- (f) A description of the methods to be employed in disposing of soil and other material that is removed from the grading site, including the location of the disposal site.
- (g) Measures for soil erosion and sediment control which must meet or exceed the methods and standards adopted by the West Virginia Department of Natural Resources and/or set forth in the West Virginia Handbook For Erosion Control in Developing Areas and which must comply with the design principles, performance standards, and requirements set forth in this chapter.
- (h) A schedule of the sequence of installation of planned erosion and sediment control measures as related to the progress of the project, including the total area of soil surface that is to be disturbed during each stage, the anticipated starting and completion dates, and a schedule for the maintenance of such measures.
- (i) Include the following notes on the sheet:
 - (i) "All erosion control practices shall be in accordance with the WVDNR "West Virginia Handbook For Erosion Control In Developing Areas" dated October 1992 and the SCS "Field Office Technical Guide."
 - (ii) "The City Engineer has the right to require additional erosion control measures in the field as conditions warrant."
- (j) Copies of the letter of intent and response from the Monongalia County Soil and Water Conservation District office for compliance, when required.
- (k) Any other information reasonably required by the Planning Commission or Planning Director to properly evaluate the plan.

SF5-04-FIT



City of Morgantown, West Virginia
TYPE III SITE PLAN REVIEW ADDENDUM B
MAJOR DEVELOPMENTS OF SIGNIFICANT IMPACT

(5) **Sheet Five (Landscape Plan)**

A landscape plan prepared to the standards specified in this zoning ordinance.

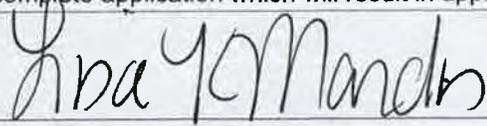
(6) **Sheet Six (Plat-like dedication sheet, if necessary)**

The following information shall be submitted as part of Sheet Five if a plat-like dedication document for easements and rights-of-way is deemed necessary by the Planning Commission or its authorized designee:

- (a) Parcels of land proposed to be dedicated or reserved for public use, or reserved for common use of all property owners within the project, with the proposed conditions and maintenance requirements, if any, shall be designated as such and clearly labeled on the plans;
 - (i) Radii, internal angles, points of curvature; tangent bearings and lengths of all arcs, chord, and chord bearings; and
 - (ii) Accurate location of all survey monuments erected, corners and other points established in the field in their proper places.

(7) **All sheets shall contain the following information:**

- (a) The proposed name by which the project shall be legally and commonly known;
- (b) Date of survey, scale, and north point;
- (c) All lots or outlots intended for sale or lease shall be designated with boundary lines and numbered or labeled for identification purposes;
- (d) Private parks, common areas, or excluded parcels shall be designated as such and clearly labeled on the plans;
- (e) A traffic impact study, if required by the City Engineer;
- (f) Such other information as may be deemed necessary for proper review of the site plan by the Planning Director, City Engineer, or Planning Commission;
- (g) All necessary reference points tying the subject property to the appropriate section corners;
- (h) Each sheet shall be sealed and signed by the professional preparing the drawings;
- (i) All sheets shall be tied to state plane coordinates for horizontal and vertical controls;
- (j) Names and addresses of the parties within 200 feet of the property; and,
- (k) The applicant must provide self-addressed stamped envelopes in sufficient quantities to provide notification to the parties identified in the item above. Return address is not required.

I hereby certify that I have read the site plan submission requirements provided herein and understand that failure to submit said exhibits constitutes an incomplete application which will result in application review delays.		
Lisa Mardis		02/03/2015
Type/Print Name of Applicant/Agent	Signature of Applicant/Agent	Date

Prepared for

Potesta Associates

125 Lakeview Drive
Morgantown, WV 26508

TRANSPORTATION IMPACT STUDY FOR

American Campus Community
Sunnyside Commons
Morgantown
Monongalia County, West Virginia

October 2014

Prepared by

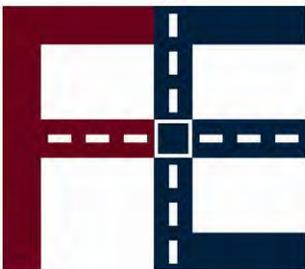
FRENCH ENGINEERING, LLC

7 North Morgantown Street
Fairchance, PA 15436

Ph: 724-564-8013

Fx: 724-564-8037

www.frenchengr.com



EXECUTIVE SUMMARY

This study is to assess the impacts of a student housing redevelopment project in the Sunnyside area of the City of Morgantown, Monongalia County. The proposed development includes 536 beds in the area between University Avenue and Jones Avenue north of Third Street and south of Highview Place. The facility will provide parking in surface lots with all spaces intended for usage by the tenants. The existing access to University Avenue will be relocated to a point approximately 550-ft north of Third Street, which is further from Third Street than the existing driveway. The existing access to Quay Street, in which the street currently runs into the south side of the site and terminates as a site driveway, will be maintained. The existing site access to Jones Avenue will be closed. The site is currently occupied by a student housing development by American Campus Community named Sunnyside Commons. Full build-out of this proposed development is expected by 2016.

Traffic counts were collected at the study on September 30 (Tuesday) and October 1 (Wednesday) of 2014. Background volumes were increased at a rate of 1.6% per year for two years, as directed by the City of Morgantown.

Trip generation was performed using the 9th edition of ITE Trip Generation. It was determined that the new site would generate a total of 150 trips in the AM peak hour and 214 trips in the PM peak hour. Pedestrian traffic was assumed to 50% of the external trips, and amounted to 75 and 107 trips in the AM and PM peaks respectively.

The overall vehicular trip distribution / traffic assignment was assumed to be split 50/50 between the Evansdale Campus to the north and the Downtown Campus to the south. The assignment of these two major flows was split again 50/50 between Jones Avenue and University Avenue, both of which run north-south.

Level of service analyses were conducted using the Highway Capacity Manual (HCM) methods contained in Synchro 8 for all of the study intersections. The “Existing” and “2016 Baseline” and “2016 With Development” scenarios were assessed. Queuing analysis was conducted on all existing and proposed turning lanes utilizing the 95% queue projections from Synchro 8.

The following are the key findings and recommendations of this study:

- The primary traffic concern in the study area is the long queue extending back University Avenue from the Stewart Street / College Avenue intersection. These queues extend through the project site in the peak hours and, as an existing condition, are beyond the scope of this study.
- A secondary concern is the level of service (LOS) of the side roads at the intersection of University Avenue at North Street. The LOS at this intersection is currently poor and not significantly impacted by the proposed development. Improvements to improve the LOS are likely not desired by the community, as this traffic is considered cut-through traffic to

avoid the queues on University Avenue. Improvements that increase the capacity for this traffic may be viewed as encouraging more of this traffic.

- In general, the street grid surrounding the proposed development is a system of unsignalized intersections with single lane approaches on each leg. These intersections operate at a high LOS due to the low traffic volumes. The primary concern with the grid system is the topography that results in a steep grade running downhill from east to west. Again, this is an existing condition that can not be corrected within the scope of this development.
- There are no LOS- or capacity-related issues expected at any of the driveway intersections with the public street system.
- A concern raised by the City is whether Jones Avenue between Overhill Street and North Avenue is reaching its capacity for cut-through traffic originating in the student housing projects along University Avenue near the Stewart Street / Campus Drive intersection. It is estimated--based on the current volumes of traffic making right-turns into Jones from North and left-turns onto North from Jones--that currently there are approximately 50 to 100 vph cutting through on Jones during the peak hours. The traffic assignment for the proposed development assigns 20 to 25 vph to this movement. However, it must be noted that this site, once redeveloped, will be less likely to contribute cut through traffic to Jones since its existing access to Jones Avenue is being eliminated. Furthermore, considering the near-to-overcapacity conditions projected for North Avenue at University Avenue, making a right-turn out of the site driveway directly onto northbound University Avenue will be much more convenient than using Jones. It is anticipated that the net effect of the redevelopment project on Jones traffic will be negligible. In all likelihood, less traffic from this parcel is likely to use Jones after it is redeveloped. In short, any issues on Jones Avenue are existing conditions that will not be negatively impacted by the proposed redevelopment and should not be the responsibility of the developer to address.
- The proposed developer activities, as they relate to the transportation network, are as follows:
 - Relocate the existing driveway to University Avenue to the north to the location shown on the site plan.
 - Close the existing access to Jones Avenue.
 - Maintain the current access at the end of Quay Street.

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 EXISTING VOLUMES	3
3.0 TRAFFIC PROJECTIONS	8
4.0 TRAFFIC ANALYSES	14
5.0 SUMMARY AND RECOMMENDED DEVELOPER ACTIVITIES	17
APPENDIX A – TRAFFIC DATABASE	A-1
APPENDIX B – HCM (SYNCHRO) PRINTOUTS	B-1
APPENDIX C - PHOTOGRAPHS	C-1

LIST OF FIGURES

	<u>Page</u>
FIGURE 1 - LOCATION MAP.....	2
FIGURE 2 - 2014 EXISTING AM PEAK HOUR VOLUMES.....	4
FIGURE 3 - 2014 EXISTING PM PEAK HOUR VOLUMES.....	5
FIGURE 4 – 2016 AM BASELINE PEAK HOUR VOLUMES	6
FIGURE 5 – 2016 PM BASELINE PEAK HOUR VOLUMES	7
FIGURE 6 – NEW TRIPS – AM PEAK	10
FIGURE 7 – NEW TRIPS – PM PEAK.....	11
FIGURE 10 – AM PEAK TRAFFIC ASSIGNMENT WITH PROPOSED DEVELOPMENT ..	12
FIGURE 11 – PM PEAK TRAFFIC ASSIGNMENT WITH PROPOSED DEVELOPMENT ..	13

1.0 INTRODUCTION

1.1 Purpose of Report

This study is to assess the impacts of a student housing redevelopment project in the Sunnyside area of the City of Morgantown, Monongalia County. See Figure 1 for a Location Map. The Site Plan has been provided as an attachment to this report. The report presents existing and anticipated traffic volumes on the adjacent road network and the existing and expected level of service (LOS).

1.2 Proposed Site Development

The proposed redevelopment is for the parcel currently occupied by Sunnyside Commons (American Campus Community). The development is currently a student housing project and will remain so after redevelopment. It will have 536 beds and surface parking intended for residents only.

1.3 Site Access Conditions

The site currently has three access points to the public street system:

- University Avenue: This driveway will be relocated to the north to be approximately 550-ft north of Third Street.
- Quay Street: Quay Street will continue to terminate at the site driveway on the north side of Quay / south side of the property.
- Jones Avenue: This access point will be eliminated.

1.4 Study Intersections

The intersections studied include the following:

- University Avenue at:
 - North Avenue
 - Third Street
 - Overhill Street
 - Stewart Street / Campus Drive
- Jones Avenue at:
 - Stewart Street
 - Overhill Street
 - North Avenue
- Overhill Street at Quay Street

Along University Avenue, the intersection spacing is as follows:

- North Avenue to Third Street = approximately 1970-ft
- Third Street to Overhill Street = approximately 380-ft

- Overhill Street to Stewart Street / Campus Drive = approximately 790-ft

Along Jones Avenue, the intersection spacing is as follows:

- North Avenue to Overhill Street = approximately 1830-ft
- Overhill Street to Stewart Street = approximately 830-ft

Along Stewart Street, it is approximately 330-ft from University Avenue to Jones Avenue

Along Overhill Street, the intersection spacing is as follows:

- University Avenue to Quay Street = approximately 175-ft
- Quay Street to Jones Avenue = approximately 140-ft

The speed limit on University Avenue is 35 mph in this area.

1.5 Build-Out Year

Full build-out of this proposed development is expected by 2016. As provided by the City via email, the current growth rate is 1.6% annually. As such, a growth factor of 1.03 was applied to the background 2014 traffic volumes to project them to the opening year of 2016.

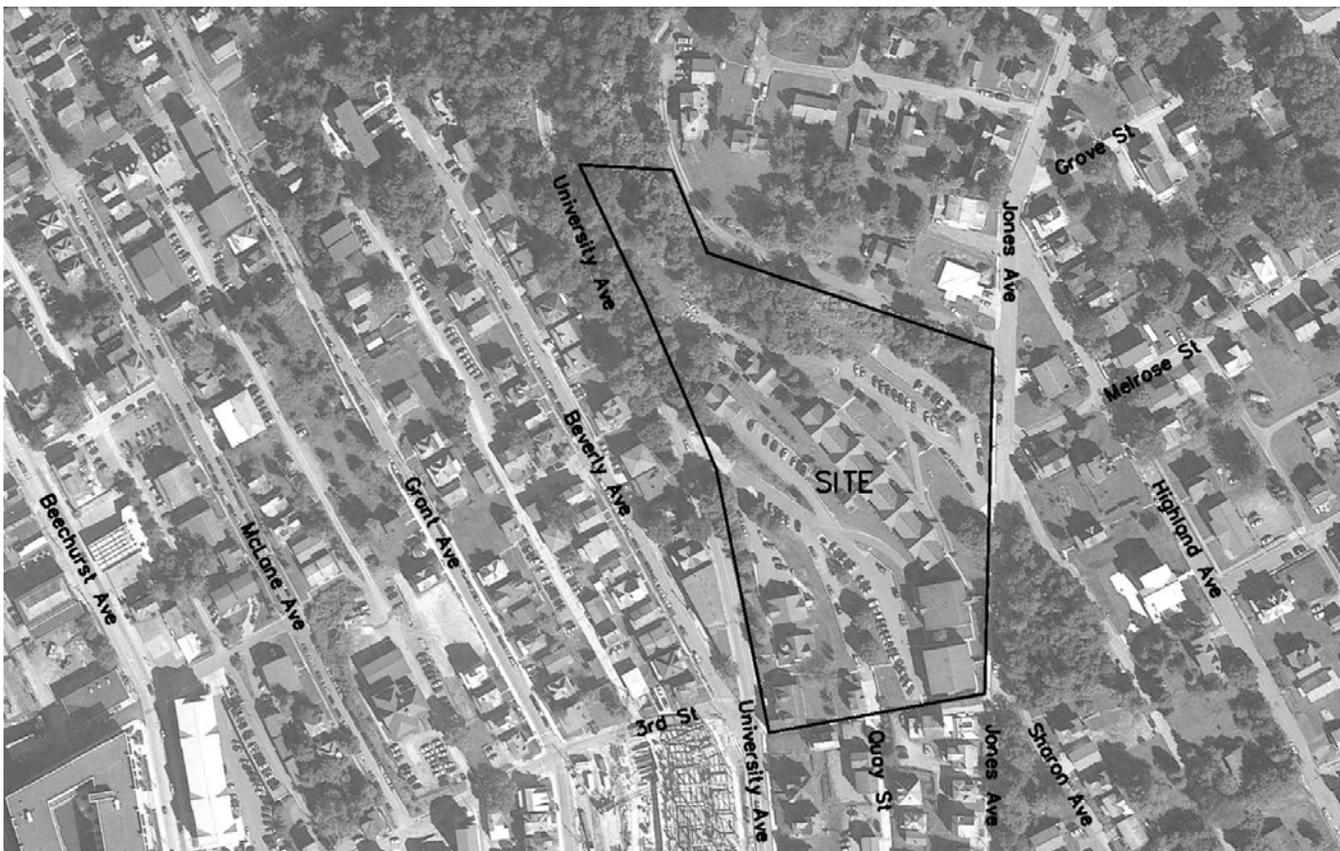


Figure 1 – Location Map

2.0 EXISTING VOLUMES

Traffic counts were collected at the study intersections along on September 30 (Tuesday) and October 1 (Wednesday) of 2014 from 7 AM to 9 AM and 4 PM to 6 PM

The peak hours for traffic on University Avenue past the site were 7:30 to 8:30 AM and 4:15 to 5:15 PM. The existing AM and PM peak hour turning movement counts at the study intersections are shown in Figures 2 and 3 respectively. Appendix A contains the full set of turning movement count data. The 1.03 growth factor was applied to the 2014 data to arrive at the 2016 Baseline, which is presented in Figures 4 and 5.

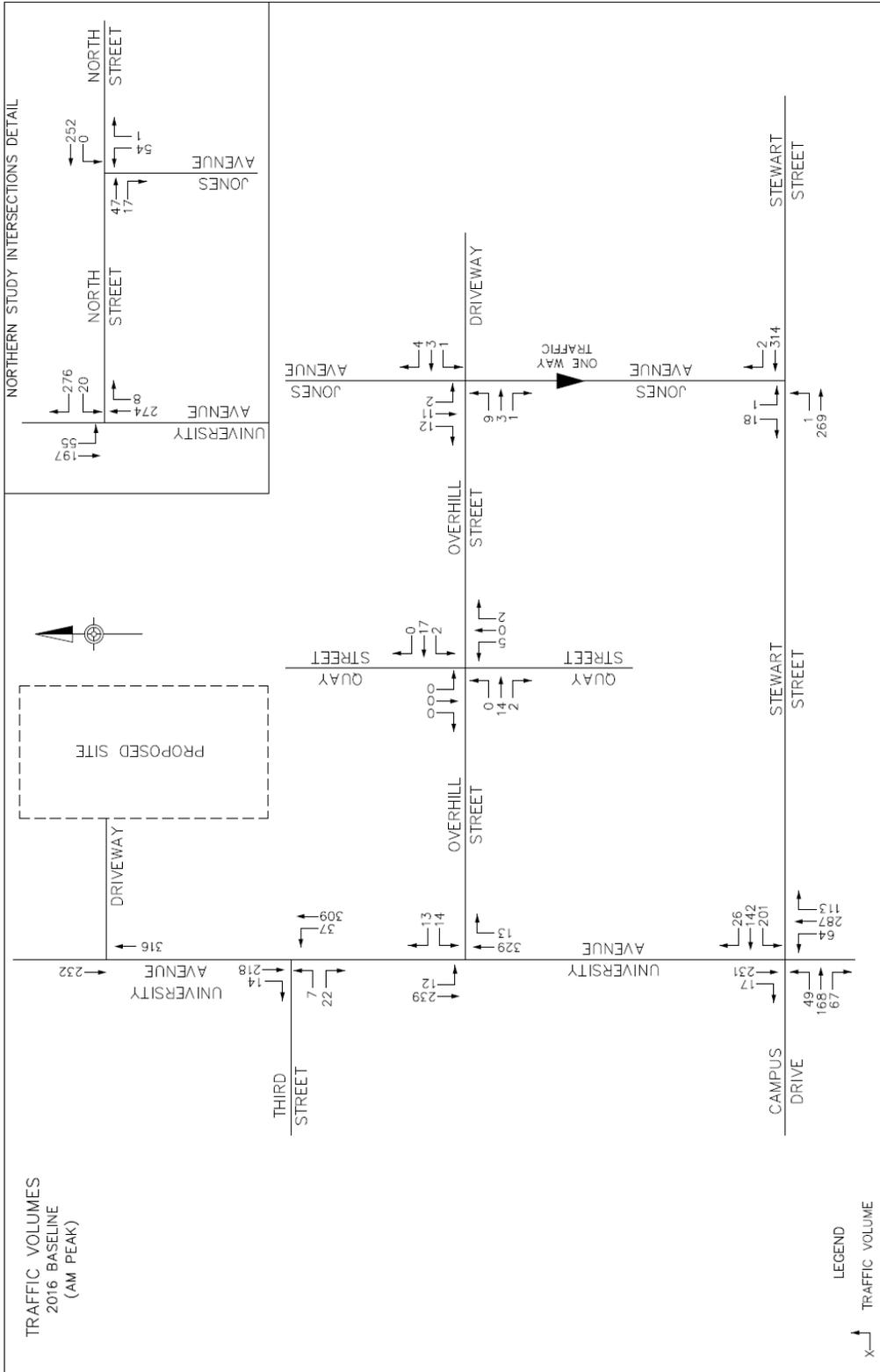


Figure 4 – 2016 AM Baseline (Without Development) Peak Hour Volumes

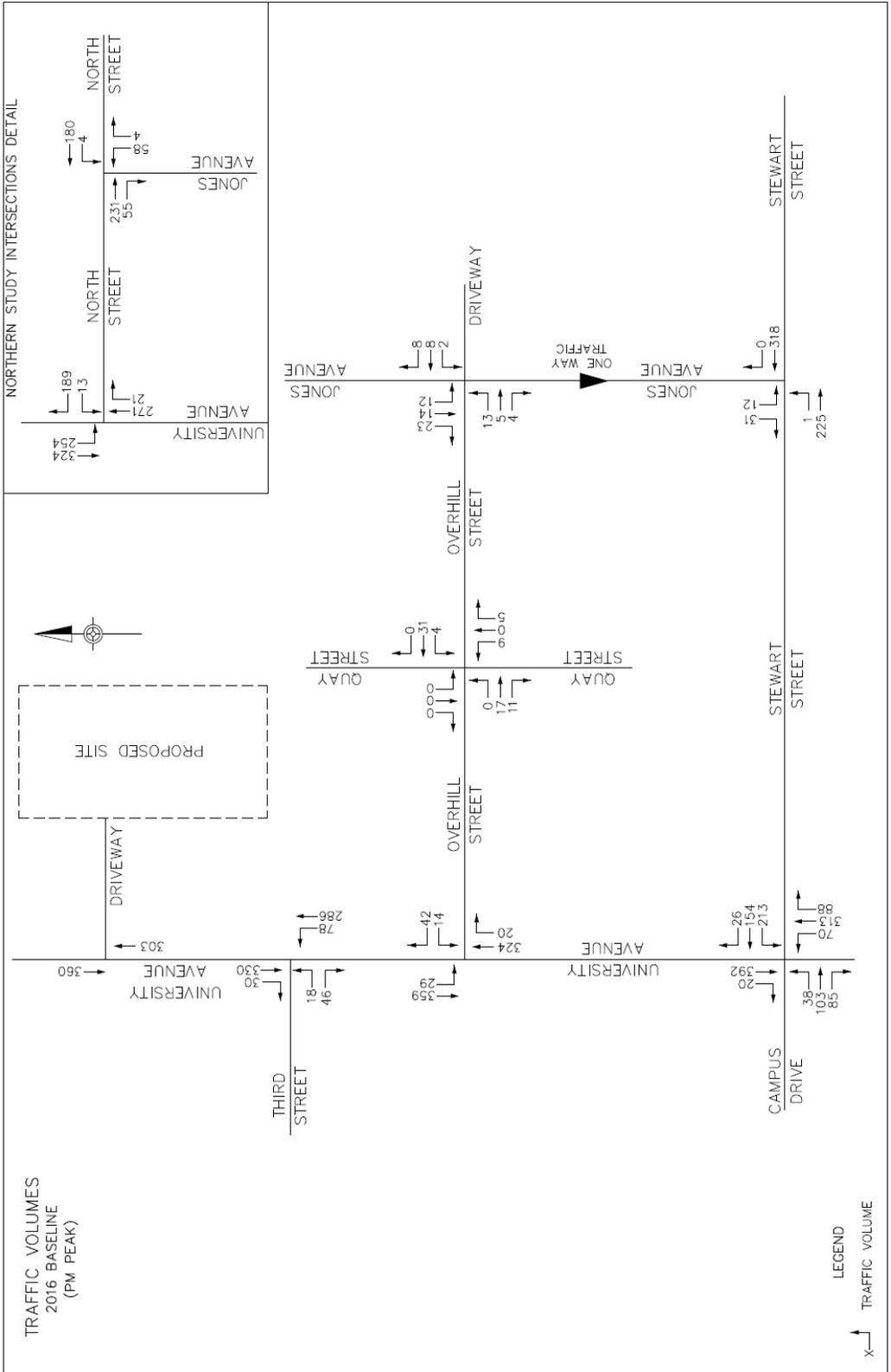


Figure 5 – 2016 PM Baseline (Without Development) Peak Hour Volumes

3.0 TRAFFIC PROJECTIONS

3.1 Trip Generation

The trip generation rates were obtained from the Institute of Transportation Engineers' (ITE) Trip Generation, 9th Edition. Land Use #220 –Apartment was the only land use required for the proposed redevelopment project. Pedestrian traffic was assumed to 50% of the external trips. There were no internal capture or pass-by trips assumed. There were no trip credits assumed for the existing student housing on the property. As such, the study is considered conservative.

Table 1 shows the peak hour trip generation rates for Land Use #220. Table 2 shows the trip generation results for the proposed development.

Table 1 - Trip Generation Rates from ITE Trip Generation (9th Edition)

Land Use	Trip Generation Rate Per Person		Percent In/Out	
	AM Peak	PM Peak	AM Peak	PM Peak
Apartment (220)	0.28	0.40	20/80	65/35

Table 2 - Trip Generation Results

Land Use	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Apartments	30	120	150	139	75	214
Pedestrian	15	60	75	70	38	107
Total Vehicular Trips	15	60	75	70	38	107

Note: Numbers may not add due to rounding.

3.2 Trip Distribution

The overall distribution of the vehicular trips was assumed as follows:

- 50% to/from the Evansdale Campus to North
- 50% to/from the Downtown Campus to the South

The assignment of these two major flows was split again 50/50 between Jones Avenue and University Avenue, both of which run north-south.

The new trips generated by the site are shown in Figures 6 and 7.

3.3 Traffic Assignment

Figures 7 and 8 show the estimated peak hour turning movement volumes for the “With Development” scenario.

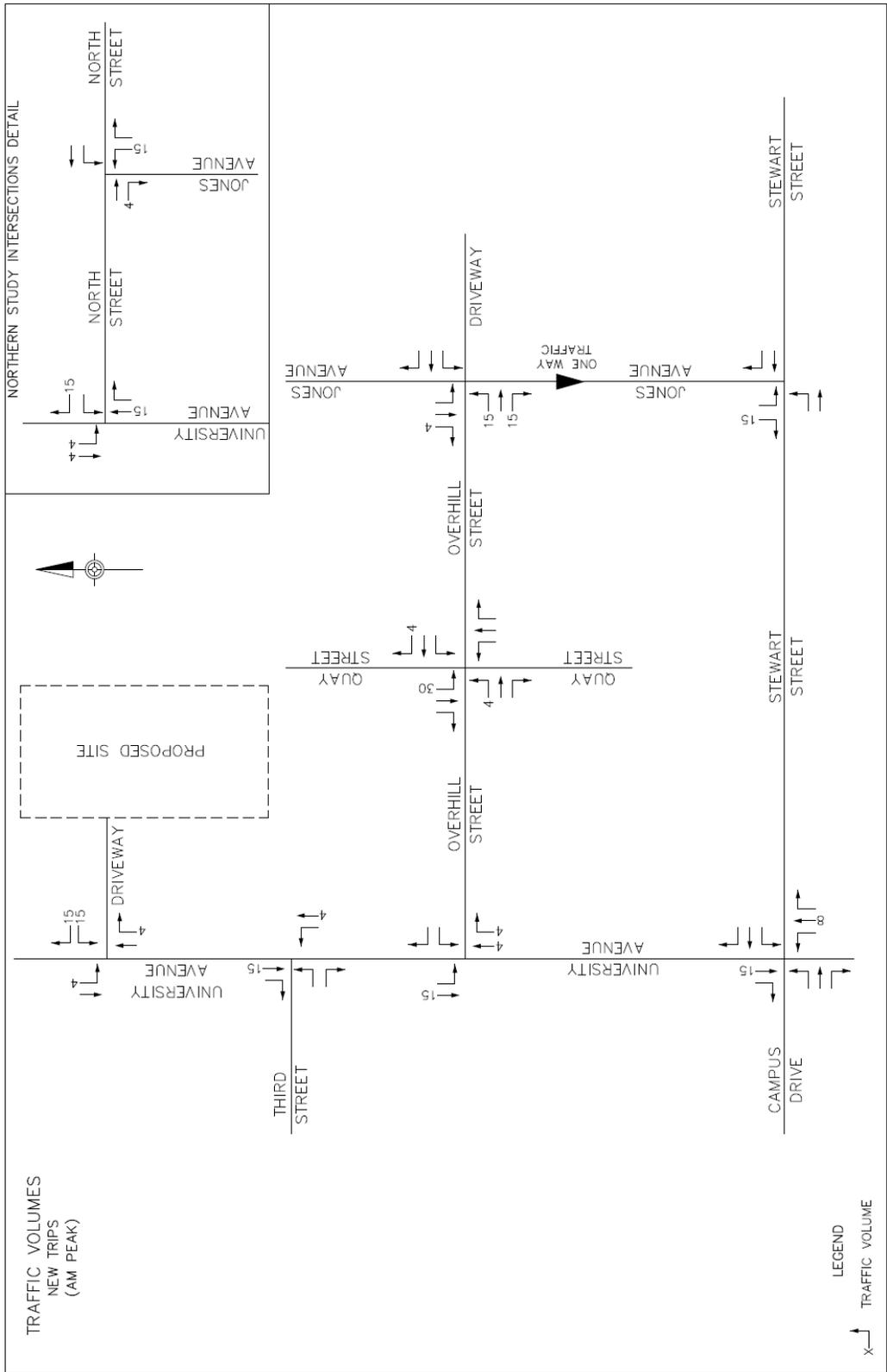


Figure 6 – New Trips – AM Peak

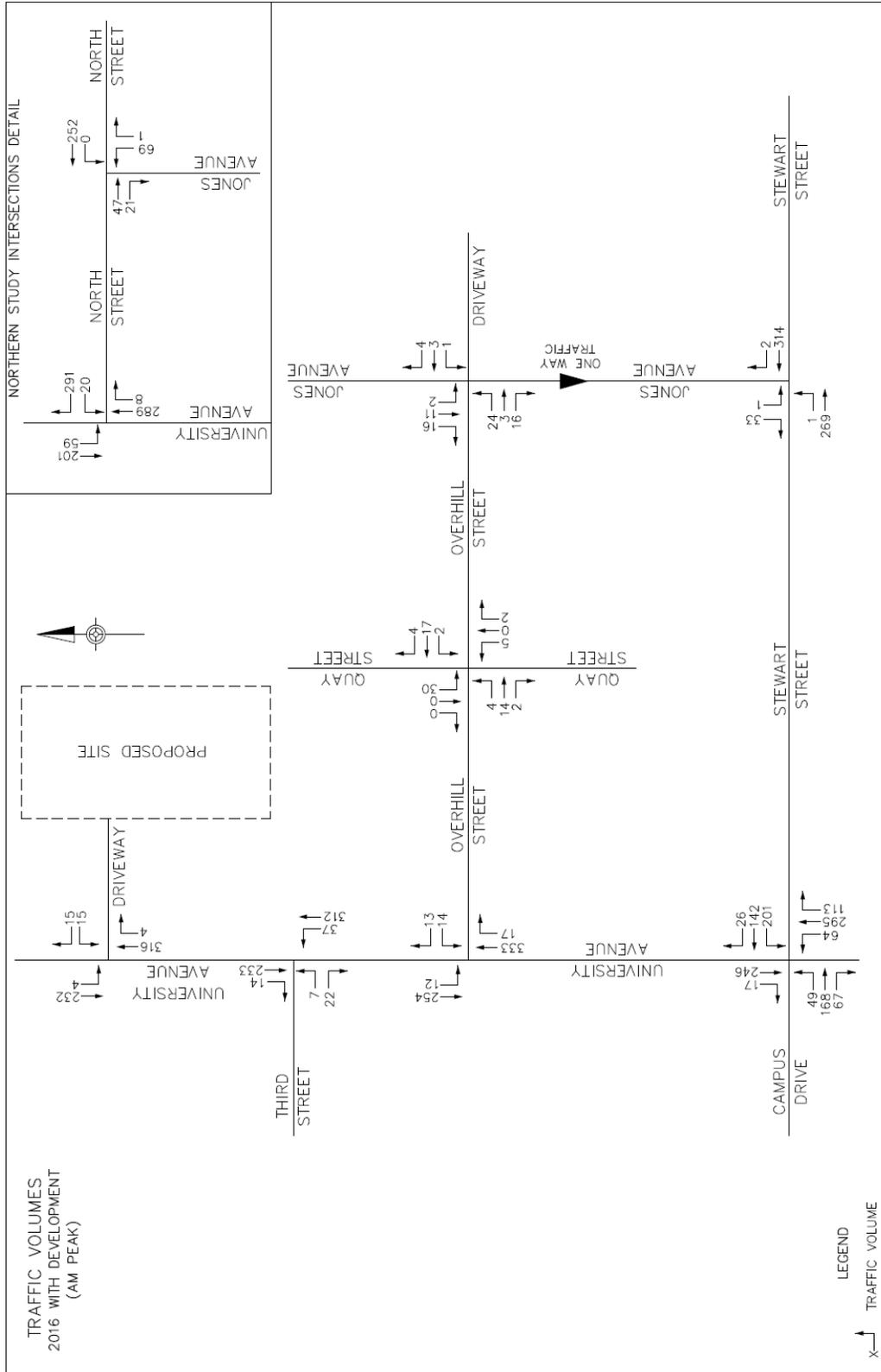


Figure 8 – AM Peak Traffic Assignment with Proposed Development

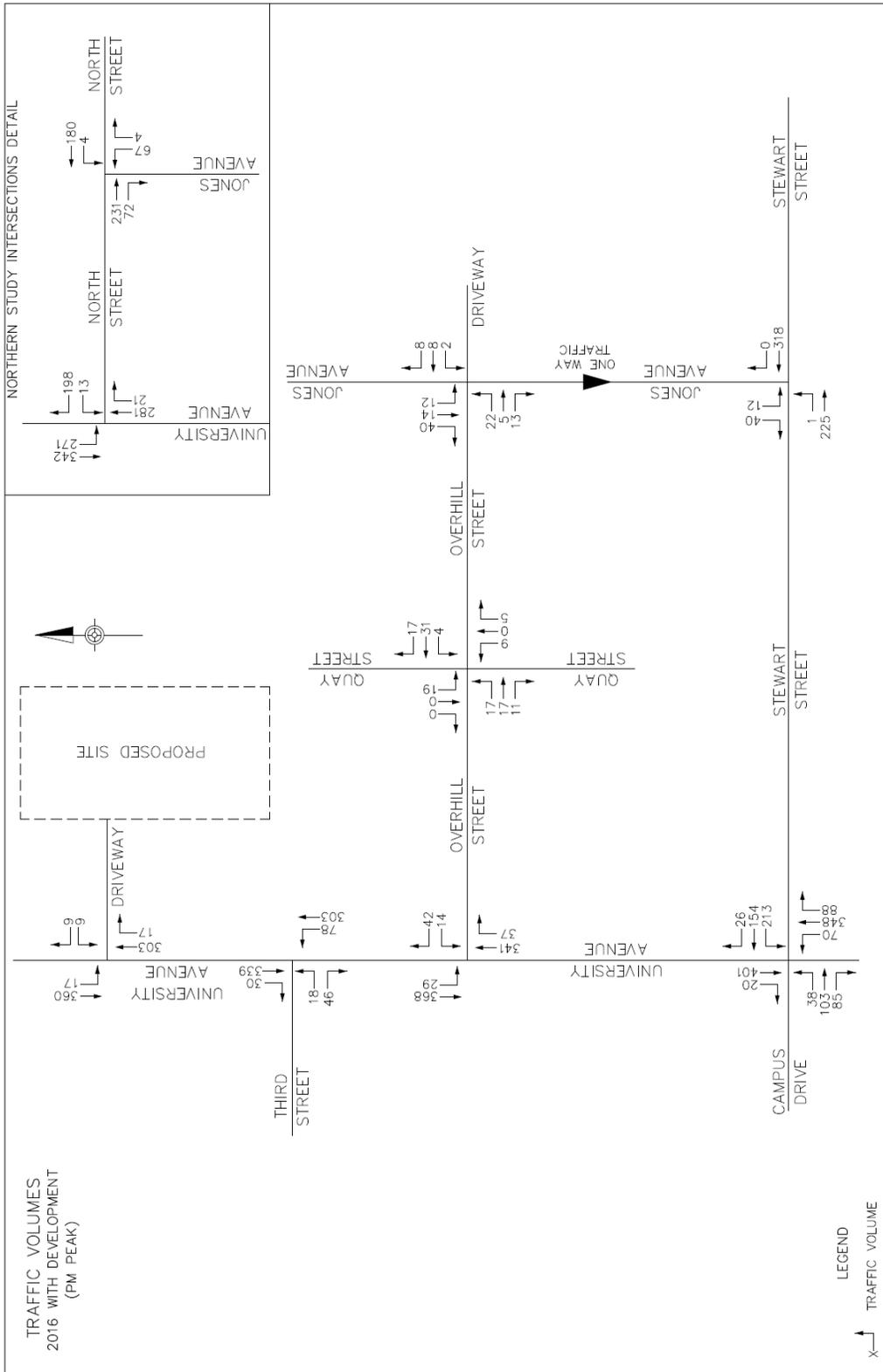


Figure 9 – PM Peak Traffic Assignment with Proposed Development

4.0 TRAFFIC ANALYSES

4.1 Level of Service (LOS) Analysis

Level of service (LOS) analyses were conducted for all of the intersections for which projections were made. The “2014 Existing”, “2016 Baseline” and “2016 With Development” scenarios were analyzed. The latest version of Synchro 8, which performs the LOS computations in accordance with the Highway Capacity Manual (HCM), was utilized for these analyses. All HCM analyses were performed in accordance with WVDOH Traffic Engineering Directive (TED) 106-2, dated November 10, 2010. The capacity analysis results are summarized in Table 3 and the Synchro - HCM printouts are provided in Appendix B.

Anecdotally, it is known that during the peak times, a long queue extends back up University Avenue from the Stewart Street / Campus Drive intersection. During peak times, it has an impact on turning in and out of side streets because it blocks these intersections. While this queue likely represents the most significant traffic issue in the study area, it is an existing problem that to alleviate would require significant changes and investment in the network that are beyond the scope of this study and development’s reach.

Other than the queuing issues on University Avenue, the network is largely a grid system of unsignalized intersections with a single lane serving each direction of travel. Traffic volumes are not heavy and in general, levels of service are high. The most significant issue facing the street system at this time is the steep grade running downhill from east to west, and less significantly from north to south. The proposed development does not have any significant impact on LOS in the area, and clearly will not impact the grades involved.

The one exception occurs at the intersection of North Avenue and University Avenue. Currently, some trips in and out of the Jones Avenue / Overhill Street area utilize Jones Avenue to bypass congestion on University Avenue. This traffic causes poor a LOS on the North Avenue approach to this intersection. It is unlikely that the proposed development will add any traffic to this flow, and it is not expected that the proposed development will alter the LOS or significantly change any existing operational patterns.

Table 4 – Summary of LOS Results

Intersection	Movement	AM (LOS)			PM (LOS)		
		2014 Existing	2016 Base	2016 With Development	2014 Existing	2016 Base	2016 With Development
Stewart Street & Jones Avenue	SB Jones	B	B	B	B	B	B
	Overall Int	A	A	A	A	A	A
Stewart St / Campus Dr & University Ave	EB Campus	D	E	E	E	E	E
	WB Stewart	D	E	E	D	D	D
	NB Univ	E	E	E	C	C	C
	SB Univ	C	D	D	D	D	D
	Overall Int	D	E	E	D	D	D
Overhill Street & University Avenue	WB Overhill	B	B	B	B	B	B
	SB Univ LT	A	A	A	A	A	A
	Overall Int	A	A	A	A	A	A
Overhill Street & Quay Street	EB Overhill LT	A	A	A	A	A	A
	WB Overhill LT	A	A	A	A	A	A
	NB Quay	A	A	A	A	A	A
	SB Quay	A	A	A	A	A	A
	Overall Int	A	A	A	A	A	A
Overhill Street & Jones Avenue / Driveway	EB Overhill	A	A	A	A	A	A
	WB Driveway	A	A	A	A	A	A
	SB Jones	A	A	A	A	A	A
	Overall Int	A	A	A	A	A	A
University Avenue & Third Street	EB 3rd	C	C	C	D	D	D
	NB Univ LT	A	A	A	A	A	A
	Overall Int	A	A	A	A	A	A
University Avenue & North Avenue / Ensign Avenue	EB Ensign	F	F	F	F	F	F
	WB North	B	B	C	C	C	D
	NB Univ LT	A	A	A	A	A	A
	SB Univ LT	A	A	A	A	A	A
	Overall Int	A	A	A	C	C	D
North Avenue & Jones Avenue	EB North LT	A	A	A	A	A	A
	WB North LT	A	A	A	A	A	A
	NB Jones	B	B	B	B	B	B
	SB Jones	A	A	A	B	B	B
	Overall Int	A	A	A	A	A	A
University Ave at Driveway	WB Driveway	---	---	B	---	---	B
	SB Univ LT	---	---	A	---	---	A
	Overall Int	---	---	A	---	---	A

4.2 Turning Lane Lengths / Queuing Analysis

This analysis was performed for all lane groups in the intersections studied. The estimate of turn lane length was obtained from the 95th percentile back of queue estimates from Synchro. They are summarized in Table 5. As noted previously, there are some congestion issues on the side roads in the North Avenue / University Avenue intersection. These should deter any traffic from the proposed project from cutting through this area since the right-turn onto northbound University Avenue from the site driveway should be much more convenient. Otherwise, there are no queue issues of concern in the study intersections except in the Stewart Street / Campus Drive / University Avenue intersection, but is in not significantly impacted by the proposed redevelopment project.

Table 5 – Queuing Analysis

Intersection	Movement	AM Queue Length (ft)			PM Queue Length (ft)		
		2014 Existing	2016 Base	2016 With Development	2014 Existing	2016 Base	2016 With Development
Stewart Street & Jones Avenue	SB Jones L/R	5	5	9	8	9	10
Stewart St / Campus Dr & University Ave	EB Campus L/T/R	209	225	245	207	216	205
	WB Stewart L/T/R	381	395	395	371	387	389
	NB LT Univ	49	51	49	43	44	45
	NB Univ T/R	350	367	368	235	244	282
	SB Univ L/T/R	236	247	245	380	395	412
Overhill Street & University Avenue	WB Overhill L/R	9	9	9	11	12	12
	SB Univ LT	2	2	2	3	3	3
Overhill Street & Quay Street	EB Overhill L/T/R	0	0	0	0	0	1
	WB Overhill L/T/R	0	0	0	0	0	0
	NB Quay L/T/R	1	1	1	2	2	2
	SB Quay L/T/R	0	0	3	0	0	2
Overhill Street & Jones Avenue / Driveway	EB Overhill L/T/R	1	1	2	1	1	2
	WB Driveway L/T/R	0	0	0	0	0	0
	SB Jones L/T/R	4	4	5	6	7	10
University Avenue & Third Street	EB 3rd L/R	6	7	7	11	11	20
	NB Univ L/T	4	4	4	6	6	7
University Avenue & North Avenue / Ensign Avenue	EB Ensign L/T/R	12	14	15	45	53	61
	WB North L/T/R	94	103	121	206	241	285
	NB Univ L/T/R	1	1	1	1	1	1
	SB Univ L/T/R	4	4	5	21	22	24
North Avenue & Jones Avenue	EB North L/T/R	0	0	0	0	0	0
	WB North L/T/R	0	0	0	1	1	1
	NB Jones L/T/R	10	11	14	16	17	20
	SB Jones L/T/R	2	2	2	4	4	4
University Ave at Driveway	WB Driveway	---	---	5	---	---	3
	SB Univ LT	---	---	0	---	---	1

5.0 SUMMARY AND RECOMMENDED DEVELOPER ACTIVITIES

A student housing redevelopment project is proposed in the Sunnyside area of the City of Morgantown, Monongalia County. The proposed development includes 536 beds in the area between University Avenue and Jones Avenue north of Third Street and south of Highview Place. The facility will provide parking in surface lots with all spaces intended for usage by the tenants. The existing access to University Avenue will be relocated to a point approximately 550-ft north of Third Street, which is further from Third Street than the existing driveway. The existing access to Quay Street, in which the street currently runs into the south side of the site and terminates as a site driveway, will be maintained. The existing site access to Jones Avenue will be closed. The site is currently occupied by a student housing development by American Campus Community named Sunnyside Commons. Full build-out of this proposed development is expected by 2016.

The following is a summary of the key findings of this study:

- The primary traffic concern in the study area is the long queue extending back University Avenue from the Stewart Street / College Avenue intersection. These queues extend through the project site in the peak hours and, as an existing condition, are beyond the scope of this study.
- A secondary concern is the level of service (LOS) of the side roads at the intersection of University Avenue at North Street. The LOS at this intersection is currently poor and not significantly impacted by the proposed development. Improvements to improve the LOS are likely not desired by the community, as this traffic is considered cut-through traffic to avoid the queues on University Avenue. Improvements that increase the capacity for this traffic may be viewed as encouraging more of this traffic.
- In general, the street grid surrounding the proposed development is a system of unsignalized intersections with single lane approaches on each leg. These intersections operate at a high LOS due to the low traffic volumes. The primary concern with the grid system is the topography that results in a steep grade running downhill from east to west. Again, this is an existing condition that can not be corrected within the scope of this development.
- There are no LOS- or capacity-related issues expected at any of the driveway intersections with the public street system.
- A concern raised by the City is whether Jones Avenue between Overhill Street and North Avenue is reaching its capacity for cut-through traffic originating in the student housing projects along University Avenue near the Stewart Street / Campus Drive intersection. It is estimated--based on the current volumes of traffic making right-turns into Jones from North and left-turns onto North from Jones--that currently there are approximately 50 to 100 vph cutting through on Jones during the peak hours. The traffic assignment for the proposed development assigns 20 to 25 vph to this movement. However, it must be noted that this site, once redeveloped, will be less likely to contribute cut through traffic to Jones since its existing access to Jones Avenue is being

eliminated. Furthermore, considering the near-to-overcapacity conditions projected for North Avenue at University Avenue, making a right-turn out of the site driveway directly onto northbound University Avenue will be much more convenient than using Jones. It is anticipated that the net effect of the redevelopment project on Jones traffic will be negligible. In all likelihood, less traffic from this parcel is likely to use Jones after it is redeveloped. In short, any issues on Jones Avenue are existing conditions that will not be negatively impacted by the proposed redevelopment and should not be the responsibility of the developer to address.

- The proposed developer activities, as they relate to the transportation network, are as follows:
 - Relocate the existing driveway to University Avenue to the north to the location shown on the site plan.
 - Close the existing access to Jones Avenue.
 - Maintain the current access at the end of Quay Street.

APPENDIX A – TRAFFIC DATABASE

Jones Ave at Stewart Street (10-1-2014)

Time	Stewart Street EB		Stewart Street WB		Jones Avenue SB		Peds	
	LT All	Trucks	TH All	Trucks	LT All	Trucks	RT All	Xing Jones X-ing Stew on N Side on E side on W side
AM								
7:00	0	0	57	1	0	0	0	0
7:15	0	0	87	1	0	0	2	0
7:30	0	0	99	2	0	0	0	0
7:45	0	0	81	2	0	0	5	0
8:00	0	0	41	4	0	0	4	0
8:15	1	0	40	0	0	0	8	0
8:30	0	0	59	0	0	0	2	0
8:45	0	0	52	2	1	0	1	0
9:00	0	0	52	0	1	0	8	0
4:00	0	0	40	1	0	0	10	0
4:15	0	0	63	0	0	0	7	0
4:30	1	0	59	2	0	0	8	0
4:45	0	0	56	2	0	0	5	0
5:00	0	0	56	1	0	0	8	0
5:15	0	0	69	1	0	0	7	0
5:30	2	0	49	0	0	0	11	0
5:45	0	0	49	0	0	0	0	0
6:00	0	0	49	0	0	0	0	0

AM Peak Hour - (7:30 to 8:30 am)

Time	Stewart Street EB		Stewart Street WB		Jones Avenue SB		Peds	
	LT All	Trucks	TH All	Trucks	LT All	Trucks	RT All	Xing Jones X-ing Stew on N Side on E side on W side
7:30	0	0	99	2	0	0	0	0
7:45	0	0	81	2	0	0	5	0
8:00	0	0	41	4	0	0	4	0
8:15	1	0	40	0	0	0	8	0
8:30	0	0	56	1	0	0	7	0
Total	1	0	261	8	2	0	17	0
Peak 15	0.25		0.84		0.25		0.53	
PHF	0%		4%		0%		0%	
% trucks			3%					

PM Peak Hour - (4:15 to 5:15 pm)

Time	Stewart Street EB		Stewart Street WB		Jones Avenue SB		Peds	
	LT All	Trucks	TH All	Trucks	LT All	Trucks	RT All	Xing Jones X-ing Stew on N Side on E side on W side
4:15	0	0	40	1	2	0	10	0
4:30	0	0	63	0	3	0	7	0
4:45	1	0	59	2	3	0	8	0
5:00	0	0	56	2	4	0	5	0
5:15	0	0	56	2	0	0	8	0

Overhill St at Jones Ave (10-1-2014)

Time	Overhill St EB			Driveway WB			Jones Ave SB			Peds							
	LT	All	Trucks	LT	All	Trucks	LT	All	Trucks	TH	All	Trucks	X-ing on W side	Ohill on N side	Xing Jones on E side	Dwai on S Side	Xing Jones on S Side
7:00	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7:15	1	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0
7:30	3	0	0	0	0	0	0	0	0	2	0	0	0	4	3	0	0
7:45	2	0	0	0	0	0	0	0	0	2	0	0	0	2	1	1	1
8:00	2	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0
8:15	2	0	0	0	0	0	0	0	0	0	0	0	0	8	0	1	1
8:30	2	0	0	0	0	0	0	0	0	1	0	0	0	3	3	1	1
8:45	2	0	0	0	0	0	0	0	0	1	0	0	0	4	0	0	1
9:00	2	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0
4:00	5	0	0	1	1	0	0	0	0	5	0	0	0	0	2	1	1
4:15	3	0	0	2	0	0	0	0	0	3	0	0	0	0	0	1	1
4:30	2	0	0	0	0	0	0	0	0	3	0	0	0	2	1	0	1
4:45	3	0	0	0	0	0	0	0	0	3	0	0	0	2	1	0	1
5:00	3	0	0	0	0	0	0	0	0	4	0	0	0	0	0	1	3
5:15	3	0	0	0	0	0	0	0	0	1	0	0	0	2	3	1	1
5:30	3	0	0	0	0	0	0	0	0	4	0	0	0	2	2	0	2
5:45	4	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	1
6:00	5	0	0	0	0	0	0	0	0	10	0	0	0	6	1	0	0
Peak 15	3	0	0	1	1	0	0	0	0	5	0	0	0	12	15	1	2
PHF	0.75	0%	0%	0.25	0%	0%	0.25	0%	0%	0.38	0%	0%	0.50	0%	0.60	0%	0%
% trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

AM Peak Hour - (7:30 to 8:30 am)

Time	Overhill St EB			Driveway WB			Jones Ave SB			Peds							
	LT	All	Trucks	LT	All	Trucks	LT	All	Trucks	TH	All	Trucks	X-ing on W side	Ohill on N side	Xing Jones on E side	Dwai on S Side	Xing Jones on S Side
7:30	3	0	0	0	0	0	0	0	0	2	0	0	0	4	3	0	0
7:45	2	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1
8:00	2	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	0
8:15	2	0	0	0	0	0	0	0	0	2	0	0	0	8	0	0	1
Total	9	0	0	1	1	0	0	0	0	11	0	0	0	20	15	1	2
Peak 15	3	0	0	1	1	0	0	0	0	5	0	0	0	12	15	1	2
PHF	0.75	0%	0%	0.25	0%	0%	0.25	0%	0%	0.38	0%	0%	0.50	0%	0.60	0%	0%
% trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

PM Peak Hour - (4:15 to 5:15 pm)

Time	Overhill St EB			Driveway WB			Jones Ave SB			Peds							
	LT	All	Trucks	LT	All	Trucks	LT	All	Trucks	TH	All	Trucks	X-ing on W side	Ohill on N side	Xing Jones on E side	Dwai on S Side	Xing Jones on S Side
4:15	5	1	0	0	0	0	0	0	0	3	0	0	0	2	0	1	1
4:30	3	0	0	0	0	0	0	0	0	4	0	0	0	2	1	0	1
4:45	2	0	0	0	0	0	0	0	0	4	0	0	0	2	0	1	3
5:00	3	0	0	0	0	0	0	0	0	3	0	0	0	2	3	1	1
Total	13	1	0	0	0	0	0	0	0	14	0	0	0	22	4	3	6
Peak 15	5	1	0	0	0	0	0	0	0	4	0	0	0	10	4	3	6
PHF	0.65	8%	0%	0.25	0%	0%	0.25	0%	0%	0.67	0%	0%	0.67	0.55	0%	0%	0%
% trucks	8%	0%	0%	0%	0%	0%	0%	0%	0%	0.88	0%	0%	0%	0.55	0%	0%	0%

University Avenue at Third St (9-30-2014)

Time	Third St EB			University Ave NB			University Ave SB			Peds						
	LT	All	Trucks	LT	All	Trucks	TH	All	Trucks	RT	All	Trucks	X-ing 3rd on W side	Xing Univ on N side	X-ing 3rd on E side	Xing Univ on S Side
7:00																
7:15	1	0	0	3	39	3	42	2	0	0	0	0	1	0	0	0
7:30	2	0	0	7	49	2	43	3	1	0	0	0	4	2	0	0
7:45	2	0	0	6	76	3	43	2	4	0	0	0	5	1	0	0
8:00	0	0	0	5	90	4	65	3	4	0	0	0	6	0	0	0
8:15	0	0	0	15	70	5	54	1	2	0	0	0	22	0	0	4
8:30	3	0	0	10	63	8	49	1	4	0	0	0	10	0	0	5
8:45	2	0	0	11	70	5	39	0	2	0	0	0	2	0	0	1
9:00	2	0	0	11	60	7	32	2	4	0	0	0	9	0	0	1
4:00	4	0	0	21	62	4	77	0	8	0	0	0	6	0	0	1
4:15	6	0	0	14	64	4	73	0	5	0	0	0	8	0	0	5
4:30	5	0	0	20	84	2	85	1	3	0	0	0	10	0	0	0
4:45	2	0	0	21	55	3	87	2	11	0	0	0	7	0	0	4
5:00	4	0	0	21	74	1	75	0	10	0	0	0	14	0	0	4
5:15	4	0	0	24	68	4	66	0	6	0	0	0	22	0	0	7
5:30	2	0	0	15	81	2	75	1	2	0	0	0	12	0	0	1
5:45	2	0	0	16	55	2	64	0	6	0	0	0	14	0	0	5
6:00	2	0	0													

AM Peak Hour - (7:30 to 8:30 am)

Time	Third St EB			University Ave NB			University Ave SB			Peds						
	LT	All	Trucks	LT	All	Trucks	TH	All	Trucks	RT	All	Trucks	X-ing 3rd on W side	Xing Univ on N side	X-ing 3rd on E side	Xing Univ on S Side
7:30	2	0	0	6	76	3	43	2	4	0	0	0	5	1	0	0
7:45	0	0	0	5	90	4	65	3	4	0	0	0	6	0	0	0
8:00	2	0	0	15	70	5	54	1	2	0	0	0	22	0	0	4
8:15	3	0	0	10	63	8	49	1	4	0	0	0	10	0	0	5
Total	7	0	0	36	299	20	211	7	14	0	0	0	43	1	0	9
Peak 15	3	0	0	15	90	4	65	3	4	0	0	0				
PHF	0.58			0.60	0.83		0.81		0.88							
% trucks	0%			8%	7%		3%		0%							

PM Peak Hour - (4:15 to 5:15 pm)

Time	Third St EB			University Ave NB			University Ave SB			Peds						
	LT	All	Trucks	LT	All	Trucks	TH	All	Trucks	RT	All	Trucks	X-ing 3rd on W side	Xing Univ on N side	X-ing 3rd on E side	Xing Univ on S Side
4:15	6	0	0	14	64	4	73	0	5	0	0	0	8	0	0	5
4:30	5	0	0	20	84	2	85	1	3	0	0	0	10	0	0	0
4:45	2	0	0	21	55	3	87	2	11	0	0	0	7	0	0	4
5:00	4	0	0	16	74	1	75	0	10	0	0	0	14	0	0	4
Total	17	0	0	76	277	10	320	3	29	0	0	0	39	0	0	13
Peak 15	6	0	0	21	84	3	87	1	11	0	0	0				
PHF	0.71			0.90	0.82		0.92		0.66							
% trucks	0%			0%	4%		1%		0%							

University Avenue at Overhill St (9-30-2014)

Time	Overhill St WB			University Ave NB			University Ave SB			Peds			
	LT	RT	Trucks	TH	RT	Trucks	TH	RT	Trucks	X-ing Ohill on W side	Xing Univ on N side	X-ing Ohill on E side	Xing Univ on S Side
7:00	0	0	0	44	2	2	43	0	0	6	0	0	0
7:15	1	2	0	53	3	2	36	1	2	17	0	0	0
7:30	7	7	1	70	3	0	54	2	2	9	0	0	0
7:45	1	0	0	100	4	3	48	1	1	9	1	0	0
8:00	2	1	0	72	7	2	71	0	2	29	1	0	0
8:15	4	3	0	77	8	1	59	0	1	27	0	0	0
8:30	2	2	0	73	6	3	45	0	2	6	0	0	0
8:45	6	4	0	61	8	3	36	1	1	12	0	0	1
PM													
4:00	2	0	0	72	4	0	79	0	0	10	1	0	0
4:15	2	0	0	70	6	4	78	0	1	20	0	0	0
4:30	5	0	0	92	2	0	89	0	3	10	0	0	0
4:45	3	0	0	66	2	0	91	0	0	9	0	0	0
5:00	4	0	0	86	1	0	90	0	0	18	0	0	0
5:15	6	0	0	83	5	0	74	0	1	29	0	0	1
5:30	5	0	0	79	2	0	86	0	1	10	1	0	1
5:45	2	0	0	66	2	0	75	0	0	18	1	0	0

AM Peak Hour - (7:30 to 8:30 am)

Time	Overhill St WB			University Ave NB			University Ave SB			Peds			
	LT	RT	Trucks	TH	RT	Trucks	TH	RT	Trucks	X-ing Ohill on W side	Xing Univ on N side	X-ing Ohill on E side	Xing Univ on S Side
7:30	7	7	1	70	3	0	54	0	2	9	0	0	0
7:45	1	2	0	100	4	1	48	1	1	9	1	1	0
8:00	2	1	0	72	7	2	71	0	0	29	1	0	1
8:15	4	3	0	77	8	1	59	1	0	27	0	0	0
Total	14	11	1	319	22	4	232	3	3	74	2	1	1
Peak 15	7	5	0.65	100	5	0.65	71	7	0.43				
PHF	0.50	0.65	8%	0.80	0.65	31%	0.82	0.43	25%				
% trucks	79%	8%		7%	31%		3%						

PM Peak Hour - (4:15 to 5:15 pm)

Time	Overhill St WB			University Ave NB			University Ave SB			Peds			
	LT	RT	Trucks	TH	RT	Trucks	TH	RT	Trucks	X-ing Ohill on W side	Xing Univ on N side	X-ing Ohill on E side	Xing Univ on S Side
4:15	2	0	0	70	6	0	78	0	1	20	0	0	0
4:30	5	0	0	92	2	0	89	1	1	10	0	0	0
4:45	3	0	0	66	2	0	91	0	0	9	0	0	0
5:00	4	0	0	86	1	0	90	0	0	18	0	0	0
Total	14	0	1	314	11	0	348	2	2	57	0	0	0
Peak 15	5	12	0.85	92	5	0.95	91	11	0.64				
PHF	0.70	0.85	2%	0.85	0.95	7%	0.96	0.64	7%				
% trucks	0%	2%		4%	0%		2%						

University Ave at Stewart Street / Campus Drive (9-30-2014)

Time	Campus Drive EB			Stewart Street WB			University Ave NB			University Avenue SB			Peds					
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT			
7:00	5	3	3	44	1	23	0	0	0	11	0	37	2	35	3	4	0	2
7:15	11	5	13	23	3	20	0	13	0	51	0	34	1	38	1	4	3	1
7:30	7	2	11	37	2	35	1	4	0	16	2	44	4	55	8	6	1	1
7:45	10	3	53	51	0	32	0	7	0	83	2	36	1	63	1	3	0	1
8:00	12	4	33	62	0	33	0	20	0	67	6	16	2	58	2	0	0	7
8:15	18	6	21	45	1	38	1	7	0	15	0	56	3	48	3	5	1	13
8:30	8:45	9	5	32	0	36	1	13	2	72	4	27	3	46	3	1	0	24
8:45	9:00	9	5	31	1	40	1	11	0	51	5	16	2	33	4	4	1	0
4:00	4:15	14	3	49	2	28	0	7	1	16	0	63	1	85	1	2	0	4
4:15	4:30	8	2	58	2	36	0	9	0	52	2	22	0	81	0	3	9	0
4:30	4:45	14	1	56	1	36	1	6	0	28	0	17	1	104	2	0	22	0
4:45	5:00	7	2	44	0	4	0	4	0	16	0	71	0	103	3	8	0	1
5:00	5:15	8	1	48	0	41	0	6	0	13	0	21	1	92	0	6	4	2
5:15	5:30	7	2	37	0	25	0	3	0	25	0	84	2	97	1	3	0	5
5:30	5:45	10	1	62	0	33	0	7	0	17	0	94	1	110	2	3	0	22
5:45	6:00	5	1	42	0	26	1	8	0	11	0	48	1	97	0	1	0	3

AM Peak Hour - (7:30 to 8:30 am)

Time	Campus Drive EB			Stewart Street WB			University Ave NB			University Avenue SB			Peds					
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT			
7:30	7	56	11	37	2	35	1	4	0	16	2	72	2	55	8	6	1	1
7:45	10	53	0	51	0	32	0	7	0	11	0	83	2	53	1	3	0	1
8:00	12	33	0	62	0	33	0	7	0	20	0	67	6	68	2	2	0	7
8:15	18	21	3	45	1	38	1	7	0	15	0	56	3	48	3	5	1	13
Total	47	163	4	195	3	138	2	25	0	62	2	278	13	224	14	16	4	22
Peak 15	18	56	21	62	38	38	2	7	0	20	38	44	9	68	44	6	4	4
PHF	0.65	0.73	0.77	0.79	0.91	0.89	0.84	0.89	0.84	0.78	0.84	0.62	0.62	0.82	0.82	0.67	0.67	0.67
% trucks	32%	2%	6%	2%	1%	1%	0%	0%	5%	3%	5%	8%	9%	6%	6%	13%	13%	13%

PM Peak Hour - (4:15 to 5:15 pm)

Time	Campus Drive EB			Stewart Street WB			University Ave NB			University Avenue SB			Peds					
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT			
4:15	8	32	0	58	2	36	0	9	0	11	0	82	2	81	0	3	0	3
4:30	14	20	0	46	1	36	1	4	0	18	0	97	0	103	2	2	0	0
4:45	8	24	0	48	0	41	0	6	0	13	0	63	0	103	0	8	0	1
5:00	6	100	0	206	3	149	1	25	0	68	0	21	1	380	0	6	0	7
Total	37	100	0	206	3	149	1	25	0	28	0	65	3	380	5	19	2	26
Peak 15	14	32	0	58	41	41	1	9	0	28	28	25	8	104	104	8	2	7
PHF	0.66	0.78	0.85	0.89	0.91	0.89	0.81	0.69	0.85	0.61	0.85	0.85	0.85	0.91	0.59	0.59	0.59	0.59
% trucks	16%	0%	1%	1%	1%	1%	0%	0%	4%	0%	4%	4%	4%	1%	0%	0%	0%	0%

APPENDIX B – HCM (SYNCHRO) PRINTOUTS

Queues

1: University Avenue & Campus Drive/Stewart St

10/8/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	379	427	79	507	297
v/c Ratio	0.89	0.91	0.32	0.89	0.78
Control Delay	51.1	54.6	22.2	43.5	46.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.1	54.6	22.2	43.5	46.2
Queue Length 50th (ft)	174	206	27	219	142
Queue Length 95th (ft)	209	#381	49	#350	#236
Internal Link Dist (ft)	420	235		421	479
Turn Bay Length (ft)			275		
Base Capacity (vph)	458	488	252	614	380
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	0.83	0.88	0.31	0.83	0.78

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: University Avenue & Campus Drive/Stewart St

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	47	163	65	195	138	25	62	278	109	0	224	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	0.88		0.78	1.00		0.69
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1843	1697	1843	1938	1909	1938	1817	1765	1872	0	1801	1919
Adj Flow Rate, veh/h	72	223	84	247	152	28	79	331	176	0	273	24
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.65	0.73	0.77	0.79	0.91	0.89	0.78	0.84	0.62	0.90	0.82	0.67
Percent Heavy Veh, %	2	2	2	1	1	1	3	5	5	0	6	6
Cap, veh/h	78	242	91	266	164	30	249	333	177	0	378	33
Arrive On Green	0.26	0.26	0.26	0.25	0.25	0.25	0.05	0.34	0.34	0.00	0.24	0.24
Sat Flow, veh/h	304	942	355	1058	651	120	1730	981	521	0	1567	138
Grp Volume(v), veh/h	379	0	0	427	0	0	79	0	507	0	0	297
Grp Sat Flow(s),veh/h/ln	1601	0	0	1829	0	0	1730	0	1502	0	0	1705
Q Serve(g_s), s	18.3	0.0	0.0	18.1	0.0	0.0	2.6	0.0	26.7	0.0	0.0	12.7
Cycle Q Clear(g_c), s	18.3	0.0	0.0	18.1	0.0	0.0	2.6	0.0	26.7	0.0	0.0	12.7
Prop In Lane	0.19		0.22	0.58		0.07	1.00		0.35	0.00		0.08
Lane Grp Cap(c), veh/h	412	0	0	460	0	0	249	0	511	0	0	411
V/C Ratio(X)	0.92	0.00	0.00	0.93	0.00	0.00	0.32	0.00	0.99	0.00	0.00	0.72
Avail Cap(c_a), veh/h	423	0	0	460	0	0	318	0	511	0	0	411
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	28.7	0.0	0.0	29.0	0.0	0.0	21.0	0.0	26.1	0.0	0.0	27.7
Incr Delay (d2), s/veh	24.9	0.0	0.0	25.0	0.0	0.0	0.7	0.0	37.9	0.0	0.0	6.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.9	0.0	0.0	12.3	0.0	0.0	1.3	0.0	16.4	0.0	0.0	6.6
LnGrp Delay(d),s/veh	53.6	0.0	0.0	54.1	0.0	0.0	21.8	0.0	64.0	0.0	0.0	33.8
LnGrp LOS	D			D			C		E			C
Approach Vol, veh/h		379			427			586				297
Approach Delay, s/veh		53.6			54.1			58.3				33.8
Approach LOS		D			D			E				C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		31.0		24.4	7.8	23.2		24.0				
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s		27.0		21.0	7.0	16.0		20.0				
Max Q Clear Time (g_c+I1), s		28.7		20.3	4.6	14.7		20.1				
Green Ext Time (p_c), s		0.0		0.1	0.0	0.6		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			51.9									
HCM 2010 LOS			D									

HCM Unsignalized Intersection Capacity Analysis

6: Jones Avenue & North Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	46	16	0	244	0	52	0	1	1	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		12%			8%			-3%			-6%	
Peak Hour Factor	0.90	0.72	0.50	0.90	0.95	0.90	0.76	0.90	0.25	0.25	0.90	0.33
Hourly flow rate (vph)	0	64	32	0	257	0	68	0	4	4	0	12
Pedestrians		3										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		4.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	257			96			352	337	80	341	353	260
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	257			96			352	337	80	341	353	260
tC, single (s)	4.1			4.8			7.1	6.5	6.2	7.1	7.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			3.5	4.0	3.3	3.5	4.9	3.3
p0 queue free %	100			100			88	100	100	99	100	98
cM capacity (veh/h)	1320			1174			593	588	986	615	444	782
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	96	257	72	16								
Volume Left	0	0	68	4								
Volume Right	32	0	4	12								
cSH	1320	1174	606	733								
Volume to Capacity	0.00	0.00	0.12	0.02								
Queue Length 95th (ft)	0	0	10	2								
Control Delay (s)	0.0	0.0	11.7	10.0								
Lane LOS			B	B								
Approach Delay (s)	0.0	0.0	11.7	10.0								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			29.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	46	16	0	244	0	52	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	12	-	-	8	-	-	-3	-
Peak Hour Factor	90	72	50	90	95	90	76	90	25
Heavy Vehicles, %	0	0	0	67	0	0	2	0	0
Mvmt Flow	0	64	32	0	257	0	68	0	4

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	260	0	0	99	0	0	349	343	83
Stage 1	-	-	-	-	-	-	83	83	-
Stage 2	-	-	-	-	-	-	266	260	-
Critical Hdwy	4.1	-	-	4.77	-	-	6.52	5.9	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.52	4.9	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.52	4.9	-
Follow-up Hdwy	2.2	-	-	2.803	-	-	3.518	4	3.3
Pot Cap-1 Maneuver	1316	-	-	1170	-	-	642	617	989
Stage 1	-	-	-	-	-	-	938	841	-
Stage 2	-	-	-	-	-	-	773	727	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1316	-	-	1170	-	-	631	614	987
Mov Cap-2 Maneuver	-	-	-	-	-	-	631	614	-
Stage 1	-	-	-	-	-	-	936	839	-
Stage 2	-	-	-	-	-	-	762	725	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	644	1316	-	-	1170	-	-	778
HCM Lane V/C Ratio	0.112	-	-	-	-	-	-	0.021
HCM Control Delay (s)	11.3	0	-	-	0	-	-	9.7
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	1	0	4
Conflicting Peds, #/hr	0	0	3
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	25	90	33
Heavy Vehicles, %	0	100	0
Mvmt Flow	4	0	12

Major/Minor

	Minor2		
Conflicting Flow All	345	359	260
Stage 1	260	260	-
Stage 2	85	99	-
Critical Hdwy	5.9	6.3	5.6
Critical Hdwy Stg 1	4.9	5.3	-
Critical Hdwy Stg 2	4.9	5.3	-
Follow-up Hdwy	3.5	4.9	3.3
Pot Cap-1 Maneuver	688	496	818
Stage 1	817	595	-
Stage 2	955	679	-
Platoon blocked, %			
Mov Cap-1 Maneuver	683	494	816
Mov Cap-2 Maneuver	683	494	-
Stage 1	815	594	-
Stage 2	951	677	-

Approach

	SB
HCM Control Delay, s	9.7
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis

9: Stewart St & Jones Ave

10/8/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	261	304	0	1	17
Sign Control		Free	Free		Stop	
Grade		2%	-2%		-15%	
Peak Hour Factor	0.92	0.66	0.84	0.92	0.25	0.53
Hourly flow rate (vph)	0	395	362	0	4	32
Pedestrians		23				
Lane Width (ft)		11.0				
Walking Speed (ft/s)		4.0				
Percent Blockage		2				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		315				
pX, platoon unblocked						
vC, conflicting volume	362				757	385
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	362				757	385
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	95
cM capacity (veh/h)	1197				381	657

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	395	362	36
Volume Left	0	0	4
Volume Right	0	0	32
cSH	1700	1700	608
Volume to Capacity	0.23	0.21	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.0	11.3
Lane LOS			B
Approach Delay (s)	0.0	0.0	11.3
Approach LOS			B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		31.4%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	261	304	0	1	17
Conflicting Peds, #/hr	0	0	0	0	0	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-15	-
Peak Hour Factor	92	66	84	92	25	53
Heavy Vehicles, %	2	3	4	2	0	0
Mvmt Flow	0	395	362	0	4	32

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	385	0	780
Stage 1	-	-	385
Stage 2	-	-	395
Critical Hdwy	4.12	-	3.4
Critical Hdwy Stg 1	-	-	2.4
Critical Hdwy Stg 2	-	-	2.4
Follow-up Hdwy	2.218	-	3.5
Pot Cap-1 Maneuver	1173	-	702
Stage 1	-	-	954
Stage 2	-	-	952
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1173	-	675
Mov Cap-2 Maneuver	-	-	675
Stage 1	-	-	936
Stage 2	-	-	934

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1173	-	-	-	756
HCM Lane V/C Ratio	-	-	-	-	0.048
HCM Control Delay (s)	0	-	-	-	10
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM Unsignalized Intersection Capacity Analysis

12: University Avenue & Third Street

10/8/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	21	36	299	211	14
Sign Control	Stop			Free	Free	
Grade	15%			6%	-6%	
Peak Hour Factor	0.58	0.75	0.60	0.83	0.81	0.88
Hourly flow rate (vph)	12	28	60	360	260	16
Pedestrians	43			9	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			1	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1104		
pX, platoon unblocked						
vC, conflicting volume	793	320	319			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	793	320	319			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	96	96	95			
cM capacity (veh/h)	327	693	1164			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	40	420	276
Volume Left	12	60	0
Volume Right	28	0	16
cSH	518	1164	1700
Volume to Capacity	0.08	0.05	0.16
Queue Length 95th (ft)	6	4	0
Control Delay (s)	12.5	1.6	0.0
Lane LOS	B	A	
Approach Delay (s)	12.5	1.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization	46.7%		ICU Level of Service A
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	7	21	36	299	211	14
Conflicting Peds, #/hr	1	9	43	0	0	43
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	15	-	-	6	-6	-
Peak Hour Factor	58	75	60	83	81	88
Heavy Vehicles, %	0	0	8	7	3	0
Mvmt Flow	12	28	60	360	260	16

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	757	320	285
Stage 1	277	-	-
Stage 2	480	-	-
Critical Hdwy	9.4	7.7	4.18
Critical Hdwy Stg 1	8.4	-	-
Critical Hdwy Stg 2	8.4	-	-
Follow-up Hdwy	3.5	3.3	2.272
Pot Cap-1 Maneuver	201	635	1244
Stage 1	615	-	-
Stage 2	420	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	186	608	1199
Mov Cap-2 Maneuver	186	-	-
Stage 1	610	-	-
Stage 2	391	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.2	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1199	-	361	-	-
HCM Lane V/C Ratio	0.05	-	0.111	-	-
HCM Control Delay (s)	8.2	0	16.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

HCM Unsignalized Intersection Capacity Analysis

13: University Avenue & Overhill Street

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	13	319	13	12	232
Sign Control	Stop		Free			Free
Grade	-15%		6%			-6%
Peak Hour Factor	0.50	0.65	0.80	0.65	0.43	0.82
Hourly flow rate (vph)	28	20	399	20	28	283
Pedestrians	1		1			2
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			749			
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	749	412			420	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	652	271			280	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	97			98	
cM capacity (veh/h)	378	683			1145	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	48	419	311
Volume Left	28	0	28
Volume Right	20	20	0
cSH	464	1700	1145
Volume to Capacity	0.10	0.25	0.02
Queue Length 95th (ft)	9	0	2
Control Delay (s)	13.6	0.0	1.0
Lane LOS	B		A
Approach Delay (s)	13.6	0.0	1.0
Approach LOS	B		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		32.6%	ICU Level of Service A
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	13	319	13	12	232
Conflicting Peds, #/hr	1	2	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-15	-	6	-	-	-6
Peak Hour Factor	50	65	80	65	43	82
Heavy Vehicles, %	0	0	5	0	0	4
Mvmt Flow	28	20	399	20	28	283

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	750	412	0
Stage 1	411	-	-
Stage 2	339	-	-
Critical Hdwy	3.4	4.7	4.1
Critical Hdwy Stg 1	2.4	-	-
Critical Hdwy Stg 2	2.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	713	765	1149
Stage 1	949	-	-
Stage 2	963	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	691	763	1148
Mov Cap-2 Maneuver	691	-	-
Stage 1	947	-	-
Stage 2	934	-	-

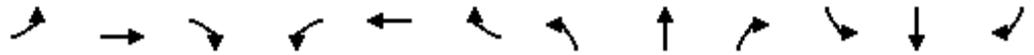
Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	719	1148	-
HCM Lane V/C Ratio	-	-	0.067	0.024	-
HCM Control Delay (s)	-	-	10.4	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

HCM Unsignalized Intersection Capacity Analysis

14: Jones Avenue & Overhill Street/Driveway

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔						↔	
Volume (veh/h)	9	3	1	1	3	4	0	0	0	2	11	12
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-6%			-4%			-10%	
Peak Hour Factor	0.75	0.75	0.25	0.25	0.38	0.50	0.90	0.90	0.90	0.50	0.55	0.60
Hourly flow rate (vph)	12	4	4	4	8	8	0	0	0	4	20	20
Pedestrians		31			1			2			15	
Lane Width (ft)		12.0			12.0			0.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		3			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	31			10			113	71	9	66	69	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	31			10			113	71	9	66	69	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			100			100	100	100	100	98	98
cM capacity (veh/h)	1575			1623			800	805	1078	905	807	975

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	20	20	44
Volume Left	12	4	4
Volume Right	4	8	20
cSH	1575	1623	885
Volume to Capacity	0.01	0.00	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	4.4	1.5	9.3
Lane LOS	A	A	A
Approach Delay (s)	4.4	1.5	9.3
Approach LOS			A

Intersection Summary		
Average Delay		6.3
Intersection Capacity Utilization	23.7%	ICU Level of Service
Analysis Period (min)		15
		A

Intersection

Int Delay, s/veh 6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	9	3	1	1	3	4	0	0	0
Conflicting Peds, #/hr	15	0	2	2	0	15	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-6	-	-	-4	-
Peak Hour Factor	75	75	25	25	38	50	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	4	4	4	8	8	0	0	0

Major/Minor

	Major1		Major2		
Conflicting Flow All	47	0	0	8	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	4.1	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.2	-
Pot Cap-1 Maneuver	1573	-	-	1625	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Platoon blocked, %		-	-		-
Mov Cap-1 Maneuver	1553	-	-	1605	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

HCM Control Delay, s 4.4 WB 1.5

HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1553	-	-	1605	-	-	976
HCM Lane V/C Ratio	0.008	-	-	0.002	-	-	0.045
HCM Control Delay (s)	7.3	0	-	7.2	0	-	8.9
HCM Lane LOS	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	11	12
Conflicting Peds, #/hr	1	0	31
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-10	-
Peak Hour Factor	50	55	60
Heavy Vehicles, %	0	0	0
Mvmt Flow	4	20	20

Major/Minor

	Minor2		
Conflicting Flow All	81	83	58
Stage 1	51	51	-
Stage 2	30	32	-
Critical Hdwy	4.4	4.5	5.2
Critical Hdwy Stg 1	3.4	3.5	-
Critical Hdwy Stg 2	3.4	3.5	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	969	849	1030
Stage 1	1005	881	-
Stage 2	1014	888	-
Platoon blocked, %			
Mov Cap-1 Maneuver	909	0	991
Mov Cap-2 Maneuver	909	0	-
Stage 1	976	0	-
Stage 2	980	0	-

Approach

	SB
HCM Control Delay, s	8.9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 16: Quay Street & Overhill Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	14	2	2	16	0	5	0	2	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-15%			-2%			-8%	
Peak Hour Factor	0.90	0.88	0.50	0.50	0.67	0.90	0.42	0.90	0.50	0.90	0.90	0.90
Hourly flow rate (vph)	0	16	4	4	24	0	12	0	4	0	0	0
Pedestrians					1			7			4	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	28			27			57	61	26	59	63	28
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	28			27			57	61	26	59	63	28
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	100			100			99	100	100	100	100	100
cM capacity (veh/h)	1593			1591			931	824	1049	927	822	1050
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	20	28	16	0								
Volume Left	0	4	12	0								
Volume Right	4	0	4	0								
cSH	1593	1591	958	1700								
Volume to Capacity	0.00	0.00	0.02	0.00								
Queue Length 95th (ft)	0	0	1	0								
Control Delay (s)	0.0	1.1	8.8	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	1.1	8.8	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			15.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	14	2	2	16	0	5	0	2
Conflicting Peds, #/hr	4	0	7	7	0	4	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-15	-	-	-2	-
Peak Hour Factor	90	88	50	50	67	90	42	90	50
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	16	4	4	24	0	12	0	4

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	25	0	0	21	0	0	52	52	26
Stage 1	-	-	-	-	-	-	19	19	-
Stage 2	-	-	-	-	-	-	33	33	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1603	-	-	1608	-	-	957	848	1057
Stage 1	-	-	-	-	-	-	1007	885	-
Stage 2	-	-	-	-	-	-	992	875	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1594	-	-	1599	-	-	948	844	1050
Mov Cap-2 Maneuver	-	-	-	-	-	-	948	844	-
Stage 1	-	-	-	-	-	-	1006	884	-
Stage 2	-	-	-	-	-	-	983	872	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	972	1594	-	-	1599	-	-	-
HCM Lane V/C Ratio	0.016	-	-	-	0.003	-	-	-
HCM Control Delay (s)	8.8	0	-	-	7.3	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	0	0	0
Conflicting Peds, #/hr	1	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-8	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	0	0

Major/Minor **Minor2**

Conflicting Flow All	54	54	32
Stage 1	33	33	-
Stage 2	21	21	-
Critical Hdwy	5.5	4.9	5.4
Critical Hdwy Stg 1	4.5	3.9	-
Critical Hdwy Stg 2	4.5	3.9	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	972	862	1055
Stage 1	1003	884	-
Stage 2	1012	890	-
Platoon blocked, %			
Mov Cap-1 Maneuver	960	858	1048
Mov Cap-2 Maneuver	960	858	-
Stage 1	1002	881	-
Stage 2	1002	889	-

Approach **SB**

HCM Control Delay, s	0
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 19: University Avenue & Ensign Avenue/North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	10	4	0	19	8	267	4	265	8	53	191	6
Sign Control		Stop			Stop			Free			Free	
Grade		15%			-12%			6%			-6%	
Peak Hour Factor	0.83	0.50	0.90	0.68	0.50	0.79	0.33	0.93	0.50	0.78	0.82	0.50
Hourly flow rate (vph)	12	8	0	28	16	338	12	285	16	68	233	12
Pedestrians		10										1
Lane Width (ft)		12.0										12.0
Walking Speed (ft/s)		4.0										4.0
Percent Blockage		1										0
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1049	710	249	696	708	294	255			301		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1049	710	249	696	708	294	255			301		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.4			2.2		
p0 queue free %	88	98	100	92	95	55	99			95		
cM capacity (veh/h)	102	333	787	335	338	750	1177			1260		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	382	313	313
Volume Left	12	28	12	68
Volume Right	0	338	16	12
cSH	141	657	1177	1260
Volume to Capacity	0.14	0.58	0.01	0.05
Queue Length 95th (ft)	12	94	1	4
Control Delay (s)	34.7	17.8	0.4	2.1
Lane LOS	D	C	A	A
Approach Delay (s)	34.7	17.8	0.4	2.1
Approach LOS	D	C		

Intersection Summary			
Average Delay		8.1	
Intersection Capacity Utilization	55.8%		ICU Level of Service
Analysis Period (min)		15	B

Intersection

Int Delay, s/veh 7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	10	4	0	19	8	267	4	265	8
Conflicting Peds, #/hr	1	0	0	0	0	1	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-12	-	-	6	-
Peak Hour Factor	83	50	90	68	50	79	33	93	50
Heavy Vehicles, %	0	0	0	0	0	0	25	6	0
Mvmt Flow	12	8	0	28	16	338	12	285	16

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	871	702	250	698	700	304	246	0	0
Stage 1	376	376	-	318	318	-	-	-	-
Stage 2	495	326	-	380	382	-	-	-	-
Critical Hdwy	10.1	9.5	7.7	4.7	4.1	5	4.35	-	-
Critical Hdwy Stg 1	9.1	8.5	-	3.7	3.1	-	-	-	-
Critical Hdwy Stg 2	9.1	8.5	-	3.7	3.1	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.425	-	-
Pot Cap-1 Maneuver	132	203	715	570	583	819	1197	-	-
Stage 1	475	453	-	862	812	-	-	-	-
Stage 2	371	497	-	832	795	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	70	188	708	516	539	811	1187	-	-
Mov Cap-2 Maneuver	70	188	-	516	539	-	-	-	-
Stage 1	469	424	-	851	802	-	-	-	-
Stage 2	208	491	-	759	744	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	54	14.4	0.3
HCM LOS	F	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1187	-	-	93	763	1249	-	-
HCM Lane V/C Ratio	0.01	-	-	0.216	0.501	0.054	-	-
HCM Control Delay (s)	8.1	0	-	54	14.4	8	0	-
HCM Lane LOS	A	A	-	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	2.8	0.2	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	53	191	6
Conflicting Peds, #/hr	0	0	10
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	78	82	50
Heavy Vehicles, %	2	4	0
Mvmt Flow	68	233	12

Major/Minor Major2

Conflicting Flow All	302	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1259	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1249	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach SB

HCM Control Delay, s	1.7
HCM LOS	

Minor Lane/Major Mvmt

Queues

1: University Avenue & Campus Drive/Stewart St

10/8/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	280	431	111	474	450
v/c Ratio	0.86	0.88	0.44	0.68	0.87
Control Delay	54.8	48.3	20.7	23.8	46.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	48.3	20.7	23.8	46.5
Queue Length 50th (ft)	125	204	34	175	212
Queue Length 95th (ft)	#207	#371	43	235	#380
Internal Link Dist (ft)	420	235		421	479
Turn Bay Length (ft)			275		
Base Capacity (vph)	341	535	255	815	564
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	0.82	0.81	0.44	0.58	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: University Avenue & Campus Drive/Stewart St

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	37	100	82	206	149	25	68	303	85	0	380	19
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	1.00		0.95	0.95		0.87	1.00		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1843	1780	1843	1938	1920	1938	1872	1841	1872	0	1901	1919
Adj Flow Rate, veh/h	56	128	96	231	164	36	111	374	100	0	418	32
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.66	0.78	0.85	0.89	0.91	0.69	0.61	0.81	0.85	0.90	0.91	0.59
Percent Heavy Veh, %	0	0	0	1	1	1	0	1	1	0	1	1
Cap, veh/h	61	139	104	255	181	40	246	530	142	0	473	36
Arrive On Green	0.19	0.19	0.19	0.26	0.26	0.26	0.06	0.39	0.39	0.00	0.28	0.28
Sat Flow, veh/h	323	739	554	983	698	153	1782	1351	361	0	1713	131
Grp Volume(v), veh/h	280	0	0	431	0	0	111	0	474	0	0	450
Grp Sat Flow(s),veh/h/ln	1617	0	0	1835	0	0	1782	0	1713	0	0	1844
Q Serve(g_s), s	12.7	0.0	0.0	17.0	0.0	0.0	3.1	0.0	17.4	0.0	0.0	17.5
Cycle Q Clear(g_c), s	12.7	0.0	0.0	17.0	0.0	0.0	3.1	0.0	17.4	0.0	0.0	17.5
Prop In Lane	0.20		0.34	0.54		0.08	1.00		0.21	0.00		0.07
Lane Grp Cap(c), veh/h	303	0	0	476	0	0	246	0	672	0	0	509
V/C Ratio(X)	0.92	0.00	0.00	0.90	0.00	0.00	0.45	0.00	0.71	0.00	0.00	0.88
Avail Cap(c_a), veh/h	303	0	0	516	0	0	301	0	756	0	0	543
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	29.8	0.0	0.0	26.8	0.0	0.0	18.9	0.0	19.1	0.0	0.0	25.9
Incr Delay (d2), s/veh	32.6	0.0	0.0	18.6	0.0	0.0	1.3	0.0	2.6	0.0	0.0	15.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.0	0.0	11.1	0.0	0.0	1.6	0.0	8.7	0.0	0.0	11.0
LnGrp Delay(d),s/veh	62.5	0.0	0.0	45.3	0.0	0.0	20.2	0.0	21.7	0.0	0.0	41.1
LnGrp LOS	E			D			C		C			D
Approach Vol, veh/h		280			431			585				450
Approach Delay, s/veh		62.5			45.3			21.4				41.1
Approach LOS		E			D			C				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		33.3		18.0	8.7	24.6		23.4				
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s		33.0		14.0	7.0	22.0		21.0				
Max Q Clear Time (g_c+I1), s		19.4		14.7	5.1	19.5		19.0				
Green Ext Time (p_c), s		3.8		0.0	0.1	1.2		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay				39.0								
HCM 2010 LOS				D								

HCM Unsignalized Intersection Capacity Analysis

6: Jones Avenue & North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	3	224	53	4	174	1	56	0	4	2	1	9
Sign Control		Free			Free			Stop			Stop	
Grade		12%			8%			-3%			-6%	
Peak Hour Factor	0.75	0.97	0.83	0.50	0.87	0.25	0.78	0.90	0.50	0.25	0.25	0.56
Hourly flow rate (vph)	4	231	64	8	200	4	72	0	8	8	4	16
Pedestrians		15			1			3			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	206			298			525	496	267	500	526	219
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	206			298			525	496	267	500	526	219
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	100			99			84	100	99	98	99	98
cM capacity (veh/h)	1375			1140			440	472	774	474	454	788

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	299	212	80	28
Volume Left	4	8	72	8
Volume Right	64	4	8	16
cSH	1375	1140	460	609
Volume to Capacity	0.00	0.01	0.17	0.05
Queue Length 95th (ft)	0	1	16	4
Control Delay (s)	0.1	0.4	14.5	11.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.4	14.5	11.2
Approach LOS			B	B

Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization	33.3%		ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	3	224	53	4	174	1	56	0	4
Conflicting Peds, #/hr	2	0	3	3	0	2	15	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	12	-	-	8	-	-	-3	-
Peak Hour Factor	75	97	83	50	87	25	78	90	50
Heavy Vehicles, %	0	0	0	25	2	0	2	0	0
Mvmt Flow	4	231	64	8	200	4	72	0	8

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	219	0	0	310	0	0	529	521	281
Stage 1	-	-	-	-	-	-	286	286	-
Stage 2	-	-	-	-	-	-	243	235	-
Critical Hdwy	4.1	-	-	4.35	-	-	6.52	5.9	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.52	4.9	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.52	4.9	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.518	4	3.3
Pot Cap-1 Maneuver	1362	-	-	1131	-	-	503	505	781
Stage 1	-	-	-	-	-	-	757	712	-
Stage 2	-	-	-	-	-	-	792	743	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1359	-	-	1128	-	-	478	487	769
Mov Cap-2 Maneuver	-	-	-	-	-	-	478	487	-
Stage 1	-	-	-	-	-	-	745	700	-
Stage 2	-	-	-	-	-	-	764	728	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0.3	13.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	497	1359	-	-	1128	-	-	663
HCM Lane V/C Ratio	0.161	0.003	-	-	0.007	-	-	0.042
HCM Control Delay (s)	13.6	7.7	0	-	8.2	0	-	10.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	1	9
Conflicting Peds, #/hr	1	0	15
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	25	25	56
Heavy Vehicles, %	0	0	11
Mvmt Flow	8	4	16

Major/Minor

	Minor2		
Conflicting Flow All	523	551	220
Stage 1	233	233	-
Stage 2	290	318	-
Critical Hdwy	5.9	5.3	5.71
Critical Hdwy Stg 1	4.9	4.3	-
Critical Hdwy Stg 2	4.9	4.3	-
Follow-up Hdwy	3.5	4	3.399
Pot Cap-1 Maneuver	557	535	827
Stage 1	837	773	-
Stage 2	795	731	-
Platoon blocked, %			
Mov Cap-1 Maneuver	538	515	815
Mov Cap-2 Maneuver	538	515	-
Stage 1	823	757	-
Stage 2	782	719	-

Approach

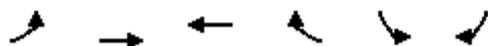
	SB
HCM Control Delay, s	10.7
HCM LOS	B

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis

9: Stewart St & Jones Ave

10/8/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	218	308	0	12	30
Sign Control		Free	Free		Stop	
Grade		2%	-2%		-15%	
Peak Hour Factor	0.25	0.87	0.79	0.90	0.75	0.75
Hourly flow rate (vph)	0	251	390	0	16	40
Pedestrians		21				
Lane Width (ft)		11.0				
Walking Speed (ft/s)		4.0				
Percent Blockage		2				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		315				
pX, platoon unblocked						
vC, conflicting volume	390				640	411
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	390				640	411
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	94
cM capacity (veh/h)	1180				445	630

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	251	390	56
Volume Left	0	0	16
Volume Right	0	0	40
cSH	1700	1700	563
Volume to Capacity	0.15	0.23	0.10
Queue Length 95th (ft)	0	0	8
Control Delay (s)	0.0	0.0	12.1
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.1
Approach LOS			B

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		31.6%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	218	308	0	12	30
Conflicting Peds, #/hr	0	0	0	0	0	21
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-15	-
Peak Hour Factor	25	87	79	90	75	75
Heavy Vehicles, %	0	2	0	0	0	3
Mvmt Flow	0	251	390	0	16	40

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	411	0	662
Stage 1	-	-	411
Stage 2	-	-	251
Critical Hdwy	4.1	-	3.4
Critical Hdwy Stg 1	-	-	2.4
Critical Hdwy Stg 2	-	-	2.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1159	-	746
Stage 1	-	-	949
Stage 2	-	-	981
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1159	-	720
Mov Cap-2 Maneuver	-	-	720
Stage 1	-	-	932
Stage 2	-	-	964

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1159	-	-	-	738
HCM Lane V/C Ratio	-	-	-	-	0.076
HCM Control Delay (s)	0	-	-	-	10.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM Unsignalized Intersection Capacity Analysis

12: University Avenue & Third Street

10/8/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	17	15	76	277	320	29
Sign Control	Stop			Free	Free	
Grade	15%			6%	-6%	
Peak Hour Factor	0.71	0.70	0.90	0.82	0.92	0.66
Hourly flow rate (vph)	24	21	84	338	348	44
Pedestrians	39			13		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	3			1		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1104		
pX, platoon unblocked	0.98					
vC, conflicting volume	915	422	431			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	905	422	431			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	91	96	92			
cM capacity (veh/h)	270	594	1102			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	45	422	392			
Volume Left	24	84	0			
Volume Right	21	0	44			
cSH	363	1102	1700			
Volume to Capacity	0.12	0.08	0.23			
Queue Length 95th (ft)	11	6	0			
Control Delay (s)	16.3	2.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.3	2.4	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			54.5%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	17	15	76	277	320	29
Conflicting Peds, #/hr	0	13	39	0	0	39
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	15	-	-	6	-6	-
Peak Hour Factor	71	70	90	82	92	66
Heavy Vehicles, %	0	7	0	4	1	0
Mvmt Flow	24	21	84	338	348	44

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	890	422	405 0
Stage 1	383	-	- -
Stage 2	507	-	- -
Critical Hdwy	9.4	7.77	4.1 -
Critical Hdwy Stg 1	8.4	-	- -
Critical Hdwy Stg 2	8.4	-	- -
Follow-up Hdwy	3.5	3.363	2.2 -
Pot Cap-1 Maneuver	150	521	1165 -
Stage 1	504	-	- -
Stage 2	399	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	133	499	1127 -
Mov Cap-2 Maneuver	133	-	- -
Stage 1	499	-	- -
Stage 2	358	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	27.8	1.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1127	-	203	-	-
HCM Lane V/C Ratio	0.075	-	0.224	-	-
HCM Control Delay (s)	8.5	0	27.8	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.2	-	0.8	-	-

HCM Unsignalized Intersection Capacity Analysis

13: University Avenue & Overhill Street

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	41	314	19	28	348
Sign Control	Stop		Free			Free
Grade	-15%		6%			-6%
Peak Hour Factor	0.70	0.85	0.85	0.95	0.64	0.96
Hourly flow rate (vph)	20	48	369	20	44	362
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			749			
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	829	379			389	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	238			250	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	94	93			96	
cM capacity (veh/h)	330	712			1143	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	68	389	406
Volume Left	20	0	44
Volume Right	48	20	0
cSH	532	1700	1143
Volume to Capacity	0.13	0.23	0.04
Queue Length 95th (ft)	11	0	3
Control Delay (s)	12.8	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	12.8	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		50.9%	ICU Level of Service A
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	41	314	19	28	348
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-15	-	6	-	-	-6
Peak Hour Factor	70	85	85	95	64	96
Heavy Vehicles, %	0	2	4	0	7	2
Mvmt Flow	20	48	369	20	44	362

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	829	379	0 0 389 0
Stage 1	379	-	- - - -
Stage 2	450	-	- - - -
Critical Hdwy	3.4	4.72	- - 4.17 -
Critical Hdwy Stg 1	2.4	-	- - - -
Critical Hdwy Stg 2	2.4	-	- - - -
Follow-up Hdwy	3.5	3.318	- - 2.263 -
Pot Cap-1 Maneuver	685	782	- - 1143 -
Stage 1	955	-	- - - -
Stage 2	941	-	- - - -
Platoon blocked, %			- - - -
Mov Cap-1 Maneuver	652	782	- - 1143 -
Mov Cap-2 Maneuver	652	-	- - - -
Stage 1	955	-	- - - -
Stage 2	896	-	- - - -

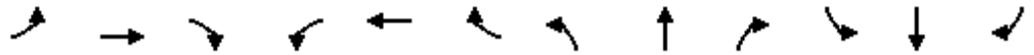
Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	739	1143	-
HCM Lane V/C Ratio	-	-	0.092	0.038	-
HCM Control Delay (s)	-	-	10.4	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

HCM Unsignalized Intersection Capacity Analysis

14: Jones Avenue & Overhill Street/Driveway

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔						↔	
Volume (veh/h)	13	5	4	2	8	8	0	0	0	12	14	22
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-6%			-4%			-10%	
Peak Hour Factor	0.65	0.63	0.33	0.25	0.67	0.67	0.90	0.90	0.90	0.75	0.88	0.55
Hourly flow rate (vph)	20	8	12	8	12	12	0	0	0	16	16	40
Pedestrians		8			3			6			4	
Lane Width (ft)		12.0			12.0			0.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	28			26			150	104	23	95	104	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	28			26			150	104	23	95	104	30
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			100			100	100	100	98	98	96
cM capacity (veh/h)	1593			1601			761	774	1057	874	774	1026

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	40	32	72
Volume Left	20	8	16
Volume Right	12	12	40
cSH	1593	1601	924
Volume to Capacity	0.01	0.00	0.08
Queue Length 95th (ft)	1	0	6
Control Delay (s)	3.7	1.8	9.2
Lane LOS	A	A	A
Approach Delay (s)	3.7	1.8	9.2
Approach LOS			A

Intersection Summary		
Average Delay		6.0
Intersection Capacity Utilization	23.4%	ICU Level of Service
Analysis Period (min)		15
		A

Intersection

Int Delay, s/veh 5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	13	5	4	2	8	8	0	0	0
Conflicting Peds, #/hr	4	0	6	6	0	4	8	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-6	-	-	-4	-
Peak Hour Factor	65	63	33	25	67	67	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	8	12	8	12	12	0	0	0

Major/Minor

	Major1		Major2		
Conflicting Flow All	32	0	0	20	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	4.1	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.2	-
Pot Cap-1 Maneuver	1593	-	-	1609	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Platoon blocked, %		-	-		-
Mov Cap-1 Maneuver	1585	-	-	1601	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

HCM Control Delay, s 3.6 WB 1.8

HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1585	-	-	1601	-	-	999
HCM Lane V/C Ratio	0.013	-	-	0.005	-	-	0.072
HCM Control Delay (s)	7.3	0	-	7.3	0	-	8.9
HCM Lane LOS	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.2

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	12	14	22
Conflicting Peds, #/hr	3	0	8
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-10	-
Peak Hour Factor	75	88	55
Heavy Vehicles, %	0	0	5
Mvmt Flow	16	16	40

Major/Minor

Minor2

Conflicting Flow All	96	102	32
Stage 1	42	42	-
Stage 2	54	60	-
Critical Hdwy	4.4	4.5	5.25
Critical Hdwy Stg 1	3.4	3.5	-
Critical Hdwy Stg 2	3.4	3.5	-
Follow-up Hdwy	3.5	4	3.345
Pot Cap-1 Maneuver	958	838	1043
Stage 1	1009	884	-
Stage 2	1003	878	-
Platoon blocked, %			
Mov Cap-1 Maneuver	928	0	1031
Mov Cap-2 Maneuver	928	0	-
Stage 1	997	0	-
Stage 2	983	0	-

Approach

SB

HCM Control Delay, s	8.9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 16: Quay Street & Overhill Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	16	11	4	30	0	9	0	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-15%			-2%			-8%	
Peak Hour Factor	0.90	0.57	0.55	0.50	0.54	0.90	0.56	0.90	0.63	0.90	0.90	0.90
Hourly flow rate (vph)	0	28	20	8	56	0	16	0	8	0	0	0
Pedestrians								12			2	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								4.0			4.0	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	58			60			122	124	50	120	134	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	58			60			122	124	50	120	134	58
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			98	100	99	100	100	100
cM capacity (veh/h)	1557			1395			838	757	1014	842	748	1013
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	48	64	24	0								
Volume Left	0	8	16	0								
Volume Right	20	0	8	0								
cSH	1557	1395	889	1700								
Volume to Capacity	0.00	0.01	0.03	0.00								
Queue Length 95th (ft)	0	0	2	0								
Control Delay (s)	0.0	1.0	9.2	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	1.0	9.2	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			16.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	16	11	4	30	0	9	0	5
Conflicting Peds, #/hr	2	0	12	12	0	2	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-15	-	-	-2	-
Peak Hour Factor	90	57	55	50	54	90	56	90	63
Heavy Vehicles, %	0	0	0	25	0	0	0	0	0
Mvmt Flow	0	28	20	8	56	0	16	0	8

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	56	0	0	48	0	0	110	110	50
Stage 1	-	-	-	-	-	-	38	38	-
Stage 2	-	-	-	-	-	-	72	72	-
Critical Hdwy	4.1	-	-	4.35	-	-	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1562	-	-	1424	-	-	884	794	1027
Stage 1	-	-	-	-	-	-	987	871	-
Stage 2	-	-	-	-	-	-	950	846	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1546	-	-	1410	-	-	871	789	1017
Mov Cap-2 Maneuver	-	-	-	-	-	-	871	789	-
Stage 1	-	-	-	-	-	-	987	871	-
Stage 2	-	-	-	-	-	-	935	841	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	914	1546	-	-	1410	-	-	-
HCM Lane V/C Ratio	0.026	-	-	-	0.006	-	-	-
HCM Control Delay (s)	9	0	-	-	7.6	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	0	0	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-8	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	0	0

Major/Minor **Minor2**

Conflicting Flow All	114	120	68
Stage 1	72	72	-
Stage 2	42	48	-
Critical Hdwy	5.5	4.9	5.4
Critical Hdwy Stg 1	4.5	3.9	-
Critical Hdwy Stg 2	4.5	3.9	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	913	816	1016
Stage 1	973	866	-
Stage 2	996	877	-
Platoon blocked, %			
Mov Cap-1 Maneuver	893	811	1006
Mov Cap-2 Maneuver	893	811	-
Stage 1	973	861	-
Stage 2	978	877	-

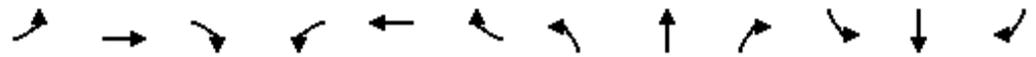
Approach **SB**

HCM Control Delay, s	0
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 19: University Avenue & Ensign Avenue/North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	7	11	2	13	32	183	7	263	20	246	314	20
Sign Control		Stop			Stop			Free			Free	
Grade		15%			-12%			6%			-6%	
Peak Hour Factor	0.58	0.69	0.50	0.65	0.62	0.93	0.58	0.79	0.83	0.92	0.88	0.83
Hourly flow rate (vph)	12	16	4	20	52	197	12	333	24	267	357	24
Pedestrians		11									7	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		1									1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1513	1296	380	1285	1296	352	392			357		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1513	1296	380	1285	1296	352	392			357		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	69	87	99	81	58	72	99			78		
cM capacity (veh/h)	39	124	664	106	123	691	1167			1213		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	268	369	648
Volume Left	12	20	12	267
Volume Right	4	197	24	24
cSH	72	300	1167	1213
Volume to Capacity	0.45	0.89	0.01	0.22
Queue Length 95th (ft)	45	206	1	21
Control Delay (s)	91.0	66.5	0.4	5.1
Lane LOS	F	F	A	A
Approach Delay (s)	91.0	66.5	0.4	5.1
Approach LOS	F	F		

Intersection Summary			
Average Delay		18.4	
Intersection Capacity Utilization	71.4%		ICU Level of Service C
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 16.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	7	11	2	13	32	183	7	263	20
Conflicting Peds, #/hr	7	0	0	0	0	7	11	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-12	-	-	6	-
Peak Hour Factor	58	69	50	65	62	93	58	79	83
Heavy Vehicles, %	0	0	0	0	6	1	0	3	0
Mvmt Flow	12	16	4	20	52	197	12	333	24

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1411	1299	387	1297	1299	363	388	0	0
Stage 1	911	911	-	376	376	-	-	-	-
Stage 2	500	388	-	921	923	-	-	-	-
Critical Hdwy	10.1	9.5	7.7	4.7	4.16	5.01	4.1	-	-
Critical Hdwy Stg 1	9.1	8.5	-	3.7	3.16	-	-	-	-
Critical Hdwy Stg 2	9.1	8.5	-	3.7	3.16	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4.054	3.309	2.2	-	-
Pot Cap-1 Maneuver	36	55	566	333	377	772	1182	-	-
Stage 1	155	167	-	834	783	-	-	-	-
Stage 2	367	443	-	604	635	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	17	38	558	173	263	760	1171	-	-
Mov Cap-2 Maneuver	17	38	-	173	263	-	-	-	-
Stage 1	152	119	-	818	768	-	-	-	-
Stage 2	248	435	-	368	452	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	\$ 425	22.4	0.3
HCM LOS	F	C	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1171	-	-	28	470	1195	-	-
HCM Lane V/C Ratio	0.01	-	-	1.143	0.571	0.224	-	-
HCM Control Delay (s)	8.1	0	-	\$ 425	22.4	8.9	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3.7	3.5	0.9	-	-

Notes

-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	246	314	20
Conflicting Peds, #/hr	0	0	11
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	92	88	83
Heavy Vehicles, %	0	1	0
Mvmt Flow	267	357	24

Major/Minor Major2

Conflicting Flow All	364	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1206	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1195	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach SB

HCM Control Delay, s 3.7

HCM LOS

Minor Lane/Major Mvmt

Queues

1: University Avenue & Campus Drive/Stewart St

10/8/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	391	439	82	522	306
v/c Ratio	0.91	0.93	0.34	0.92	0.80
Control Delay	54.8	58.3	22.7	47.1	48.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	58.3	22.7	47.1	48.1
Queue Length 50th (ft)	181	214	28	229	147
Queue Length 95th (ft)	#225	#395	51	#367	#247
Internal Link Dist (ft)	420	235		421	479
Turn Bay Length (ft)			275		
Base Capacity (vph)	451	480	245	604	382
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	0.87	0.91	0.33	0.86	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: University Avenue & Campus Drive/Stewart St

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	47	163	65	195	138	25	62	278	109	0	224	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	0.88		0.78	1.00		0.69
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1843	1698	1843	1938	1909	1938	1817	1765	1872	0	1801	1919
Adj Flow Rate, veh/h	74	230	87	254	156	29	82	341	181	0	281	25
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.65	0.73	0.77	0.79	0.91	0.89	0.78	0.84	0.62	0.90	0.82	0.67
Percent Heavy Veh, %	2	2	2	1	1	1	3	5	5	0	6	6
Cap, veh/h	80	247	94	264	162	30	241	331	176	0	371	33
Arrive On Green	0.26	0.26	0.26	0.25	0.25	0.25	0.05	0.34	0.34	0.00	0.24	0.24
Sat Flow, veh/h	303	942	356	1058	650	121	1730	981	520	0	1563	139
Grp Volume(v), veh/h	391	0	0	439	0	0	82	0	522	0	0	306
Grp Sat Flow(s),veh/h/ln	1601	0	0	1828	0	0	1730	0	1501	0	0	1702
Q Serve(g_s), s	19.1	0.0	0.0	19.0	0.0	0.0	2.7	0.0	27.0	0.0	0.0	13.4
Cycle Q Clear(g_c), s	19.1	0.0	0.0	19.0	0.0	0.0	2.7	0.0	27.0	0.0	0.0	13.4
Prop In Lane	0.19		0.22	0.58		0.07	1.00		0.35	0.00		0.08
Lane Grp Cap(c), veh/h	420	0	0	457	0	0	241	0	507	0	0	404
V/C Ratio(X)	0.93	0.00	0.00	0.96	0.00	0.00	0.34	0.00	1.03	0.00	0.00	0.76
Avail Cap(c_a), veh/h	420	0	0	457	0	0	306	0	507	0	0	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	28.8	0.0	0.0	29.6	0.0	0.0	21.5	0.0	26.5	0.0	0.0	28.4
Incr Delay (d2), s/veh	27.2	0.0	0.0	32.0	0.0	0.0	0.8	0.0	48.0	0.0	0.0	8.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	0.0	0.0	13.6	0.0	0.0	1.3	0.0	17.9	0.0	0.0	7.2
LnGrp Delay(d),s/veh	56.0	0.0	0.0	61.6	0.0	0.0	22.3	0.0	74.5	0.0	0.0	36.4
LnGrp LOS	E			E			C		F			D
Approach Vol, veh/h		391			439			604				306
Approach Delay, s/veh		56.0			61.6			67.4				36.4
Approach LOS		E			E			E				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		31.0		25.0	8.0	23.0		24.0				
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s		27.0		21.0	7.0	16.0		20.0				
Max Q Clear Time (g_c+I1), s		29.0		21.1	4.7	15.4		21.0				
Green Ext Time (p_c), s		0.0		0.0	0.0	0.3		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				57.9								
HCM 2010 LOS				E								

HCM Unsignalized Intersection Capacity Analysis

6: Jones Avenue & North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	46	16	0	244	0	52	0	1	1	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		12%			8%			-3%			-6%	
Peak Hour Factor	0.90	0.72	0.50	0.90	0.95	0.90	0.76	0.90	0.25	0.25	0.90	0.33
Hourly flow rate (vph)	0	66	33	0	265	0	70	0	4	4	0	12
Pedestrians		3										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		4.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	265			99			362	347	82	351	363	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	265			99			362	347	82	351	363	268
tC, single (s)	4.1			4.8			7.1	6.5	6.2	7.1	7.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			3.5	4.0	3.3	3.5	4.9	3.3
p0 queue free %	100			100			88	100	100	99	100	98
cM capacity (veh/h)	1311			1171			583	580	983	606	437	774

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	265	75	17
Volume Left	0	0	70	4
Volume Right	33	0	4	12
cSH	1311	1171	596	724
Volume to Capacity	0.00	0.00	0.13	0.02
Queue Length 95th (ft)	0	0	11	2
Control Delay (s)	0.0	0.0	11.9	10.1
Lane LOS			B	B
Approach Delay (s)	0.0	0.0	11.9	10.1
Approach LOS			B	B

Intersection Summary			
Average Delay		2.3	
Intersection Capacity Utilization	29.6%		ICU Level of Service
Analysis Period (min)	15		A

Intersection

Int Delay, s/veh 2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	46	16	0	244	0	52	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	12	-	-	8	-	-	-3	-
Peak Hour Factor	90	72	50	90	95	90	76	90	25
Heavy Vehicles, %	0	0	0	67	0	0	2	0	0
Mvmt Flow	0	66	33	0	265	0	70	0	4

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	268	0	0	102	0	0	359	353	85
Stage 1	-	-	-	-	-	-	85	85	-
Stage 2	-	-	-	-	-	-	274	268	-
Critical Hdwy	4.1	-	-	4.77	-	-	6.52	5.9	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.52	4.9	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.52	4.9	-
Follow-up Hdwy	2.2	-	-	2.803	-	-	3.518	4	3.3
Pot Cap-1 Maneuver	1307	-	-	1167	-	-	633	610	987
Stage 1	-	-	-	-	-	-	936	840	-
Stage 2	-	-	-	-	-	-	766	723	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1307	-	-	1167	-	-	622	607	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	622	607	-
Stage 1	-	-	-	-	-	-	934	838	-
Stage 2	-	-	-	-	-	-	754	721	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	635	1307	-	-	1167	-	-	771
HCM Lane V/C Ratio	0.117	-	-	-	-	-	-	0.022
HCM Control Delay (s)	11.4	0	-	-	0	-	-	9.8
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	1	0	4
Conflicting Peds, #/hr	0	0	3
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	25	90	33
Heavy Vehicles, %	0	100	0
Mvmt Flow	4	0	12

Major/Minor **Minor2**

Conflicting Flow All	355	370	268
Stage 1	268	268	-
Stage 2	87	102	-
Critical Hdwy	5.9	6.3	5.6
Critical Hdwy Stg 1	4.9	5.3	-
Critical Hdwy Stg 2	4.9	5.3	-
Follow-up Hdwy	3.5	4.9	3.3
Pot Cap-1 Maneuver	680	489	811
Stage 1	811	591	-
Stage 2	953	677	-
Platoon blocked, %			
Mov Cap-1 Maneuver	675	487	809
Mov Cap-2 Maneuver	675	487	-
Stage 1	809	590	-
Stage 2	949	675	-

Approach **SB**

HCM Control Delay, s	9.8
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis

9: Stewart St & Jones Ave

10/8/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	261	304	0	1	17
Sign Control		Free	Free		Stop	
Grade		2%	-2%		-15%	
Peak Hour Factor	0.92	0.66	0.84	0.92	0.25	0.53
Hourly flow rate (vph)	0	407	373	0	4	33
Pedestrians		23				
Lane Width (ft)		11.0				
Walking Speed (ft/s)		4.0				
Percent Blockage		2				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		315				
pX, platoon unblocked						
vC, conflicting volume	373				780	396
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	373				780	396
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	95
cM capacity (veh/h)	1186				369	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	407	373	37
Volume Left	0	0	4
Volume Right	0	0	33
cSH	1700	1700	597
Volume to Capacity	0.24	0.22	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.0	11.4
Lane LOS			B
Approach Delay (s)	0.0	0.0	11.4
Approach LOS			B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		31.8%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	261	304	0	1	17
Conflicting Peds, #/hr	0	0	0	0	0	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-15	-
Peak Hour Factor	92	66	84	92	25	53
Heavy Vehicles, %	2	3	4	2	0	0
Mvmt Flow	0	407	373	0	4	33

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	396	0	803
Stage 1	-	-	396
Stage 2	-	-	407
Critical Hdwy	4.12	-	3.4
Critical Hdwy Stg 1	-	-	2.4
Critical Hdwy Stg 2	-	-	2.4
Follow-up Hdwy	2.218	-	3.5
Pot Cap-1 Maneuver	1163	-	694
Stage 1	-	-	952
Stage 2	-	-	949
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1163	-	668
Mov Cap-2 Maneuver	-	-	668
Stage 1	-	-	934
Stage 2	-	-	931

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1163	-	-	-	749
HCM Lane V/C Ratio	-	-	-	-	0.05
HCM Control Delay (s)	0	-	-	-	10.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM Unsignalized Intersection Capacity Analysis

12: University Avenue & Third Street

10/8/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	21	36	299	211	14
Sign Control	Stop			Free	Free	
Grade	15%			6%	-6%	
Peak Hour Factor	0.58	0.75	0.60	0.83	0.81	0.88
Hourly flow rate (vph)	12	29	62	371	268	16
Pedestrians	43			9	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			1	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)	1104					
pX, platoon unblocked						
vC, conflicting volume	815	329	328			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	815	329	328			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	96	96	95			
cM capacity (veh/h)	317	686	1156			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	41	433	285			
Volume Left	12	62	0			
Volume Right	29	0	16			
cSH	508	1156	1700			
Volume to Capacity	0.08	0.05	0.17			
Queue Length 95th (ft)	7	4	0			
Control Delay (s)	12.7	1.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.7	1.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			47.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	7	21	36	299	211	14
Conflicting Peds, #/hr	1	9	43	0	0	43
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	15	-	-	6	-6	-
Peak Hour Factor	58	75	60	83	81	88
Heavy Vehicles, %	0	0	8	7	3	0
Mvmt Flow	12	29	62	371	268	16

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	781	329	294
Stage 1	286	-	-
Stage 2	495	-	-
Critical Hdwy	9.4	7.7	4.18
Critical Hdwy Stg 1	8.4	-	-
Critical Hdwy Stg 2	8.4	-	-
Follow-up Hdwy	3.5	3.3	2.272
Pot Cap-1 Maneuver	191	625	1234
Stage 1	604	-	-
Stage 2	408	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	176	598	1190
Mov Cap-2 Maneuver	176	-	-
Stage 1	599	-	-
Stage 2	378	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.8	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1190	-	347	-	-
HCM Lane V/C Ratio	0.052	-	0.119	-	-
HCM Control Delay (s)	8.2	0	16.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

HCM Unsignalized Intersection Capacity Analysis

13: University Avenue & Overhill Street

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	13	319	13	12	232
Sign Control	Stop		Free			Free
Grade	-15%		6%			-6%
Peak Hour Factor	0.50	0.65	0.80	0.65	0.43	0.82
Hourly flow rate (vph)	29	21	411	21	29	291
Pedestrians	1		1			2
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			749			
pX, platoon unblocked	0.87	0.87			0.87	
vC, conflicting volume	772	424			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	661	261			270	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	97			97	
cM capacity (veh/h)	365	679			1132	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	49	431	320
Volume Left	29	0	29
Volume Right	21	21	0
cSH	453	1700	1132
Volume to Capacity	0.11	0.25	0.03
Queue Length 95th (ft)	9	0	2
Control Delay (s)	13.9	0.0	1.0
Lane LOS	B		A
Approach Delay (s)	13.9	0.0	1.0
Approach LOS	B		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		33.3%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	13	319	13	12	232
Conflicting Peds, #/hr	1	2	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-15	-	6	-	-	-6
Peak Hour Factor	50	65	80	65	43	82
Heavy Vehicles, %	0	0	5	0	0	4
Mvmt Flow	29	21	411	21	29	291

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	772	424	433
Stage 1	423	-	-
Stage 2	349	-	-
Critical Hdwy	3.4	4.7	4.1
Critical Hdwy Stg 1	2.4	-	-
Critical Hdwy Stg 2	2.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	705	757	1137
Stage 1	946	-	-
Stage 2	961	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	682	755	1136
Mov Cap-2 Maneuver	682	-	-
Stage 1	944	-	-
Stage 2	931	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	711	1136	-
HCM Lane V/C Ratio	-	-	0.07	0.025	-
HCM Control Delay (s)	-	-	10.4	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

HCM Unsignalized Intersection Capacity Analysis

14: Jones Avenue & Overhill Street/Driveway

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕						↕	
Volume (veh/h)	9	3	1	1	3	4	0	0	0	2	11	12
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-6%			-4%			-10%	
Peak Hour Factor	0.75	0.75	0.25	0.25	0.38	0.50	0.90	0.90	0.90	0.50	0.55	0.60
Hourly flow rate (vph)	12	4	4	4	8	8	0	0	0	4	21	21
Pedestrians		31			1			2			15	
Lane Width (ft)		12.0			12.0			0.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		3			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	31			10			115	73	9	67	70	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	31			10			115	73	9	67	70	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			100			100	100	100	100	97	98
cM capacity (veh/h)	1574			1622			796	803	1077	902	805	975

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	21	20	45
Volume Left	12	4	4
Volume Right	4	8	21
cSH	1574	1622	884
Volume to Capacity	0.01	0.00	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	4.4	1.5	9.3
Lane LOS	A	A	A
Approach Delay (s)	4.4	1.5	9.3
Approach LOS			A

Intersection Summary		
Average Delay		6.3
Intersection Capacity Utilization	23.7%	ICU Level of Service
Analysis Period (min)		15
		A

Intersection

Int Delay, s/veh 6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	9	3	1	1	3	4	0	0	0
Conflicting Peds, #/hr	15	0	2	2	0	15	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-6	-	-	-4	-
Peak Hour Factor	75	75	25	25	38	50	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	4	4	4	8	8	0	0	0

Major/Minor

	Major1		Major2		
Conflicting Flow All	47	0	0	8	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	4.1	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.2	-
Pot Cap-1 Maneuver	1573	-	-	1625	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1553	-	-	1605	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

HCM Control Delay, s 4.4 WB 1.5

HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1553	-	-	1605	-	-	976
HCM Lane V/C Ratio	0.008	-	-	0.003	-	-	0.046
HCM Control Delay (s)	7.3	0	-	7.2	0	-	8.9
HCM Lane LOS	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	11	12
Conflicting Peds, #/hr	1	0	31
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-10	-
Peak Hour Factor	50	55	60
Heavy Vehicles, %	0	0	0
Mvmt Flow	4	21	21

Major/Minor **Minor2**

Conflicting Flow All	82	84	58
Stage 1	51	51	-
Stage 2	31	33	-
Critical Hdwy	4.4	4.5	5.2
Critical Hdwy Stg 1	3.4	3.5	-
Critical Hdwy Stg 2	3.4	3.5	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	968	849	1030
Stage 1	1005	881	-
Stage 2	1014	888	-
Platoon blocked, %			
Mov Cap-1 Maneuver	909	0	991
Mov Cap-2 Maneuver	909	0	-
Stage 1	976	0	-
Stage 2	980	0	-

Approach **SB**

HCM Control Delay, s	8.9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 16: Quay Street & Overhill Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	14	2	2	16	0	5	0	2	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-15%			-2%			-8%	
Peak Hour Factor	0.90	0.88	0.50	0.50	0.67	0.90	0.42	0.90	0.50	0.90	0.90	0.90
Hourly flow rate (vph)	0	16	4	4	25	0	12	0	4	0	0	0
Pedestrians					1			7			4	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	29			28			58	62	26	60	64	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	29			28			58	62	26	60	64	29
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	100			100			99	100	100	100	100	100
cM capacity (veh/h)	1592			1590			929	823	1048	924	821	1049
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	29	16	0								
Volume Left	0	4	12	0								
Volume Right	4	0	4	0								
cSH	1592	1590	957	1700								
Volume to Capacity	0.00	0.00	0.02	0.00								
Queue Length 95th (ft)	0	0	1	0								
Control Delay (s)	0.0	1.1	8.8	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	1.1	8.8	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			15.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	14	2	2	16	0	5	0	2
Conflicting Peds, #/hr	4	0	7	7	0	4	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-15	-	-	-2	-
Peak Hour Factor	90	88	50	50	67	90	42	90	50
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	16	4	4	25	0	12	0	4

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	26	0	0	22	0	0	53	53	26
Stage 1	-	-	-	-	-	-	19	19	-
Stage 2	-	-	-	-	-	-	34	34	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1601	-	-	1607	-	-	956	847	1057
Stage 1	-	-	-	-	-	-	1007	885	-
Stage 2	-	-	-	-	-	-	991	874	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1592	-	-	1598	-	-	947	843	1050
Mov Cap-2 Maneuver	-	-	-	-	-	-	947	843	-
Stage 1	-	-	-	-	-	-	1006	884	-
Stage 2	-	-	-	-	-	-	982	871	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	971	1592	-	-	1598	-	-	-
HCM Lane V/C Ratio	0.017	-	-	-	0.003	-	-	-
HCM Control Delay (s)	8.8	0	-	-	7.3	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	0	0	0
Conflicting Peds, #/hr	1	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-8	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	0	0

Major/Minor **Minor2**

Conflicting Flow All	56	56	33
Stage 1	34	34	-
Stage 2	22	22	-
Critical Hdwy	5.5	4.9	5.4
Critical Hdwy Stg 1	4.5	3.9	-
Critical Hdwy Stg 2	4.5	3.9	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	970	860	1054
Stage 1	1002	884	-
Stage 2	1011	890	-
Platoon blocked, %			
Mov Cap-1 Maneuver	958	856	1047
Mov Cap-2 Maneuver	958	856	-
Stage 1	1001	881	-
Stage 2	1001	889	-

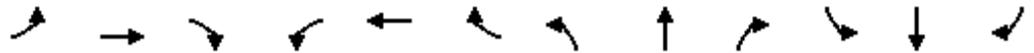
Approach **SB**

HCM Control Delay, s	0
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 19: University Avenue & Ensign Avenue/North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	10	4	0	19	8	267	4	265	8	53	191	6
Sign Control		Stop			Stop			Free			Free	
Grade		15%			-12%			6%			-6%	
Peak Hour Factor	0.83	0.50	0.90	0.68	0.50	0.79	0.33	0.93	0.50	0.78	0.82	0.50
Hourly flow rate (vph)	12	8	0	29	16	348	12	293	16	70	240	12
Pedestrians		10										1
Lane Width (ft)		12.0										12.0
Walking Speed (ft/s)		4.0										4.0
Percent Blockage		1										0
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1080	731	256	717	729	303	262			310		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1080	731	256	717	729	303	262			310		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.4			2.2		
p0 queue free %	87	97	100	91	95	53	99			94		
cM capacity (veh/h)	93	323	780	323	328	742	1170			1251		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	393	322	322
Volume Left	12	29	12	70
Volume Right	0	348	16	12
cSH	130	646	1170	1251
Volume to Capacity	0.16	0.61	0.01	0.06
Queue Length 95th (ft)	14	103	1	4
Control Delay (s)	37.7	18.8	0.4	2.2
Lane LOS	E	C	A	A
Approach Delay (s)	37.7	18.8	0.4	2.2
Approach LOS	E	C		

Intersection Summary			
Average Delay		8.5	
Intersection Capacity Utilization	57.2%		ICU Level of Service B
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	10	4	0	19	8	267	4	265	8
Conflicting Peds, #/hr	1	0	0	0	0	1	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-12	-	-	6	-
Peak Hour Factor	83	50	90	68	50	79	33	93	50
Heavy Vehicles, %	0	0	0	0	0	0	25	6	0
Mvmt Flow	12	8	0	29	16	348	12	293	16

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	897	723	257	719	721	313	253	0	0
Stage 1	387	387	-	328	328	-	-	-	-
Stage 2	510	336	-	391	393	-	-	-	-
Critical Hdwy	10.1	9.5	7.7	4.7	4.1	5	4.35	-	-
Critical Hdwy Stg 1	9.1	8.5	-	3.7	3.1	-	-	-	-
Critical Hdwy Stg 2	9.1	8.5	-	3.7	3.1	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.425	-	-
Pot Cap-1 Maneuver	124	194	707	559	575	812	1189	-	-
Stage 1	464	444	-	858	810	-	-	-	-
Stage 2	359	488	-	827	792	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	64	179	701	503	530	805	1179	-	-
Mov Cap-2 Maneuver	64	179	-	503	530	-	-	-	-
Stage 1	458	414	-	847	800	-	-	-	-
Stage 2	196	482	-	751	739	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	59.6	14.8	0.3
HCM LOS	F	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1179	-	-	86	755	1239	-	-
HCM Lane V/C Ratio	0.011	-	-	0.24	0.521	0.056	-	-
HCM Control Delay (s)	8.1	0	-	59.6	14.8	8.1	0	-
HCM Lane LOS	A	A	-	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	3.1	0.2	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	53	191	6
Conflicting Peds, #/hr	0	0	10
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	78	82	50
Heavy Vehicles, %	2	4	0
Mvmt Flow	70	240	12

Major/Minor

Major2

Conflicting Flow All	311	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1249	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1239	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

SB

HCM Control Delay, s	1.8
HCM LOS	

Minor Lane/Major Mvmt

Queues

1: University Avenue & Campus Drive/Stewart St

10/8/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	289	444	115	488	463
v/c Ratio	0.88	0.90	0.47	0.70	0.89
Control Delay	58.0	51.3	21.4	24.6	49.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	51.3	21.4	24.6	49.5
Queue Length 50th (ft)	130	212	35	183	220
Queue Length 95th (ft)	#216	#387	44	244	#395
Internal Link Dist (ft)	420	235		421	479
Turn Bay Length (ft)			275		
Base Capacity (vph)	335	524	251	799	553
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	0.86	0.85	0.46	0.61	0.84

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: University Avenue & Campus Drive/Stewart St

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	37	100	82	206	149	25	68	303	85	0	380	19
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	1.00		0.95	0.95		0.87	1.00		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1843	1780	1843	1938	1920	1938	1872	1841	1872	0	1901	1919
Adj Flow Rate, veh/h	58	132	99	238	169	37	115	385	103	0	430	33
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.66	0.78	0.85	0.89	0.91	0.69	0.61	0.81	0.85	0.90	0.91	0.59
Percent Heavy Veh, %	0	0	0	1	1	1	0	1	1	0	1	1
Cap, veh/h	60	135	102	260	185	40	241	534	143	0	477	37
Arrive On Green	0.18	0.18	0.18	0.26	0.26	0.26	0.06	0.39	0.39	0.00	0.28	0.28
Sat Flow, veh/h	324	738	554	984	698	153	1782	1352	362	0	1712	131
Grp Volume(v), veh/h	289	0	0	444	0	0	115	0	488	0	0	463
Grp Sat Flow(s),veh/h/ln	1616	0	0	1835	0	0	1782	0	1713	0	0	1844
Q Serve(g_s), s	13.6	0.0	0.0	17.9	0.0	0.0	3.3	0.0	18.4	0.0	0.0	18.5
Cycle Q Clear(g_c), s	13.6	0.0	0.0	17.9	0.0	0.0	3.3	0.0	18.4	0.0	0.0	18.5
Prop In Lane	0.20		0.34	0.54		0.08	1.00		0.21	0.00		0.07
Lane Grp Cap(c), veh/h	297	0	0	485	0	0	241	0	677	0	0	513
V/C Ratio(X)	0.97	0.00	0.00	0.92	0.00	0.00	0.48	0.00	0.72	0.00	0.00	0.90
Avail Cap(c_a), veh/h	297	0	0	505	0	0	290	0	741	0	0	532
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	31.0	0.0	0.0	27.2	0.0	0.0	19.4	0.0	19.5	0.0	0.0	26.5
Incr Delay (d2), s/veh	45.2	0.0	0.0	21.0	0.0	0.0	1.5	0.0	3.1	0.0	0.0	18.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	0.0	0.0	11.8	0.0	0.0	1.7	0.0	9.3	0.0	0.0	12.0
LnGrp Delay(d),s/veh	76.2	0.0	0.0	48.3	0.0	0.0	20.9	0.0	22.7	0.0	0.0	44.8
LnGrp LOS	E			D			C		C			D
Approach Vol, veh/h		289			444			603				463
Approach Delay, s/veh		76.2			48.3			22.3				44.8
Approach LOS		E			D			C				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		34.1		18.0	8.9	25.2		24.2				
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s		33.0		14.0	7.0	22.0		21.0				
Max Q Clear Time (g_c+I1), s		20.4		15.6	5.3	20.5		19.9				
Green Ext Time (p_c), s		3.8		0.0	0.1	0.8		0.2				
Intersection Summary												
HCM 2010 Ctrl Delay				43.2								
HCM 2010 LOS				D								

HCM Unsignalized Intersection Capacity Analysis

6: Jones Avenue & North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	3	224	53	4	174	1	56	0	4	2	1	9
Sign Control		Free			Free			Stop			Stop	
Grade		12%			8%			-3%			-6%	
Peak Hour Factor	0.75	0.97	0.83	0.50	0.87	0.25	0.78	0.90	0.50	0.25	0.25	0.56
Hourly flow rate (vph)	4	238	66	8	206	4	74	0	8	8	4	17
Pedestrians		15			1			3			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	212			307			540	511	275	515	541	225
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	212			307			540	511	275	515	541	225
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	100			99			83	100	99	98	99	98
cM capacity (veh/h)	1368			1132			429	463	766	463	445	782

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	308	218	82	29
Volume Left	4	8	74	8
Volume Right	66	4	8	17
cSH	1368	1132	449	599
Volume to Capacity	0.00	0.01	0.18	0.05
Queue Length 95th (ft)	0	1	17	4
Control Delay (s)	0.1	0.4	14.8	11.3
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.4	14.8	11.3
Approach LOS			B	B

Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization		33.9%	ICU Level of Service
Analysis Period (min)		15	A

Intersection										
Int Delay, s/veh	2.4									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	3	224	53	4	174	1	56	0	4
Conflicting Peds, #/hr	2	0	3	3	0	2	15	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	12	-	-	8	-	-	-3	-
Peak Hour Factor	75	97	83	50	87	25	78	90	50
Heavy Vehicles, %	0	0	0	25	2	0	2	0	0
Mvmt Flow	4	238	66	8	206	4	74	0	8

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	225	0	0	319	0	0	544	536	289
Stage 1	-	-	-	-	-	-	294	294	-
Stage 2	-	-	-	-	-	-	250	242	-
Critical Hdwy	4.1	-	-	4.35	-	-	6.52	5.9	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.52	4.9	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.52	4.9	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.518	4	3.3
Pot Cap-1 Maneuver	1356	-	-	1122	-	-	493	496	773
Stage 1	-	-	-	-	-	-	750	707	-
Stage 2	-	-	-	-	-	-	786	738	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1353	-	-	1119	-	-	468	478	761
Mov Cap-2 Maneuver	-	-	-	-	-	-	468	478	-
Stage 1	-	-	-	-	-	-	738	695	-
Stage 2	-	-	-	-	-	-	758	723	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0.3	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	487	1353	-	-	1119	-	-	655
HCM Lane V/C Ratio	0.169	0.003	-	-	0.007	-	-	0.044
HCM Control Delay (s)	13.9	7.7	0	-	8.2	0	-	10.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	1	9
Conflicting Peds, #/hr	1	0	15
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	25	25	56
Heavy Vehicles, %	0	0	11
Mvmt Flow	8	4	17

Major/Minor

	Minor2		
Conflicting Flow All	538	567	226
Stage 1	240	240	-
Stage 2	298	327	-
Critical Hdwy	5.9	5.3	5.71
Critical Hdwy Stg 1	4.9	4.3	-
Critical Hdwy Stg 2	4.9	4.3	-
Follow-up Hdwy	3.5	4	3.399
Pot Cap-1 Maneuver	547	526	822
Stage 1	832	770	-
Stage 2	790	726	-
Platoon blocked, %			
Mov Cap-1 Maneuver	528	507	810
Mov Cap-2 Maneuver	528	507	-
Stage 1	818	754	-
Stage 2	776	714	-

Approach

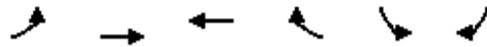
	SB
HCM Control Delay, s	10.8
HCM LOS	B

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis

9: Stewart St & Jones Ave

10/8/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	218	308	0	12	30
Sign Control		Free	Free		Stop	
Grade		2%	-2%		-15%	
Peak Hour Factor	0.25	0.87	0.79	0.90	0.75	0.75
Hourly flow rate (vph)	0	258	402	0	16	41
Pedestrians		21				
Lane Width (ft)		11.0				
Walking Speed (ft/s)		4.0				
Percent Blockage		2				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		315				
pX, platoon unblocked						
vC, conflicting volume	402				660	423
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	402				660	423
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	93
cM capacity (veh/h)	1168				434	620

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	258	402	58
Volume Left	0	0	16
Volume Right	0	0	41
cSH	1700	1700	552
Volume to Capacity	0.15	0.24	0.10
Queue Length 95th (ft)	0	0	9
Control Delay (s)	0.0	0.0	12.3
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.3
Approach LOS			B

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		32.1%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	218	308	0	12	30
Conflicting Peds, #/hr	0	0	0	0	0	21
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-15	-
Peak Hour Factor	25	87	79	90	75	75
Heavy Vehicles, %	0	2	0	0	0	3
Mvmt Flow	0	258	402	0	16	41

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	423	0	681
Stage 1	-	-	423
Stage 2	-	-	258
Critical Hdwy	4.1	-	3.4
Critical Hdwy Stg 1	-	-	2.4
Critical Hdwy Stg 2	-	-	2.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1147	-	739
Stage 1	-	-	946
Stage 2	-	-	979
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1147	-	713
Mov Cap-2 Maneuver	-	-	713
Stage 1	-	-	929
Stage 2	-	-	962

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1147	-	-	-	730
HCM Lane V/C Ratio	-	-	-	-	0.079
HCM Control Delay (s)	0	-	-	-	10.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM Unsignalized Intersection Capacity Analysis

12: University Avenue & Third Street

10/8/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	17	15	76	277	320	29
Sign Control	Stop			Free	Free	
Grade	15%			6%	-6%	
Peak Hour Factor	0.71	0.70	0.90	0.82	0.92	0.66
Hourly flow rate (vph)	25	22	87	348	358	45
Pedestrians	39			13		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	3			1		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1104		
pX, platoon unblocked	0.97					
vC, conflicting volume	942	433	443			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	924	433	443			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	90	96	92			
cM capacity (veh/h)	258	585	1092			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	47	435	404			
Volume Left	25	87	0			
Volume Right	22	0	45			
cSH	351	1092	1700			
Volume to Capacity	0.13	0.08	0.24			
Queue Length 95th (ft)	11	6	0			
Control Delay (s)	16.8	2.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.8	2.4	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			55.6%		ICU Level of Service	B
Analysis Period (min)			15			

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	17	15	76	277	320	29
Conflicting Peds, #/hr	0	13	39	0	0	39
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	15	-	-	6	-6	-
Peak Hour Factor	71	70	90	82	92	66
Heavy Vehicles, %	0	7	0	4	1	0
Mvmt Flow	25	22	87	348	358	45

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	916	433	417
Stage 1	394	-	-
Stage 2	522	-	-
Critical Hdwy	9.4	7.77	4.1
Critical Hdwy Stg 1	8.4	-	-
Critical Hdwy Stg 2	8.4	-	-
Follow-up Hdwy	3.5	3.363	2.2
Pot Cap-1 Maneuver	142	511	1153
Stage 1	494	-	-
Stage 2	388	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	125	489	1116
Mov Cap-2 Maneuver	125	-	-
Stage 1	489	-	-
Stage 2	347	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.5	1.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1116	-	193	-	-
HCM Lane V/C Ratio	0.078	-	0.242	-	-
HCM Control Delay (s)	8.5	0	29.5	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

HCM Unsignalized Intersection Capacity Analysis

13: University Avenue & Overhill Street

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	41	314	19	28	348
Sign Control	Stop		Free			Free
Grade	-15%		6%			-6%
Peak Hour Factor	0.70	0.85	0.85	0.95	0.64	0.96
Hourly flow rate (vph)	21	50	380	21	45	373
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			749			
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	854	391			401	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	235			247	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	94	93			96	
cM capacity (veh/h)	318	706			1131	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	70	401	418
Volume Left	21	0	45
Volume Right	50	21	0
cSH	520	1700	1131
Volume to Capacity	0.14	0.24	0.04
Queue Length 95th (ft)	12	0	3
Control Delay (s)	13.0	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	13.0	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		52.1%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	41	314	19	28	348
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-15	-	6	-	-	-6
Peak Hour Factor	70	85	85	95	64	96
Heavy Vehicles, %	0	2	4	0	7	2
Mvmt Flow	21	50	380	21	45	373

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	855	391	401
Stage 1	391	-	-
Stage 2	464	-	-
Critical Hdwy	3.4	4.72	4.17
Critical Hdwy Stg 1	2.4	-	-
Critical Hdwy Stg 2	2.4	-	-
Follow-up Hdwy	3.5	3.318	2.263
Pot Cap-1 Maneuver	675	774	1131
Stage 1	953	-	-
Stage 2	938	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	641	774	1131
Mov Cap-2 Maneuver	641	-	-
Stage 1	953	-	-
Stage 2	891	-	-

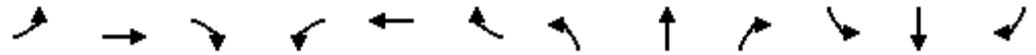
Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	730	1131	-
HCM Lane V/C Ratio	-	-	0.096	0.04	-
HCM Control Delay (s)	-	-	10.5	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

HCM Unsignalized Intersection Capacity Analysis

14: Jones Avenue & Overhill Street/Driveway

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔						↔	
Volume (veh/h)	13	5	4	2	8	8	0	0	0	12	14	22
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-6%			-4%			-10%	
Peak Hour Factor	0.65	0.63	0.33	0.25	0.67	0.67	0.90	0.90	0.90	0.75	0.88	0.55
Hourly flow rate (vph)	21	8	12	8	12	12	0	0	0	16	16	41
Pedestrians		8			3			6			4	
Lane Width (ft)		12.0			12.0			0.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	29			27			154	107	23	98	107	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	29			27			154	107	23	98	107	30
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	100	100	98	98	96
cM capacity (veh/h)	1592			1600			755	771	1056	870	771	1025

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	41	33	74
Volume Left	21	8	16
Volume Right	12	12	41
cSH	1592	1600	921
Volume to Capacity	0.01	0.01	0.08
Queue Length 95th (ft)	1	0	7
Control Delay (s)	3.7	1.9	9.2
Lane LOS	A	A	A
Approach Delay (s)	3.7	1.9	9.2
Approach LOS			A

Intersection Summary		
Average Delay		6.1
Intersection Capacity Utilization	23.5%	ICU Level of Service
Analysis Period (min)		15
		A

Intersection

Int Delay, s/veh 5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	13	5	4	2	8	8	0	0	0
Conflicting Peds, #/hr	4	0	6	6	0	4	8	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-6	-	-	-4	-
Peak Hour Factor	65	63	33	25	67	67	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	21	8	12	8	12	12	0	0	0

Major/Minor

	Major1		Major2		
Conflicting Flow All	33	0	0	21	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	4.1	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.2	-
Pot Cap-1 Maneuver	1592	-	-	1608	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1584	-	-	1600	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

HCM Control Delay, s 3.6 WB 1.8

HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1584	-	-	1600	-	-	999
HCM Lane V/C Ratio	0.013	-	-	0.005	-	-	0.074
HCM Control Delay (s)	7.3	0	-	7.3	0	-	8.9
HCM Lane LOS	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.2

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	12	14	22
Conflicting Peds, #/hr	3	0	8
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-10	-
Peak Hour Factor	75	88	55
Heavy Vehicles, %	0	0	5
Mvmt Flow	16	16	41

Major/Minor

	Minor2		
Conflicting Flow All	99	105	32
Stage 1	43	43	-
Stage 2	56	62	-
Critical Hdwy	4.4	4.5	5.25
Critical Hdwy Stg 1	3.4	3.5	-
Critical Hdwy Stg 2	3.4	3.5	-
Follow-up Hdwy	3.5	4	3.345
Pot Cap-1 Maneuver	956	836	1043
Stage 1	1008	884	-
Stage 2	1002	877	-
Platoon blocked, %			
Mov Cap-1 Maneuver	926	0	1031
Mov Cap-2 Maneuver	926	0	-
Stage 1	996	0	-
Stage 2	982	0	-

Approach

	SB
HCM Control Delay, s	8.9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 16: Quay Street & Overhill Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	16	11	4	30	0	9	0	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-15%			-2%			-8%	
Peak Hour Factor	0.90	0.57	0.55	0.50	0.54	0.90	0.56	0.90	0.63	0.90	0.90	0.90
Hourly flow rate (vph)	0	29	21	8	57	0	17	0	8	0	0	0
Pedestrians								12			2	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								4.0			4.0	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	59			62			125	127	51	123	137	59
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	59			62			125	127	51	123	137	59
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			98	100	99	100	100	100
cM capacity (veh/h)	1555			1393			834	754	1012	837	745	1011
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	50	65	25	0								
Volume Left	0	8	17	0								
Volume Right	21	0	8	0								
cSH	1555	1393	886	1700								
Volume to Capacity	0.00	0.01	0.03	0.00								
Queue Length 95th (ft)	0	0	2	0								
Control Delay (s)	0.0	1.0	9.2	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	1.0	9.2	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			16.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	16	11	4	30	0	9	0	5
Conflicting Peds, #/hr	2	0	12	12	0	2	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-15	-	-	-2	-
Peak Hour Factor	90	57	55	50	54	90	56	90	63
Heavy Vehicles, %	0	0	0	25	0	0	0	0	0
Mvmt Flow	0	29	21	8	57	0	17	0	8

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	57	0	0	50	0	0	113	113	51
Stage 1	-	-	-	-	-	-	39	39	-
Stage 2	-	-	-	-	-	-	74	74	-
Critical Hdwy	4.1	-	-	4.35	-	-	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1560	-	-	1421	-	-	880	791	1026
Stage 1	-	-	-	-	-	-	985	870	-
Stage 2	-	-	-	-	-	-	948	844	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1544	-	-	1407	-	-	867	786	1016
Mov Cap-2 Maneuver	-	-	-	-	-	-	867	786	-
Stage 1	-	-	-	-	-	-	985	870	-
Stage 2	-	-	-	-	-	-	933	839	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	911	1544	-	-	1407	-	-	-
HCM Lane V/C Ratio	0.027	-	-	-	0.006	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.6	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	0	0	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-8	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	0	0

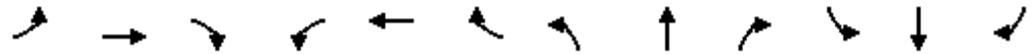
Major/Minor	Minor2		
Conflicting Flow All	117	124	69
Stage 1	74	74	-
Stage 2	43	50	-
Critical Hdwy	5.5	4.9	5.4
Critical Hdwy Stg 1	4.5	3.9	-
Critical Hdwy Stg 2	4.5	3.9	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	910	814	1015
Stage 1	972	865	-
Stage 2	995	876	-
Platoon blocked, %			
Mov Cap-1 Maneuver	890	809	1005
Mov Cap-2 Maneuver	890	809	-
Stage 1	972	860	-
Stage 2	977	876	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 19: University Avenue & Ensign Avenue/North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	7	11	2	13	32	183	7	263	20	246	314	20
Sign Control		Stop			Stop			Free			Free	
Grade		15%			-12%			6%			-6%	
Peak Hour Factor	0.58	0.69	0.50	0.65	0.62	0.93	0.58	0.79	0.83	0.92	0.88	0.83
Hourly flow rate (vph)	12	16	4	21	53	203	12	343	25	275	368	25
Pedestrians		11										7
Lane Width (ft)		12.0										12.0
Walking Speed (ft/s)		4.0										4.0
Percent Blockage		1										1
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1558	1334	391	1323	1334	362	403			368		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1558	1334	391	1323	1334	362	403			368		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	63	86	99	79	54	70	99			77		
cM capacity (veh/h)	33	116	655	98	115	682	1156			1202		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	276	380	668
Volume Left	12	21	12	275
Volume Right	4	203	25	25
cSH	63	285	1156	1202
Volume to Capacity	0.52	0.97	0.01	0.23
Queue Length 95th (ft)	53	241	1	22
Control Delay (s)	112.2	85.4	0.4	5.2
Lane LOS	F	F	A	A
Approach Delay (s)	112.2	85.4	0.4	5.2
Approach LOS	F	F		

Intersection Summary			
Average Delay		22.8	
Intersection Capacity Utilization	73.3%		ICU Level of Service D
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 19.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	7	11	2	13	32	183	7	263	20
Conflicting Peds, #/hr	7	0	0	0	0	7	11	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-12	-	-	6	-
Peak Hour Factor	58	69	50	65	62	93	58	79	83
Heavy Vehicles, %	0	0	0	0	6	1	0	3	0
Mvmt Flow	12	16	4	21	53	203	12	343	25

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1453	1338	398	1335	1337	373	399	0	0
Stage 1	938	938	-	387	387	-	-	-	-
Stage 2	515	400	-	948	950	-	-	-	-
Critical Hdwy	10.1	9.5	7.7	4.7	4.16	5.01	4.1	-	-
Critical Hdwy Stg 1	9.1	8.5	-	3.7	3.16	-	-	-	-
Critical Hdwy Stg 2	9.1	8.5	-	3.7	3.16	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4.054	3.309	2.2	-	-
Pot Cap-1 Maneuver	33	51	556	321	367	765	1171	-	-
Stage 1	146	158	-	829	780	-	-	-	-
Stage 2	356	434	-	594	628	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	15	35	548	155	251	754	1160	-	-
Mov Cap-2 Maneuver	15	35	-	155	251	-	-	-	-
Stage 1	143	110	-	813	765	-	-	-	-
Stage 2	237	426	-	349	438	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	\$ 521.8	24.8	0.3
HCM LOS	F	C	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1160	-	-	25	451	1184	-	-
HCM Lane V/C Ratio	0.011	-	-	1.319	0.613	0.233	-	-
HCM Control Delay (s)	8.1	0	-	\$ 521.8	24.8	9	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	4	4	0.9	-	-

Notes

-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	246	314	20
Conflicting Peds, #/hr	0	0	11
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	92	88	83
Heavy Vehicles, %	0	1	0
Mvmt Flow	275	368	25

Major/Minor

Major2

Conflicting Flow All	375	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1195	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1184	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

SB

HCM Control Delay, s	3.7
HCM LOS	

Minor Lane/Major Mvmt

Queues

1: University Avenue & Campus Drive/Stewart St

10/8/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	392	439	82	532	325
v/c Ratio	0.94	0.93	0.36	0.91	0.78
Control Delay	60.7	59.3	22.4	45.2	43.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	60.7	59.3	22.4	45.2	43.6
Queue Length 50th (ft)	185	214	27	231	153
Queue Length 95th (ft)	#245	#395	49	#368	#245
Internal Link Dist (ft)	420	235		421	479
Turn Bay Length (ft)			275		
Base Capacity (vph)	426	475	232	621	417
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	0.92	0.92	0.35	0.86	0.78

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: University Avenue & Campus Drive/Stewart St

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	49	168	67	201	142	26	64	294	113	0	246	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	0.89		0.79	1.00		0.70
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1843	1697	1843	1938	1909	1938	1817	1765	1872	0	1801	1919
Adj Flow Rate, veh/h	75	230	87	254	156	29	82	350	182	0	300	25
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.65	0.73	0.77	0.79	0.91	0.89	0.78	0.84	0.62	0.90	0.82	0.67
Percent Heavy Veh, %	2	2	2	1	1	1	3	5	5	0	6	6
Cap, veh/h	77	235	89	264	162	30	244	348	181	0	396	33
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.05	0.35	0.35	0.00	0.25	0.25
Sat Flow, veh/h	306	938	355	1058	650	121	1730	994	517	0	1581	132
Grp Volume(v), veh/h	392	0	0	439	0	0	82	0	532	0	0	325
Grp Sat Flow(s),veh/h/ln	1599	0	0	1828	0	0	1730	0	1511	0	0	1713
Q Serve(g_s), s	19.5	0.0	0.0	19.0	0.0	0.0	2.7	0.0	28.0	0.0	0.0	14.0
Cycle Q Clear(g_c), s	19.5	0.0	0.0	19.0	0.0	0.0	2.7	0.0	28.0	0.0	0.0	14.0
Prop In Lane	0.19		0.22	0.58		0.07	1.00		0.34	0.00		0.08
Lane Grp Cap(c), veh/h	400	0	0	457	0	0	244	0	529	0	0	429
V/C Ratio(X)	0.98	0.00	0.00	0.96	0.00	0.00	0.34	0.00	1.01	0.00	0.00	0.76
Avail Cap(c_a), veh/h	400	0	0	457	0	0	288	0	529	0	0	429
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	29.8	0.0	0.0	29.6	0.0	0.0	20.9	0.0	26.0	0.0	0.0	27.7
Incr Delay (d2), s/veh	39.7	0.0	0.0	32.0	0.0	0.0	0.8	0.0	40.6	0.0	0.0	7.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.0	0.0	0.0	13.6	0.0	0.0	1.3	0.0	17.6	0.0	0.0	7.5
LnGrp Delay(d),s/veh	69.5	0.0	0.0	61.6	0.0	0.0	21.7	0.0	66.7	0.0	0.0	35.3
LnGrp LOS	E			E			C		F			D
Approach Vol, veh/h		392			439			614				325
Approach Delay, s/veh		69.5			61.6			60.7				35.3
Approach LOS		E			E			E				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		32.0		24.0	7.9	24.1		24.0				
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s		28.0		20.0	6.0	18.0		20.0				
Max Q Clear Time (g_c+I1), s		30.0		21.5	4.7	16.0		21.0				
Green Ext Time (p_c), s		0.0		0.0	0.0	0.9		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			58.2									
HCM 2010 LOS			E									

HCM Unsignalized Intersection Capacity Analysis

6: Jones Avenue & North Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	47	20	0	252	0	69	0	1	1	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		12%			8%			-3%			-6%	
Peak Hour Factor	0.90	0.72	0.50	0.90	0.95	0.90	0.76	0.90	0.25	0.25	0.90	0.33
Hourly flow rate (vph)	0	65	40	0	265	0	91	0	4	4	0	12
Pedestrians		3										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		4.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	265			105			366	351	85	355	371	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	265			105			366	351	85	355	371	268
tC, single (s)	4.1			4.8			7.1	6.5	6.2	7.1	7.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			3.5	4.0	3.3	3.5	4.9	3.3
p0 queue free %	100			100			84	100	100	99	100	98
cM capacity (veh/h)	1310			1164			580	577	979	603	433	774
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	105	265	95	16								
Volume Left	0	0	91	4								
Volume Right	40	0	4	12								
cSH	1310	1164	590	723								
Volume to Capacity	0.00	0.00	0.16	0.02								
Queue Length 95th (ft)	0	0	14	2								
Control Delay (s)	0.0	0.0	12.3	10.1								
Lane LOS			B	B								
Approach Delay (s)	0.0	0.0	12.3	10.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			30.5%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	47	20	0	252	0	69	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	12	-	-	8	-	-	-3	-
Peak Hour Factor	90	72	50	90	95	90	76	90	25
Heavy Vehicles, %	0	0	0	67	0	0	2	0	0
Mvmt Flow	0	65	40	0	265	0	91	0	4

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	268	0	0	108	0	0	362	356	88
Stage 1	-	-	-	-	-	-	88	88	-
Stage 2	-	-	-	-	-	-	274	268	-
Critical Hdwy	4.1	-	-	4.77	-	-	6.52	5.9	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.52	4.9	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.52	4.9	-
Follow-up Hdwy	2.2	-	-	2.803	-	-	3.518	4	3.3
Pot Cap-1 Maneuver	1307	-	-	1161	-	-	631	608	983
Stage 1	-	-	-	-	-	-	933	838	-
Stage 2	-	-	-	-	-	-	766	723	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1307	-	-	1161	-	-	620	605	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	620	605	-
Stage 1	-	-	-	-	-	-	931	836	-
Stage 2	-	-	-	-	-	-	755	721	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	630	1307	-	-	1161	-	-	770
HCM Lane V/C Ratio	0.15	-	-	-	-	-	-	0.021
HCM Control Delay (s)	11.7	0	-	-	0	-	-	9.8
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	1	0	4
Conflicting Peds, #/hr	0	0	3
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	25	90	33
Heavy Vehicles, %	0	100	0
Mvmt Flow	4	0	12

Major/Minor

	Minor2		
Conflicting Flow All	358	376	268
Stage 1	268	268	-
Stage 2	90	108	-
Critical Hdwy	5.9	6.3	5.6
Critical Hdwy Stg 1	4.9	5.3	-
Critical Hdwy Stg 2	4.9	5.3	-
Follow-up Hdwy	3.5	4.9	3.3
Pot Cap-1 Maneuver	677	486	811
Stage 1	811	591	-
Stage 2	950	674	-
Platoon blocked, %			
Mov Cap-1 Maneuver	673	484	809
Mov Cap-2 Maneuver	673	484	-
Stage 1	809	590	-
Stage 2	946	672	-

Approach

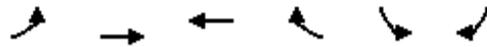
	SB
HCM Control Delay, s	9.8
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis

9: Stewart St & Jones Ave

10/8/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	269	314	0	1	33
Sign Control		Free	Free		Stop	
Grade		2%	-2%		-15%	
Peak Hour Factor	0.92	0.66	0.84	0.92	0.25	0.53
Hourly flow rate (vph)	0	408	374	0	4	62
Pedestrians		23				
Lane Width (ft)		11.0				
Walking Speed (ft/s)		4.0				
Percent Blockage		2				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		315				
pX, platoon unblocked						
vC, conflicting volume	374				781	397
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	374				781	397
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	90
cM capacity (veh/h)	1185				368	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	408	374	66
Volume Left	0	0	4
Volume Right	0	0	62
cSH	1700	1700	618
Volume to Capacity	0.24	0.22	0.11
Queue Length 95th (ft)	0	0	9
Control Delay (s)	0.0	0.0	11.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	11.5
Approach LOS			B

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		32.3%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	269	314	0	1	33
Conflicting Peds, #/hr	0	0	0	0	0	23
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-15	-
Peak Hour Factor	92	66	84	92	25	53
Heavy Vehicles, %	2	3	4	2	0	0
Mvmt Flow	0	408	374	0	4	62

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	397	0	805
Stage 1	-	-	397
Stage 2	-	-	408
Critical Hdwy	4.12	-	3.4
Critical Hdwy Stg 1	-	-	2.4
Critical Hdwy Stg 2	-	-	2.4
Follow-up Hdwy	2.218	-	3.5
Pot Cap-1 Maneuver	1162	-	693
Stage 1	-	-	952
Stage 2	-	-	949
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1162	-	667
Mov Cap-2 Maneuver	-	-	667
Stage 1	-	-	934
Stage 2	-	-	931

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1162	-	-	-	754
HCM Lane V/C Ratio	-	-	-	-	0.088
HCM Control Delay (s)	0	-	-	-	10.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM Unsignalized Intersection Capacity Analysis

11: University Avenue & Driveway

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	15	316	4	4	232
Sign Control	Stop		Free			Free
Grade	-6%		6%			-6%
Peak Hour Factor	0.92	0.92	0.83	0.92	0.92	0.81
Hourly flow rate (vph)	16	16	381	4	4	286
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	678	383			385	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	678	383			385	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			100	
cM capacity (veh/h)	420	669			1184	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	33	385	291
Volume Left	16	0	4
Volume Right	16	4	0
cSH	516	1700	1184
Volume to Capacity	0.06	0.23	0.00
Queue Length 95th (ft)	5	0	0
Control Delay (s)	12.4	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	12.4	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		26.9%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	15	15	316	4	4	232
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-6	-	6	-	-	-6
Peak Hour Factor	92	92	83	92	92	81
Heavy Vehicles, %	0	0	7	0	0	3
Mvmt Flow	16	16	381	4	4	286

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	678	383	0 0 385 0
Stage 1	383	-	- - - -
Stage 2	295	-	- - - -
Critical Hdwy	5.2	5.6	- - 4.1 -
Critical Hdwy Stg 1	4.2	-	- - - -
Critical Hdwy Stg 2	4.2	-	- - - -
Follow-up Hdwy	3.5	3.3	- - 2.2 -
Pot Cap-1 Maneuver	527	713	- - 1185 -
Stage 1	788	-	- - - -
Stage 2	839	-	- - - -
Platoon blocked, %			- - - -
Mov Cap-1 Maneuver	525	713	- - 1185 -
Mov Cap-2 Maneuver	525	-	- - - -
Stage 1	788	-	- - - -
Stage 2	836	-	- - - -

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	605	1185	-
HCM Lane V/C Ratio	-	-	0.054	0.004	-
HCM Control Delay (s)	-	-	11.3	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

HCM Unsignalized Intersection Capacity Analysis

12: University Avenue & Third Street

10/8/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	22	37	312	233	14
Sign Control	Stop			Free	Free	
Grade	15%			6%	-6%	
Peak Hour Factor	0.58	0.75	0.60	0.83	0.81	0.88
Hourly flow rate (vph)	12	29	62	376	288	16
Pedestrians	43			9	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			1	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1104		
pX, platoon unblocked						
vC, conflicting volume	839	348	347			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	839	348	347			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	96	96	95			
cM capacity (veh/h)	306	669	1137			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	41	438	304			
Volume Left	12	62	0			
Volume Right	29	0	16			
cSH	497	1137	1700			
Volume to Capacity	0.08	0.05	0.18			
Queue Length 95th (ft)	7	4	0			
Control Delay (s)	12.9	1.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.9	1.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization		47.7%		ICU Level of Service		A
Analysis Period (min)			15			

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	7	22	37	312	233	14
Conflicting Peds, #/hr	1	9	43	0	0	43
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	15	-	-	6	-6	-
Peak Hour Factor	58	75	60	83	81	88
Heavy Vehicles, %	0	0	8	7	3	0
Mvmt Flow	12	29	62	376	288	16

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	804	348	313 0
Stage 1	305	-	- -
Stage 2	499	-	- -
Critical Hdwy	9.4	7.7	4.18 -
Critical Hdwy Stg 1	8.4	-	- -
Critical Hdwy Stg 2	8.4	-	- -
Follow-up Hdwy	3.5	3.3	2.272 -
Pot Cap-1 Maneuver	182	605	1214 -
Stage 1	583	-	- -
Stage 2	405	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	167	579	1170 -
Mov Cap-2 Maneuver	167	-	- -
Stage 1	579	-	- -
Stage 2	375	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	17.2	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1170	-	337	-	-
HCM Lane V/C Ratio	0.053	-	0.123	-	-
HCM Control Delay (s)	8.2	0	17.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

HCM Unsignalized Intersection Capacity Analysis

13: University Avenue & Overhill Street

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	13	333	17	12	254
Sign Control	Stop		Free			Free
Grade	-15%		6%			-6%
Peak Hour Factor	0.50	0.65	0.80	0.65	0.43	0.82
Hourly flow rate (vph)	28	20	416	26	28	310
Pedestrians	1		1			2
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			749			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	797	432			443	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	676	249			262	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	97			98	
cM capacity (veh/h)	352	677			1121	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	48	442	338
Volume Left	28	0	28
Volume Right	20	26	0
cSH	440	1700	1121
Volume to Capacity	0.11	0.26	0.02
Queue Length 95th (ft)	9	0	2
Control Delay (s)	14.2	0.0	0.9
Lane LOS	B		A
Approach Delay (s)	14.2	0.0	0.9
Approach LOS	B		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		33.8%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	13	333	17	12	254
Conflicting Peds, #/hr	1	2	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-15	-	6	-	-	-6
Peak Hour Factor	50	65	80	65	43	82
Heavy Vehicles, %	0	0	5	0	0	4
Mvmt Flow	28	20	416	26	28	310

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	797	432	0 0 444 0
Stage 1	431	-	- - - -
Stage 2	366	-	- - - -
Critical Hdwy	3.4	4.7	- - 4.1 -
Critical Hdwy Stg 1	2.4	-	- - - -
Critical Hdwy Stg 2	2.4	-	- - - -
Follow-up Hdwy	3.5	3.3	- - 2.2 -
Pot Cap-1 Maneuver	696	752	- - 1127 -
Stage 1	945	-	- - - -
Stage 2	958	-	- - - -
Platoon blocked, %			- - - -
Mov Cap-1 Maneuver	673	750	- - 1126 -
Mov Cap-2 Maneuver	673	-	- - - -
Stage 1	943	-	- - - -
Stage 2	928	-	- - - -

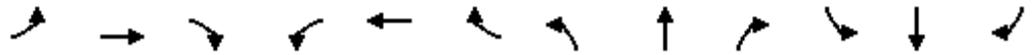
Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	703	1126	-
HCM Lane V/C Ratio	-	-	0.068	0.025	-
HCM Control Delay (s)	-	-	10.5	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

HCM Unsignalized Intersection Capacity Analysis

14: Jones Avenue & Overhill Street/Driveway

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔						↔	
Volume (veh/h)	24	3	16	1	3	4	0	0	0	2	11	16
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-6%			-4%			-10%	
Peak Hour Factor	0.75	0.75	0.25	0.25	0.38	0.50	0.90	0.90	0.90	0.50	0.55	0.60
Hourly flow rate (vph)	32	4	64	4	8	8	0	0	0	4	20	27
Pedestrians		31			1			2			15	
Lane Width (ft)		12.0			12.0			0.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		3			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	31			70			190	141	39	136	169	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	31			70			190	141	39	136	169	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	98			100			100	100	100	100	97	97
cM capacity (veh/h)	1575			1544			699	728	1038	807	703	975

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	100	20	51
Volume Left	32	4	4
Volume Right	64	8	27
cSH	1575	1544	834
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (ft)	2	0	5
Control Delay (s)	2.5	1.5	9.6
Lane LOS	A	A	A
Approach Delay (s)	2.5	1.5	9.6
Approach LOS			A

Intersection Summary		
Average Delay		4.5
Intersection Capacity Utilization	24.6%	ICU Level of Service
Analysis Period (min)		15
		A

HCM 2010 TWSC
 14: Jones Avenue & Overhill Street/Driveway

10/8/2014

Intersection

Int Delay, s/veh 4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	24	3	16	1	3	4	0	0	0
Conflicting Peds, #/hr	15	0	2	2	0	15	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-6	-	-	-4	-
Peak Hour Factor	75	75	25	25	38	50	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	4	64	4	8	8	0	0	0

Major/Minor

	Major1		Major2		
Conflicting Flow All	47	0	0	68	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	4.1	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.2	-
Pot Cap-1 Maneuver	1573	-	-	1546	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1553	-	-	1527	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

HCM Control Delay, s 2.4 WB 1.5

HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1553	-	-	1527	-	-	970
HCM Lane V/C Ratio	0.021	-	-	0.003	-	-	0.052
HCM Control Delay (s)	7.4	0	-	7.4	0	-	8.9
HCM Lane LOS	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.2

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	11	16
Conflicting Peds, #/hr	1	0	31
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-10	-
Peak Hour Factor	50	55	60
Heavy Vehicles, %	0	0	0
Mvmt Flow	4	20	27

Major/Minor

	Minor2		
Conflicting Flow All	151	183	58
Stage 1	51	51	-
Stage 2	100	132	-
Critical Hdwy	4.4	4.5	5.2
Critical Hdwy Stg 1	3.4	3.5	-
Critical Hdwy Stg 2	3.4	3.5	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	920	791	1030
Stage 1	1005	881	-
Stage 2	982	851	-
Platoon blocked, %			
Mov Cap-1 Maneuver	851	0	991
Mov Cap-2 Maneuver	851	0	-
Stage 1	976	0	-
Stage 2	936	0	-

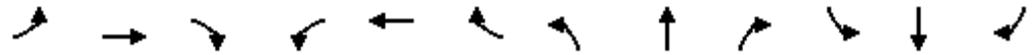
Approach

	SB
HCM Control Delay, s	8.9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 16: Quay Street & Overhill Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	4	14	2	2	17	4	5	0	2	30	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-15%			-2%			-8%	
Peak Hour Factor	0.90	0.88	0.50	0.50	0.67	0.90	0.42	0.90	0.50	0.90	0.90	0.90
Hourly flow rate (vph)	4	16	4	4	25	4	12	0	4	33	0	0
Pedestrians					1			7			4	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	34			27			69	76	26	71	75	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	34			27			69	76	26	71	75	32
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	100			100			99	100	100	96	100	100
cM capacity (veh/h)	1586			1591			912	807	1049	908	807	1045

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	24	34	16	33
Volume Left	4	4	12	33
Volume Right	4	4	4	0
cSH	1586	1591	943	908
Volume to Capacity	0.00	0.00	0.02	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	1.3	0.9	8.9	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	1.3	0.9	8.9	9.1
Approach LOS			A	A

Intersection Summary			
Average Delay		4.7	
Intersection Capacity Utilization	15.7%		ICU Level of Service A
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	4	14	2	2	17	4	5	0	2
Conflicting Peds, #/hr	4	0	7	7	0	4	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-15	-	-	-2	-
Peak Hour Factor	90	88	50	50	67	90	42	90	50
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	16	4	4	25	4	12	0	4

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	31	0	0	21	0	0	65	67	26
Stage 1	-	-	-	-	-	-	28	28	-
Stage 2	-	-	-	-	-	-	37	39	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1595	-	-	1608	-	-	940	834	1057
Stage 1	-	-	-	-	-	-	997	879	-
Stage 2	-	-	-	-	-	-	988	870	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1586	-	-	1599	-	-	929	828	1050
Mov Cap-2 Maneuver	-	-	-	-	-	-	929	828	-
Stage 1	-	-	-	-	-	-	993	876	-
Stage 2	-	-	-	-	-	-	979	867	-

Approach	EB	WB	NB
HCM Control Delay, s	1.3	0.9	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	957	1586	-	-	1599	-	-	945
HCM Lane V/C Ratio	0.017	0.003	-	-	0.003	-	-	0.035
HCM Control Delay (s)	8.8	7.3	0	-	7.3	0	-	8.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	30	0	0
Conflicting Peds, #/hr	1	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-8	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	33	0	0

Major/Minor **Minor2**

Conflicting Flow All	67	67	36
Stage 1	37	37	-
Stage 2	30	30	-
Critical Hdwy	5.5	4.9	5.4
Critical Hdwy Stg 1	4.5	3.9	-
Critical Hdwy Stg 2	4.5	3.9	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	959	853	1051
Stage 1	1000	883	-
Stage 2	1005	886	-
Platoon blocked, %			
Mov Cap-1 Maneuver	945	846	1044
Mov Cap-2 Maneuver	945	846	-
Stage 1	996	880	-
Stage 2	992	883	-

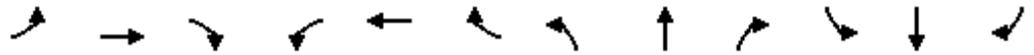
Approach **SB**

HCM Control Delay, s	8.9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 19: University Avenue & Ensign Avenue/North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	10	4	0	20	8	291	4	289	8	58	201	6
Sign Control		Stop			Stop			Free			Free	
Grade		15%			-12%			6%			-6%	
Peak Hour Factor	0.83	0.50	0.90	0.68	0.50	0.79	0.33	0.93	0.50	0.78	0.82	0.50
Hourly flow rate (vph)	12	8	0	29	16	368	12	311	16	74	245	12
Pedestrians		10										1
Lane Width (ft)		12.0										12.0
Walking Speed (ft/s)		4.0										4.0
Percent Blockage		1										0
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1130	761	261	747	759	320	267			327		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1130	761	261	747	759	320	267			327		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.4			2.2		
p0 queue free %	85	97	100	90	95	49	99			94		
cM capacity (veh/h)	80	309	775	307	314	726	1165			1233		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	414	339	331
Volume Left	12	29	12	74
Volume Right	0	368	16	12
cSH	113	632	1165	1233
Volume to Capacity	0.18	0.65	0.01	0.06
Queue Length 95th (ft)	15	121	1	5
Control Delay (s)	43.5	20.8	0.4	2.3
Lane LOS	E	C	A	A
Approach Delay (s)	43.5	20.8	0.4	2.3
Approach LOS	E	C		

Intersection Summary			
Average Delay		9.4	
Intersection Capacity Utilization	59.4%		ICU Level of Service
Analysis Period (min)		15	B

Intersection

Int Delay, s/veh 7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	10	4	0	20	8	291	4	289	8
Conflicting Peds, #/hr	1	0	0	0	0	1	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-12	-	-	6	-
Peak Hour Factor	83	50	90	68	50	79	33	93	50
Heavy Vehicles, %	0	0	0	0	0	0	25	6	0
Mvmt Flow	12	8	0	29	16	368	12	311	16

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	937	753	262	749	751	330	258	0	0
Stage 1	401	401	-	344	344	-	-	-	-
Stage 2	536	352	-	405	407	-	-	-	-
Critical Hdwy	10.1	9.5	7.7	4.7	4.1	5	4.35	-	-
Critical Hdwy Stg 1	9.1	8.5	-	3.7	3.1	-	-	-	-
Critical Hdwy Stg 2	9.1	8.5	-	3.7	3.1	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.425	-	-
Pot Cap-1 Maneuver	113	182	701	545	564	799	1184	-	-
Stage 1	451	433	-	850	805	-	-	-	-
Stage 2	340	474	-	821	788	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	55	167	695	487	516	792	1174	-	-
Mov Cap-2 Maneuver	55	167	-	487	516	-	-	-	-
Stage 1	445	402	-	838	794	-	-	-	-
Stage 2	174	467	-	741	731	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	69.7	15.7	0.3
HCM LOS	F	C	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1174	-	-	75	744	1222	-	-
HCM Lane V/C Ratio	0.01	-	-	0.267	0.556	0.061	-	-
HCM Control Delay (s)	8.1	0	-	69.7	15.7	8.1	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	3.5	0.2	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	58	201	6
Conflicting Peds, #/hr	0	0	10
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	78	82	50
Heavy Vehicles, %	2	4	0
Mvmt Flow	74	245	12

Major/Minor

Major2

Conflicting Flow All	328	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1232	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1222	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

SB

HCM Control Delay, s	1.8
HCM LOS	

Minor Lane/Major Mvmt

Queues

1: University Avenue & Campus Drive/Stewart St

10/8/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	290	446	115	534	476
v/c Ratio	0.86	0.90	0.50	0.77	0.91
Control Delay	53.6	51.7	23.5	28.8	51.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	51.7	23.5	28.8	51.4
Queue Length 50th (ft)	128	214	36	214	229
Queue Length 95th (ft)	#205	#389	45	282	#412
Internal Link Dist (ft)	420	235		421	479
Turn Bay Length (ft)			275		
Base Capacity (vph)	357	522	228	776	552
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	0.81	0.85	0.50	0.69	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: University Avenue & Campus Drive/Stewart St

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	103	85	213	154	26	70	348	88	0	402	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	1.00		0.95	0.95		0.87	1.00		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1843	1780	1843	1938	1920	1938	1872	1842	1872	0	1901	1919
Adj Flow Rate, veh/h	58	132	100	239	169	38	115	430	104	0	442	34
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.66	0.78	0.85	0.89	0.91	0.69	0.61	0.81	0.85	0.90	0.91	0.59
Percent Heavy Veh, %	0	0	0	1	1	1	0	1	1	0	1	1
Cap, veh/h	62	141	106	259	183	41	229	545	132	0	477	37
Arrive On Green	0.19	0.19	0.19	0.26	0.26	0.26	0.06	0.39	0.39	0.00	0.28	0.28
Sat Flow, veh/h	323	736	558	983	695	156	1782	1387	336	0	1712	132
Grp Volume(v), veh/h	290	0	0	446	0	0	115	0	534	0	0	476
Grp Sat Flow(s),veh/h/ln	1617	0	0	1834	0	0	1782	0	1723	0	0	1844
Q Serve(g_s), s	13.9	0.0	0.0	18.6	0.0	0.0	3.4	0.0	21.4	0.0	0.0	19.7
Cycle Q Clear(g_c), s	13.9	0.0	0.0	18.6	0.0	0.0	3.4	0.0	21.4	0.0	0.0	19.7
Prop In Lane	0.20		0.34	0.54		0.09	1.00		0.19	0.00		0.07
Lane Grp Cap(c), veh/h	309	0	0	483	0	0	229	0	677	0	0	513
V/C Ratio(X)	0.94	0.00	0.00	0.92	0.00	0.00	0.50	0.00	0.79	0.00	0.00	0.93
Avail Cap(c_a), veh/h	309	0	0	490	0	0	252	0	702	0	0	516
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	31.3	0.0	0.0	28.2	0.0	0.0	20.2	0.0	21.0	0.0	0.0	27.6
Incr Delay (d2), s/veh	35.5	0.0	0.0	23.1	0.0	0.0	1.7	0.0	5.8	0.0	0.0	23.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	0.0	0.0	12.5	0.0	0.0	1.8	0.0	11.2	0.0	0.0	13.3
LnGrp Delay(d),s/veh	66.8	0.0	0.0	51.3	0.0	0.0	21.9	0.0	26.8	0.0	0.0	50.6
LnGrp LOS	E			D			C		C			D
Approach Vol, veh/h		290			446			649				476
Approach Delay, s/veh		66.8			51.3			25.9				50.6
Approach LOS		E			D			C				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		34.9		19.0	9.0	25.9		24.7				
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s		32.0		15.0	6.0	22.0		21.0				
Max Q Clear Time (g_c+I1), s		23.4		15.9	5.4	21.7		20.6				
Green Ext Time (p_c), s		3.3		0.0	0.0	0.2		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay				44.7								
HCM 2010 LOS				D								

HCM Unsignalized Intersection Capacity Analysis

6: Jones Avenue & North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	3	231	72	4	180	1	67	0	4	2	1	9
Sign Control		Free			Free			Stop			Stop	
Grade		12%			8%			-3%			-6%	
Peak Hour Factor	0.75	0.97	0.83	0.50	0.87	0.25	0.78	0.90	0.50	0.25	0.25	0.56
Hourly flow rate (vph)	4	238	87	8	207	4	86	0	8	8	4	16
Pedestrians		15			1			3			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	213			328			550	521	286	525	563	226
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	213			328			550	521	286	525	563	226
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	100			99			80	100	99	98	99	98
cM capacity (veh/h)	1367			1110			422	456	756	456	433	781

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	329	219	94	28
Volume Left	4	8	86	8
Volume Right	87	4	8	16
cSH	1367	1110	439	592
Volume to Capacity	0.00	0.01	0.21	0.05
Queue Length 95th (ft)	0	1	20	4
Control Delay (s)	0.1	0.4	15.4	11.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.1	0.4	15.4	11.4
Approach LOS			C	B

Intersection Summary			
Average Delay		2.8	
Intersection Capacity Utilization	35.5%		ICU Level of Service
Analysis Period (min)	15		A

Intersection										
Int Delay, s/veh	2.6									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	3	231	72	4	180	1	67	0	4
Conflicting Peds, #/hr	2	0	3	3	0	2	15	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	12	-	-	8	-	-	-3	-
Peak Hour Factor	75	97	83	50	87	25	78	90	50
Heavy Vehicles, %	0	0	0	25	2	0	2	0	0
Mvmt Flow	4	238	87	8	207	4	86	0	8

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	226	0	0	340	0	0	555	547	300
Stage 1	-	-	-	-	-	-	305	305	-
Stage 2	-	-	-	-	-	-	250	242	-
Critical Hdwy	4.1	-	-	4.35	-	-	6.52	5.9	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.52	4.9	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.52	4.9	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.518	4	3.3
Pot Cap-1 Maneuver	1354	-	-	1101	-	-	485	490	763
Stage 1	-	-	-	-	-	-	741	701	-
Stage 2	-	-	-	-	-	-	786	738	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1351	-	-	1098	-	-	461	472	752
Mov Cap-2 Maneuver	-	-	-	-	-	-	461	472	-
Stage 1	-	-	-	-	-	-	729	689	-
Stage 2	-	-	-	-	-	-	758	723	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0.3	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	477	1351	-	-	1098	-	-	649
HCM Lane V/C Ratio	0.197	0.003	-	-	0.007	-	-	0.043
HCM Control Delay (s)	14.4	7.7	0	-	8.3	0	-	10.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.7	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	1	9
Conflicting Peds, #/hr	1	0	15
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	25	25	56
Heavy Vehicles, %	0	0	11
Mvmt Flow	8	4	16

Major/Minor

Minor2

Conflicting Flow All	549	588	227
Stage 1	240	240	-
Stage 2	309	348	-
Critical Hdwy	5.9	5.3	5.71
Critical Hdwy Stg 1	4.9	4.3	-
Critical Hdwy Stg 2	4.9	4.3	-
Follow-up Hdwy	3.5	4	3.399
Pot Cap-1 Maneuver	540	516	821
Stage 1	832	770	-
Stage 2	782	716	-
Platoon blocked, %			
Mov Cap-1 Maneuver	521	497	809
Mov Cap-2 Maneuver	521	497	-
Stage 1	818	754	-
Stage 2	769	704	-

Approach

SB

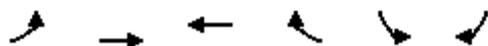
HCM Control Delay, s	10.8
HCM LOS	B

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis

9: Stewart St & Jones Ave

10/8/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Volume (veh/h)	0	225	318	0	12	40
Sign Control		Free	Free		Stop	
Grade		2%	-2%		-15%	
Peak Hour Factor	0.25	0.87	0.79	0.90	0.75	0.75
Hourly flow rate (vph)	0	259	403	0	16	53
Pedestrians		21				
Lane Width (ft)		11.0				
Walking Speed (ft/s)		4.0				
Percent Blockage		2				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		315				
pX, platoon unblocked						
vC, conflicting volume	403				661	424
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	403				661	424
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	91
cM capacity (veh/h)	1167				433	619

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	259	403	69
Volume Left	0	0	16
Volume Right	0	0	53
cSH	1700	1700	563
Volume to Capacity	0.15	0.24	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.0	0.0	12.3
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.3
Approach LOS			B

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		32.4%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	225	318	0	12	40
Conflicting Peds, #/hr	0	0	0	0	0	21
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-15	-
Peak Hour Factor	25	87	79	90	75	75
Heavy Vehicles, %	0	2	0	0	0	3
Mvmt Flow	0	259	403	0	16	53

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	424	0	683
Stage 1	-	-	424
Stage 2	-	-	259
Critical Hdwy	4.1	-	3.4
Critical Hdwy Stg 1	-	-	2.4
Critical Hdwy Stg 2	-	-	2.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1146	-	738
Stage 1	-	-	946
Stage 2	-	-	979
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1146	-	712
Mov Cap-2 Maneuver	-	-	712
Stage 1	-	-	929
Stage 2	-	-	962

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1146	-	-	-	730
HCM Lane V/C Ratio	-	-	-	-	0.095
HCM Control Delay (s)	0	-	-	-	10.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM Unsignalized Intersection Capacity Analysis

11: University Avenue

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	9	9	303	17	17	360
Sign Control	Stop		Free			Free
Grade	-6%		6%			-6%
Peak Hour Factor	0.92	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	370	18	18	391
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	807	379			388	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	807	379			388	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			98	
cM capacity (veh/h)	349	673			1176	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	388	410
Volume Left	10	0	18
Volume Right	10	18	0
cSH	460	1700	1176
Volume to Capacity	0.04	0.23	0.02
Queue Length 95th (ft)	3	0	1
Control Delay (s)	13.2	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	13.2	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		42.8%	ICU Level of Service A
Analysis Period (min)		15	

Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	9	9	303	17	17	360
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-6	-	6	-	-	-6
Peak Hour Factor	92	92	82	92	92	92
Heavy Vehicles, %	0	0	4	0	1	0
Mvmt Flow	10	10	370	18	18	391

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	807	379	0
Stage 1	379	-	-
Stage 2	428	-	-
Critical Hdwy	5.2	5.6	4.11
Critical Hdwy Stg 1	4.2	-	-
Critical Hdwy Stg 2	4.2	-	-
Follow-up Hdwy	3.5	3.3	2.209
Pot Cap-1 Maneuver	463	716	1176
Stage 1	790	-	-
Stage 2	763	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	454	716	1176
Mov Cap-2 Maneuver	454	-	-
Stage 1	790	-	-
Stage 2	748	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	556	1176	-
HCM Lane V/C Ratio	-	-	0.035	0.016	-
HCM Control Delay (s)	-	-	11.7	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM Unsignalized Intersection Capacity Analysis

12: University Avenue & Third Street

10/8/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	46	78	303	340	30
Sign Control	Stop			Free	Free	
Grade	15%			6%	-6%	
Peak Hour Factor	0.71	0.70	0.90	0.82	0.92	0.66
Hourly flow rate (vph)	25	66	87	370	370	45
Pedestrians	39			13		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	3			1		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1104		
pX, platoon unblocked	0.94					
vC, conflicting volume	974	444	454			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	943	444	454			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	90	89	92			
cM capacity (veh/h)	245	576	1081			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	91	456	415			
Volume Left	25	87	0			
Volume Right	66	0	45			
cSH	419	1081	1700			
Volume to Capacity	0.22	0.08	0.24			
Queue Length 95th (ft)	20	7	0			
Control Delay (s)	16.0	2.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.0	2.4	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			58.0%	ICU Level of Service	B	
Analysis Period (min)			15			

Intersection

Int Delay, s/veh 3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	18	46	78	303	340	30
Conflicting Peds, #/hr	0	13	39	0	0	39
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	15	-	-	6	-6	-
Peak Hour Factor	71	70	90	82	92	66
Heavy Vehicles, %	0	7	0	4	1	0
Mvmt Flow	25	66	87	370	370	45

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	948	444	428
Stage 1	405	-	-
Stage 2	543	-	-
Critical Hdwy	9.4	7.77	4.1
Critical Hdwy Stg 1	8.4	-	-
Critical Hdwy Stg 2	8.4	-	-
Follow-up Hdwy	3.5	3.363	2.2
Pot Cap-1 Maneuver	132	502	1142
Stage 1	484	-	-
Stage 2	373	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	116	480	1105
Mov Cap-2 Maneuver	116	-	-
Stage 1	479	-	-
Stage 2	332	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.6	1.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1105	-	256	-	-
HCM Lane V/C Ratio	0.078	-	0.356	-	-
HCM Control Delay (s)	8.5	0	26.6	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.5	-	-

HCM Unsignalized Intersection Capacity Analysis

13: University Avenue & Overhill Street

10/8/2014



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	42	342	37	29	369
Sign Control	Stop		Free			Free
Grade	-15%		6%			-6%
Peak Hour Factor	0.70	0.85	0.85	0.95	0.64	0.96
Hourly flow rate (vph)	20	49	402	39	45	384
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			749			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	897	422			441	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	775	203			227	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	93	93			96	
cM capacity (veh/h)	296	697			1091	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	441	430
Volume Left	20	0	45
Volume Right	49	39	0
cSH	502	1700	1091
Volume to Capacity	0.14	0.26	0.04
Queue Length 95th (ft)	12	0	3
Control Delay (s)	13.3	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	13.3	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		53.4%	ICU Level of Service
Analysis Period (min)		15	A

Intersection

Int Delay, s/veh 1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	42	342	37	29	369
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-15	-	6	-	-	-6
Peak Hour Factor	70	85	85	95	64	96
Heavy Vehicles, %	0	2	4	0	7	2
Mvmt Flow	20	49	402	39	45	384

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	897	422	0
Stage 1	422	-	-
Stage 2	475	-	-
Critical Hdwy	3.4	4.72	4.17
Critical Hdwy Stg 1	2.4	-	-
Critical Hdwy Stg 2	2.4	-	-
Follow-up Hdwy	3.5	3.318	2.263
Pot Cap-1 Maneuver	661	753	1093
Stage 1	946	-	-
Stage 2	936	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	627	753	1093
Mov Cap-2 Maneuver	627	-	-
Stage 1	946	-	-
Stage 2	887	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	712	1093	-
HCM Lane V/C Ratio	-	-	0.097	0.041	-
HCM Control Delay (s)	-	-	10.6	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

HCM Unsignalized Intersection Capacity Analysis

14: Jones Avenue & Overhill Street/Driveway

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔						↔	
Volume (veh/h)	23	5	14	2	8	8	0	0	0	12	14	40
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-6%			-4%			-10%	
Peak Hour Factor	0.65	0.63	0.33	0.25	0.67	0.67	0.90	0.90	0.90	0.75	0.88	0.55
Hourly flow rate (vph)	35	8	42	8	12	12	0	0	0	16	16	73
Pedestrians		8			3			6			4	
Lane Width (ft)		12.0			12.0			0.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	28			56			229	150	38	141	165	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	28			56			229	150	38	141	165	30
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	98			99			100	100	100	98	98	93
cM capacity (veh/h)	1593			1561			648	723	1037	810	710	1026

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	86	32	105
Volume Left	35	8	16
Volume Right	42	12	73
cSH	1593	1561	925
Volume to Capacity	0.02	0.01	0.11
Queue Length 95th (ft)	2	0	10
Control Delay (s)	3.1	1.9	9.4
Lane LOS	A	A	A
Approach Delay (s)	3.1	1.9	9.4
Approach LOS			A

Intersection Summary		
Average Delay		5.9
Intersection Capacity Utilization	27.3%	ICU Level of Service
Analysis Period (min)		15
		A

Intersection

Int Delay, s/veh 5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	23	5	14	2	8	8	0	0	0
Conflicting Peds, #/hr	4	0	6	6	0	4	8	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-6	-	-	-4	-
Peak Hour Factor	65	63	33	25	67	67	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	35	8	42	8	12	12	0	0	0

Major/Minor

	Major1		Major2		
Conflicting Flow All	32	0	0	50	0
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	4.1	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.2	-
Pot Cap-1 Maneuver	1593	-	-	1570	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1585	-	-	1562	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach

HCM Control Delay, s 3 1.8

HCM LOS

Minor Lane/Major Mvmt

	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1585	-	-	1562	-	-	1002
HCM Lane V/C Ratio	0.022	-	-	0.005	-	-	0.104
HCM Control Delay (s)	7.3	0	-	7.3	0	-	9
HCM Lane LOS	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.3

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	12	14	40
Conflicting Peds, #/hr	3	0	8
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-10	-
Peak Hour Factor	75	88	55
Heavy Vehicles, %	0	0	5
Mvmt Flow	16	16	73

Major/Minor

	Minor2		
Conflicting Flow All	142	163	32
Stage 1	42	42	-
Stage 2	100	121	-
Critical Hdwy	4.4	4.5	5.25
Critical Hdwy Stg 1	3.4	3.5	-
Critical Hdwy Stg 2	3.4	3.5	-
Follow-up Hdwy	3.5	4	3.345
Pot Cap-1 Maneuver	926	803	1043
Stage 1	1009	884	-
Stage 2	982	855	-
Platoon blocked, %			
Mov Cap-1 Maneuver	888	0	1031
Mov Cap-2 Maneuver	888	0	-
Stage 1	997	0	-
Stage 2	953	0	-

Approach

	SB
HCM Control Delay, s	9
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 16: Quay Street & Overhill Street

10/8/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	17	11	4	31	17	9	0	5	19	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		15%			-15%			-2%			-8%	
Peak Hour Factor	0.90	0.57	0.55	0.50	0.54	0.90	0.56	0.90	0.63	0.90	0.90	0.90
Hourly flow rate (vph)	19	30	20	8	57	19	16	0	8	21	0	0
Pedestrians								12			2	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								4.0			4.0	
Percent Blockage								1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	78			62			172	184	52	170	184	69
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			62			172	184	52	170	184	69
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	100	99	97	100	100
cM capacity (veh/h)	1530			1392			770	693	1011	773	693	998
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	69	84	24	21								
Volume Left	19	8	16	21								
Volume Right	20	19	8	0								
cSH	1530	1392	836	773								
Volume to Capacity	0.01	0.01	0.03	0.03								
Queue Length 95th (ft)	1	0	2	2								
Control Delay (s)	2.1	0.8	9.4	9.8								
Lane LOS	A	A	A	A								
Approach Delay (s)	2.1	0.8	9.4	9.8								
Approach LOS			A	A								
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			19.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	17	17	11	4	31	17	9	0	5
Conflicting Peds, #/hr	2	0	12	12	0	2	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-15	-	-	-2	-
Peak Hour Factor	90	57	55	50	54	90	56	90	63
Heavy Vehicles, %	0	0	0	25	0	0	0	0	0
Mvmt Flow	19	30	20	8	57	19	16	0	8

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	76	0	0	50	0	0	161	170	52
Stage 1	-	-	-	-	-	-	78	78	-
Stage 2	-	-	-	-	-	-	83	92	-
Critical Hdwy	4.1	-	-	4.35	-	-	6.7	6.1	6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.7	5.1	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.7	5.1	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1536	-	-	1421	-	-	823	740	1024
Stage 1	-	-	-	-	-	-	944	841	-
Stage 2	-	-	-	-	-	-	939	831	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1521	-	-	1407	-	-	803	726	1014
Mov Cap-2 Maneuver	-	-	-	-	-	-	803	726	-
Stage 1	-	-	-	-	-	-	932	830	-
Stage 2	-	-	-	-	-	-	924	826	-

Approach	EB	WB	NB
HCM Control Delay, s	2	0.7	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	862	1521	-	-	1407	-	-	837
HCM Lane V/C Ratio	0.028	0.012	-	-	0.006	-	-	0.025
HCM Control Delay (s)	9.3	7.4	0	-	7.6	0	-	9.4
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	19	0	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-8	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	21	0	0

Major/Minor **Minor2**

Conflicting Flow All	165	171	79
Stage 1	83	83	-
Stage 2	82	88	-
Critical Hdwy	5.5	4.9	5.4
Critical Hdwy Stg 1	4.5	3.9	-
Critical Hdwy Stg 2	4.5	3.9	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	865	783	1005
Stage 1	965	861	-
Stage 2	966	859	-
Platoon blocked, %			
Mov Cap-1 Maneuver	837	768	995
Mov Cap-2 Maneuver	837	768	-
Stage 1	952	856	-
Stage 2	937	848	-

Approach **SB**

HCM Control Delay, s	9.4
HCM LOS	A

Minor Lane/Major Mvmt

HCM Unsignalized Intersection Capacity Analysis
 19: University Avenue & Ensign Avenue/North Street

10/8/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	7	11	2	13	32	198	7	281	21	271	342	20
Sign Control		Stop			Stop			Free			Free	
Grade		15%			-12%			6%			-6%	
Peak Hour Factor	0.58	0.69	0.50	0.65	0.62	0.93	0.58	0.79	0.83	0.92	0.88	0.83
Hourly flow rate (vph)	12	16	4	20	52	213	12	356	25	295	389	24
Pedestrians		11										7
Lane Width (ft)		12.0										12.0
Walking Speed (ft/s)		4.0										4.0
Percent Blockage		1										1
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1639	1406	412	1394	1405	375	424			381		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1639	1406	412	1394	1405	375	424			381		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	54	84	99	76	49	68	99			75		
cM capacity (veh/h)	26	102	638	85	102	670	1136			1189		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	285	393	707
Volume Left	12	20	12	295
Volume Right	4	213	25	24
cSH	52	268	1136	1189
Volume to Capacity	0.62	1.06	0.01	0.25
Queue Length 95th (ft)	61	285	1	24
Control Delay (s)	152.8	113.2	0.4	5.5
Lane LOS	F	F	A	A
Approach Delay (s)	152.8	113.2	0.4	5.5
Approach LOS	F	F		

Intersection Summary			
Average Delay		29.0	
Intersection Capacity Utilization		76.2%	ICU Level of Service
Analysis Period (min)		15	D

Intersection

Int Delay, s/veh 23.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	7	11	2	13	32	198	7	281	21
Conflicting Peds, #/hr	7	0	0	0	0	7	11	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	15	-	-	-12	-	-	6	-
Peak Hour Factor	58	69	50	65	62	93	58	79	83
Heavy Vehicles, %	0	0	0	0	6	1	0	3	0
Mvmt Flow	12	16	4	20	52	213	12	356	25

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1529	1409	419	1406	1408	386	420	0	0
Stage 1	997	997	-	399	399	-	-	-	-
Stage 2	532	412	-	1007	1009	-	-	-	-
Critical Hdwy	10.1	9.5	7.7	4.7	4.16	5.01	4.1	-	-
Critical Hdwy Stg 1	9.1	8.5	-	3.7	3.16	-	-	-	-
Critical Hdwy Stg 2	9.1	8.5	-	3.7	3.16	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4.054	3.309	2.2	-	-
Pot Cap-1 Maneuver	27	43	536	301	348	755	1150	-	-
Stage 1	129	141	-	823	777	-	-	-	-
Stage 2	343	424	-	573	613	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	~ 12	28	528	123	228	744	1139	-	-
Mov Cap-2 Maneuver	~ 12	28	-	123	228	-	-	-	-
Stage 1	127	94	-	808	762	-	-	-	-
Stage 2	223	416	-	314	410	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	\$ 704.7	29.6	0.3
HCM LOS	F	D	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1139	-	-	20	421	1171	-	-
HCM Lane V/C Ratio	0.011	-	-	1.601	0.676	0.252	-	-
HCM Control Delay (s)	8.2	0	-	\$ 704.7	29.6	9.1	0	-
HCM Lane LOS	A	A	-	F	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	4.3	4.9	1	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	271	342	20
Conflicting Peds, #/hr	0	0	11
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	-6	-
Peak Hour Factor	92	88	83
Heavy Vehicles, %	0	1	0
Mvmt Flow	295	389	24

Major/Minor

Major2

Conflicting Flow All	388	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1182	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1171	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

SB

HCM Control Delay, s	3.8
HCM LOS	

Minor Lane/Major Mvmt

APPENDIX C - PHOTOGRAPHS



NB Jones Avenue at North Street



NB Jones Avenue at North Street



SB Jones Avenue at North Street



SB Jones Avenue at North Street



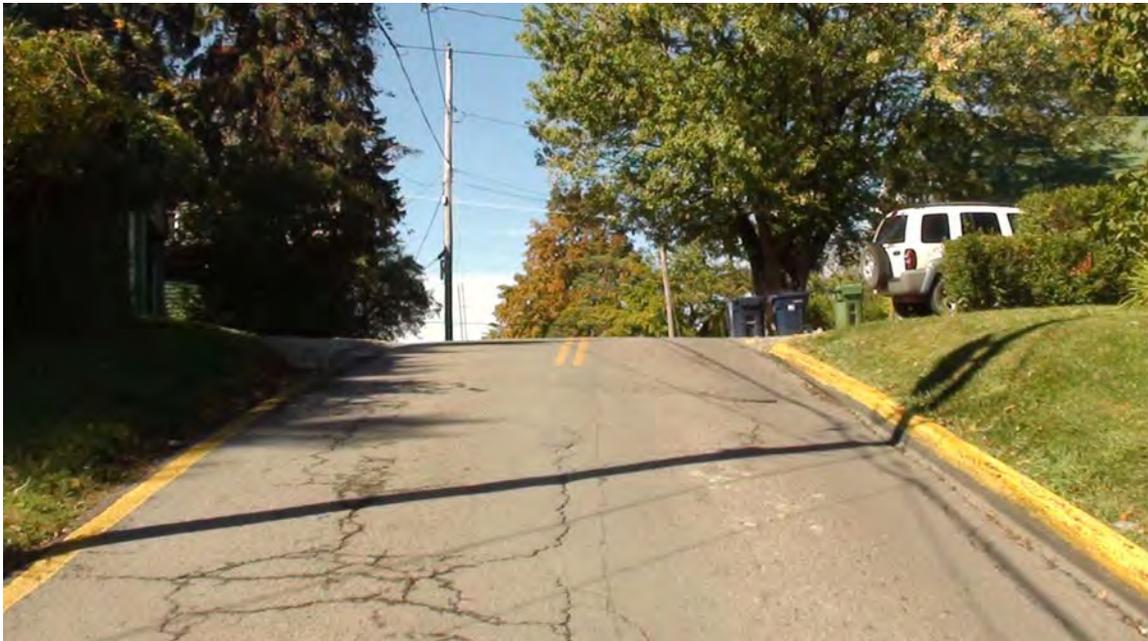
EB North Street at Jones Avenue



EB North Street at Jones Avenue



WB North Street at Jones Avenue



WB North Street at Jones Avenue



NB University Avenue at North Street / Ensign Avenue



NB University Avenue at North Street / Ensign Avenue



SB University Avenue at North Street / Ensign Avenue



SB University Avenue at North Street / Ensign Avenue



EB Ensign Avenue at University Avenue



EB Ensign Avenue at University Avenue



WB North Street at University Avenue



WB North Street at University Avenue



NB University Avenue at Beverly Avenue



NB University Avenue at Beverly Avenue



SB University Avenue at Beverly Avenue



SB University Avenue at Beverly Avenue



EB Beverly Avenue at University Avenue



SB Beverly Avenue at Third Street



EB Third Street at Beverly Avenue



EB Third Street at Beverly Avenue



SB Jones Avenue at Overhill Street



SB Jones Avenue at Overhill Street



EB Overhill Street at Jones Avenue



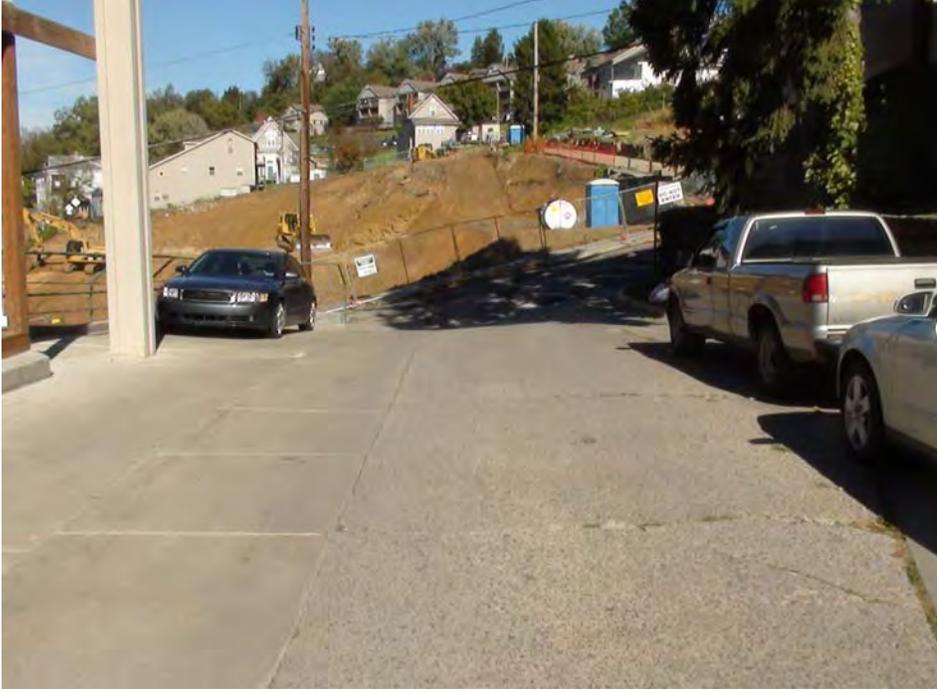
EB Overhill Street at Jones Avenue



WB Driveway at Jones Avenue



WB Driveway at Jones Avenue



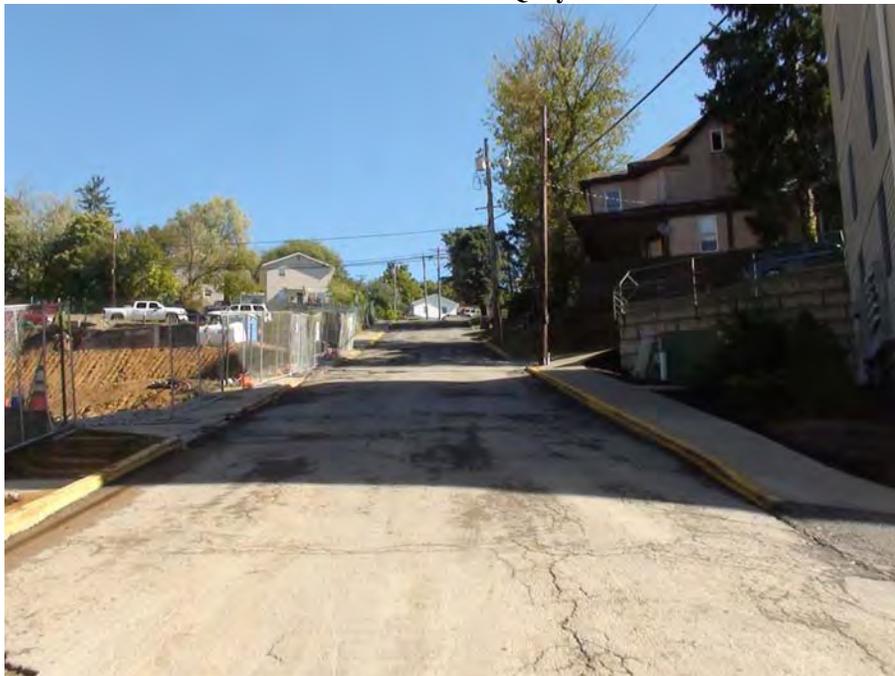
NB Quay Street at Overhill Street



NB Quay Street at Overhill Street



EB Overhill Street at Quay Street



EB Overhill Street at Quay Street



WB Overhill Street at Quay Street



WB Overhill Street at Quay Street



NB University Avenue at Overhill Street



NB University Avenue at Overhill Street



SB University Avenue at Overhill Street



SB University Avenue at Overhill Street



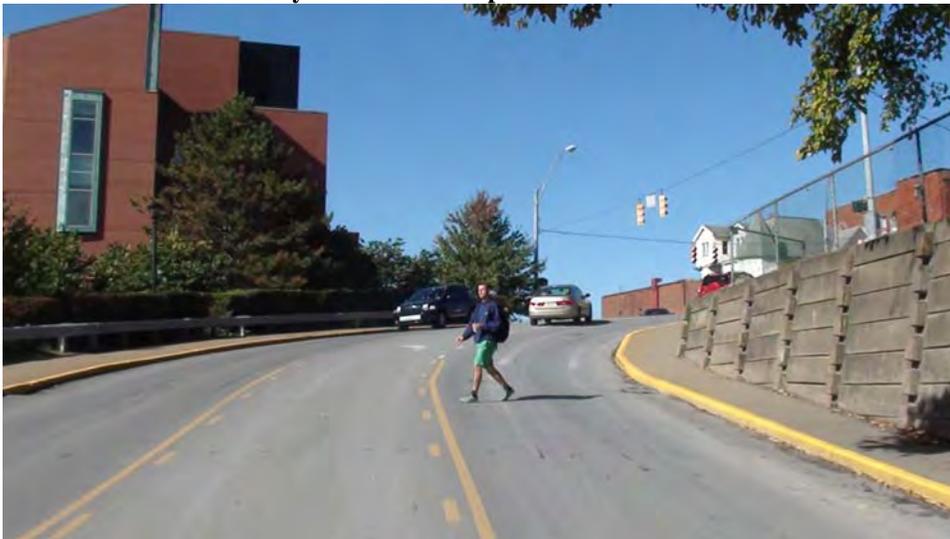
WB Overhill Street at University Avenue



WB Overhill Street at University Avenue



NB University Avenue at Campus Drive and Stewart Street



NB University Avenue at Campus Drive and Stewart Street



SB University Avenue at Campus Drive and Stewart Street



SB University Avenue at Campus Drive and Stewart Street



EB Campus Drive at University Avenue



EB Campus Drive at University Avenue



WB Stewart Street at University Avenue



WB Stewart Street at University Avenue



SB Jones Avenue at Stewart Street



SB Jones Avenue at Stewart Street



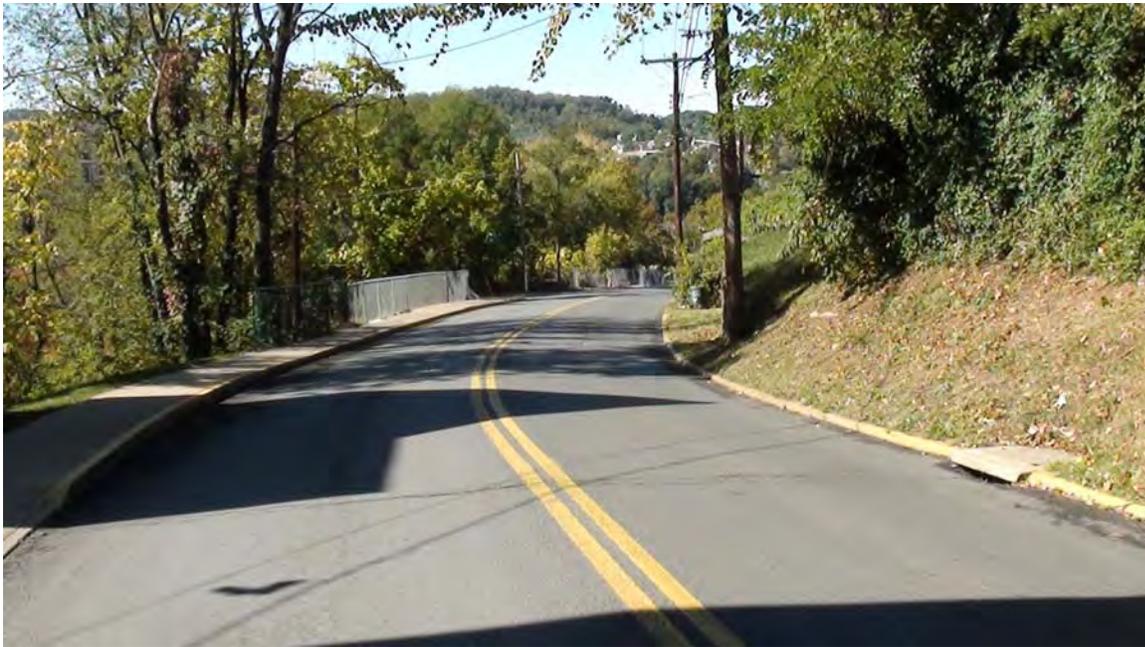
EB Stewart Street at Jones Avenue



EB Stewart Street at Jones Avenue



WB Stewart Street at Jones Avenue



WB Stewart Street at Jones Avenue



NB University Avenue at Sunnyside Commons Driveway



NB University Avenue at Sunnyside Commons Driveway



SB University Avenue at Sunnyside Commons Driveway



SB University Avenue at Sunnyside Commons Driveway



WB Sunnyside Commons Driveway at University Avenue



WB Sunnyside Commons Driveway at University Avenue