

Canal Winchester

**CW Community Center
22 South Trine Street
Canal Winchester, OH 43110**



Meeting Agenda

Monday, April 13, 2020

7:00 PM

Planning and Zoning Commission

*Bill Christensen - Chairman
Michael Vasko - Vice Chairman
Joe Donahue - Secretary
Brad Richey
Joe Wildenthaler
Mark Caulk
Kevin Serna*

Call To Order

Time In: _____

Declaring A Quorum (Roll Call)

Bill Christensen Brad Richey Mike Vasko Kevin Serna
Joe Wildenthaler Joe Donahue Mark Caulk

Excused: _____ Motion By: _____

Second By: _____ Vote: _____

Approval of Minutes

March 9, 2020 Planning and Zoning Commission Meeting Minutes

Motion By: _____ 2nd By: _____ Vote: _____

Public Comment

*Discussion of issues unrelated to agenda items.
Time limit of four minutes per speaker*

Public Oath

Administration of an oath by the Commission Chair to anyone who will speak at the meeting.

Appeals

Property owner: Steve & Gretel Adams
Applicant: Steve & Grete Adams
Location: 800 Washington Street
Request: A Substitution Appeal to the Planning and Zoning Commission to allow for the production of commercial flower farming on the subject property.

Public Hearings

CU-20-002

Property Owner: GLSV LLC
Applicant: Lynn Grinstead
Location: 6825 Thrush Drive (PID 184-003244)
Request: Conditional Use from section 80.37.03(g)(h) of the 1990 zoning code, to allow a veterinary clinic and commercial kennel in a PUD district.

Motion to close Public Hearing By: _____

2nd By: _____ Vote: _____

Motion By: _____ 2nd By: _____

Vote: _____

Conditions: _____

CU-20-003

Property Owner: GLSV LLC
Applicant: Lynn Grinstead
Location: 6825 Thrush Drive (PID 184-003244)
Request: Conditional Use from section 80.37.03(b) of the 1990 zoning code, to allow a residential living quarters in the veterinary clinic building.

Motion to close Public Hearing By: _____

2nd By: _____ *Vote:* _____

Motion By: _____ *2nd By:* _____

Vote: _____

Conditions: _____

FDP-20-003

Property Owner: GLSV LLC
Applicant: Lynn Grinstead
Location: 6825 Thrush Drive (PID 184-003244)
Request: Final Development Plan to construct a 9,611 sq. ft. two story Veterinary Clinic with associated site uses.

Motion By: _____ *2nd By:* _____

Vote: _____

Conditions: _____

FDP-20-002

Property Owner: Pifer Tract Five Limited Partnership
Applicant: DDC Management
Location: PID 042-0388600 & 042-0388500
Request: Final Development Plan for a 191 unit detached condominium community.

Motion By: _____ *2nd By:* _____

Vote: _____

Conditions: _____

Old Business

New Business

Adjournment

Motion by: _____ *2nd by:* _____ *Vote:* _____

Time Out: _____

Canal Winchester

*Town Hall
10 North High Street
Canal Winchester, OH 43110*



Meeting Minutes

Monday, March 9, 2020

7:00 PM

Planning and Zoning Commission

*Bill Christensen - Chairman
Michael Vasko - Vice Chairman
Joe Donahue - Secretary
Brad Richey
Joe Wildenthaler
Mark Caulk
Kevin Serna*

Call To Order

Time In: 7:00pm

Declaring A Quorum (Roll Call)

A motion was made by Kevin Serna, seconded by Joe Wildenthaler that Kevin Serna be excused.

The motion carried by the following vote:

Yes: 6 – Caulk, Donahue, Richey, Wildenthaler, Vasko & Christensen

Excused: 7 – Serna

Approval of Minutes

February 10, 2020 Planning and Zoning Commission Meeting Minutes

A motion was made Brad Richey, seconded by Mark Caulk, that the February 10, 2020 Minutes be approved.

The motion carried by the following vote:

Yes: 5 – Christensen, Richey, Vasko, Donahue & Caulk

Abstain: 1 - Wildenthaler

Public Comment

Public Oath

Public Hearings

CU-20-001

Property Owner: Travis Jacks

Applicant: Hilary Jacks

Location: 36 East Waterloo Street

Request: Conditional Use from Section 1187.03 of the Home Occupation section of the code to allow for the conduct of the home occupation to be within a structure accessory to the principal structure.

Mr. Moore presented the application for Hilary Jacks for property located at 36 East Waterloo Street. The applicant is requesting approval to allow for a Conditional Use from the Home Occupation section of the zoning code to allow for the conduct of the home occupation to be within the accessory structure in the rear yard.

Staff discussed that the property consists of .127 acres on the north side of East Waterloo Street and is zoned Old Town Commercial, which allows for both commercial and residential as permitted uses. Properties to the east, west and south are also zoned Old Town Commercial and consist of single-family homes, multi-family homes, and commercial businesses. The purpose of the Home Occupation section of the code is to allow where appropriate, non-residential

activities in residential structures that are compatible with neighborhoods in which they are located. Many Home Occupations are permitted without any approval, only when they go outside of the code standards is when they need to be reviewed. Within the Conditional Uses section of the code, when an accessory structure is used for the commercial business is one instance when it needs certain approvals.

Staff discussed that this application came about in response to a noise complaint from a resident. The resident was concerned with the level of noise being generated with wood working equipment within the accessory structure and asked the city to cease the noise. Staff indicated that there are no specific noise ordinances against using power tools and the resident provided information that the equipment was being used to produce products that were available for sale on the internet. Staff then notified the property owner that the home occupation within the accessory building would require a Conditional Use Approval from the Planning and Zoning Commission.

Staff discussed the applicant's submittal, noting that they state they produce small-scale furniture for sale. The power equipment used for the business involves a miter saw and palm sander. Typical hours of operation are between 10am and 6pm. Possible solutions to reduce any further noise complaints involve moving the power tools to the far side of the garage to lessen the impact from the equipment being used from the western property owner, log the hours of operation and to stick to the strict 10-6 schedule.

During staff's investigation of the home occupation, it was discovered that the business appears to have been in operation since 2008 when the applicant first applied for the business license. From 2008 to about 2019 the trademark name was to an address on East Mound Street and since has been transferred to the current home. The original business license discusses that they create small scale children's art and accessories for online sales.

The applicant has asked that member Mark Caulk be excluded from the discussion as a commission member due to a conflict of interest this evening.

Staff discussed that the subject property is unique in that it is zoned Old Town Commercial where both commercial and residential uses are both permitted. The blend of these uses can be seen along East Waterloo and West Waterloo Street and is not an unusual condition. All of the complaints that staff has received regarding noise from this home occupation has been sited that such noise from the production of furniture was well into the evening hours, sometimes as late as 10pm. Therefore, subject to comments

from abutting property owners, staff recommends that the applicants Conditional Use request be approved with the following conditions:

1. The hours of operation for the business within the accessory structure be limited from 10am to 6pm.
2. The doors and windows on the structure be closed while any equipment is being operated.

It is noted that Mr. Serna joined the meeting at 7:02 during Staff's presentation.

Mr. Donahue asked staff how many complaints there have been. Staff indicated that there have been complaints from three different individuals.

Mr. Donahue asked if the conditional use follows the property. Staff indicated that a Conditional Use is specific for the application contents.

Mr. Richey asked staff if there was not a residential home on this lot, what rules would there be to allow for this as a commercial business on the entire property. Staff indicated that manufacturing wood furniture would not be a permitted use if the property was being used strictly for the commercial business. Manufacturing is not a permitted use in the Old Town Commercial District.

Mr. Christensen asked the applicant if there was anything they would like to add.

Mrs. Jacks discussed that she has started logging her work hours, stating that she has never been out there working until 9pm or later. Typically, she is out there on average three hours a day. This past week she didn't even start working in the shop until after 2pm. During a typical day only a palm sander is used.

Mrs. Jacks noted that she does try and wait for the neighbors vehicle to be gone so she knows they are out of the house when she is running equipment.

Staff did note the commission for clarification that if the property owner was not producing a product that was for sale there would be no application this evening.

Mr. Vasko asked the applicant how long they have operating at this location. The application noted the past four years. Vasko asked if they have been conducting this business for the past four years. The applicant indicated on and off. Vasko asked if the business has changed recently. The applicant indicated it has not. Vasko further asked if they knew why now after four

years of operation there is a sudden influx in complaints. The applicant stated they were unsure.

Mr. Donahue asked the applicant if the adjacent neighbors have complained to them directly. Mr. Jacks discussed that is a big concern because nobody has complained directly to them.

Mr. Richey discussed the staff comments with the applicant, the first being the self-imposed hours of operation, the second in having the structure closed during operation.

The applicant asked staff to define what an accessory structure is. Staff indicated that an accessory structure is a structure that is an accessory to the principal use. The principal structure or use in this case is the residential home. The accessory would be the detached outbuilding to the rear of the lot. A Primary structure is what is listed in the zoning code as uses or structures permitted. Anything subsidiary would be the accessory.

Mr. Donahue asked the applicant if there were any concerns with the two conditions staff had outlined. The applicant indicated they do not have any issues.

Mr. Christensen opened up the application for the public hearing.

Adjacent resident Mark Caulk spoke to the commission in regards to the application. Mr. Caulk noted that he is excusing himself as a member of the commission with the application as he is an adjacent property owner. Mr. Caulk first state that he nor his wife have contacted the city to complain about the workshop next door, nor have the complained to the neighbors. He does support the application from a private property owner standpoint but requests that the applicant be restricted form operating the business on the weekend as it would interfere with the time he uses to enjoy his property.

Adjacent resident Lysa Blasing noted that she lives next door to the subject property. Mrs. Blasing discussed that she is concerned with the noise and the times of day with the noise associated with the business. They have been in the shop working during the evening hours, on the weekends and even during the festivals. Mrs. Blasing proposed the applicant install a sound barrier interior of the structure to help deaden the noise.

A motion was made by Joe Donahue, seconded by Mike Vasko that this Public Hearing be Closed.

The motion carried by the following vote:

Yes: 6 –Donahue, Richey, Serna, Wildenthaler, Vasko & Christensen

Abstain: 1 - Caulk

Mrs. Jacks discussed with the commission her concern that as a property owner they choose to live within the Old Town part of Canal Winchester where it is a mixed-use zone. Why is it that they have to get approval for the commercial business operations because it makes noise. Staff indicated that this property is zoned Old Town Commercial. The OTC zoning district allows for both residential and commercial uses to be primary uses. Once the primary use is residential it can not allow for the commercial component unless it is a home occupation. Likewise, if the property is primarily commercial it can not allow for residential uses unless it meets the mixed-use section of the code. The Old Town Commercial district allows for the flexibility of either use to the primary use due to the naturally evolving elements in a historic area. The home occupation section of the code does not have any requirements for limiting hours of operation. The limited hours of operation was a suggestion on the application to reduce the potential complaints on the noise derived from this business. The resident's comments to further limit the hours of operation was merely a suggestion for the commission to take into consideration.

Mr. Vasko asked the applicant how often they work in the shop during the weekend. Mrs. Jacks stated that she has her two kids every other weekend so she tries to not be working when they are over. The kids take up most weekend time. Mrs. Jacks stated she tries to be done working before the evening most days.

Mr. Serna asked staff what the recourse could be for non-conformance to the conditions of the approval or scope of the application. Staff indicated that the Conditional Use approval could be revoked and the use would no longer be permitted.

Staff did discuss that based on the mix of uses within the Old Town Zoning district and based on the information obtained from the applicants Etsy page, the number of products that have been sold in the past 10 years are limited and staff does not believe that this business seems to affect the normal character of the residential property. If the product was not for sale nothing is prohibiting any other resident from running similar equipment in a garage.

A motion was made Joe Donahue, seconded by Mike Vasko that Conditional Use Application #CU-20-001 be approved with the following conditions:

- 1. The hours of operation for the business within the accessory structure be limited from 10am to 6pm.**

2. The doors and windows on the structure be closed while any equipment is being operated.

The motion carried by the following vote:

Yes: 6 –Donahue, Richey, Serna, Wildenthaler, Vasko & Christensen

Abstain: 1 - Caulk

SDP-20-002

Property Owner: Waterloo Crossing, LTD

Applicant: Bank of America

Location: PID 184-00308 (6.164 acres located on the south side of Winchester Blvd)

Request: Site Development Plan for a 3,960 sq. ft. commercial bank.

Mr. Moore presented the application for Bank of America for property located at PID 184-00308. The applicant is requesting approval for a Site Development Plan for a 3,960 sq. ft. commercial bank. Staff discussed that the applicant received plan approval for the commercial bank back in September 2019 but has since redesigned the building, thus requiring new approvals.

Staff overviewed the site layout with the commission noting that the majority of it was identical to the previous plan, minus the building footprint. The change in the building elevations do meet the requirements of the commercial development standards and the shopping center requirements. The changes were noted to include removing the architectural arch at the front of the building for a more simplistic entry with a false brick arch on the right hand side where the entry has been relocated. The building is still primarily brick but with a more predominant shopping center look to the front glass and a cmu water table. The side and rear elevations have been changed more significantly by reducing the total square footage of window glass to much smaller thin windows. This building design still conceals the rooftop mechanical units.

The signage on the building is still shown as conceptual at this time. The front entry feature has a hardi-board sign panel that is fished both front a back.

Staff has reviewed the modifications to the proposed site plan and has found that they meet the appropriate development standards for the Waterloo Crossing shopping center and other applicable zoning requirements. Based on feedback from the P&Z Commission, staff recommends that SDP-20-002 be approved as presented.

Mr. Donahue asked staff if the two conditions outlined in the staff report have been satisfied. Staff affirmed.

Mr. Vasko asked the applicant if they are going to have live tellers in this facility. The applicant indicated that the atm's will be tellerless. There will be people working at the facility if a customer requires an interaction.

A motion was made by Joe Donahue, seconded by Joe Wildenthaler that Site Development Plan #SDP-20-002 be approved as presented.

The motion carried by the following vote:

Yes: 5 –Donahue, Richey, Serna, Wildenthaler & Christensen

No: 2 – Vasko & Caulk

FDP-20-002

Property Owner: Pifer Tract Five Limited Partnership

Applicant: DDC Management

Location: PID 042-0388600 & 042-0388500

Request: Final Development Plan for a 191 unit detached condominium community.

Mr. Moore presented the application for DDC Management for 46 acres located at Parcel ID 042-0388600 & 042-0388500. The applicant is requesting approval for a Final Development Plan for a 191 unit detached condominium community.

Staff discussed that this property consists of 46.17 acres on the west side of Hill Road. This property is part of the original Planned Residential District for the GreenGates development from 2001. The preliminary development exhibit for the site indicates that it was planned for 246 detached condominiums. To the north of the site is Busey Road Park. To the west is Phases 1 - 4 of the Winchester Ridge community that contains 329 multi-family units. To the east is undeveloped land within the PRD designated for an Assisted Living/Independent Living Condominiums. To the south is the Meijer Shopping Center zoned Planned Industrial District.

The GreenGates development text and conditions were adopted by Ordinance 52-01 which approved the site for a maximum 246 detached condominium dwelling units. The Preliminary Site Plan had a number of conditions which is being met by this current proposal. One of those conditions was that all Final Development Plans go to Planning and Zoning Commission for a recommendation by City Council for approval.

Staff discussed that the proposed development is for 191 detached condominium units that will have primary access from Hill Road with the construction of Greengate Blvd. Greengate Blvd was designed as part of the PRD to be an east to west connector from Hill Road to Diley Road. The layout of this project is a typical grid pattern with public roads varying in width by travel intensity. The applicant is requesting seven phases for the development.

An eight-foot asphalt path to be located on the north side of the Greengate Blvd and along Hill Road. Additional eight-foot asphalt paths have been provided around the retention basin and open space to the south along with two asphalt paths stubbing to Busey Road Park to the north. A five-foot pedestrian sidewalk is provided elsewhere on all streets.

All residential dwellings will have an attached front loaded two-car garage and will face the public streets. The spacing provided between driveways is 18 feet to provide for additional on-street parking on all roadways. The architecture of these units consists of two-story detached condominiums varying in elevation styles. The elevations shown in the development proposal are indicated as samples of the products proposed for this development. The indication of a product sample allows for future building designs to be incorporated into the development as necessary.

The landscape plan provided shows that with the development there will be the removal of 61 trees. Based on our landscape code requirements the applicant will be planting 101 2.5" caliper trees on site to make up for what is being removed. The applicant is showing the replacement trees in strategic locations on sheets G1 through G3. Additionally, the landscape code requires 1 tree per 500 sq. ft. of building ground coverage. The applicant is showing an estimated three trees to be planted per unit to meet the landscape requirements. Corner lots are shown to have an additional three trees for a total of six trees to make up for some of the additional planting requirements. The applicant is proposing landscape screening along Hill Road meeting the development text for the GreenGates/Pifer zoning exhibit.

The applicant is proposing a residential identification monument sign along Hill Road for the development. The signage submitted with the plans meets both the Violet Pointe Overlay District and the GreenGate development text requirements.

The applicant has submitted a traffic study as part of the development requirements. The traffic study shows that this project warrants a left turn lane on Hill Road into the site. The turn lane is designed to have 125 feet of storage plus a 50 foot taper. A portion of Hill Road right-of-way is within Fairfield County and the plans show the need to obtain additional right-of-way to the west within the County. Fairfield County was provided a copy of the traffic study for review.

The traffic study notes that the improvements along Hill Road for the turn lane are to be completed by 2023 based on a previous phasing plan for the subdivision. Staff has asked that the Hill Road improvements be installed with

Phase 2 of the development, when Greengate Blvd construction through this site is completed to the western property line. The plan the applicant has submitted does not show the applicant has the ability to construct the necessary improvements along Hill Road due to it requiring additional right-of-way being obtained from a property owner to the west. The additional right-of-way needs to be obtained for this project prior to the Final Development Plan being approved.

The traffic study submitted does not show any connection to Diley Road in the scope of the study. Staff has notified the applicants that Canal Winchester has made a commitment with adjacent properties within the planned development to have the connection of Greengate Blvd to Diley Road be completed by 2025. Staff has asked the applicant to revise the traffic study to include this information and to study the impacts of this development with the existing multi-family and future commercial property that will share this new intersection. The applicant is revising the traffic study for staff to send out to EMH&T for review.

Staff discussed that the CEDA Land Use Committee met on March 3, 2020 to review the proposed Final Development Plan for Greengate. The committee made the following recommendations based on the meeting:

1. Street C pavement radius for the cul-de-sac be a minimum of 51.5' per Violet Township Fire Department recommendations to allow for a fire truck turning radius.
2. Fairfield County Engineer signs off on the traffic study for the development impacts on Hill Road.
3. That the development be constructed with Phases 1 and 2 as shown on the phasing plan in order before continuing on to another phase of construction.

Staff is recommending that recommends the applicant's request for the Final Development Plan be tabled at this time so that the traffic study can be amended and reviewed by Canal Winchester. Additionally, the applicant needs to show that they have the ability to construct the necessary improvements along Hill Road prior to approval of the Final Development Plan.

Mr. Christensen asked the applicant if there was anything they would like to add.

Jon Bills with DDC Management spoke to the commission about the phasing for the project noting that they plan on building 2-3 phases at a time for a total of three phases for construction depending on sales. They are eager to get started with the project and the goal is to construction of the first phase be completed before this fall. As it relates to the couple items, the team has been working with the Orr's to reach a solution on the property acquisition for the right-of-way needed to do the turn lane improvements. They are working towards and

agreement and getting it documented. They do have other alternatives to get the right-of-way obtained but as of now they do have a path forward to the original design. The traffic study is the final piece of the plan that they are confident they will be able to work out.

Mr. Bills stated that they are here for any questions the commission may have but they are really requesting a conditional approval on the development plan this evening contingent on the staff concerns being resolved with the right-of-way acquisition and traffic study review.

Mr. Caulk asked the applicant if they are purchasing phases of the property or the entire ground. The applicant stated that they are purchasing the entire ground and building out phases of the development.

Mr. Caulk asked the applicant if the unit type are condominiums. The applicant affirmed that the development text called for a condo development that is single family in nature. This is planned to be a family community the only difference that they will be maintained.

Mr. Caulk asked for the bedroom count and price range. The applicant stated they are not limited for the number of bedrooms, just a minimum square footage. They would predominately be a 3-4 bedroom units. Price point would be mid \$200,000 to low/mid \$300,000.

Mr. Christensen asked if there were any more questions for the applicant. No more questions were asked.

A motion was made by Mike Vasko, seconded by Brad Richey that application FDP-20-002 be tabled based on staff's recommendation.

The motion carried by the following vote:

Yes: 7 – Caulk, Serna, Donahue, Richey, Wildenthaler, Vasko & Christensen

Old Business

Mr. Haire discussed that City Council has reached a settlement agreement with Panda Express with the litigation against them. The settlement agreement approved a site plan for the project which eliminated the northwest access point into the site and has the drive-thru going only one direction around the front of the building, similar to Panera and Burger King. This resulted in a patio being added to the front of the building.

Mr. Vasko asked if the site plan would go back to P&Z Commission for review. Mr. Haire stated that was the nature of the legal agreement, that Council would accept the site plan approval.

Mr. Christensen asked if the northwest intersection would have a traffic light. Mr. Haire stated that the northwest intersection was removed as part of the settlement.

New Business

Mr. Moore briefly discussed that at the April Agenda there will be an appeal filed for the farm on Washington Street across from Ashbrook. The property owner wishes to change the farming on the property to a specialty crop type of farming for flowers. Due to the farming being a legal non-conforming use they are requesting for a substitution.

Mr. Vasko discussed a potential code violation with a burnt down camper parked on West Waterloo Street. Staff suggested that they would investigate.

Adjournment

Time Out: 8:13 pm

A motion was made by Mike Vasko, seconded by Joe Donahue, that this Meeting be adjourned. The motion carried by the following vote:

Yes: 7 – Caulk, Donahue, Richey, Wildenthaler, Serna, Vasko & Christensen

Date

Bill Christensen - Chairman

Joe Donahue - Secretary

Sunny Meadows Flower Farm
3555 Watkins Rd
Columbus, Ohio 43232

Letter to appeal to 1149.04(c) for Non-conforming uses of land at 800 Washington St:

The Property is Zoned R-3 (Low Density Residential). R-3 does not allow agriculture as a permitted use. Due to the property currently being farmed (wheat/corn/beans) as a legal non-conforming use, changing the type of farming to a specialty crop such as flowers would require approval of a substitution for a different form of agriculture. (1149.04(c)).

1149.04 NONCONFORMING USES.

The lawful nonconforming use of a lot and/or structure may be continued, expanded, substituted, changed, or re-established subject to the following:

(c) Substitution. On approval of an appeal to the Planning and Zoning Commission, the substitution of a lawful nonconforming use existing at the time of enactment of this Zoning Code by another lawful nonconforming use may be permitted if no structural alterations, except those required by law or resolution are made, provided that any use so substituted shall be of the same or a more restricted classification, subject to approval of an appeal to the Planning and Zoning Commission, provided the applicant shows that:

(1) The nonconforming use was lawful at the time of enactment of this Zoning Code.

(2) Such tax parcel has been under the same ownership for not less than two years.

(3) Such substitution is compatible with adjacent land use, adjacent zoning, and to appropriate plans for the area.

(4) No substitution shall be requested within two (2) years of the last previous expansion as approved by the Planning and Zoning Commission.

I am applying for a substitution of land use from the type of agriculture that is permitted to be done on 800 Washington Street (see photo CW property). Currently the farm is being used for hay and I'm proposing to be allowed to transfer the crop field to specialty cut flower production. This type of agriculture would have similar practices and would show no structural alterations. We have been operating as a specialty cut flower farm since 2006 at our home farm location at 3555 Watkins Rd Columbus, Ohio. Since 2013, we have been renting 2.5 acres from the Special Olympics of Ohio (see photo of Home Farm & SOF). All of the structures shown are on our home farm acreage that is owned by us. For the last 5 years, we have also been renting land from Decker's Nursery that consists of 15 acres (see photo Decker's Sims Rd).

Sunny Meadows Flower Farm sells cut flowers through many outlets including farmers markets, florist sales, wholesalers, and grocery stores around Columbus and into Cleveland. We currently employ 20 people to operate our farm, some in the office and some in the fields. Our day starts off with harvest in the mornings through to lunch, after lunch the crew meets up in the processing barn at the home farm in order to process that day's harvest to go out to our sales outlets the next day.

If we were to be given the okay to transition the 800 Washington farm to cut flowers, we would intend on this location becoming our woody and perennial farm. There is 16 acres total in the front section, 10 acres below the swale, and 6 acres above the swale (see photo CW tillable acres). Our focus over the next few years would be to build up the soil with cover crops

like rye, clover, and wheat. We would start to set up fields and plant willows and peonies at first. These crops would remain in the ground for many years to come. As time passes, we intend to increase production in phases. We would be propagating most of our own root stock at the home farm, and then replanting them once they are established plants at 800 Washington. These crops have limited harvest times, so we would only actively have employees there during planting, weeding season, and harvest season. During a typical day in May we would harvest the cut peonies, and be planting new crops, or weeding the peonies. There will be days when we aren't at the farm because we are busy at the other two location. The idea behind this farm is to grow less labor-intensive crops than we do at the home farm.

We grow using organic minerals as our main fertilizer, and we don't use round up. We use smaller tractors 70-80 hp, a rototiller, and a few types of cultivators. We do not need to put up any permanent structures for this operation to succeed. There may be interest in the future for erecting high tunnels (not up by the road), which are structures made from metal poles, but nothing is cemented into the ground, and we would be growing in the dirt in those houses (see IMG 4423). The property would remain in Nancy Webster's name and we would be renting the field from them in exchange for helping them with groundskeeping for the rest of the property.

If you are interested in talking with our other landlords for our current rented properties, please contact:

Brian Decker
Owner
Decker's Nursery
bdecker@deckersnursery.com
614-836-2130

Jessica Stewart
President and CEO
Special Olympics Ohio
jstewart@sooh.org
614-239-7050

Thank you,



Steve Adams
Sunny Meadows Flower Farm
www.sunnymeadowsflowerfarm.com
(614) 570-6719
3555 Watkins Road
Columbus, OH 43232



800 Washington St

Washington St

Saylor St

An aerial satellite view of a property. Two large, irregularly shaped lots are outlined: the top one in purple and the bottom one in cyan. A red location pin is placed on the left side of the cyan lot. To the right, a road labeled 'Washington St' runs vertically. The surrounding area includes fields, trees, and some buildings in the distance.

 800 Washington St

Washington St



3555 Watkins Rd

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Go





**Conditional Use #CU-20-002
Winchester Veterinary Clinic**

Owner: GLSV LLC
Applicant: Lynn Grinstead
Location: 6825 Thrush Drive (PID 184-000866)
Existing Zoning: PUD (Planned Unit Development)
Request: Conditional use to section 80.37.03(g)(h) of the 1990 zoning code, to allow a veterinary clinic and commercial kennel in a PUD district.

Location and Surrounding Land Uses

The subject property is zoned Planned Unit Development (PUD) and is regulated with the Villages at Westchester development text for commercial properties. This property consists of 4.85 acres located on the west side of Thrush Drive at the intersection of Cormorant Way. The properties directly to the west of the subject property consist of the Village of Westchester Section 3.3, consisting of 8 single family homes backing up to the subject site. The property to the north contains Altercare, a skilled nursing facility that is within the Villages at Westchester PUD zoning and follows the commercial standards set in the PUD development text. To the east of the subject property contains the Eagle Ridge Condominiums that is also within the Villages of Westchester PUD zoning and follows the multi-family section of the Villages of Westchester development text. To the south of the subject property is The Church of Jesus Christ of Latter-day Saints and is within the Villages of Westchester and follows the PUD zoning development text.

Conditional Use

The applicant is seeking approval for a conditional use to Section 80.37.03(g) & (h) to allow a veterinary clinic and commercial kennel in a PUD district.

Section 80.37.03(g) and (h) of the 1990 zoning code for Conditional Uses in the General Commercial District, States: "The following uses may be allowed in the General Commercial District (GC) subject to approval in accordance with Chapter 80.15:

- f) Offices of Veterinarians and Animal Hospitals
- g) Commercial kennel. Commercial kennels shall not be located within two-hundred (200) feet of a residential zoning district, including PUD and PRD."

Section 80.15.03 of the of the 1990 zoning code for approving a conditional use, states:

- a. The proposed use is a conditional use of the zoning district and the applicable development standards of this Zoning Code are met.
- b. The proposed use is compatible with adjacent land use, adjacent zoning, and to appropriate plans for the area.
- c. The proposed use will not adversely impact access, traffic flow, and other public facilities and services.

- d. The proposed use will not result in the destruction, loss or damage of a natural, scenic, or historic feature.
- e. The proposed use will not adversely affect the public health, safety, convenience, comfort, prosperity, and general welfare.

Analysis

This site previously received a conditional use approval for a veterinary clinic and commercial kennel back in September 2016. Conditional Use applications are only valid for two (2) years pending that no development has taken place on sight. Due to the construction of the site not being active the previous conditional use has expired.

The Winchester Veterinary Clinic site consists of 4.85 acres that is an irregularly shaped polygonal lot located to the west of Thrush Drive. The proposed site plan has one commercial building constructed on the northern most portion of the site to house the veterinary clinic/commercial kennel. As indicated on the site plan, directly behind the building would be a fenced in dog play area and to the south of the building would be the retention pond. The rest of the site is planned to remain undeveloped at this time.

This new facility will allow the current business to relocate from Cemetery Road off of Waterloo Street to the new facility once completed. This facility will house 24-hour on site resident care staff and will offer other upscale pet related services such as day care, boarding bathing and grooming.

The applicant has indicated that the distance from the nearest corner of the building to the western most property line is 187.32 feet and the facility was designed to be pushed as far east as possible towards Thrush drive, to provide an additional buffer to the single family properties to the rear of the site. The applicant indicates that all screening and fencing will meet zoning requirements and examples will be provided during the Final Development Plan Application. Additionally, the applicant has stated that the dogs will not be housed outside and any exercise activities for the dogs will take place during daylight hours.

In September 2016, the Planning and Zoning Commission approved Variance #VA-16-012 to allow for this site to have a commercial kennel within 200 feet of a residential zoning district.

Staff Recommendation

Staff recommends the applicant's request for a Conditional Use to allow a veterinary clinic and commercial kennel be approved as presented.



City of Canal Winchester

36 South High Street
Canal Winchester, Ohio 43110
Development Department
Phone (614) 837-7501 Fax (614) 837-0145

CONDITIONAL USE APPLICATION

rev. 09/24/2013

PROPERTY OWNER

Name GLSV LLC

Address 7692 BUSEY ROAD, CANAL WINCHESTER, OHIO 43110

Daytime Phone _____ Email _____

APPLICANT

Name LYNN GRINSTAD, D.V.M., Ph.D. - WINCHESTER VETERINARY CLINIC

Address 229 WINCHESTER CEMETERY ROAD, CANAL WINCHESTER, OHIO 43110

Daytime Phone 614-837-5555 Email lgrinstead@winchester-vete-clinic.com

Address of Subject Property 6825 THROUGH DRIVE, CANAL WINCHESTER, OHIO 43110

Current Zoning PUD Description of Proposed Use CONSTRUCTION OF

PROPOSED VETERINARY CLINIC & ASSOCIATED SITE IMPROVEMENTS,
1167.03(f)

Attach legal description and current survey (within 2 years) of the subject property and all supporting materials as required by Section 1145.02 (c) (see attachment). Additional information may be required by the Planning and Zoning Administrator or the Planning and Zoning Commission

I certify that the information provided with this application is correct and accurate to the best of my ability.

Lynn Grinstead
Property Owner's or Authorize Agent's Signature

3/20/20
Date

DO NOT WRITE BELOW THIS LINE

Date Received: 3/29/20 Fee: \$ 250 Historic District: ___ Yes No
 Paid Preservation District: ___ Yes No

Date of Action: ___/___/___ Application ___ No
 Expiration Date: ___/___/___ Approved: ___ Yes
 ___ Yes, with conditions

Tracking Number: CU - 20-002

Winchester Veterinary Clinic
Canal Winchester, Franklin County, Ohio
March 23rd, 2020

Applicant/ Developer	Winchester Veterinary Clinic Attn: Lynn Grinstead 229 Winchester Cemetery Road Canal Winchester, Ohio 43110
Engineer	EMH&T Attn: John Bruno 5500 New Albany Road Columbus, Ohio 43054
Property	4.85 Acres
Tax Parcel Number	184-003244
Current Zoning	PUD, Planned Unit District
Subject	Conditional Use per Section 1167.03(b) of the Canal Winchester Zoning Code

Project Narrative

The existing project site (which was already conditionally approved) consists of approximately 4.85 acres located along the west side of Thrush Drive, south of Groveport Road. It is currently zoned PUD, Planned Unit District. The property is currently undeveloped and slopes to the southwest towards an existing drainage ditch.

Land uses currently located around the proposed development:

- WEST of the property is Villages at Westchester. It is zoned PUD.
- NORTH of the property is Altacare of Canal Winchester, It is zoned PUD.
- SOUTH of the property is The Church of Jesus Christ of Latter-day Saints. It is zoned PUD.
- EAST of the property is adjoined by Thrush Drive along the whole property line. Across Thrush Drive is Eagle Ridge Condominiums and Columbus Gymnastics Academy. It is zoned PUD.

The applicant, Winchester Veterinary Clinic, is requesting the proposed use for a veterinary clinic. Winchester Animal Hospital is an existing business located in Canal Winchester, OH. Upon completion of this new facility the practice will relocate to the new address. Once constructed, this facility will allow the business to better serve its existing caseload as well as obtain and service many new clients. Exceptional care and state of the art veterinary medicine, complete with on-site 24 hour resident care will help to set this hospital apart in the community. Additionally, upscale pet related services inclusive of day care, boarding, bathing and grooming will be offered.

The proposed development will be situated on the north end of the site with the entrance located at the intersection of Thrush Drive and Cormorant Way. The remainder on the property to the south will remain undeveloped. The proposed parking spaces will be located on the north and east sides of the building fronting Thrush Drive. Traffic to the facility will be primarily during regular business hours.

**Conditional Use #CU-20-003
Winchester Veterinary Clinic**

Owner: GLSV LLC
Applicant: Lynn Grinstead
Location: 6825 Thrush Drive (PID 184-000866)
Existing Zoning: PUD (Planned Unit Development)
Request: Conditional use to section 80.37.03(b) of the 1990 zoning code, to allow a residential living quarters in the veterinary clinic building.

Location and Surrounding Land Uses

The subject property is zoned Planned Unit Development (PUD) and is regulated with the Villages at Westchester development text for commercial properties. This property consists of 4.85 acres located on the west side of Thrush Drive at the intersection of Cormorant Way. The properties directly to the west of the subject property consist of the Village of Westchester Section 3.3, consisting of 8 single family homes backing up to the subject site. The property to the north contains Altercare, a skilled nursing facility that is within the Villages at Westchester PUD zoning and follows the commercial standards set in the PUD development text. To the east of the subject property contains the Eagle Ridge Condominiums that is also within the Villages of Westchester PUD zoning and follows the multi-family section of the Villages of Westchester development text. To the south of the subject property is The Church of Jesus Christ of Latter-day Saints and is within the Villages of Westchester and follows the PUD zoning development text.

Conditional Use

The applicant is seeking approval for a conditional use to Section 80.37.03 (b) to allow living quarters in the upper level of a veterinary clinic and commercial kennel.

Section 80.37.03 (b) of the 1990 zoning code for Conditional Uses in the General Commercial District, States:

“The following uses may be allowed in the General Commercial District (GC) subject to approval in accordance with Chapter 80.15:

- b) Residential. Living quarters as an integral part of and subordinate to a principal permitted use

Section 80.37.03 of the 1990 zoning code for approving a conditional use, states:

- a. The proposed use is a conditional use of the zoning district and the applicable development standards of this Zoning Code are met.
- b. The proposed use is compatible with adjacent land use, adjacent zoning, and to appropriate plans for the area.
- c. The proposed use will not adversely impact access, traffic flow, and other public facilities and services.

- d. The proposed use will not result in the destruction, loss or damage of a natural, scenic, or historic feature.
- e. The proposed use will not adversely affect the public health, safety, convenience, comfort, prosperity, and general welfare.

Analysis

The Winchester Veterinary Clinic site consists of 4.85 acres that is an irregularly shaped polygonal lot located to the west of Thrush Drive. The proposed site plan has one commercial building constructed on the northern most portion of the site to house the veterinary clinic/commercial kennel. As indicated on the site plan, directly behind the building would be a fenced in dog play area and to the south of the building would be the proposed retention pond. The rest of the site is planned to remain undeveloped at this time.

The applicant previously obtained Conditional Use approval in October 2016 to build a commercial kennel facility and a vet clinic on this site with the 24 veterinary care. The Planning and Zoning Commission approved Conditional Use for on site living quarters as it was found to be compatible with the surrounding residential land uses and would not adversely affect public facilities or services.

The proposed vet clinic will offer 24-hour emergency service at this facility and as part of that service the applicant plans on incorporating a living quarters on the second floor. The proposed residential living quarters will allow the veterinary assistant or registered veterinary technician to be onsite to handle after-hour emergencies, as well as treatment of hospitalized and boarding patients during non-business hours, overnights and holidays. The applicant states that the ability to provide these services are instrumental to their business practices.

Staff Recommendation

Staff recommends the applicant's request for a Conditional Use #CU-20-003 to allow living quarters in the upper level of the veterinary clinic and commercial kennel be approved as it is compatible with the surrounding residential land uses and will not adversely affect public facilities or services.



City of Canal Winchester

36 South High Street
Canal Winchester, Ohio 43110
Development Department
Phone (614) 837-7501 Fax (614) 837-0145

CONDITIONAL USE APPLICATION

rev. 09/24/2013

PROPERTY OWNER

Name GLSV LLC

Address 7692 BUSEY ROAD, CANAL WINCHESTER, OHIO 43110

Daytime Phone _____

Email _____

APPLICANT

Name LYNN GREWSTEAD, D.V.M., Ph.D. - WINCHESTER VETERINARY CLINIC

Address 229 WINCHESTER CEMETERY ROAD, CANAL WINCHESTER, OHIO 43110

Daytime Phone 614-837-5555

Email lyngre@winchestervetclinic.com

Address of Subject Property 6825 THRUJAH DRIVE, CANAL WINCHESTER, OHIO 43110

Current Zoning PUD

Description of Proposed Use RESIDENTIAL LIVING

QUARTERS AS PART OF THE PROPOSED WINCHESTER VETERINARY CLINIC.
1167.03 (b)

Attach legal description and current survey (within 2 years) of the subject property and all supporting materials as required by Section 1145.02 (c) (see attachment). Additional information may be required by the Planning and Zoning Administrator or the Planning and Zoning Commission

I certify that the information provided with this application is correct and accurate to the best of my ability.

Lynn Grewstead
Property Owner's or Authorize Agent's Signature

3/20/20
Date

DO NOT WRITE BELOW THIS LINE

Date Received: 3/20/20

Fee: \$ 250
Paid

Historic District: Yes No

Preservation District: Yes No

Date of Action: ___/___/___

Application No

Expiration Date: ___/___/___

Approved: Yes

Tracking Number: CU - 20-003

Yes, with conditions

Winchester Veterinary Clinic
Canal Winchester, Franklin County, Ohio
March 23rd, 2020

Applicant/ Developer	Winchester Veterinary Clinic Attn: Lynn Grinstead 229 Winchester Cemetery Road Canal Winchester, Ohio 43110
Engineer	EMH&T Attn: John Bruno 5500 New Albany Road Columbus, Ohio 43054
Property	4.85 Acres
Tax Parcel Number	184-003244
Current Zoning	PUD, Planned Unit District
Subject	Conditional Use per Section 1167.03(b) of the Canal Winchester Zoning Code

Project Narrative

The existing project site (which was already conditionally approved) consists of approximately 4.85 acres located along the west side of Thrush Drive, south of Groveport Road. It is currently zoned PUD, Planned Unit District. The property is currently undeveloped and slopes to the southwest towards an existing drainage ditch.

Land uses currently located around the proposed development:

- WEST of the property is Villages at Westchester. It is zoned PUD.
- NORTH of the property is Altacare of Canal Winchester, It is zoned PUD.
- SOUTH of the property is The Church of Jesus Christ of Latter-day Saints. It is zoned PUD.
- EAST of the property is adjoined by Thrush Drive along the whole property line. Across Thrush Drive is Eagle Ridge Condominiums and Columbus Gymnastics Academy. It is zoned PUD.

The applicant, Winchester Veterinary Clinic, is requesting the proposed use for residential as part of the principal veterinary clinic use. This use is permitted in the 1990 Code under section 80.37.03 (b): Residential for living quarters as an integral part of and subordinate to the principal permitted use. The veterinary assistant or registered veterinary technician occupying the area will be responsible for assisting the veterinarian during after-hour emergencies as well as treatment of hospitalized and boarding patients during non-business hours, overnights and holidays

The residential space will allow the veterinary assistant or registered veterinary technician to be onsite to handle the late-night treatments and to provide care to critical needs patients. The ability to provide this service to the community is instrumental to our business practice.

**Final Development Plan #FDP-20-003
Winchester Veterinary Clinic**

Owner: GLSV LLC
Applicant: Lynn Grinstead
Property Location: 6825 Thrush Drive (PID 184-000866)
Existing Zoning: PUD
Proposed Use: Final Development Plan to construct a 9,611 sq. ft. 2 story Veterinary Clinic with associated site uses.

Location and Surrounding Land Uses

The subject property is zoned Planned Unit Development (PUD) and is regulated with the Villages at Westchester development text for commercial properties. This property consists of 4.85 acres located on the west side of Thrush Drive at the intersection of Cormorant Way. The properties directly to the west of the subject property consist of the Village of Westchester Section 3.3, consisting of 8 single family homes backing up to the subject site. The property to the north contains Altercare, a skilled nursing facility that is within the Villages at Westchester PUD zoning and follows the commercial standards set in the PUD development text. To the east of the subject property contains the Eagle Ridge Condominiums that is also within the Villages of Westchester PUD zoning and follows the multi-family section of the Villages of Westchester development text. To the south of the subject property is The Church of Jesus Christ of Latter-day Saints and is within the Villages of Westchester and follows the PUD zoning development text.

Setbacks

- Front Yard: Average of the existing adjacent commercial structures on the same side of the street and facing thereon within the same block. Where there are no adjacent commercial structures, the building line shall not be less than fifty (50) feet measured from the street right-of-way.
- Side Yard: For main and accessory structures, including open service and loading areas, the required side yard shall not be less than twenty (20) feet.
- Rear Yard: For main and accessory structures, the required side yard shall not be less than twenty-five (25) feet.

Supplemental Standards

- 1) No building shall exceed forty (40) feet in height, nor more than three (3) stories in height.

Analysis

The Winchester Veterinary Clinic site consists of 4.85 acres that is an irregularly shaped polygonal lot located to the west of Thrush Drive. The proposed site plan has one two story commercial building constructed on the northern most portion of the site to house the veterinary clinic/commercial kennel. As indicated on the site plan, directly behind the building would be a

fenced in dog play area and to the south of the building would be the retention pond. The rest of the site is planned to remain undeveloped at this time.

This site is subject to the Village at Westchester development text which refers to all commercial development follow the standards in the 1990 zoning code, among other various standards set forth for commercial properties in the PUD.

This new facility will allow the current business to relocate from Cemetery Road off of Waterloo Street to the new facility once completed. This new facility will house 24-hour on site resident care staff and will offer other upscale pet related services such as day care, boarding bathing and grooming.

A Final Development Plan was previously approved for this site in October of 2016 to allow for the Veterinary Clinic and Commercial Boarding facility. Final Development Plans expire in two (2) years given that no development has taken place on sight. Due to the lack of continuous progress towards construction the previous site plan has expired.

The new facility will comprise of two (2) floors. The ground floor will house the veterinary service with 14 rooms that range from standard exam rooms to other specialty rooms. To the rear of the building is the pet boarding and grooming station with 20 dog kennels and a room for the cat kennels. The plans show an interior play area for the dogs and a separate interior play room for the cats. The second floor contains living quarters for the 24-hour care staff.

The site plan shows a fenced in play area and exercise yard to the rear of the building. This area is proposed to be screened/limited by an 8' tall white vinyl fence.

Access and parking

With the proposed site plan there are 35 parking spaces provided. In the 1990 zoning code there are not specific standards for parking a veterinary clinic or commercial kennel so staff used the following calculations to substitute for the parking requirement:

Day Care Centers: 2 for each classroom but not less than 6 per center.

- The applicant has a total of 5 rooms for the boarding service which would dictate 10 parking spaces.

Multi-family residential: 1.25 for each dwelling unit.

- The applicant has 1 unit which would dictate 1.25 parking spaces

Hospitals: 1.5 for each bed.

- The applicant has 14 exam rooms including for the public and surgery/specialty treatment rooms which would dictate 21 parking spaces.

Utilities

Public Water and Sanitary Utilities are available to the site along Thrush Drive. Storm sewer is being handled with an onsite detention basin that outlets to the ditch to the rear of the site.

Landscaping and Lighting

The landscape plan meets the parking lot screening requirement and the screening requirement from the residential to the north with a mix of deciduous and evergreen trees varying in height from 8'-12'. The city's Urban Forester has reviewed the landscape plan and has verified that it meets the no less than 75% opacity requirement set forth by Variance VA-16-012.

The applicant has noted on the site plan that there will be a dumpster enclosure at the end of the northern parking lot. The dumpster enclosure is proposed to be 8' tall with a opaque gate painted to match the building. The sides and rear of the enclosure will be the Sienna ledgestone to match the water table on the building. The dumpster enclosure meets the requirements of the 1990 Zoning Code Chapter 80.61.03(f), which regulates screening of trash container receptacles.

The supplied lighting plan shows three (3) 20' tall parking lot lights. While the regulation of parking lot lights was not discussed in the 1990 zoning code, they do meet the current Commercial Development Standards in Chapter 1199.

Architecture and Signage

The applicant has proposed a building that is more residential in scale and design than a traditional office building found on Gender Road. The front of building features a front porch element on the right-hand side with wood railings and columns. The roof is proposed to be a dimensional shingle in a natural brown color. The building is designed with a Sienna ledgestone water table and hardie plank cement board siding and hardi plank trim around the windows. The exterior finish legend note's an 8" hardi plank lap siding.

The proposed freestanding sign is located in front of the parking lot, just south of the primary access drive. Details of the monument sign are below:

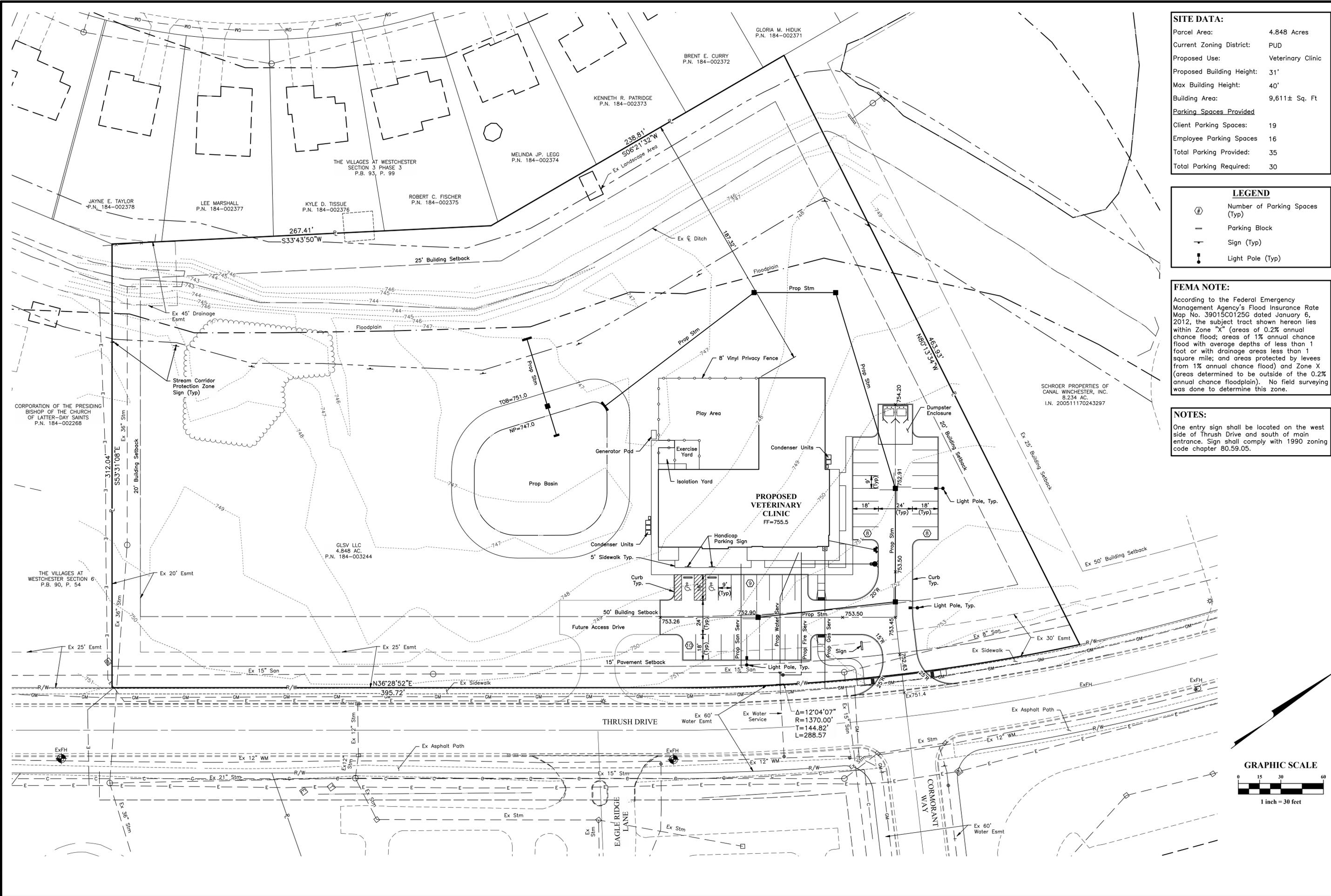
1. The plans call for the sign to be 46.24 sq. ft. and sit 9' 8" tall. The total size of the sign will require a variance from the following section below:
 - a. Chapter 80.59.05(e)(3) of the 1990 Zoning Code, states; "The display area of any one surface does not exceed twenty-five (25) square feet.
2. The sign is planned to be an internally illuminated cabinet box with the digitally printed vinyl overlay.
3. The sign face features five colors (black, white, red (1), red (2) and a red-orange gradient). Zoning only permits up to three (3) colors for signage on this property. The number of colors purposed on the sign will require a variance from the following section below:
 - a. Chapter 80.59 of the 1990 Zoning Code regulates signage. Section 80.59.05(a) Colors. States that "Not more than three (3) colors may be used on the sign or signs or any one building. For the purposes of this section, black and white shall be considered colors."

The proposed wall sign is located on the east end of the building. The design of this sign is the same as the monument sign in terms of scale and color. The 46.24 sq. ft. wall sign is permitted on the building based on the 120' wall face the sign is being located on. However, the sign will require the same variance as the freestanding sign for the number of colors exceeding the max of three (3).

Staff Recommendation

Staff recommends that the application FDP-20-003 be approved with the following recommendations:

- 1) The applicant modify the scale of the monument sign to be in compliance with the 1990 zoning code regulations.
- 2) The applicant reduce the number of colors on all signs to be within the three (3) permitted.



SITE DATA:

Parcel Area:	4.848 Acres
Current Zoning District:	PUD
Proposed Use:	Veterinary Clinic
Proposed Building Height:	31'
Max Building Height:	40'
Building Area:	9,611± Sq. Ft
Parking Spaces Provided	
Client Parking Spaces:	19
Employee Parking Spaces:	16
Total Parking Provided:	35
Total Parking Required:	30

LEGEND

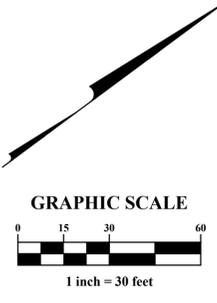
	Number of Parking Spaces (Typ)
	Parking Block
	Sign (Typ)
	Light Pole (Typ)

FEMA NOTE:

According to the Federal Emergency Management Agency's Flood Insurance Rate Map No. 39015C0125G dated January 6, 2012, the subject tract shown hereon lies within Zone "X" (areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood) and Zone X (areas determined to be outside of the 0.2% annual chance floodplain). No field surveying was done to determine this zone.

NOTES:

One entry sign shall be located on the west side of Thrush Drive and south of main entrance. Sign shall comply with 1990 zoning code chapter 80.59.05.



PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
PLAN SET DATE
MARCH 20, 2020

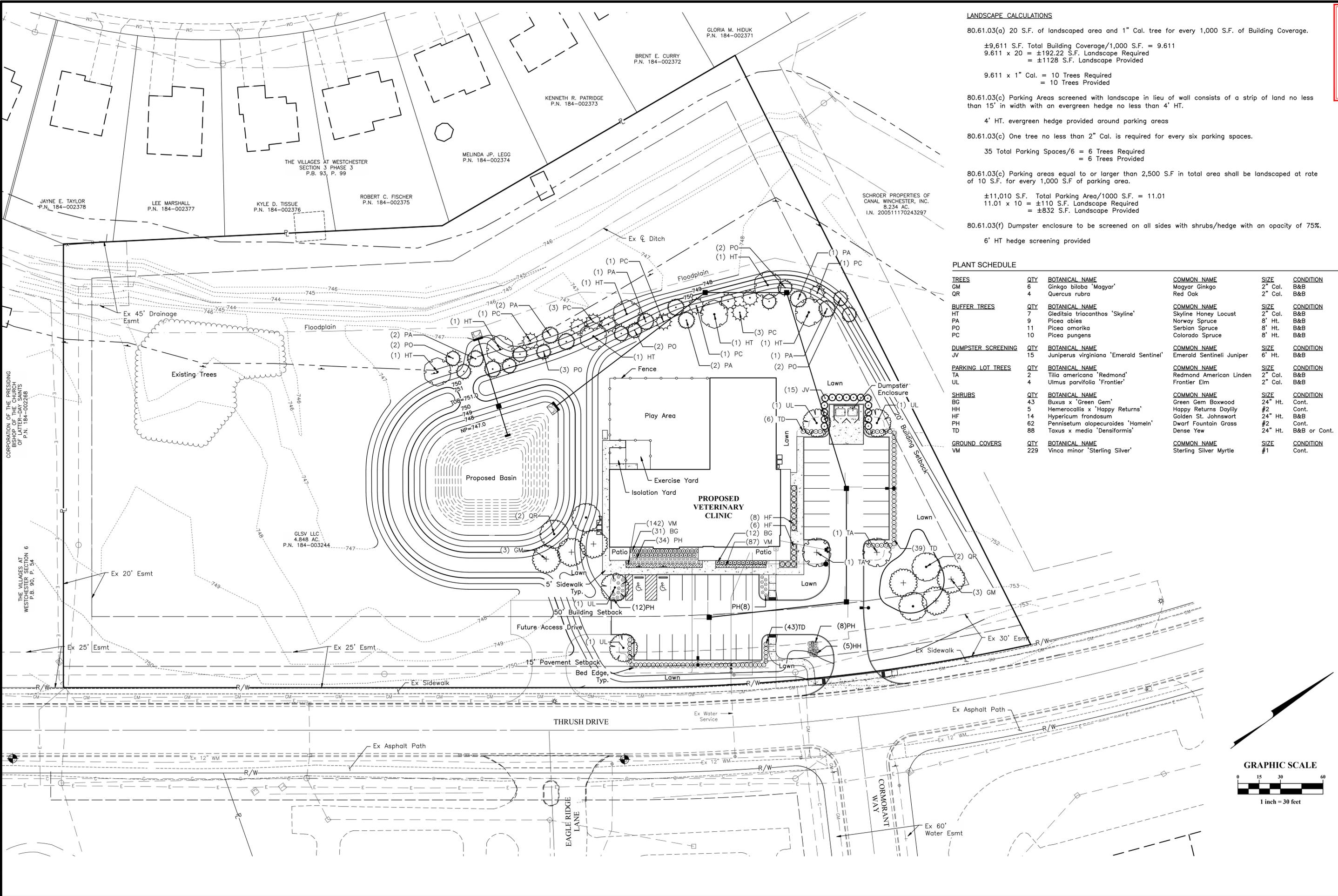
MARK	DATE	DESCRIPTION

WINCHESTER VETERINARY CLINIC

CANAL WINCHESTER, FRANKLIN COUNTY, OHIO
DEVELOPMENT PLAN
FOR
WINCHESTER VETERINARY CLINIC
SITE PLAN

EMHT
Ernie M. Heston & Thomas, Inc.
5900 New Albany Road, Columbus, OH 43254
Phone: 614.775.6900 Fax: 614.775.3468
emht.com

DATE	MARCH 20, 2020
SCALE	1" = 30'
JOB NO.	20151785
SHEET	1/3



LANDSCAPE CALCULATIONS

80.61.03(a) 20 S.F. of landscaped area and 1" Cal. tree for every 1,000 S.F. of Building Coverage.

±9,611 S.F. Total Building Coverage/1,000 S.F. = 9.611
 9.611 x 20 = ±192.22 S.F. Landscape Required
 = ±1128 S.F. Landscape Provided

9.611 x 1" Cal. = 10 Trees Required
 = 10 Trees Provided

80.61.03(c) Parking Areas screened with landscape in lieu of wall consists of a strip of land no less than 15' in width with an evergreen hedge no less than 4' HT.

4' HT. evergreen hedge provided around parking areas

80.61.03(c) One tree no less than 2" Cal. is required for every six parking spaces.

35 Total Parking Spaces/6 = 6 Trees Required
 = 6 Trees Provided

80.61.03(c) Parking areas equal to or larger than 2,500 S.F. in total area shall be landscaped at rate of 10 S.F. for every 1,000 S.F. of parking area.

±11,010 S.F. Total Parking Area/1000 S.F. = 11.01
 11.01 x 10 = ±110 S.F. Landscape Required
 = ±832 S.F. Landscape Provided

80.61.03(f) Dumpster enclosure to be screened on all sides with shrubs/hedge with an opacity of 75%.

6' HT hedge screening provided

PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION
GM	6	Ginkgo biloba 'Magyar'	Magyar Ginkgo	2" Cal.	B&B
QR	4	Quercus rubra	Red Oak	2" Cal.	B&B
BUFFER TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION
HT	7	Gleditsia triacanthos 'Skyline'	Skyline Honey Locust	2" Cal.	B&B
PA	9	Picea abies	Norway Spruce	8' Ht.	B&B
PO	11	Picea omorika	Serbian Spruce	8' Ht.	B&B
PC	10	Picea pungens	Colorado Spruce	8' Ht.	B&B
DUMPSTER SCREENING	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION
JV	15	Juniperus virginiana 'Emerald Sentinel'	Emerald Sentinel Juniper	6' Ht.	B&B
PARKING LOT TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION
TA	2	Tilia americana 'Redmond'	Redmond American Linden	2" Cal.	B&B
UL	4	Ulmus parvifolia 'Frontier'	Frontier Elm	2" Cal.	B&B
SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION
BG	43	Buxus x 'Green Gem'	Green Gem Boxwood	24" Ht.	Cont.
HH	5	Hemerocallis x 'Happy Returns'	Happy Returns Daylily	#2	Cont.
HF	14	Hypericum frondosum	Golden St. Johnswort	24" Ht.	B&B
PH	62	Pennisetum alopecuroides 'Hameln'	Dwarf Fountain Grass	#2	Cont.
TD	88	Taxus x media 'Densiformis'	Dense Yew	24" Ht.	B&B or Cont.
GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION
VM	229	Vinca minor 'Sterling Silver'	Sterling Silver Myrtle	#1	Cont.

PRELIMINARY
 NOT TO BE USED FOR CONSTRUCTION
 PLAN SET DATE
 MARCH 20, 2020

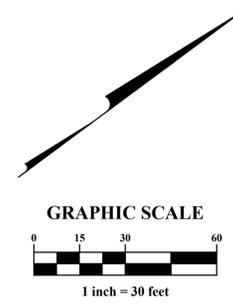
MARK	DATE	DESCRIPTION

WINCHESTER VETERINARY CLINIC

CANAL WINCHESTER, FRANKLIN COUNTY, OHIO
 DEVELOPMENT PLAN
 FOR
WINCHESTER VETERINARY CLINIC
 LANDSCAPE PLAN

EMHT
 Evans, McSchwert, Henderson & Tinn, Inc.
 5300 New Albany Road, Columbus, OH 43254
 Phone: 614.775.6900 Fax: 614.775.3468
 emht.com

DATE	MARCH 20, 2020
SCALE	1" = 30'
JOB NO.	20151785
SHEET	2/3



CORPORATION OF THE PRESIDING BISHOP OF THE CHURCH OF LATTER-DAY SAINTS
 P.N. 184-002268
 4/8/2020 2:39 PM Last Printed By: Bruno John 4/8/2020 2:39 PM (No Xrefs)
 THE VILLAGES AT WESTCHESTER SECTION 6
 P.B. 90, P. 54

GLORIA M. HIDUK
P.N. 184-002371

BRENT E. CURRY
P.N. 184-002372

KENNETH R. PATRIDGE
P.N. 184-002373

MELINDA JP. LEGG
P.N. 184-002374

THE VILLAGES AT WESTCHESTER SECTION 3 PHASE 3
P.B. 93, P. 99

JAYNE E. TAYLOR
P.N. 184-002378

LEE MARSHALL
P.N. 184-002377

KYLE D. TISSUE
P.N. 184-002376

ROBERT C. FISCHER
P.N. 184-002375

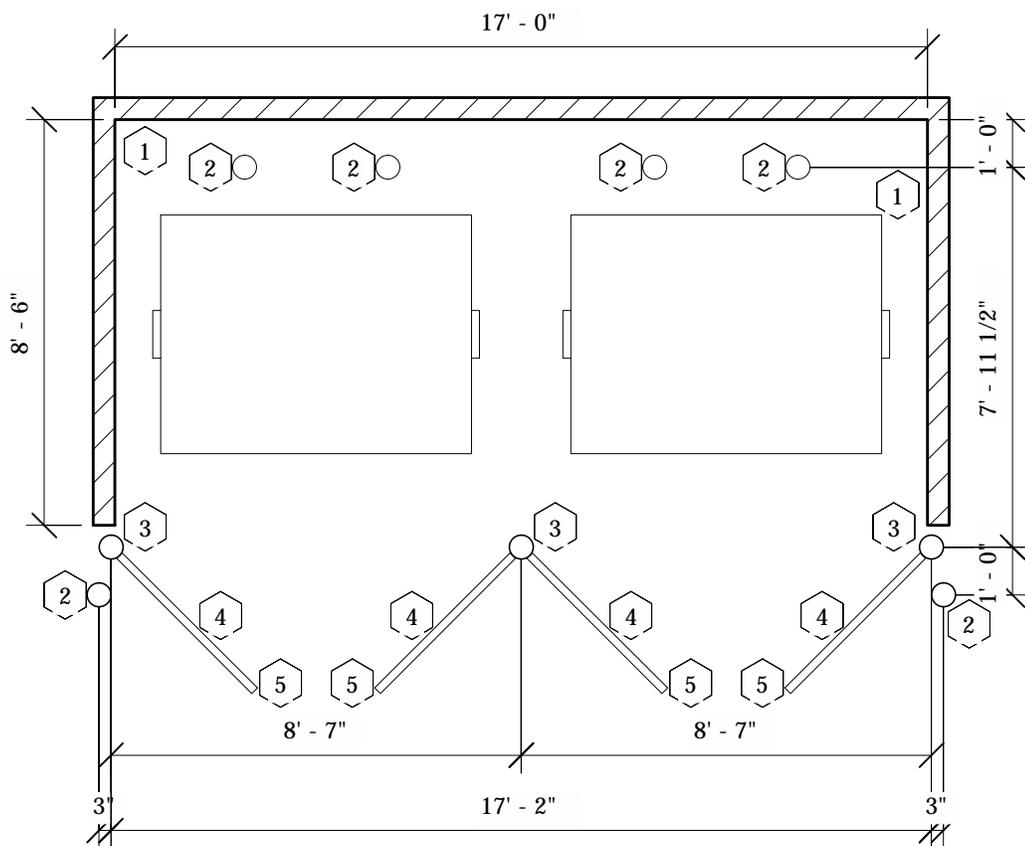
SCHROER PROPERTIES OF CANAL WINCHESTER, INC.
8.234 AC.
I.N. 200511170243297

GLSV, LLC
4.849 AC.
P.N. 184-003244

NOTE: REFER TO CIVIL DRAWINGS FOR LOCATION, POSITION, AND ORIENTATION OF DUMPSTER ENCLOSURE AND PAD ON THE BUILDING SITE.

CODED NOTES

1. STONE DUMPSTER ENCLOSURE WALL. PATTERN AND COLOR TO MATCH BUILDING STONE.
2. 6" DIAMETER BOLLARD. REFER TO DETAIL 1/102 FOR FURTHER INFORMATION.
3. 6" DIAMETER POST WITH CONCRETE CORE. EMBED GATE POST.
4. OPAQUE DUMPSTER GATE. PAINT PANEL TO MATCH BUILDING PAINT.
5. INSTALL GATE PINS, 3" SPRING LOADED CASTERS, AND GATE HINGES. REFER TO DETAILS 2 AND 3 ON SHEET 102 FOR FURTHER INFORMATION.

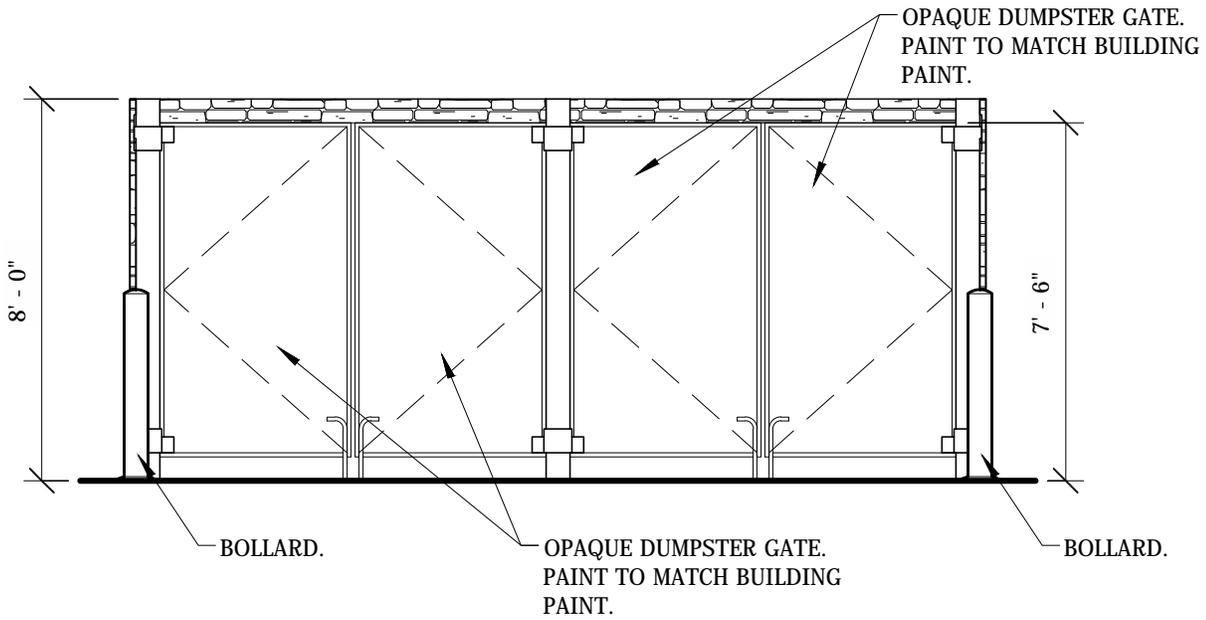


DUMPSTER ENCLOSURE PLAN

1/4" = 1'-0"

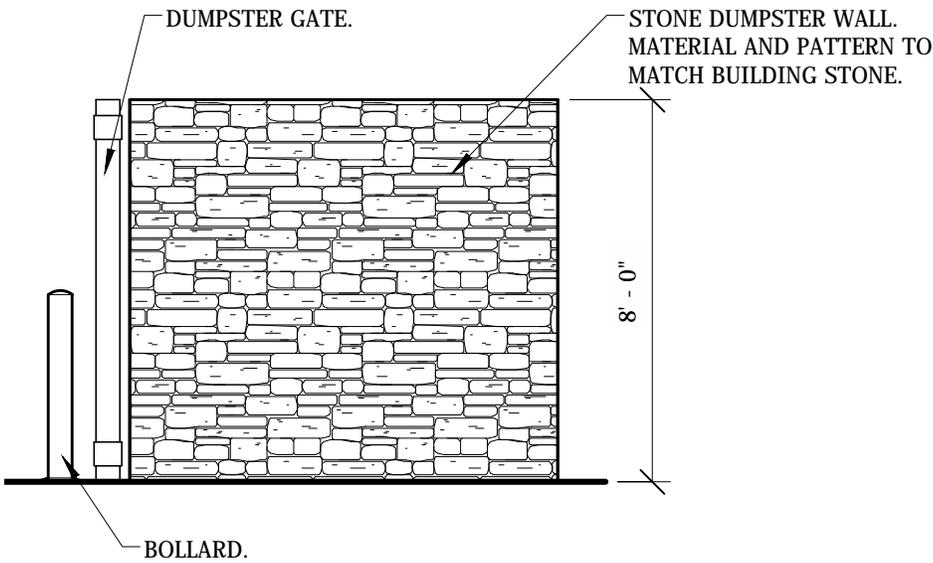
100

WINCHESTER ANIMAL HOSPITAL



DUMPSTER ELEVATION - FRONT

1/4" = 1'-0"

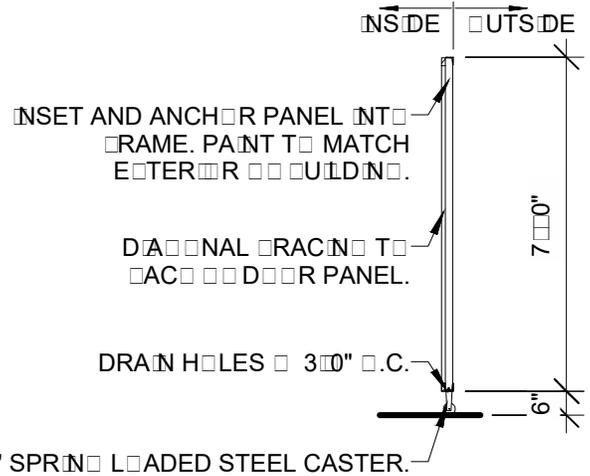
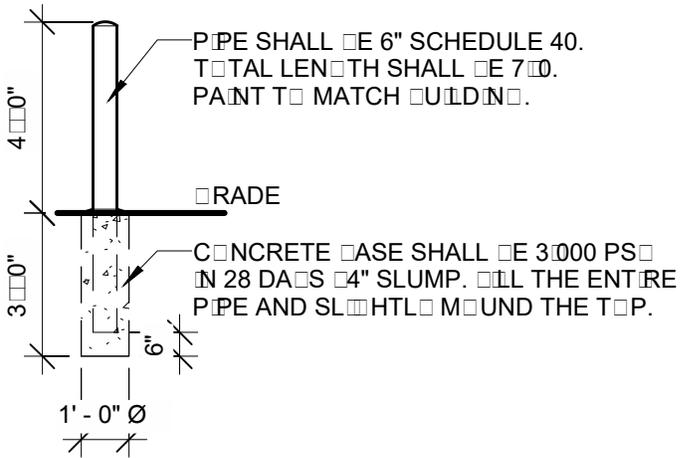


DUMPSTER ELEVATION - SIDE

1/4" = 1'-0"

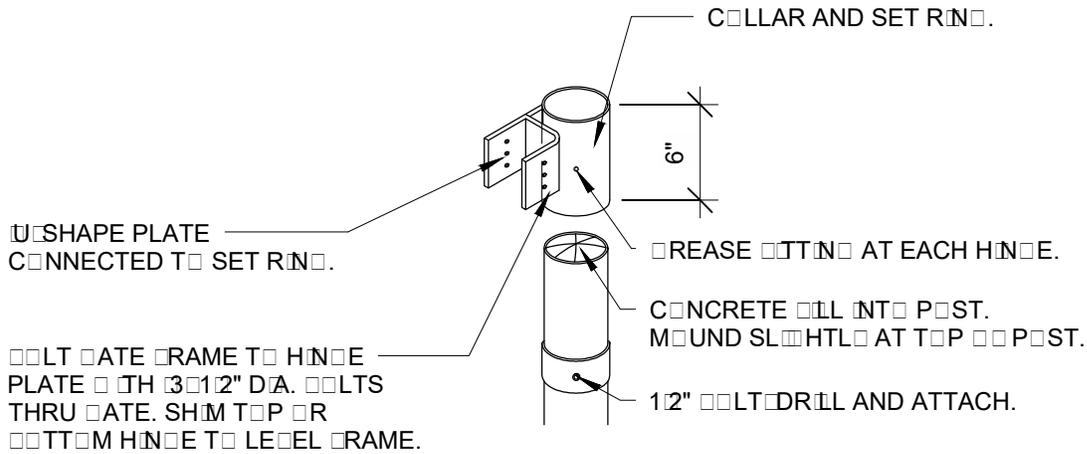
101

WINCHESTER ANIMAL HOSPITAL



1 DUMPSTER BOLLARD
1/4" = 1'-0"

2 DUMPSTER GATE
1/4" = 1'-0"



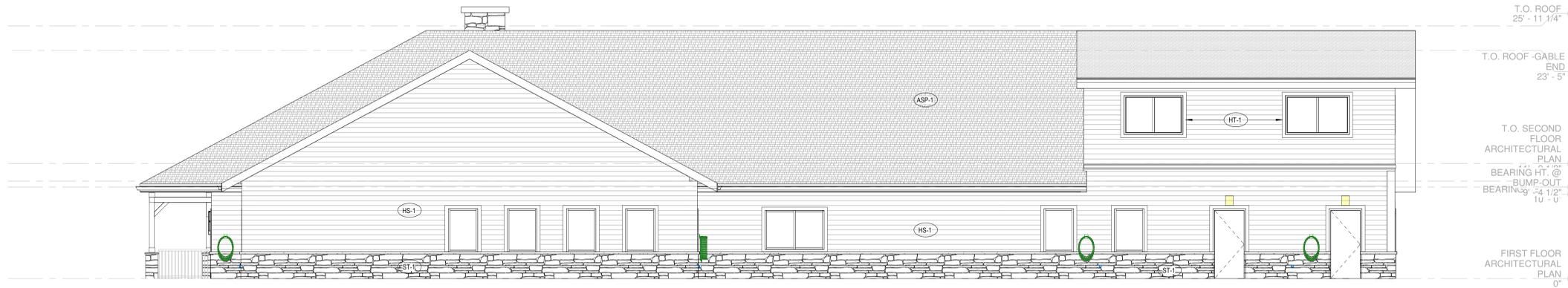
3 DUMPSTER GATE HINGE
1" = 1'-0"

EXTERIOR FINISH LEGEND

- (HS-1) HARDIEPLANK CEDARMILL 8" LAP SIDING - COBBLESTONE
- (HT-1) HARDIETRIM SMOOTH BATTEN BOARDS - ARCTIC WHITE
- (ST-1) DUTCH QUALITY LEDGESTONE - SIENNA
- (ASP-1) GAF TIMBERLINE HDZ SHINGLES - BARKWOOD



1 ELEVATION - NORTH
A3.0 3/16" = 1'-0"



2 ELEVATION - SOUTH
A3.0 3/16" = 1'-0"



3 ELEVATION - WEST
A3.0 3/16" = 1'-0"



4 ELEVATION - EAST
A3.0 3/16" = 1'-0"

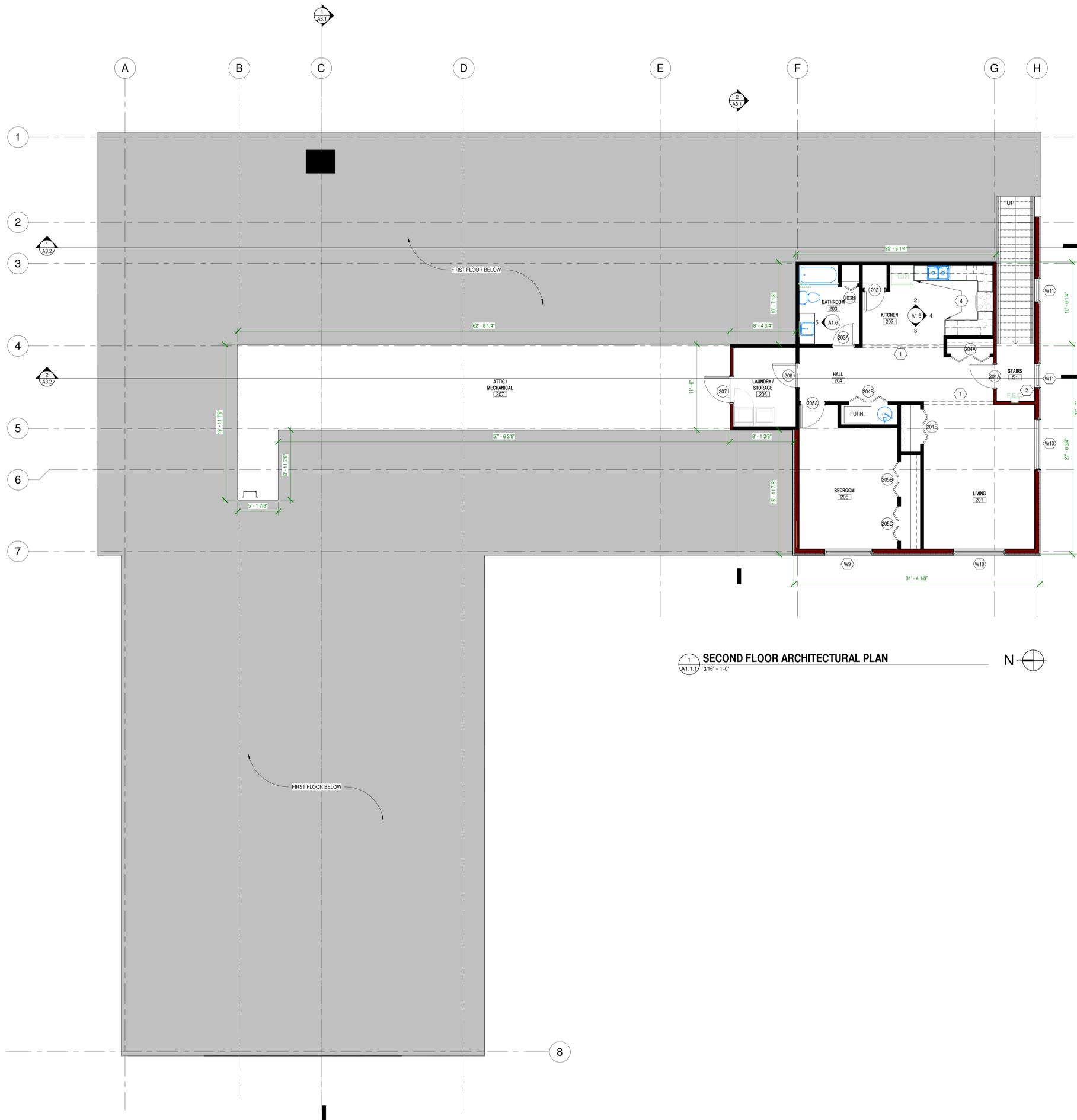
CERTIFICATION

DATE	NO.	REVISION

DATE	NO.	REVISION

DATE	NO.	REVISION

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ARCHITECTURAL GENERAL NOTES

- A. G.C. SHALL COORDINATE WORK DESCRIBED IN ARCHITECTURAL SCOPE WITH THAT OF ALL OTHER TRADES.
- B. REVIEW DOCUMENTS. FIELD VERIFY EXACT SIZE AND LOCATIONS OF ALL EXISTING WORK PRIOR TO CONSTRUCTION. IN THE EVENT OF CONFLICTS OR OMISSIONS, CONTACT THE ARCHITECT.
- C. DO NOT SCALE DRAWINGS.
- D. PROVIDE A PORTABLE FIRE EXTINGUISHER, WITH A RATING OF NOT LESS THAN 2-A, WITHIN 75 FOOT TRAVEL DISTANCE TO ALL PORTIONS OF THE BUILDING ON EACH FLOOR, AND ADDITIONAL EXTINGUISHERS AS REQUIRED BY FIRE DEPARTMENT FIELD INSPECTOR OR BUILDING DEPARTMENT INSPECTOR. PROVIDE SEMI-RECESSED TYPE CABINETS WHERE POSSIBLE.
- E. ABRUPT CHANGES IN LEVEL ALONG ANY ACCESSIBLE ROUTE SHALL NOT EXCEED 1/2" IN HEIGHT, INCLUDING AT DOOR THRESHOLDS. LEVEL CHANGES NOT EXCEEDING 1/4" MAY BE VERTICAL. BEVEL OTHERS WITH A SLOPE NO GREATER THAN 1:2.
- F. IN BUILDINGS AND FACILITIES, FLOORS OF A GIVEN STORY SHALL BE A COMMON LEVEL THROUGHOUT, OR SHALL BE CONNECTED BY PEDESTRIAN RAMPS, PASSENGER ELEVATORS OR SPECIAL ACCESS LIFTS.
- G. ALL DIMENSIONS ARE FROM FINISH FACE TO FINISH FACE, OR FACE OF MASONRY.
- H. ALL GYPSUM BOARD AT FRONT OF HOUSE AREAS, TO RECEIVE A 'LEVEL 5' FINISH THROUGHOUT. ALL BACK OF HOUSE AREAS TO RECEIVE A 'LEVEL 4' FINISH.
- I. WHERE EXISTING WALLS ARE TO RECEIVE NEW WALL TILE, REMOVE EXISTING GYPSUM BOARD, AND INSTALL 5/8" CEMENT BOARD.
- J. PROVIDE BLOCKING AT ALL WALL-MOUNTED TOILET ACCESSORIES, CABINETRY, EQUIPMENT ETC. TO ENSURE A STABLE INSTALLATION.
- K. PROVIDE MOISTURE RESISTANT BOARD IN LIEU OF GYPSUM WALL BOARD IN ALL WET AREAS. INSTALL 5/8" CEMENT BOARD (DUROCK OR EQUAL) AT ALL WALL TILE APPLICATIONS.
- L. WHERE EXISTING WALLS ARE TO RECEIVE NEW WALL TILE, REMOVE EXISTING GYPSUM BOARD, AND INSTALL 5/8" CEMENT BOARD.
- M. PROVIDE INTERIOR SIGNAGE, REFER TO SHEET A8.0 & PROJECT MANUAL FOR MORE INFORMATION.
- N. ALL LOCATIONS OF NEW DOG RUN FLOOR DRAINS ARE SHOWN ON PLAN PORTION OF DOG RUN INTERIOR ELEVATION SHEET.
- O. IF NEW EXTERIOR SIGNAGE IS TO BE INSTALLED, COORDINATE POWER REQUIREMENTS (REQUIRED SEPARATE CIRCUIT) WITH SUPERIOR ELECTRICAL (VCA SIGNAGE VENDOR).

ARCHITECTURAL PLAN KEYNOTES

- 1 LINE OF BULKHEAD ABOVE.
- 2 NEW SEMI-RECESSED FIRE EXTINGUISHER CABINET / EXTINGUISHER TO BE PROVIDED AND INSTALLED PER A.D.A. REQUIREMENTS.
- 3 NEW SOLID SURFACE WINDOW SILL. REFER TO DETAIL ON SHEET A5.1.
- 4 PRE-FABRICATED CASEWORK. PROVIDED / INSTALLED BY G.C.
- 5

ARCHITECTURAL SYMBOL LEGEND

- 101 DOOR TAG, REFER TO DOOR SCHEDULE.
- 101 DOOR TAG (IN RED, FOR A RATED DOOR), REFER TO DOOR SCHEDULE.
- W# WINDOW TAG, REFER TO WINDOW GLAZING INFORMATION ON SHEET A5.0
- ELEVATION TARGET
- WALLTYPE, REFER TO SHEET A0.2 FOR INFORMATION
- DETAIL NUMBER
- 1 SIM SHEET NUMBER
- ENLARGED PLAN OR DETAIL
- SECTION NUMBER
- 1 SIM SHEET NUMBER
- ELEVATION NUMBER
- A4.1 SHEET NUMBER
- REVISION TAG

WALL LEGEND

- EXISTING WALLS TO REMAIN
- NEW WALL CONSTRUCTION, NON-INSULATED
- NEW PARTIAL HEIGHT INSULATED WALL CONSTRUCTION
- NEW FULL-HEIGHT INSULATED WALL CONSTRUCTION
- NEW MASONRY WALL CONSTRUCTION
- EXISTING DOOR TO REMAIN
- NEW DOOR TO BE INSTALLED



WINCHESTER VETERINARY CLINIC
 6825 THRUSH DRIVE
 CANAL WINCHESTER, OH 43110
 SECOND FLOOR ARCHITECTURAL FLOOR PLAN

DATE PLOTTED:	SCALE:	DATE:	NO. REVISIONS:
PROJECT NUMBER:	DATE:	DATE:	DATE:
PROJECT NAME:	DATE:	DATE:	DATE:
SHEET:	DATE:	DATE:	DATE:
A11.1			
<small> THESE DRAWINGS ARE EITHER IN OR OUT OF COMPLIANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 704 CODE. NO. OF ARCHITECTS: 5. NO. OF ENGINEERS: 0. NO. OF PROFESSIONAL ENGINEERS: 0. ALL OTHER PROFESSIONAL AND TRADE SECTIONS SPECIFICALLY IDENTIFIED. </small>			



OPTION D

7'-1 3/8"

6'-6"

9'-8"

6"

2'-8"



46.24 SqFt

3/4" = 1'-0"

SIDE VIEW

- CABINET: FABRICATED ALUMINUM WITH 2" RETAINERS - ALL PAINTED BLACK
- FACES: FLAT WHITE POLYCARBONATE WITH DIGITALLY PRINTED VINYL OVERLAYS.
- ILLUMINATION: WHITE LED
- SUPPORT POSTS: 6" X 6" STEEL TUBES WRAPPED WITH 3/4" THICK ROUGH SAWN CEDAR BOARDS - DECORATIVE ALUMINUM ELEMENTS PAINTED BLACK.
- HORIZONTAL CROSS MEMBERS: 4" X 4" STEEL TUBE - PAINTED BLACK.
- STONE BASES: FABRICATED ANGLE AND PLYWOOD STRUCTURES COVERED WITH STONE VENEER TO MATCH BUILDING - BLACK ALUMINUM CAPS.

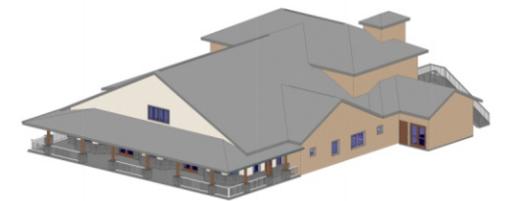


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FILE NO.:E60042 DaNITE SIGN CO.

For electrical illuminated signs. For non-illuminated signs, UL does not apply.



PROPOSED BUILDING DESIGN

COLORS

- DIGITALLY PRINTED VINYL - ARTWORK REQUIRED
- BLACK
- WHITE
- WOOD STAIN TO MATCH BUILDING COLUMNS

APPROVED-CUSTOMER _____ DATE _____



JOB NAME	WINCHESTER VET CLINIC	#S1-31314-R3
STREET	THRUSH DRIVE AND GROVEPORT RD.	
CITY, STATE	CANAL WINCHESTER, OH	
SIGN TYPE	MONUMENT SIGN	

DATE	11/10/16	REV. DATE: 12/20/16
FILE NAME	WINCHESTER VET CLINIC.CDR	
DIRECTORY	THAD > 2016 > W	

SCALE AS NOTED SALE LD DESIGNER TK

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OPTION D

7'-1 3/8"

6'-6"



46.24 SqFt

#S2-31314-R3: S/F (LED) ILLUMINATED WALL SIGN 3/4" = 1'-0"

- CABINET: FABRICATED ALUMINUM WITH 2" RETAINERS - ALL PAINTED BLACK
- FACES: FLAT WHITE POLYCARBONATE WITH DIGITALLY PRINTED VINYL OVERLAYS.
- ILLUMINATION: WHITE LED.

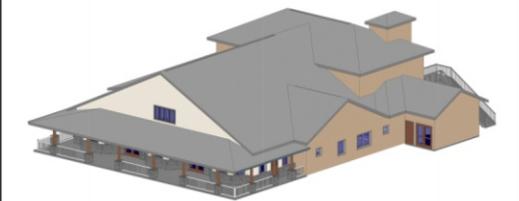


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UL LISTED via STANDARD UL48
FILE NO.:E60042 DaNITE SIGN CO.

For electrical illuminated signs. For non-illuminated signs, UL does not apply.



PROPOSED BUILDING DESIGN

COLORS

- DIGITALLY PRINTED VINYL - ARTWORK REQUIRED
- BLACK
- WHITE

APPROVED-CUSTOMER _____ DATE _____



JOB NAME	WINCHESTER VET CLINIC	#S2-31314-R3
STREET	THRUSH DRIVE AND GROVEPORT RD.	
CITY, STATE	CANAL WINCHESTER, OH	
SIGN TYPE	WALL SIGN	
DATE	11/10/16	REV. DATE: 12/20/16
FILE NAME	WINCHESTER VET CLINIC.CDR	
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PERSPECTIVE VIEW - NOT TO SCALE

**Final Development Plan #FDP-20-002
Greengate**

Owner: Pifer Tract Five Limited Partnership
Applicant: DDC Management
Location: 46.17 acres off Hill Road located at PID #042-0388600 & 042-0388500
Existing Zoning: PRD (Planned Residential District)
Request: Requesting approval for a Final Development Plan for 191 Detached Condominiums for the Greengate Residential Development.

Location and Surrounding Land Uses

The subject property consists of 46.17 acres on the west side of Hill Road. This property is part of the original PRD District for GreenGates. The development exhibit for the site indicates it is planned for detached condominiums. To the north is Busey Road Park. To the west is Phase 1 - 4 of the Winchester Ridge community that contains 329 multi-family units. To the east is undeveloped land within the PRD designated for an Assisted Living/Independent Living Condominiums. To the south is the Meijer Shopping Center zoned Planned Industrial District (PID).

Zoning

The subject parcels are zoned PRD (Planned Residential District), subject to the GreenGates development text and conditions adopted by Ordinance 52-01. This area of the PRD is designated in the plan for Detached Condominiums (246 Dwelling Units). The approved development standards as part of the GreenGate PRD district are as follows:

The Preliminary Site Plan conditions (Ordinance #52-01):

1. The maximum overall PRD density shall be four (4.0) dwelling units per acre based upon the number of actual units divided by the net developable acres (including open space), pursuant to Section 1173.04 (c) (4) of the Canal Winchester Codified Ordinances.
2. Revise Note "A" to read as follows: All acreages shown on this plan are approximate. The number of units permitted to be constructed within each designated use area as shown on this plan are approximate. The owner, or their agents and/or assigns, shall be permitted to build fewer units in each designated use area than are shown on this plan.
3. The developer, its successors or assigns, shall be responsible for their fair share of the costs of any off-site improvements to Diley Road, Busey Road or Hill Road. The fair share of these costs shall be determined from the required traffic study.
4. The developer, its successors or assigns, shall be responsible for all internal infrastructure improvements.

5. The developer, its successors or assigns, shall be responsible for all costs for getting water service to the site.
6. Water service to all residential development, except for detached condominiums, shall be provided by a private water system with a master meter.
7. Sanitary sewer service to the site shall be provided by a public system. Appropriate maintenance easements shall be provided to the village by the developer, its successors or assigns, if and where appropriate for the maintenance of this system. The size and location of these easements shall be subject to review and approval by the village.
8. The maximum number of total apartments shall be 258. This is based on the overall density requirement of 4.0 dwellings per acre, and the number of residential units and acreages shown on the revised site plan dated July 9, 2001.
9. Uses to be allowed and/or prohibited on the 33-acre school site are to be resolved between the developer and the school board prior to final site plan approval of the school site.
10. As each phase of the PCD, PID and PRD districts becomes ready for development, the Preliminary Site Plan and Final Site Plan shall be submitted for review and approval by the Planning & Zoning Commission and Village Council.

The approved development standards as part of Green Gate Planned Residential District are as follows.

- Units Per Building: Multiple-Unit residential structures shall not exceed sixteen (16) units per building except that assisted living and Independent Living Facilities may exceed this limit and shall be reviewed and approved on an individual basis.
- Minimum Finished Floor Area: The Minimum Finished Floor Area of a One Bedroom Units shall be 750 sq. ft. All other units shall be delineated in the Village of Canal Winchester Zoning Code. The minimum percentage of one (1) bedroom apartments shall be twenty (20) percent. Assisted Living and Independent Living Facilities shall not be required to meet the Minimum Finished Floor Area as set forth above and may include studio apartments as well as one and two bedroom units.
- Parking: The proposed final development plan for the residential areas will comply with the Village of Canal Winchester Zoning Code, Chapter 1185 Off-Street Parking and Loading for the required number of spaces and parking lot layout standards. A detailed parking lot layout will be submitted to the Village for each individual lot at the time of their individual site plan approval.
- Sidewalks: All development on the PRD area shall have sidewalks that comply with current American's with Disabilities Act (ADA) requirements. In situations where there is a bike path running parallel with the sidewalk along the same roadway, sidewalks shall be constructed only on the opposite side of the roadway as the bike path.
- Signage: A main entrance sign shall be constructed at the entrance of each residential area on the internal road and one entrance sign shall be constructed on Busey Road to

identify the attached condominium development. The specification for these signs shall be submitted to the Village for review and approval with the final development plan for each area and shall be approved on an individual basis. All signage shall follow the overall design criteria of the Canal Winchester-Violet Township Economic Development Agreement Land Use Plan.

- Building Location: The uses set forth in the final development plan have no maximum lot coverage or size, however, they must provide for adequate yard space as follows:
 - (A) Front Yard setback shall be a minimum of twenty-five (25) feet.
 - (B) Side Yard setback shall be a minimum of ten (10) feet.
 - (C) Rear Yard setback shall be a minimum of twenty-five (25) feet.
- Building Height: Buildings shall not exceed the height of thirty-five (35) feet and/or three (3) stories. This does not include any decorative elements such as cupolas, bell towers, clock towers etc. which shall be approved on an individual basis.
- Exterior Building Standards: The attached condominiums, detached condominiums and apartments shall each incorporate common elements of style, color schemes and materials such that they are architecturally compatible and complimentary. The exact style, color and materials for each area and use shall be submitted for the Villages approved along with the Final Site Plans and Final Engineered Drawings for each site.
- Landscaping: The proposed final development plan will comply with the Village of Canal Winchester Zoning Code for the individual lot and parking lot landscaping and screening requirements. The landscaping along Diley Road, Hill Road and Busey Road shall be described on attached Exhibit "C", entitled Landscape Plan for Diley/Hill Road.
- Utilities: Final Design of the utilities (sanitary sewers, storm sewers, water and street lighting) will be completed with the submission of the engineering plans for the development approval from the Village Engineer. All dumpsters will be enclosed as required by the Village of Canal Winchester Zoning Code. The street lighting plans for the streets and parking lot areas will be submitted for approval with the final development plans. All utilities shall be placed underground.

Zoning Analysis

One condition of approval in rezoning this property to the PRD district was that all Final Development Plans are to be submitted and approved by both Planning and Zoning Commission and City Council. Final Development Plan FDP-20-002 meets the development text for the planned district in terms of maximum number of units and unit type.

Site Plan

The proposed development will have primary access from Hill Road with the construction of Greengate Blvd. Greengate Blvd was designed as part of the PRD to be an east to west connector from Hill Road to Diley Road. The layout of this project is a typical grid pattern with public roads varying in width by travel intensity. The applicant is requesting seven (7) phases for the development.

The applicant has planned an 8 foot asphalt path to be located on the north side of the Greengate Blvd and along Hill Road. Additional 8' asphalt paths have been provided around the retention basin and open space to the south along with two (2) asphalt paths stubbing to Busey Road Park to the north. A 5 foot pedestrian sidewalk is provided elsewhere on all streets.

All residential dwellings will have an attached front loaded two (2) car garage and will face the public streets. The spacing provided between driveways is 18 feet to provide for additional on-street parking on all roadways. The architecture of these units consists of two-story detached condominiums varying in elevation styles. The elevations shown in the development proposal are indicated as samples of the products proposed for this development. The indication of a product sample allows for future building designs to be incorporated into the development as necessary.

The landscape plan provided shows that with the development there will be the removal of 61 trees. Based on our landscape code requirements the applicant will be planting 101 2.5" caliper trees on site to make up for what is being removed. The applicant is showing the replacement trees in strategic locations on sheets G1 through G3. Additionally, the landscape code requires 1 tree per 500 sq. ft. of building ground coverage. The applicant is showing an estimated three (3) trees to be planted per unit to meet the landscape requirements. Corner lots are shown to have an additional three (3) trees for a total of six (6) trees to make up for some of the additional planting requirements. The applicant is proposing landscape screening along Hill Road meeting the development text for the GreenGates/Pifer zoning exhibit.

The applicant is proposing a residential identification monument sign along Hill Road for the development. The signage submitted with the plans meets both the Violet Pointe Overlay District and the GreenGate development text requirements.

Traffic Study

The applicants initial traffic study has been reviewed by both Fairfield County Engineers Office and EMH&T of behalf of the City of Canal Winchester. The response letter from both entities has been included in the submittal for review. Based on a conference call with the applicant and traffic consultants on 4/1/2020, the traffic study is to be amended to take into account the additional comments.

The applicant has submitted a traffic study as part of the development requirements. The traffic study shows that this project warrants a left turn lane on Hill Road into the site. The turn lane is designed to have 125 feet of storage plus a 50 foot taper. A portion of Hill Road right-of-way is within Fairfield County and the plans show the need to obtain additional right-of-way to the west within the County. Fairfield County was provided a copy of the traffic study for review. A copy of the review letter from the county has been included.

The traffic study notes that the improvements along Hill Road for the turn lane are to be completed by 2023 based on the phasing plan for the subdivision. The phasing plan on page 3 of the traffic study notes that it is anticipated that Phases 1 & 2 will be completed in 2022, Phases 3 & 4 in 2023, and Phases 5, 6 & 7 in 2024. With the anticipated phasing staff is requesting that the Hill Road improvements be installed with Phase 2 of the Development. Phase 2 shows the construction of Greengate Blvd to the western property line.

At this time, the plan the applicant has submitted does not show the applicant has the ability to construct the necessary improvements along Hill Road due to the improvements requiring additional right-of-way being obtained from a property owner to the west. The applicant needs to

show that they have the ability to construct the Hill Road improvements prior to the Final Development Plan being approved by Planning and Zoning Commission and recommended to City Council.

CEDA Recommendation

The CEDA Land Use Committee met on March 3rd, 2020 to review the proposed FDP for Greengate. The committee has made the following recommendations for the Canal Winchester Planning and Zoning Commission.

1. Street C pavement radius for the cul-de-sac be a minimum of 51.5' per Violet Township Fire Department recommendations to allow for a fire truck turning radius.
2. Fairfield County Engineer signs off on the traffic study for the development impacts on Hill Road.
3. That the development be constructed with Phases 1 and 2 as shown on the phasing plan in order before continuing on to another phase of construction.

Staff Recommendation

Staff recommends the applicant's request for the Final Development Plan be tabled at this time. The applicant needs to show that they have the ability to construct the necessary improvements along Hill Road prior to P&Z Commission recommending approval of the Final Development Plan.



Engineers, Surveyors, Planners, Scientists

March 27, 2020

Mr. Andrew Moore
Planning and Zoning Administrator
City of Canal Winchester
36 S. High Street
Canal Winchester, OH 43110

Subject: Traffic Study Review – Greengate Residential Development

Dear Mr. Moore,

This letter summarizes our review of the March 5, 2020 Traffic Impact Study for the Greengate Residential Development.

Our comments on the subject Traffic Impact Study are as listed below:

1. Count data and trip generation calculations appear accurate and are accepted with the exception that the PM pass-by rate should not be applied to AM traffic projections for the retail site. ITE data and procedures do not support calculation of pass-by trips for the AM peak.
2. Page 19 states that MORPC growth rates are documented in Appendix B but they are not. Please list the growth rates in the report text and provide supporting documentation from MORPC in Appendix B.
3. Please request a growth rate for Diley Road from MORPC instead of using the rate MORPC provided for Hill Road. These two roadways are very different and would likely have different growth rates.
4. Section 3.4 starting on page 16 of the report describes the capacity analysis methodology but does not state what delay/LOS threshold was considered acceptable for this TIS.
5. Directional distribution of site traffic documented in Table 6 on page 27 should be the same for both peak hours. Also, the basis for the distribution is not clear. Considering the comments issued by the Fairfield County Engineer, we suggest deriving a distribution from the observed count data and documenting in the report text the methodology used and any manual adjustments applied.
6. Figure 10.F on page 37 is labeled “primary” trips but appears to represent pass-by trips.
7. In Tables 9 and 10 beginning on page 45, “capacity” is not a turn lane warrant. Please limit turn lane warrant analysis to Location and Design Manual § 401 procedures. If an unwarranted turn lane is needed to meet capacity thresholds that should be highlighted with the capacity analysis. Turn lane warrants and capacity needs should be compared in the conclusions and clarified as part of the recommendations.

8. Improvements:

- a. Site Access: We concur that the site developer is responsible for an eastbound left turn lane at the site access point.
- b. Hill Road/Busey Road: The report recommends adding a northbound (on Hill Road) left turn lane as a background improvement not related to development. Please document the percentage share of site traffic in this movement in the 2024 full-build opening year. Please also document the percentage share of total entering site traffic compared to the total entering volume at this intersection in the 2024 full-build opening year.
- c. Hill Road/Kings Crossing:
 - i. The report finds that this intersection warrants signalization under the four-hour warrant in 2023 as a result of site development (page 4 and Table 15 on page 57). Signalization is therefore a site improvement rather than “by others”. Since no warrants were found met prior to 2023, signalization should not be recommended in 2022.
 - ii. The report finds that a southbound left turn lane widening on Kings Crossing is needed to meet signalized capacity criteria in 2034 as a background condition unrelated to site development
 - iii. Please document the percentage share of site traffic entering the intersection compared to the total entering volume in the 2024 full-build opening year and 2034 design year. Also compare site volume to total volume in the southbound left turn movement in both 2024 and 2034.
- d. Diley Road/Greengate Boulevard/Howe Industrial Parkway
 - i. Improvements recommended for this intersection could change once the MORPC growth rate is updated.
 - ii. Most improvements are driven by future commercial development and are not related to site development
 - iii. Please document the percentage share of site traffic compared to the total volume in movements to/from Greengate Boulevard in the 2034 design year. Please also document the percentage share of site traffic entering the intersection compared to the total entering volume in the 2034 design year

These comments summarize our review of the referenced study.

Sincerely,



Lawrence C. Creed, Esq., PE
Principal
Director of Traffic Engineering Services

cc: Lucas Haire, City of Canal Winchester
Bill Sims, City of Canal Winchester
Matt Peoples, City of Canal Winchester
Shane Spencer, EMH&T



Fairfield County Engineer

3026 W. Fair Ave.
Lancaster, OH 43130
Main: (740) 652-2300
Fax: (740) 687-7055

March 20, 2020

To: Lucas Haire
Development Director
City of Canal Winchester

From: Eric McCrady, P.E., Deputy Engineer
Fairfield County Engineer's Office

Subject: **Greengate Traffic Impact Study – Canal Winchester**

We offer the following comments for the Traffic Impact Study dated January 21, 2020:

1. We were not part of the development of the Memorandum of Understanding, and therefore, our Standards for Level of Service and acceptable levels of degradation have not been reviewed and applied to the results. There are intersections, Kings Crossing, that reduce by 2 levels of service in 2034, which is not acceptable.
2. The Study does not include a 2034 analysis without the "improvements by others" so there is not a way to see the impact of the development on the unimproved roadway system.
3. The study shows 3 phases, one year apart. We will require the improvements that are needed as part of the 2024 to be built on opening day, since the 3 consecutive years are so close together.
4. We need to discuss and agree on the directional distribution of the development generated traffic. I would feel there may be closer to 80% going to the south. The study says 60/65% going south. I would feel there may be closer to 80% going to the south. I believe that many of the residents will be looking to commute and access US33 and additionally this in the Canal Winchester School District, which would be easiest to access by using Kings Crossing. The same would go for the PM as well.
5. There are no plans on the county's behalf to improve and add lanes at the Hill Road intersections of Kings Crossing and Busey Road. Therefore, the HCS analysis should not include the analysis with the nonexistent turn lanes, unless the development is planning to construct these.
6. It appears that at the intersection of Hill Road and Kings Crossing, that a "WB to NB right turn lane is triggered by the 2023 build, and therefore should be included in the recommendations.

Jeremiah D. Upp, P.E., P.S., County Engineer

Application for
Final Development Plan
Greengate Residential Development

City of Canal Winchester, Ohio

January 21, 2020

Applicant: DDC Management
3601 Rigby Rd, Suite 300
Miamisburg, OH 45342
(937) 401-3844
Ryan Reed

Property Owners: Pifer Tract Five Limited Partnership
1519 Bottomwood Dr.
Hebron, KY 41048

Tipani Pifer Hickey
9450 E. State Road 32
Zionsville, IN 46077

Property: Hill Rd, Canal Winchester, Ohio 43110

Approx. Site Total: 46.17± acres

Tax Parcel Numbers: 0420388600
0420388500

Project Engineer/Planner: CESO, Inc.
2800 Corporate Exchange Drive, Suite 160
Columbus, Ohio 43231
(614) 942-3019
Jonathan S. Buchanan, PE

Project Developer: DDC Management
3601 Rigby Rd, Suite 300
Miamisburg, OH 45342
(937) 401-3844
Ryan Reed

Proposed Application: PRD-Planned Residential District development plan and text
detached condominiums (Zoning per Ordinance No. 52-01 passed
9/17/2001)

Project Narrative:

The project site consists of approximately 46.17 acres located on the west side of Hill Road, north of Carriage Place. The site, zoned PRD, is comprised of farm field and woods.

Currently located around the proposed development to the:

- north of the property is Busey Rd
- south of the property is US 33
- east of the property is farm field
- west of the property is Redwood Canal Winchester Subdivision

The proposed development will consist of a detached condominium development (approximately 191 pads).

Utilities/Public Services:

- A. All utilities shall be underground, whenever possible, except for telephone and cable pedestals and electric transformers.
 1. Waterline: Waterline service throughout the development will be public.
 2. Sanitary: Sanitary service throughout the development will be public.
 3. Drainage: A retention pond is being proposed at the southwest corner of the residential development. Maintenance of the retention pond will be the responsibility of the Condominium Association.

Traffic

A. Traffic Impact Study

1. A Traffic Impact Study has been conducted and provided with the Final Development Plan. Traffic improvements shall be subject to County and City approval.
2. Roadway improvements along Hill Road shall be installed in accordance with the approved Traffic Study recommendations.

Residential Development Standards

The following are Development Standards for the Subdivision, provided however, in the event a standard, provision, or requirement is not provided, the standards, provisions and requirements set forth in the Ordinance 41-01 including any amendments as were in effect as of September 17, 2001.

A. General Standards

Site Acreage:	46.17 Acres
Number of Pads:	191 pads
Typical Pad Size:	30'x 75'
Building Setbacks:	25' (Front) from Right of Way / 10' (Side) Between Buildings / 25' (Rear)

1. All proposed roads are public and designed to comply with city standards, unless otherwise noted on the Development Plan.
2. On street parking will be allowed on both sides of the street.

B. Building, Setback and Height Restrictions

1. Subject to rules the board of directors adopts, the board may authorize the use of Limited Common Elements, as distinguished from the Common Elements and Exclusive Use Areas, for the construction of open, unenclosed patios and decks or similar improvements provided that the improvements are attached to the Unit, maintained and insured by the owner of the Unit to which the Limited Common Area is appurtenant.
 - i. The side boundaries of the Limited Common Area shall generally be as follows:
 - The side boundary line shall be the line that divides the distance between the Unit and the adjacent Unit extending from the front of the primary structure of the Unit to the rear of the primary structure of the Unit.
 - If the side of a Unit is not adjacent to another Unit, then the side

boundary line on that side of the Unit shall be a maximum of five (5') feet.

- ii. The rear boundary of the Limited Common Area shall generally be as follows:
 - The rear boundary line shall be thirty (30') feet from the rear of the primary structure of the Unit extending from one side boundary of the Unit to the other side boundary of the Unit.
2. No fences other than "invisible fences" for pet containment shall be allowed.
3. Dwelling Units shall be single-family, detached residences. The maximum building height shall not exceed thirty feet (35') in height from top of foundation to ridge of roof line.
4. There shall be no maximum lot coverage requirement.
5. House square footages (which shall be defined as habitable, heated, above-ground living space) shall be not less than twelve hundred (1,200) square feet.

C. Architectural and Design Standards:

1. In accordance with Ordinance 41-01, including any amendments as were in effect as of September 17, 2001, detached condominiums shall incorporate common elements of style, color schemes and materials such that they are architecturally compatible and complimentary.

Elevations shown in Appendix D are sample elevations and not the ONLY building design permitted.

Condominium Association Responsibilities

1. Condominium Association: All residential property owners located within Greengate will be required to join and maintain membership in a forced and funded condominium association (the "Association"), which will be formed prior to any units being sold.
2. Association shall be responsible for lawn maintenance for common areas and exclusive use areas. Lawn maintenance, by the Association, for Limited Common Areas shall be determined by the board of directors on a case by case basis.
3. Reserve areas/common areas and landscaping of those reserve areas are to be maintained by the Association.
4. The homeowner will be responsible for maintenance and repair of own dwelling structure.
5. The Board will be turned over at the expiration of the Development Period. Within ninety

(90) days after the expiration of the Development Period, the President of the Association shall call a special membership meeting (“Development Period Special Meeting”). At the Development Period Special Meeting, all Declarant appointed Directors shall be deemed removed from office, and the Class A Members, including the Declarant if it is then an Owner, shall elect a Director to fill each vacancy on the Board.

Development Period. "Development Period" means the period commencing on the date on which this Declaration is recorded and terminating on the earlier to occur of: (i) within thirty (30) days following the date when one hundred percent (100%) of the Dwelling Units which may be built on the Property or Additional Property have been deeded by either Declarant and/or any Builder to a third party purchaser; or (ii) thirty (30) years from the date of recording of the Declaration.

Landscaping, and/or Screening Commitments

The proposed development shall comply with all landscape regulations set forth in part eleven Chapter 1191 of the codified ordinances of Canal Winchester.

APPENDICES

- A. Final Development Plan Application
- B. Final Development Plan
- C. Traffic Study
- D. Detached Condominium Elevations
- E. Council Ordinance 52-01

**APPENDIX A:
FINAL DEVELOPMENT PLAN APPLICATION**



City of Canal Winchester

36 South High Street
Canal Winchester, Ohio 43110
Development Department
Phone (614) 837-7501 Fax (614) 837-0145

DEVELOPMENT PLAN APPLICATION

 Preliminary X Final

rev. 09/24/2013

PROPERTY OWNER

Name Pifer Tract Five Limited Partnership
Address 1519 Bottomwood Dr., Hebron, KY 41048
Daytime Phone 317-523-5269 Email jd.pifersllc@twc.com

APPLICANT

Name DDC Management, LLC
Address 3601 Rigby Road, Suite 300, Miamisburg, OH 45342
Daytime Phone 937.401.3844 Email reed@ddcconstruct.com

Address/Location of Subject Property Hill Road south of Busey Road
042-03885-00 &
Tax Parcel ID ~~042-03886-00~~ Current Zoning PRD Acreage 48.17/16.18 AC

Attach a current survey (within 2 years) of the subject property and all supporting materials as required by Chapter 1141 and Chapter 1173 as applicable (see attachment). Additional information may be required by the Planning and Zoning Administrator or the Planning and Zoning Commission.

I certify that the information provided with this application is correct and accurate to the best of my ability.

[Signature]
Property Owner's or Authorize Agent's Signature
Michael Simpson

1-20-20
Date

DO NOT WRITE BELOW THIS LINE

Date Received: ___/___/___ Fee: \$ ___ Paid Historic District: ___ Yes ___ No
Preservation District: ___ Yes ___ No
Date of Action: ___/___/___ Application ___ No
Expiration Date: ___/___/___ Approved: ___ Yes
___ Yes, with conditions
Tracking Number: PDP - _____



City of Canal Winchester

36 South High Street
Canal Winchester, Ohio 43110
Development Department
Phone (614) 837-7501 Fax (614) 837-0145

DEVELOPMENT PLAN APPLICATION

 Preliminary X Final

rev. 09/24/2013

PROPERTY OWNER

Name Tipani D. Fox Hickey
Address 9450 E. State Street Road 32, Zionsville
Daytime Phone 317 695 5255 Email tippi.hickey@outlook.com

APPLICANT

Name DDC Management, LLC
Address 3601 Rigby Road, Suite 300, Miamisburg, OH 45342
Daytime Phone 937.401.3844 Email rreed@ddcconstruct.com

Address/Location of Subject Property Hill Road south of Busey Road

~~042-03885-00 &~~
Tax Parcel ID 042-03886-00 Current Zoning PRD Acreage 46.17 29.98

Attach a current survey (within 2 years) of the subject property and all supporting materials as required by Chapter 1141 and Chapter 1173 as applicable (see attachment). Additional information may be required by the Planning and Zoning Administrator or the Planning and Zoning Commission.

I certify that the information provided with this application is correct and accurate to the best of my ability.

Michael Simpson
Property Owner's or Authorize Agent's Signature

1/20/08
Date

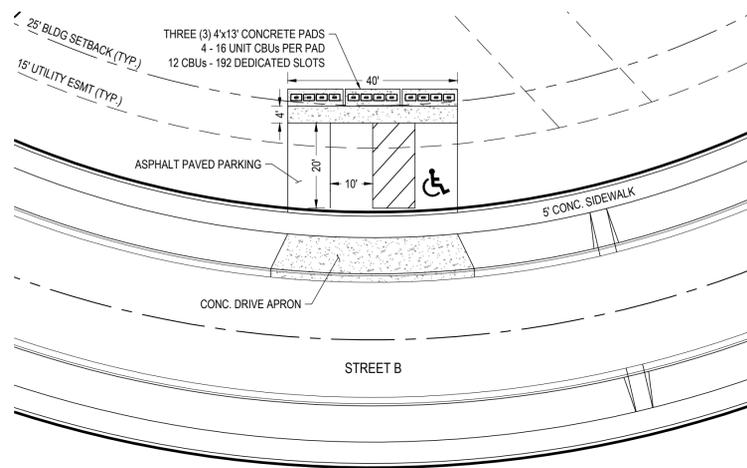
Michael Simpson DO NOT WRITE BELOW THIS LINE

Date Received: / / Fee: \$ Historic District: Yes No
Paid Preservation District: Yes No

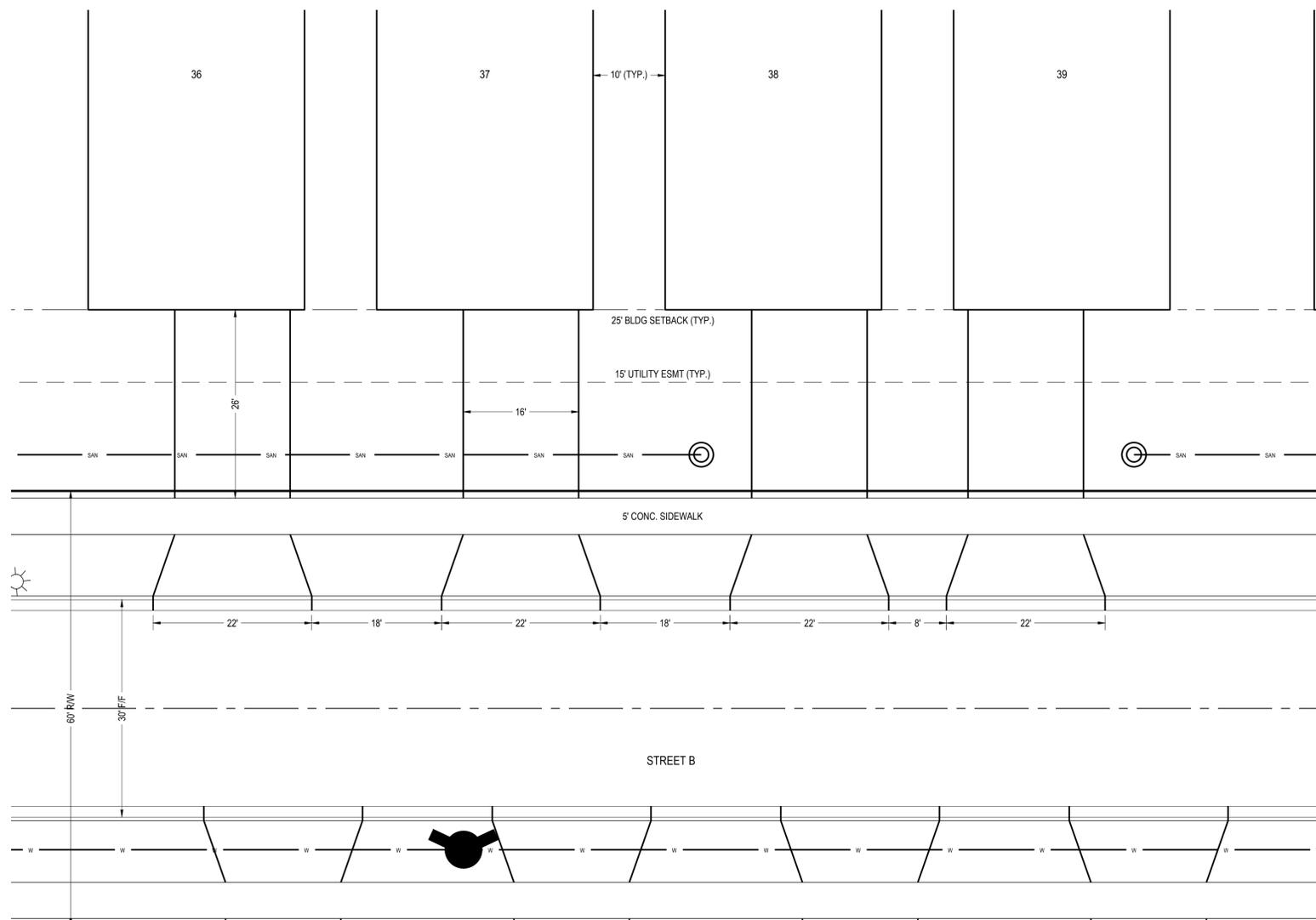
Date of Action: / / Application No
Expiration Date: / / Approved: Yes
 Yes, with conditions

Tracking Number: PDP -

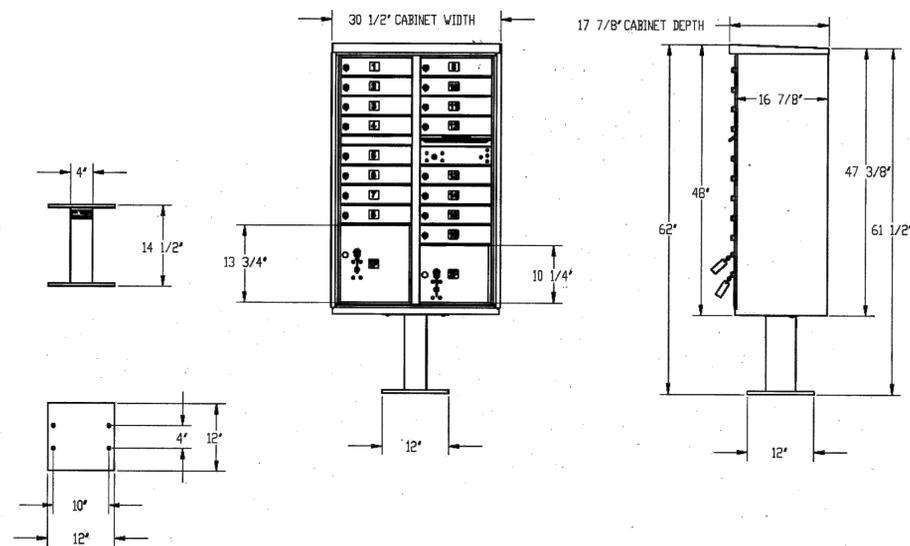
**APPENDIX B:
FINAL DEVELOPMENT PLAN**



MAIL CENTER
OFF-STREET PARKING DETAIL
SCALE: 1" = 20'



ON-STREET PARKING DETAIL
SCALE: 1" = 10'

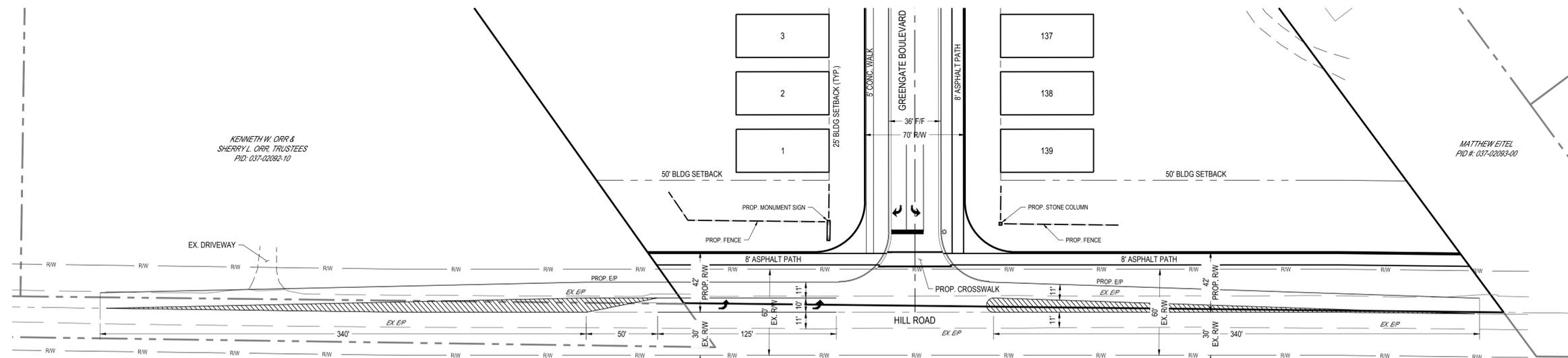


16 UNIT - CLUSTER BOX UNIT (CBU)
NTS

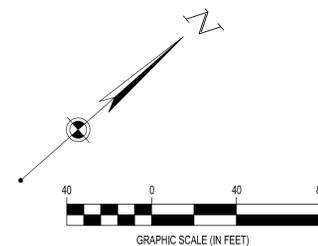
NOTE: CBUs TO BE BLACK IN COLOR TO MATCH OTHER APPROVED UNITS WITHIN THE CITY OF CANAL WINCHESTER.

NOTE: RESIDENTIAL DRIVEWAY FLAIR TO BE REDUCED FROM 4-FOOT MIN. AS SHOWN IN CITY OF CANAL WINCHESTER STANDARD DETAIL RD-09-01 TO 3-FOOT MIN.





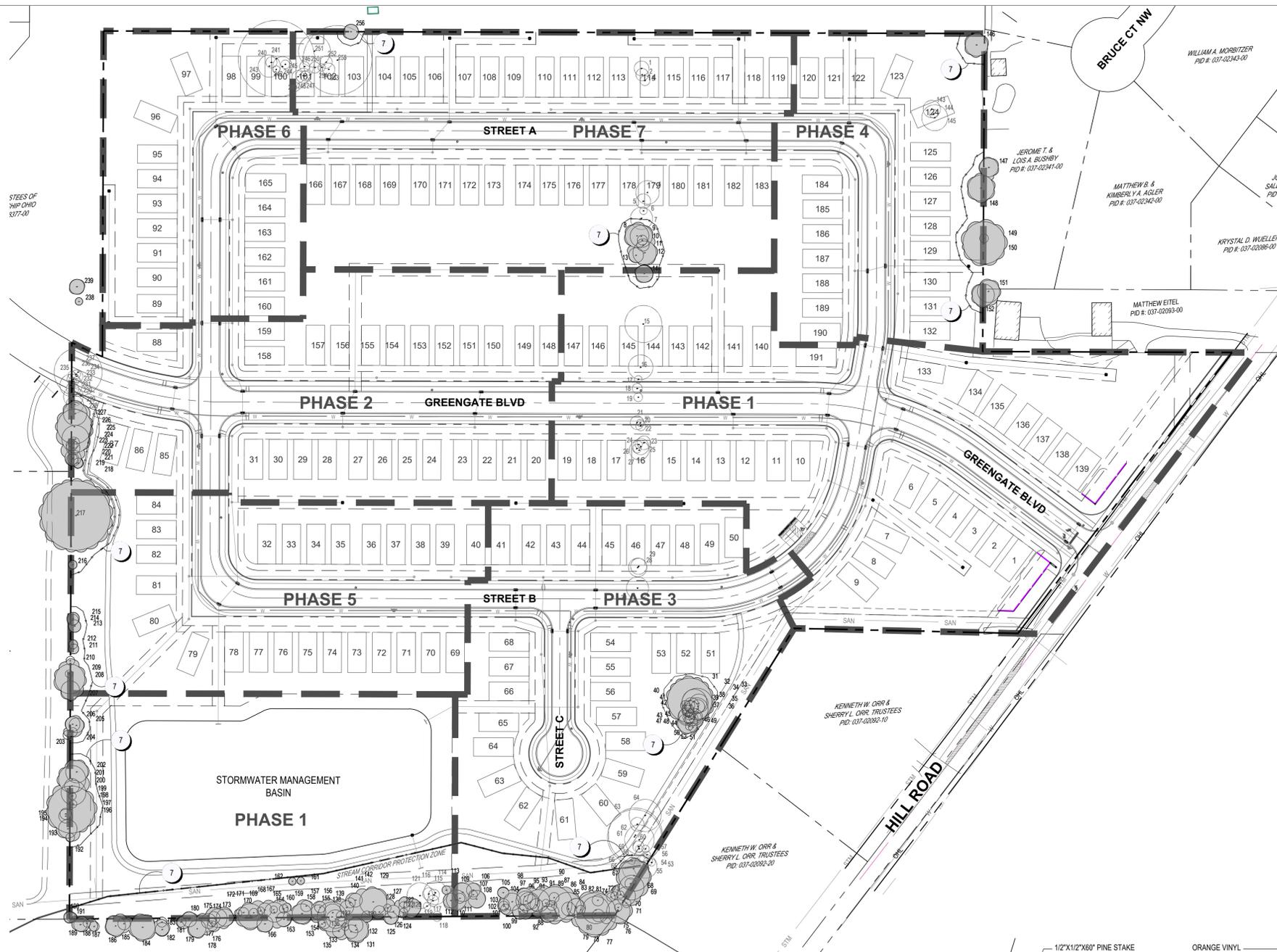
HILL ROAD IMPROVEMENTS
SCALE: 1" = 40'



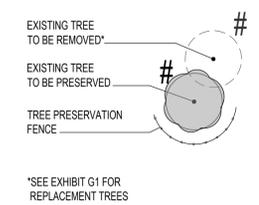
NOTES:

- ROADWAY IMPROVEMENTS ALONG HILL ROAD SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED TRAFFIC STUDY RECOMMENDATIONS.
- FINAL LAYOUT AND GEOMETRY OF THE HILL ROAD IMPROVEMENTS SHALL BE SUBJECT TO CITY OF CANAL WINCHESTER ENGINEER AND FAIRFIELD COUNTY ENGINEER APPROVALS.



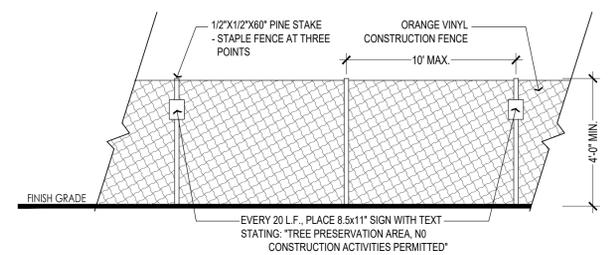


TREE PRESERVATION KEY



CODED LAYOUT & MATERIALS NOTES

KEY	ITEM	REFERENCE	NOTES
7			INSTALL 10' FROM DRIPLINE OF EXISTING TREES TO BE PRESERVED PER PLAN. SEE DETAIL A, THIS SHEET, FOR MORE INFORMATION
A	EX. H1		



A TREE PROTECTION FENCE
SCALE: N.T.S.

Letter of Certification

I, Stephan Carbonara, certify that:

- I personally visited the Greengate site, and identified size, species, and condition of the trees while Phil Moorehead of G2 provided their location.
- I have no current or prospective interest in the vegetation or the property that is the subject of this survey and have no personal interest or bias with respect to the parties involved.
- This survey has been prepared according to common accepted arboricultural practices.
- No one provided significant professional assistance to me in compiling this survey with the exception of the Phil Moorehead who provided the precise locations.
- My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party or upon the results of the survey, the attainment of stipulated results, or the occurrence of subsequent events.

I further certify that I am a member in good standing of the International Society of Arboriculture, that I am an ISA Certified Arborist (# OH-1377A) and that I have been involved in the practice of arboriculture for 31 years.

Stephan Carbonara
Stephan Carbonara

ISA Cert #OH-1377A
01/09/2020



NO.	DATE	REVISION DESCRIPTION



FINAL DEVELOPMENT PLAN

GREENGATE

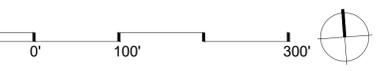
FAIRFIELD COUNTY, OHIO
CANAL WINCHESTER

TREE PRESERVATION PLAN

ISSUE: FINAL DEVELOPMENT PLAN
DATE: 2/18/2020

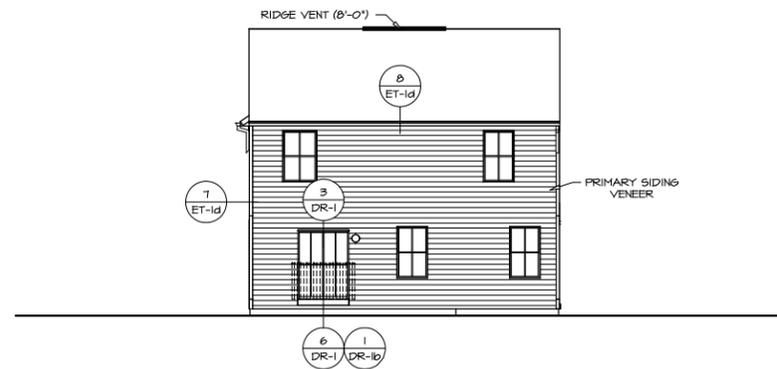
JOB NO.: 757010
DESIGN:
DRAWN:
CHECKED:

SHEET NO. EXHIBIT 'H1'

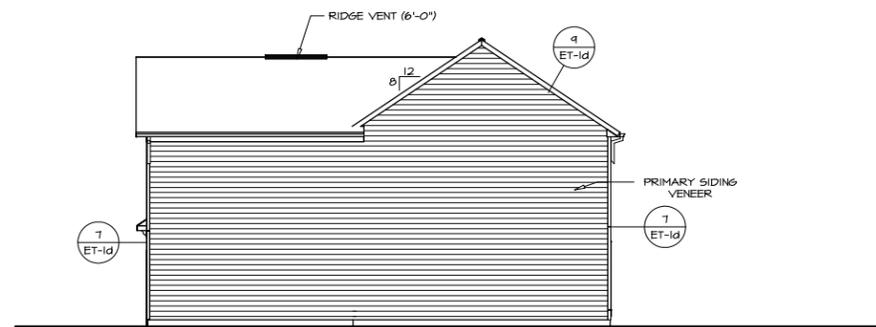


**APPENDIX C:
TRAFFIC STUDY**

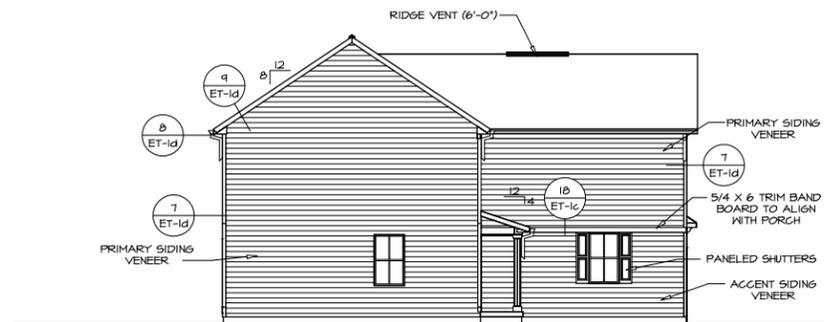
**APPENDIX D:
DETACHED CONDOMINIUM ELEVATIONS**



2 REAR ELEVATION
SCALE: 1/8" = 1'-0"



3 RIGHT ELEVATION
SCALE: 1/8" = 1'-0"



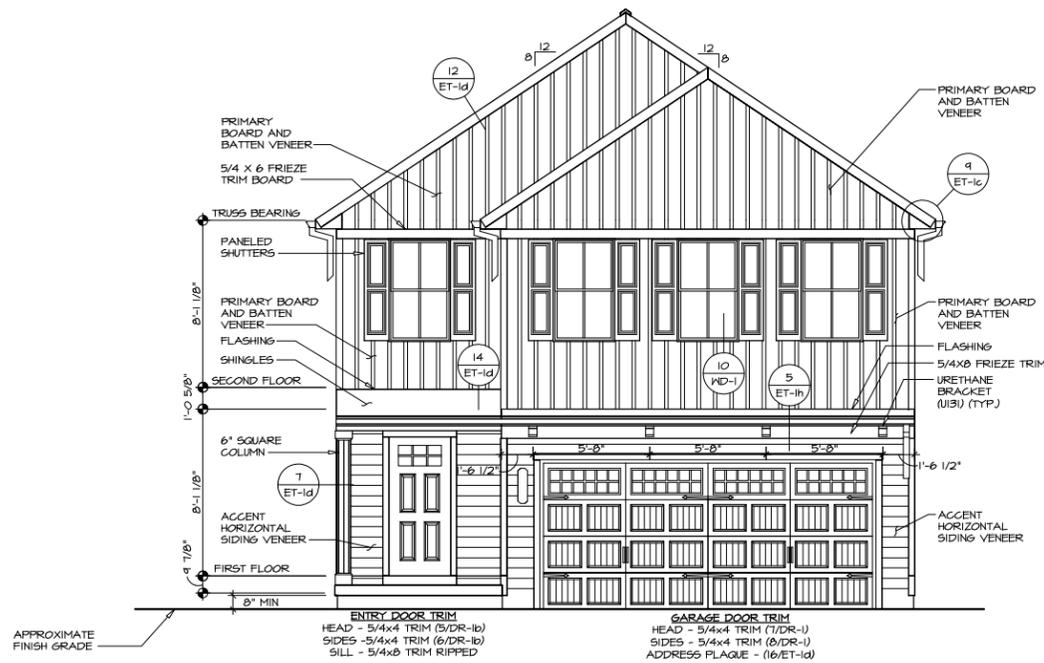
4 LEFT ELEVATION
SCALE: 1/8" = 1'-0"



1 FRONT ELEVATION "K"
SCALE: 1/4" = 1'-0"

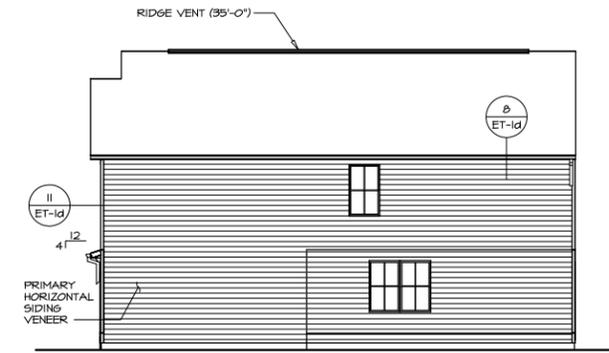
NOTE:
GARAGE DOOR GLASS
DESIGN MAY VARY BY
MANUFACTURER

REMARKS	
REV. NO.	DATE
<p>NVR, Inc. expressly reserves its copyright and other property rights in these plans. These plans are not to be copied, reproduced, or otherwise used in any form or manner without the prior written consent of NVR, Inc.</p>	
<p>NVR, Inc. 5285 Washview Drive, Suite 100 Frederick, MD 21703</p>	
SET NO.	LILLOO
VERSION	01
DRAWN BY	CDP
DATE	9/28/18
OPTION	ELK
MODEL	LILLY
DRAWING TITLE	FRONT, REAR, AND SIDE ELEVATIONS
OPTION DESCRIPTION	ELEVATION K
SHEET NO.	A-1
	4

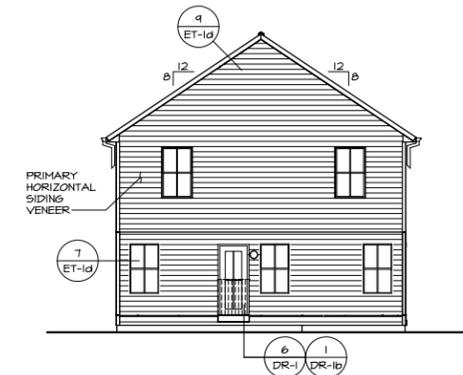


1
A-1 FRONT ELEVATION "K"
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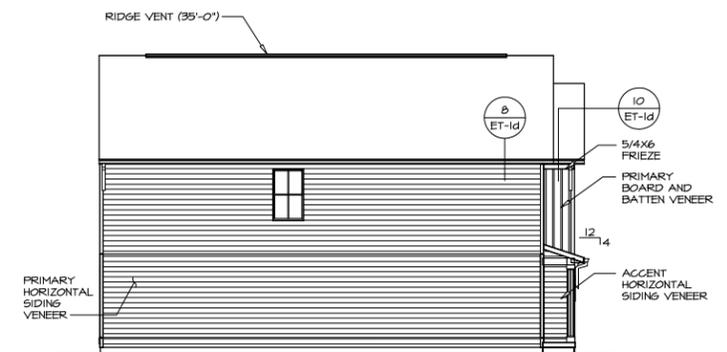
NOTE:
GARAGE DOOR GLASS
DESIGN MAY VARY BY
MANUFACTURER



2
A-1 RIGHT ELEVATION
SCALE: 1/8" = 1'-0"



3
A-1 REAR ELEVATION
SCALE: 1/8" = 1'-0"



4
A-1 LEFT ELEVATION
SCALE: 1/8" = 1'-0"

REMARKS

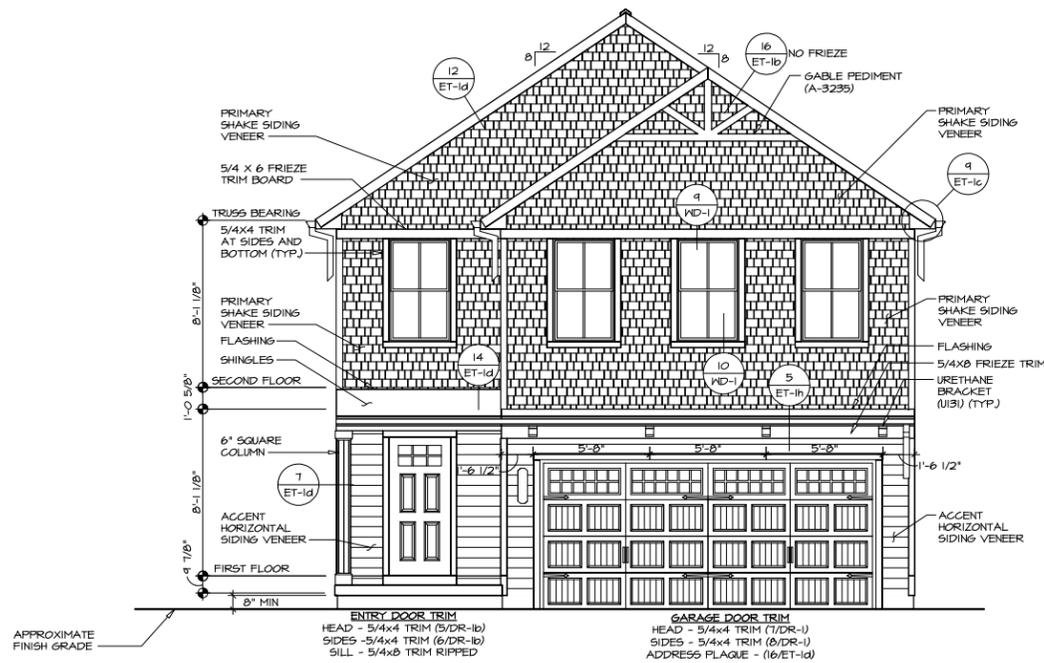
REV. NO. DATE

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NVR
NVR, Inc.
5285 Washview Drive, Suite 100
Frederick, MD 21703

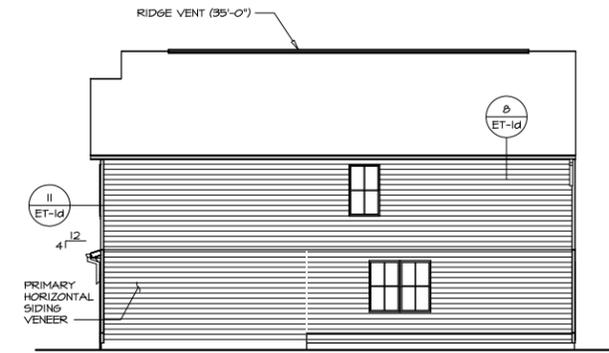
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VERSION 01
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DATE: 9/12/18
OPTION
ELK

SHEET NO. A-1
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OPTION DESCRIPTION ELEVATION "K"
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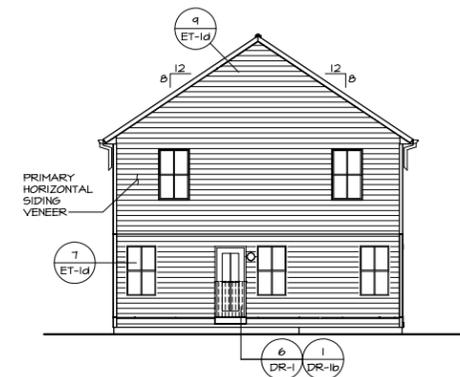


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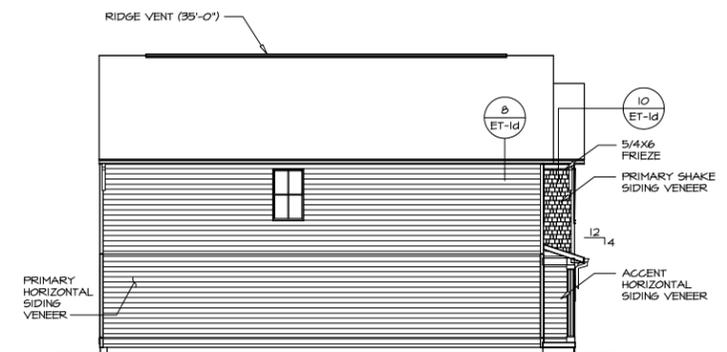
NOTE:
GARAGE DOOR GLASS DESIGN MAY VARY BY MANUFACTURER



2 RIGHT ELEVATION
SCALE: 1/8" = 1'-0"



3 REAR ELEVATION
SCALE: 1/8" = 1'-0"



4 LEFT ELEVATION
SCALE: 1/8" = 1'-0"

REMARKS

REV. NO. DATE

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NVR
NVR, Inc.
5285 Washview Drive, Suite 100
Frederick, MD 21703

SET NO. MRG00
VERSION 01
DRAWN BY SGA
DATE: 9/27/18
OPTION
ELL

MODEL: MARIGOLD
DRAWING TITLE: ELEVATIONS
OPTION DESCRIPTION: ELEVATION "L"

SHEET NO. A-1
6

**APPENDIX E:
COUNCIL ORDINANCE 52-01**

08-06-01
O-08-01H
Sponsor:

ORDINANCE NO. 52-01

AN ORDINANCE TO ZONE 40.346 +/- ACRES OF PROPERTY OWNED BY RUTH E. PIFER, ET AL., TO PLANNED COMMERCIAL DISTRICT, TO ZONE 87.945 +/- ACRES OF SUCH PROPERTY TO PLANNED INDUSTRIAL DISTRICT, TO ZONE 168.967 +/- ACRES OF SUCH PROPERTY TO PLANNED RESIDENTIAL DISTRICT, TO APPROVE THE PRELIMINARY PLAN AND DEVELOPMENT STANDARDS TEXT FOR SUCH TRACT

WHEREAS, a petition for annexation of 297.258 +/- acres in Violet Township was duly filed by Ruth E. Pifer, et al. and approved for annexation by the Village of Canal Winchester; and

WHEREAS, the applicant wishes to rezone this property into appropriate planned districts;

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE VILLAGE OF CANAL WINCHESTER, STATE OF OHIO:

SECTION 1. That, immediately upon annexation, the zoning map of the Village of Canal Winchester, Ohio be and the same is hereby amended as follows:

That the 40.346 +/- acres of such annexed property, owned by Ruth E. Pifer, et al., as fully set forth in the Rezoning Boundary Plan attached hereto as Exhibit "D" and incorporated herein by reference, is zoned Planned Commercial District (PCD).

SECTION 2. That, immediately upon annexation, the zoning map of the Village of Canal Winchester, Ohio be and the same is hereby amended as follows:

That the 87.945 +/- acres of such annexed property, owned by Ruth E. Pifer, et al., as fully set forth in the Rezoning Boundary Plan attached hereto as Exhibit "D" and incorporated herein by reference, is zoned Planned Industrial District (PID).

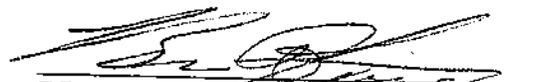
SECTION 3. That, immediately upon annexation, the zoning map of the Village of Canal Winchester, Ohio be and the same is hereby amended as follows:

That the 168.967 +/- acres of such annexed property, owned by Ruth E. Pifer, et al., as fully set forth in the Rezoning Boundary Plan attached hereto as Exhibit "D" and incorporated herein by reference, is zoned Planned Residential District (PRD).

SECTION 4. That Village Council hereby approves the preliminary plan and development standards text for such 297.258 +/- acre tract, which is attached hereto as Exhibit "E" and incorporated herein by reference, contingent upon and subject to the following conditions:

1. The maximum overall PRD density shall be four (4.0) dwelling units per acre based upon the number of actual units divided by the net developable acres (including open space), pursuant to Section 1173.04 (c) (4) of the Canal Winchester Codified Ordinances.
2. Revise Note "A" to read as follows: All acreages shown on this plan are approximate. The number of units permitted to be constructed within each designated use area as shown on this plan are approximate. The owner, or their agents and/or assigns, shall be permitted to build fewer units in each designated use area than are shown on this plan.
3. The developer, its successors or assigns, shall be responsible for their fair share of the costs for any off-site improvements to Diley Road, Busey Road or Hill Road. The fair share of these costs shall be determined from the required traffic study.
4. The developer, its successors or assigns, shall be responsible for all internal infrastructure improvements.
5. The developer, its successors or assigns, shall be responsible, including all costs, for getting water service to the site (refer to the pre-annexation agreement).
6. Water service to all residential development, except for detached condominiums, shall be provided by a private water system with a master meter.
7. Sanitary sewer service to the site shall be provided by a public system. Appropriate maintenance easements shall be provided to the village by the developer, its successors or assigns, if and where appropriate for the maintenance of this system. The size and location of these easements shall be subject to review and approval by the village.
8. The maximum number of total apartments shall be 258. This is based on the overall density requirement of 4.0 du/acre, and the number of residential units and acreages shown on the revised site plan dated July 9, 2001.
9. Uses to be allowed and/or prohibited on the 33-acre school site are to be resolved between the developer and the school board prior to final site plan approval of the school site.
10. As each phase of the PCD, PRD and PID districts becomes ready for development, the Preliminary Site Plan and Final Site Plan shall be submitted for review and approval by the Planning & Zoning Commission and Council.

DATE PASSED 9/17/01

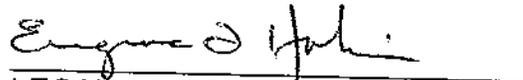

PRESIDENT OF COUNCIL

ATTEST 
CLERK OF COUNCIL


MAYOR

APPROVED AS TO FORM:

DATE APPROVED 9/17/01

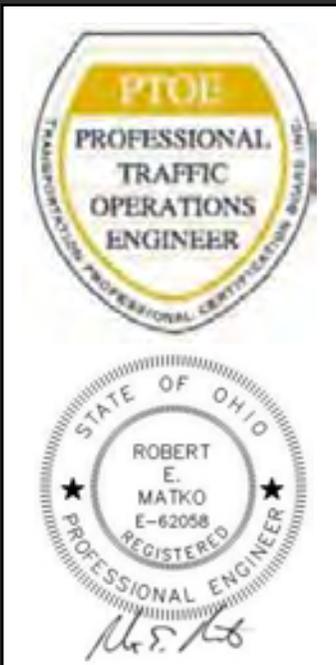

LEGAL COUNSEL

I hereby certify that the ordinance as set forth above was published for a period of not less than fifteen days after passage by the Council, by posting a copy thereof in not less than three (3) public places in the municipal corporation, as determined by Council and as set forth in the Canal Winchester Charter.

CLERK-TREASURER 

TRAFFIC IMPACT STUDY

Greengate Residential Development
City of Canal Winchester
Fairfield County, Ohio
March 5th, 2020



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1. Executive Summary

1.1. Summary

This report is submitted on behalf of Cap 5 Development in connection with its application to the City of Canal Winchester, Ohio (OH) for Site Plan approval. The Traffic Impact Study (TIS) conducted by CESO, Inc. addresses the traffic related impacts associated with the proposed Greengate Residential Development; referred to herein as “Greengate Development.” The proposed Greengate Development is to be located on the west side of Hill Road, south of Busey Road, within the City of Canal Winchester, Fairfield County, OH. The full buildout of the Greengate Development is projected to have 191 lots over seven (7) phases. Greengate Development’s application requests approval of the following access points:

- Full access driveway connection to Hill Road (referred to as “Greengate Boulevard”), approximately 0.4 miles south (center-line-to-center-line) of Busey Road.
- A future extension of Greengate Boulevard that will connect to Diley Road at the intersection with Howe Industrial Parkway.

The Site Plan application also requests approval to conduct work within the right-of-way for construction of the Site driveway along with the recommended roadway improvements. Hill Road is under jurisdiction of Fairfield County. Busey Road, Kings Crossing, and Diley Road are under jurisdiction of the City of Canal Winchester.

This report presents the methodologies, analyses, and results of the Traffic Impact Study (TIS) for traffic generated by the proposed Greengate Development. The purpose of the TIS was to identify the traffic related impacts, if any, during typical weekday AM and PM Peak Hours of the adjacent street traffic corresponding with the weekday hours of operation for the proposed Greengate Development. The study parameters of this report were generated based upon a recent concept plan, and a memorandum of understanding dated January 20, 2020 between CESO and the City of Canal Winchester outlining the TIS scope of service (See Appendix A).

As requested in the 1-20-20 MOU, the following traffic scenarios were evaluated. The term “Build” represents the first day of full use of the Greengate Development.

Existing Traffic Scenario – Represents current (year 2019) traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network. The Existing Traffic Scenario served as a baseline for comparison of the traffic impacts in relation to the proposed Greengate Development.

2022/2023 and 2024 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2022/2023 and 2024, without the proposed Greengate Development.

2034 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2034, with the existing residential and proposed commercial development traffic. This scenario does NOT include the proposed Greengate Development.

2022/2023/2024 and 2034 Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2022/2023/2024 and 2034, with the proposed Greengate Development phases constructed and fully operational.

Traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, December 12th, 2019 between the hours of 6:00 – 9:00 AM and 3:00 – 6:00 PM for a total of 6 hours at the following intersections:

- Hill Road & Busey Road (Stop Controlled).

Traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, December 12th, 2019 between the hours of 6:00 – 6:00 PM for a total of 12 hours at the following intersections:

- Hill Road & Kings Crossing (Stop Controlled).

After discussion with the City of Canal Winchester, additional traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, January 9th, 2020 between the hours of 6:00 – 6:00 PM for a total of 12 hours at the following intersections:

- Diley Road & Howe Industrial Parkway (Stop Controlled).

The weekday peak hours of the Traffic Impact Study roadway network were determined to occur between the hours of:

- 7:15 AM – 8:15 AM (AM Peak Hour).
- 5:00 PM – 6:00 PM (PM Peak Hour).

1.2. Conclusions

Note: At the intersection of Hill Road and Busey Road, Hill Road is labeled as the NB direction. Busey Road is an EB/WB roadway with a stop sign in the EB direction. For analysis purposes, WB Busey Road is labeled as SB in the capacity analysis as part of the major street, and EB Busey Road is labeled as the minor street approach. At the Hill Road and Greengate Boulevard intersection, Hill Road is labeled as the EB/WB roadway and Greengate Boulevard is labeled as SB. At the Hill Road and Kings Crossing intersection, Hill Road is labeled as the EB/WB roadway and Kings Crossing is labeled as SB.

Under the Existing Traffic Scenario, all movements operate at level of service (LOS) “B” or better condition with the exception of the SBLR movement at the Hill Road and Kings Crossing intersection, which operates at LOS “E” during the PM Peak Hour.

Under the 2022/2023/2024/2034 No-Build Traffic Scenario, all movements operate at level of service (LOS) “D” or better condition with the exception of the SBLR movement at the Hill Road and Kings Crossing intersection, which operates at LOS “F” under the 2022 No-Build PM Peak Hour. In addition, the EB and WB movements at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection operate at LOS “F” in the 2034 No-Build AM and PM Peak Hours. With recommended improvements in the No-Build Scenarios, all movements operate at LOS “D” or better condition.

According to the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10th Edition*, the Greengate Development will be constructed in seven phases as follows:

- Phase I & II (Tentative 2022 Opening Year):
 - Single-Family Detached Housing – 63 Lots (ITE Category 210).
- Phase III & V (Tentative 2023 Opening Year):
 - Single-Family Detached Housing – 53 Lots (ITE Category 210).
- Phase IV, VI, & VII (Tentative 2024 Opening Year):
 - Single-Family Detached Housing – 75 Lots (ITE Category 210).

Under Build conditions, the following trips are proposed:

- Phase I & II (Tentative 2022 Opening Year):
680 trips/day (340 in/340 out), 50 AM trips (13 in/37 out), 66 PM trips (42 in/24 out)
- Phase III & V (Tentative 2023 Opening Year):
580 trips/day (290 in/290 out), 43 AM trips (11 in/32 out), 56 PM trips (35 in/21 out)
- Phase IV, VI, & VII (Tentative 2024 Opening Year):
798 trips/day (399 in/399 out), 58 AM trips (14 in/44 out), 77 PM trips (49 in/28 out)

After discussion with the City of Canal Winchester, the proposed extension of Greengate Boulevard to intersect with Diley Road will tie into existing residential developments and a proposed future commercial development. Therefore, trips were estimated for the future growth at the Diley Road and Greengate Boulevard/Howe Industrial Parkway intersection. The following trips are proposed:

- 2034 Opening Year:
 - Commercial (304,920 SF Shopping Center):
12,832 trips per day (6,416 in/6,416 out), 287 AM trips (166 in/121 out), 1,240 PM trips (604 in/636 out)
 - Residential (100 Multifamily Low-Rise Dwelling Units):
716 trips per day (358 in/358 out), 48 AM trips (11 in/37 out), 59 PM trips (37 in/22 out)

Trips for the proposed Greengate Development are anticipated to approach and depart the Site via the directional distribution percentages shown on Figure 9.A-9.B (see pg. 28-29). Trips for the proposed Future Development are anticipated to approach and depart the Site via the directional distribution percentages shown on Figure 9.C-9.D (see pg. 30-31).

Highway Capacity Software (HCS) Version 7 methodology was used to analyze the current level of service at the key study intersections.

Under the 2022/2023/2024/2034 Build Traffic Scenario, all movements operate at level of service (LOS) "D" or better condition. In addition, all intersections have an overall LOS "C" or better condition.

CESO conducted turn lane analyses for the study network and reached the following conclusions:

- Left-turn and right-turn lane analyses were completed using the turn lane warrant charts from the ODOT *Location & Design Manual – Volume I (July 2019)*. Based on a discussion with the City of Canal Winchester and Fairfield County, a 45 mph design speed was used for the Hill Road, therefore, the high-speed turn lane warrant charts were used.

- According to ODOT Chart 401-5b, a NB left-turn lane **is warranted** at the intersection of Hill Road and Busey Road starting in the 2022 No-Build Scenario. In addition, an EB left-turn lane **is warranted** at the intersection of Hill Road and Greengate Boulevard during the PM Peak Hour starting in the 2023 Build Scenario. According to capacity analysis results, a SB left-turn lane **is warranted** at the intersection of Hill Road and Kings Crossing starting in the 2034 No-Build Scenario. In addition, a WB left-turn lane **is warranted** at the intersection of Diley Road and Howe Industrial Parkway/Greengate Boulevard starting in the 2034 No-Build Scenario.
- According to capacity analysis results, a SB right-turn lane **is warranted** at the intersection of Hill Road and Kings Crossing starting in the 2034 No-Build Scenario. In addition, a NB right-turn lane **is warranted** at the intersection of Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection starting in the 2034 No-Build Scenario.

CESO conducted queue length analyses for the study network and reached the following conclusions:

- The proposed SBL turn lane at the Hill Road and Kings Crossing intersection does not meet the ODOT required storage length due to physical constraints at the intersection.
- The NBL turn lane at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection does not meet the ODOT required backup length. Due to the minimal left-turning volume, the turn lane length was recommended to provide the ODOT required storage length only.
- All other queue lengths do not exceed the existing or proposed storage length.

CESO conducted a signal warrant analyses for two of the study intersections and reached the following conclusions:

- Warrant 1 – Eight-Hour Vehicular Volume **is satisfied** at the intersection of Hill Road & Kings Crossing under the 2034 No-Build and Build Scenarios and **is satisfied** at the intersection of Diley Road & Howe/Greengate under the 2034 No-Build and Build Traffic Scenarios.
- Warrant 2 – Four-Hour Vehicular Volume **is satisfied** at the intersection of Hill Road & Kings Crossing under the 2034 No-Build and 2023/2024/2034 Build Traffic Scenario and **is satisfied** at the intersection of Diley Road & Howe/Greengate under the 2034 No-Build and Build Traffic Scenarios.
- Warrant 3 – Peak Hour Vehicular Volume **is satisfied** at the intersection of Hill Road and Kings Crossing under all No-Build and Build Traffic Scenarios and **is satisfied** at the intersection of Diley Road & Howe/Greengate under all No-Build and Build Traffic Scenarios.
- Based on satisfying multiple warrants, CESO recommends that a signal be installed at both of the study intersections.

1.3. Summary of Recommendations

All recommendations are illustrated on Figures 16.A-16.D (pg. 61-64) of the report.

2022 No-Build Traffic Scenario (Responsibility – Others):

Hill Road & Busey Road:

- Construct NB to WB left-turn lane to provide 125 feet of storage plus a 50-foot taper.

Hill Road & Kings Crossing:

- Construct 2-phase traffic signal with a 90 second cycle length.

2022 Build Traffic Scenario, Tentative Opening Year for Phase I & II – 63 Lots (Responsibility – Cap 5 Development):

Hill Road & Greengate Boulevard:

- Construct full access roadway connection to Hill Road, which will be named 'Greengate Boulevard'. Provide one outbound left-turn lane, one outbound right-turn lane, and one inbound lane. The outbound left-turn lane shall provide 50 feet of storage plus a 50-foot taper. Control Greengate Boulevard with one stop sign.

2023 Build Traffic Scenario, Tentative Opening Year for Phase III & V – 53 Lots (Responsibility – Cap 5 Development):

Hill Road & Greengate Boulevard:

- Construct EB to NB left-turn lane to provide 125 feet of storage plus a 50-foot taper.

2034 No-Build Traffic Scenario (Responsibility – Others):

Hill Road & Kings Crossing:

- Construct SB to EB left-turn lane to provide 250 feet of storage plus a 50-foot taper.

Diley Road & Howe Industrial Parkway/Greengate Boulevard:

- Construct extension of Greengate Boulevard to connect with Diley Road. Provide two outbound left-turn lanes, one outbound thru-right turn lane, and one inbound lane. Construct the dual WB to SB left-turn lanes to provide 325 feet of storage plus a 50-foot taper.
- Extend NB to WB left-turn lane to provide 195 feet of storage plus a 50-foot taper.
- Construct NB to EB right-turn lane to provide 545 feet of storage plus a 50-foot taper.
- Construct SB to EB left-turn lane to provide 450 feet of storage plus a 50-foot taper.
- Construct 4-phase traffic signal with a 100 second cycle length. Provide a right-turn overlap for the NB to EB right-turn lane.

2034 Build Traffic Scenario, All Phases Constructed (Responsibility – Cap 5 Development):

- No further improvements are required.

2. Introduction

This report is submitted on behalf of Cap 5 Development in connection with its application to the City of Canal Winchester, Ohio (OH) for Site Plan approval. The Traffic Impact Study (TIS) conducted by CESO, Inc. addresses the traffic related impacts associated with the proposed Greengate Residential Development; referred to herein as “Greengate Development.” The proposed Greengate Development is to be located on the west side of Hill Road, south of Busey Road, within the City of Canal Winchester, Fairfield County, OH. The full buildout of the Greengate Development is projected to have 191 lots over seven (7) phases. Greengate Development’s application requests approval of the following access points:

- Full access driveway connection to Hill Road (referred to as “Greengate Boulevard”), approximately 0.4 miles south (center-line-to-center-line) of Busey Road.
- A future extension of Greengate Boulevard that will connect to Diley Road at the intersection with Howe Industrial Parkway.

The Site Plan application also requests approval to conduct work within the right-of-way for construction of the Site driveway along with the recommended roadway improvements. Hill Road is under jurisdiction of Fairfield County. Busey Road, Kings Crossing, and Diley Road are under jurisdiction of the City of Canal Winchester.

This report presents the methodologies, analyses, and results of the Traffic Impact Study (TIS) for traffic generated by the proposed Greengate Development. The purpose of the TIS was to identify the traffic related impacts, if any, during typical weekday AM and PM Peak Hours of the adjacent street traffic corresponding with the weekday hours of operation for the proposed Greengate Development. The study parameters of this report were generated based upon a recent concept plan, and a memorandum of understanding dated January 20, 2020 between CESO and the City of Canal Winchester outlining the TIS scope of service (See Appendix A).

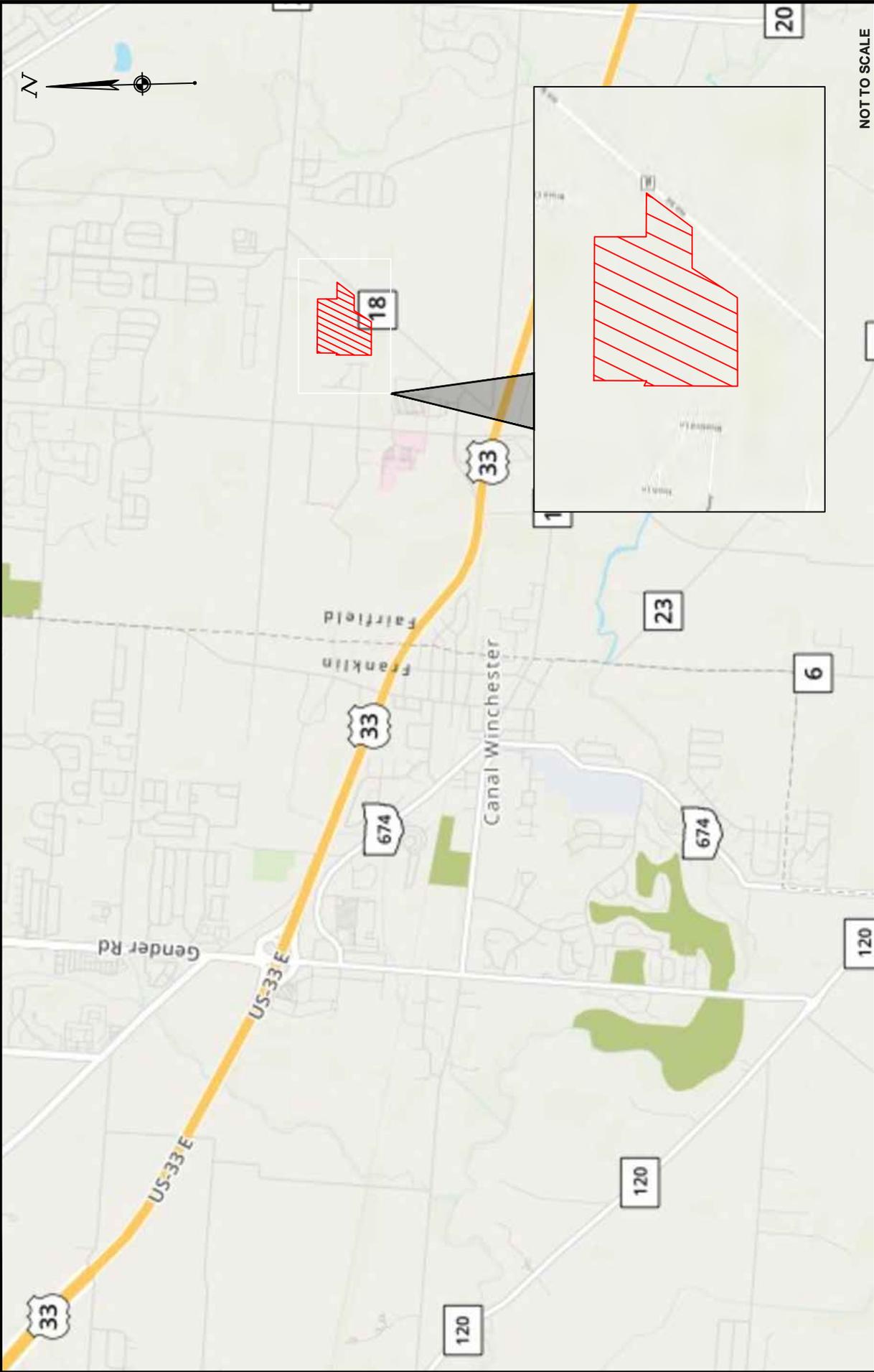
As requested in the 1-20-20 MOU, the following traffic scenarios were evaluated. The term “Build” represents the first day of full use of the Greengate Development.

Existing Traffic Scenario – Represents current (year 2019) traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network. The Existing Traffic Scenario served as a baseline for comparison of the traffic impacts in relation to the proposed Greengate Development.

2022/2023 and 2024 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2022/2023 and 2024, without the proposed Greengate Development.

2034 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2034, with the existing residential and proposed commercial development traffic. This scenario does NOT include the proposed Greengate Development.

2022/2023/2024 and 2034 Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2022/2023/2024 and 2034, with the proposed Greengate Development phases constructed and fully operational.

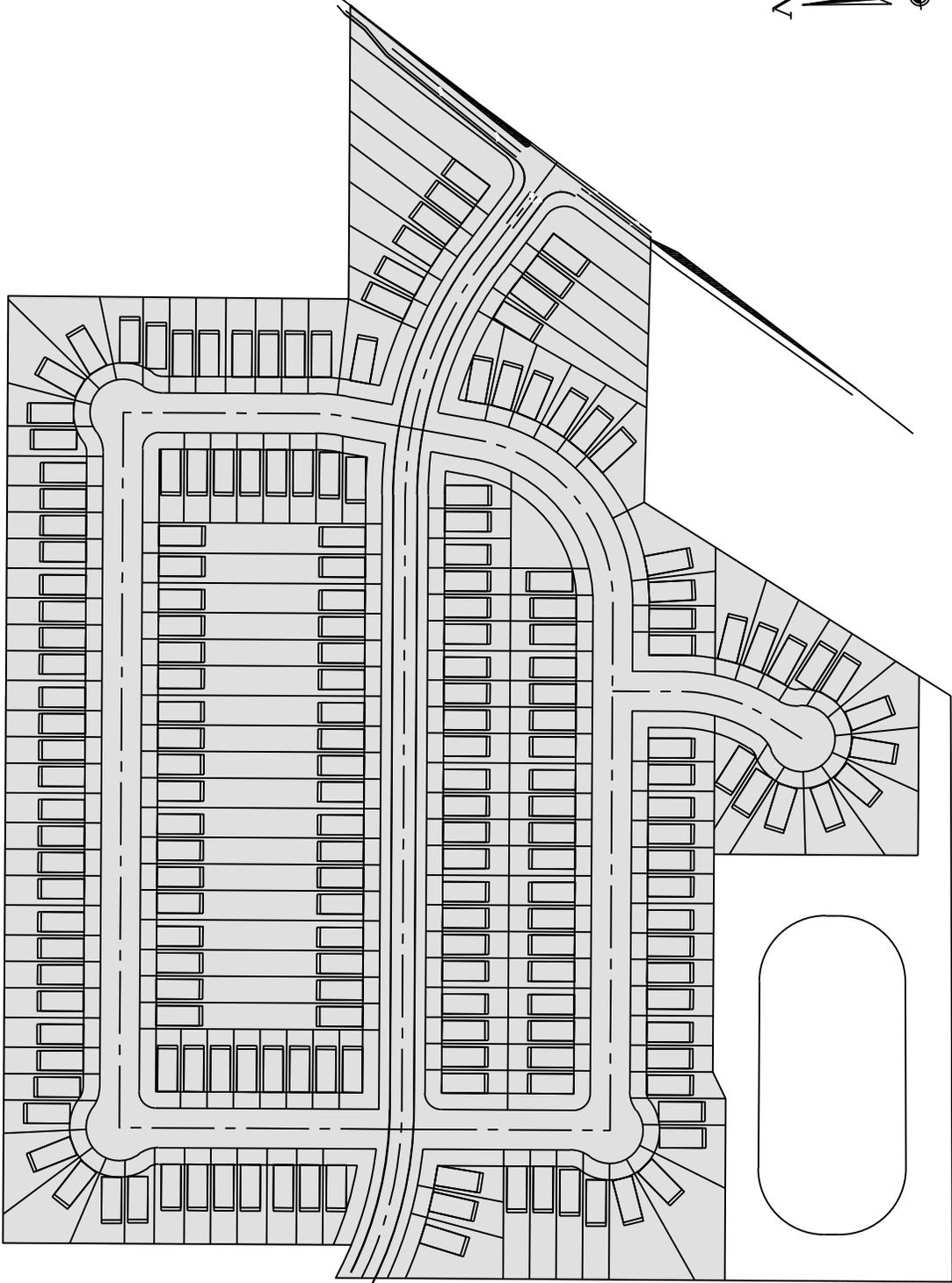


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SITE LOCATION
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CITY CANAL WINCHESTER
CARFIELD COUNTY

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FIGURE 2
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SITE PLAN

RENEWABLE RESIDENTIAL DEVELOPMENT

CITY OF INCHESTER

CARFIELD COUNCIL



2.1. Study Procedure

The following studies and analyses were undertaken:

1. Traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, December 12th, 2019 between the hours of 6:00 – 9:00 AM and 3:00 – 6:00 PM at the following intersections in order to ascertain existing traffic patterns and volumes:
 - Hill Road & Busey Road (Stop Controlled).
2. Traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, December 12th, 2019 between the hours of 6:00 – 6:00 PM at the following intersections in order to ascertain existing traffic patterns and volumes:
 - Hill Road & Kings Crossing (Stop Controlled).
3. After discussion with the City of Canal Winchester, additional traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, January 9th, 2020 between the hours of 6:00 – 6:00 PM for a total of 12 hours at the following intersections:
 - Diley Road & Howe Industrial Parkway (Stop Controlled).
4. The Existing Weekday Peak Hour Traffic Volumes were reviewed and balanced. The volumes are illustrated on Figure 4. Capacity analyses were then conducted to determine the capacity of the key study intersections under the Existing Traffic Scenario during AM and PM Peak Hours using HCS Version 7 methodology.
5. The 2022/2023/2024 and 2034 No-Build Traffic Volumes (Figures 5-8) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2019, Figure 4) to account for background growth in the vicinity of the Site. Growth rates were obtained from the Mid-Ohio Regional Planning Commission (MORPC).
6. Capacity analyses of the 2022/2023/2024 and 2034 No-Build Weekday Peak Hour Traffic Volumes (Figures 5-7, & 14) to determine the capacity of the key study intersections during AM and PM Peak Hours using HCS Version 7 methodology.
7. Directional distribution analyses were conducted to determine the potential distribution of residents for the proposed Greengate Development under the 2022/2023 and 2024 Opening Year Build Traffic Scenarios (see Figure 9.A). The directional distribution for the 2034 Opening Year is on Figure 9.B. The directional distributions for the Future Development are on Figures 9.C-9.D.
8. Analyses were conducted to determine the potential traffic volumes generated by the proposed Greengate Development under the 2022/2023/2024 and 2034 Opening Year Build Traffic Scenarios utilizing data provided in the Institute of Transportation Engineers' *Trip Generation Manual, 10th Edition* (see Table 3).
9. Addition of the Greengate Development Generated Traffic Volumes (Figures 10.A-10.F) to the 2022/2023/2024 and 2034 No-Build Weekday Peak Hour Traffic Volumes (Figures 5-7, 14) to reflect the 2022/2023/2024 and 2034 Build Weekday Peak Hour Traffic Volumes (Figures 11-13, 15).

10. Capacity analyses of the 2022/2023/2024 and 2034 Build Weekday Peak Hour Traffic Volumes (Figures 11-13, 15) to determine the capacity of the key study intersections during AM and PM Peak Hours using HCS Version 7 methodology.
11. Turn lane analyses were completed to determine if left-turn lanes or right-turn lanes were required as a result of the Greengate Development. Turn-lane analyses utilized ODOT charts for unsignalized free-flowing approaches and capacity analyses results for unsignalized stopped approaches.
12. Queue Length Analyses were completed based upon ODOT's L&D Manual Methodology.
13. Signal Warrant Analyses were completed for two of the study intersections.
14. Recommendations for roadway improvements were generated under the 2022/2023/2024 and 2034 Traffic Scenarios based upon the capacity analyses of the surrounding roadway network. Application of the recommendations and evaluation of the capacity of the key study intersections under the applicable traffic scenarios, during AM and PM Peak Hours, was completed using HCS Version 7 methodology.

2.2. References

This report utilizes information provided by the following sources:

1. *Highway Capacity Manual* Special Report 209. (2010 Edition). Transportation Research Board.
2. *Trip Generation Manual*. 10th ed. Washington, DC: Institute of Transportation Engineers, 2017.
3. Hooper, Kevin G. *Trip generation handbook: An ITE Proposed Recommended Practice*. Washington, D.C.: Institute of Transportation Engineers.
4. Most recent Site Plan.
5. "The City of Canal Winchester." 39°51'12" N and 82°46'11" W, *Google Earth*. January 16th, 2020.
6. *Location & Design Manual – Volume I (July 2019)*. Ohio Department of Transportation (ODOT).

3. Roadway and Traffic Conditions in the Vicinity of the Site

An inventory of existing transportation conditions in the vicinity of the Site was created to form a database for use in projecting Build conditions.

3.1. Study Location and Area Land Use

The Site is located on the west side of Hill Road, south of Busey Road, within the City of Canal Winchester, Fairfield County, Ohio (OH). Land use in the direct vicinity of the Site is primarily agricultural and residential.

Access to the proposed Greengate Development is projected via one (1) access point on Hill Road; one new full access driveway connection to Hill Road (referred to as “Greengate Boulevard”). In the future, Greengate Boulevard will be extended to connect with Diley Road, which will provide an additional access point for the Greengate Development.

3.2. Area Roadway Characteristics

Hill Road – Hill Road runs in the northeast/south westbound direction in the vicinity of the Site. At the intersection with Kings Crossing and the proposed Greengate Boulevard, Hill Road is labeled as east/westbound throughout the analysis. At the intersection with Busey Road, Hill Road is labeled as northbound. Hill Road is a two-lane minor collector. Hill Road is under jurisdiction of Fairfield County. The speed limit on Hill Road is unposted. After discussion with the City of Canal Winchester and Fairfield County, the design speed is assumed to be 45 mph.

Busey Road – Busey runs in the east/westbound direction in the vicinity of the Site. Busey Road is a two-lane major collector. Busey Road is stop controlled in the eastbound direction only at the intersection with Hill Road. Due to the geometry and signage at the intersection with Hill Road, westbound Busey Road is labeled as the southbound major street approach (northbound major approach is Hill Road). Eastbound Busey Road is labeled as the minor street approach in the analysis. Busey Road is under jurisdiction of the City of Canal Winchester. The speed limit on Busey Road is unposted.

Kings Crossing – Kings Crossing runs in the east/westbound direction in the vicinity of the Site. Due to the skewed orientation of the intersection with Hill Road, Kings Crossing is labeled as southbound throughout the analysis and report. Kings Crossing is a two-lane major collector. Kings Crossing is stop controlled at its intersection with Hill Road. Kings Crossing is under jurisdiction of the City of Canal Winchester. The speed limit on Kings Crossing is assumed to be 35 mph.

Diley Road – Diley Road runs in the north/southbound direction in the vicinity of the Site. Diley Road is a four-lane principal arterial. Diley Road is stop controlled at its intersection with Howe Industrial Parkway. Diley Road is under jurisdiction of the City of Canal Winchester. The speed limit on Diley Road is 45 mph.

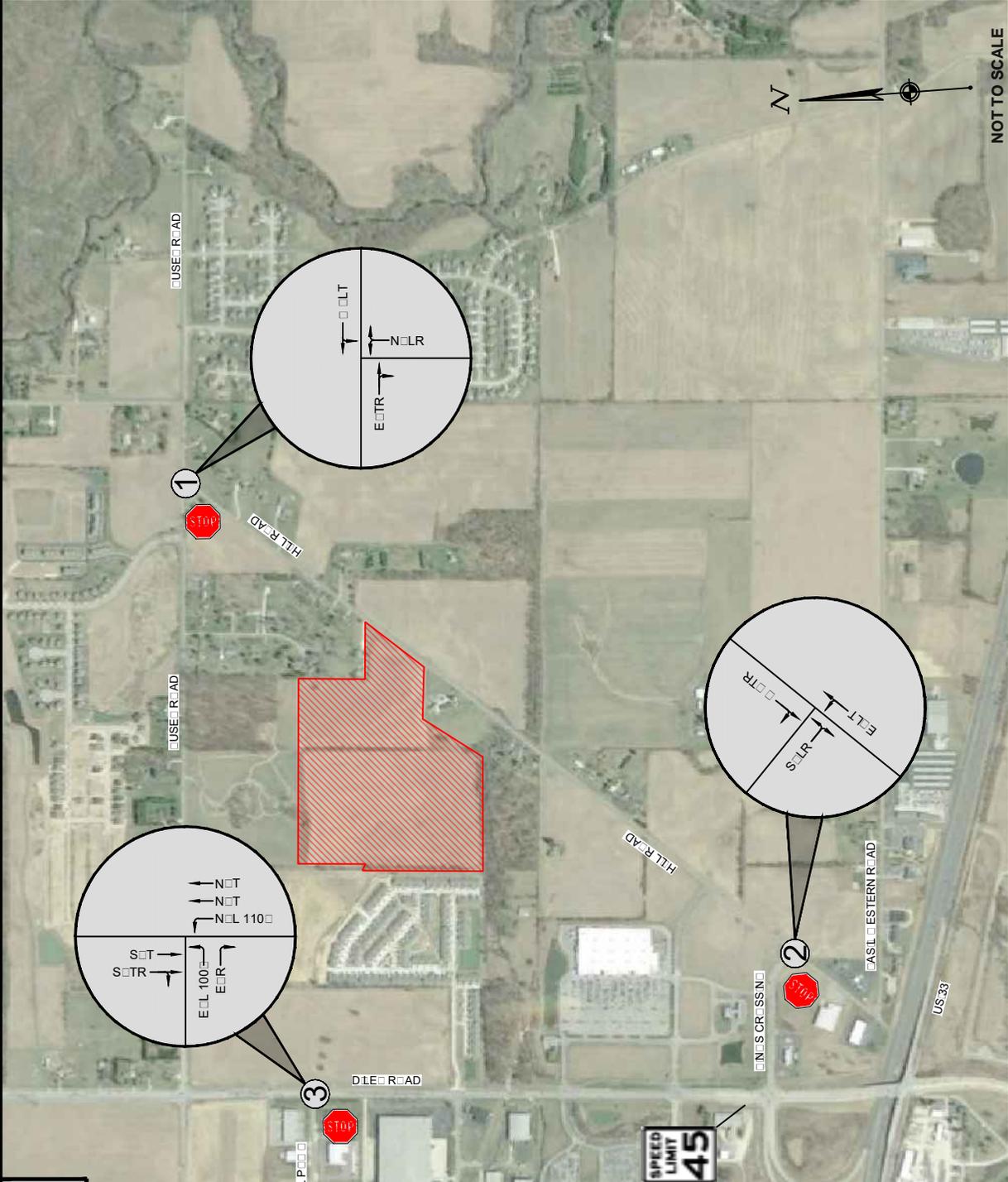
The Existing Transportation System is shown on Figure 3 of the report.

INTERSECTION

1. USE ROAD AND HILL ROAD (STOP CONTROLLED)
2. HILL ROAD AND INDEPENDENT ROAD (STOP CONTROLLED)
3. DIE ROAD AND HILL INDUSTRIAL PARK (STOP CONTROLLED)

LEGEND

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EAST TRANSPORTATION SYSTEM	
RENEWABLE RESIDENTIAL DEVELOPMENT	
CITY	CANAL / INCHESTER
COUNTY	COUNTY



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3.3. Existing Traffic Volumes

Traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, December 12th, 2019 between the hours of 6:00 – 9:00 AM and 3:00 – 6:00 PM for a total of 6 hours at the following intersections:

- Hill Road & Busey Road (Stop Controlled).

Traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, December 12th, 2019 between the hours of 6:00 – 6:00 PM for a total of 12 hours at the following intersections:

- Hill Road & Kings Crossing (Stop Controlled).

After discussion with the City of Canal Winchester, additional traffic counts were conducted by Gewalt Hamilton Associates, Inc. on Thursday, January 9th, 2020 between the hours of 6:00 – 6:00 PM for a total of 12 hours at the following intersections:

- Diley Road & Howe Industrial Parkway (Stop Controlled).

The weekday peak hours of the Traffic Impact Study roadway network were determined to occur between the hours of:

- 7:15 AM – 8:15 AM (AM Peak Hour).
- 5:00 PM – 6:00 PM (PM Peak Hour).

Traffic counts were conducted with schools in session for the season. Count data collected consists of turning movement counts with classification breakouts of lights, busses, single-unit trucks, and articulated trucks.

The Existing Traffic Count Data is in Appendix B. The Existing Weekday Peak Hour Traffic Volumes (Year 2019) are illustrated on Figure 4.



INTERSECTION

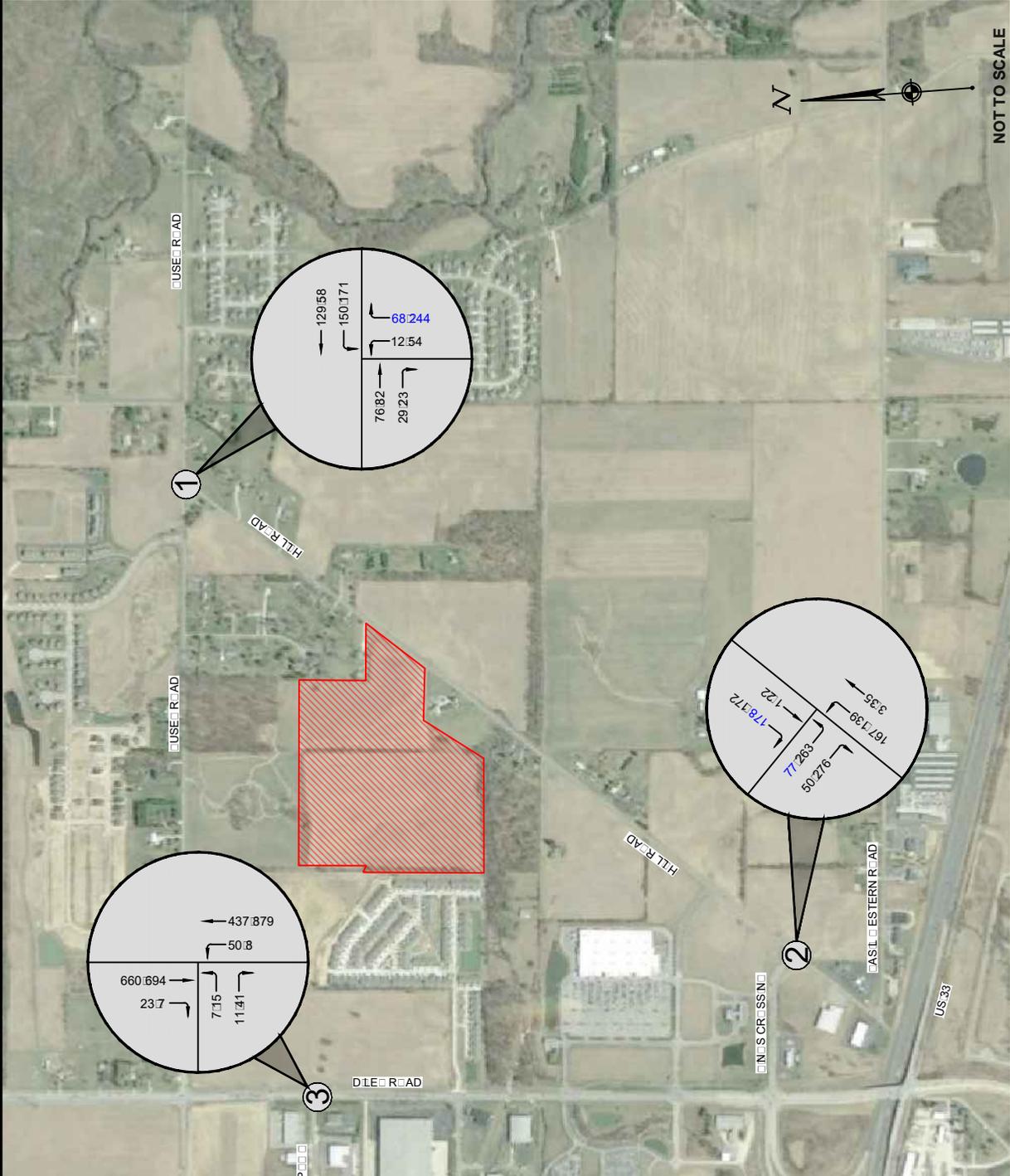
- USE ROAD AND HILL ROAD STOP CONTROLLED
- HILL ROAD AND N S CROSSING STOP CONTROLLED
- DIE ROAD AND HILL ROAD INDUSTRIAL PHASE STOP CONTROLLED

LEGEND

- SEE INTERSECTION
- VOLUME MOVEMENT
- BALANCED VOLUME
- GREEN-LATE DEVELOPMENT

VOLUME

TOTAL EXISTING VOLUME-AM/PM
 AM PEAK HOUR: 7:15 - 8:15 AM
 PM PEAK HOUR: 5:00 - 6:00 PM



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EXISTING PEAK HOUR TRAFFIC VOLUMES	GREEN-LATE RESIDENTIAL DEVELOPMENT
CANAL INCHES	CAR COUNT



3.4. Capacity Analysis Parameters

The capacity of an intersection (signalized or unsignalized) can best be described by its corresponding level of service (LOS). The level of service of an intersection is a qualitative measure of the various attributes of an intersection. There are six levels of service ranging from “ideal” free flow conditions at LOS “A”, to forced or “breakdown” conditions at LOS “F”. The level of service for signalized intersections is based upon the average stopped delay per vehicle for various movements within the intersection. Although v/c affects delay, there are other parameters that more strongly affect it, such as the quality of progression, length of green phases, cycle lengths, and others. Thus, for any given v/c ratio, a range of delay values may result, and vice versa.

The level of service for unsignalized intersections is based upon total delay. Total delay is defined in the *Highway Capacity Manual (HCM)*, 2010 as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. Table 1 summarizes the LOS definitions for unsignalized intersections. Throughout the report “unsignalized intersections” are commonly referred to as “stop controlled.”

**Table 1
 Level of Service Criteria (Unsignalized Intersections)**

Level of Service	Delay per Vehicle (Sec.)	Description
A	≤ 9.0	Little or no delay.
B	> 9.0 and ≤ 15.0	Short traffic delays.
C	> 15.0 and ≤ 25.0	Average traffic delays.
D	> 25.0 and ≤ 35.0	Long traffic delays.
E	> 35.0 and ≤ 50.0	Very long traffic delays.
F	≥ 50.0	Extreme traffic delays.

Source: *Highway Capacity Manual* Special Report 209. (2010 Edition). Transportation Research Board.

Highway Capacity Manual 2010 (HCM 2010) methodology was used in the Traffic Impact Study to remain consistent with “state-of-the-practice” professional standards. It is important to note that the Level of Service Criteria for unsignalized intersections is different than for signalized intersections. For example, a delay of 18 seconds yields level of service C under the unsignalized LOS criteria (see Table 4) while yielding level of service B under the signalized intersection LOS criteria (see Table 5).

Highway Capacity Software (HCS) Version 7 was utilized to calculate delay and level of service values. HCS 7 model parameters include traffic volumes, movements, heavy vehicle percentage, intersection traffic control, storage length, and lane widths. A peak hour factor (PHF) of 0.92 was used throughout the analysis.

Table 2 summarizes the LOS definitions for signalized intersections.

Table 2
Level of Service Criteria (Signalized Intersections)

Level of Service	Delay per Vehicle (Sec.)	Description
A	< 10.0	Most vehicles do not stop at all.
B	> 10.0 and ≤ 20.0	More vehicles stop than with LOS A.
C	> 20.0 and ≤ 35.0	The number of vehicles stopping is significant, although many pass through without stopping.
D	> 35.0 and ≤ 55.0	Many Vehicles stop. Individual cycle failures are noticeable.
E	> 55.0 and ≤ 80.0	Considered to be the limit of acceptable delay. Individual cycle failures are frequent.
F	> 80.0	Unacceptable delay.

Source: *Highway Capacity Manual* Special Report 209. (2010 Edition). Transportation Research Board.

3.5. Existing Traffic Scenario Capacity Analysis

Utilizing the Existing Weekday Peak Hour Traffic Scenario (Year 2019) shown on Figure 4, capacity calculations were performed for the key study intersections. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2010 Edition). The capacity analyses were completed using HCS Version 7 methodology.

Under the Existing Traffic Scenario, capacity calculations were performed at the following intersections:

- Hill Road and Busey Road (Stop Controlled).
- Hill Road and Kings Crossing (Stop Controlled).

Note: Capacity analysis was not completed for the Diley Road and Howe Industrial Parkway intersection until the 2034 scenarios since the Greengate Boulevard extension is not planned until after 2024.

Table 3 summarizes the capacity analysis results for the Existing Traffic Scenario.

Table 3
Summary of Existing Traffic Scenario Capacity Analysis

Intersection ↓	Year →	2019 AM and PM Peak Hours			
	Volume →	Existing – Year 2019			
	Geometry →	Existing			
	Movement	AM Peak Hour		PM Peak Hour	
LOS		*Delay	LOS	*Delay	
Hill Road & Busey Road (Stop Controlled)	EBLR	B	11.3	B	14.7
	NBLT	A	7.9	A	7.8
Hill Road & Kings Crossing (Stop Controlled)	EBLT	A	8.0	A	7.9
	SBLR	B	12.8	E	38.7
*Delay in seconds L – Left T – Through R – Right					

Under the Existing Traffic Scenario, all movements operate at level of service (LOS) “B” or better condition with the exception of the SBLR movement at the Hill Road and Kings Crossing intersection, which operates at LOS “E” during the PM Peak Hour.

The Existing Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix C of the report.

4. Estimates of 2022/2023/2024/2034 No-Build Traffic in the Vicinity of the Site

4.1. 2022/2023/2024/2034 No-Build Traffic Volumes

The 2022/2023/2024/2034 No-Build Weekday Peak Hour Traffic Volumes (Figures 5, 6, 7, and 8) were calculated by applying growth factors to the Existing Weekday Peak Hour Traffic Volumes (Year 2019, Figure 4). Growth rates were obtained from the Mid-Ohio Regional Planning Commission (MORPC). **Note:** *The original MORPC request did not include the Diley Road and Howe Industrial Parkway intersection, therefore the growth rate for Hill Road north of Kings Crossing was used for the intersection.* The growth rates are attached in Appendix B.

For the 2034 No-Build Traffic Volumes, additional development traffic was added to Figure 8 to account for the Greengate Boulevard extension. Once completed, trips from an existing residential development along with a proposed commercial development will reroute to Greengate Boulevard. The estimated traffic calculations are shown below in Section 5.2. The 2034 No-Build Traffic Volumes (With Future Development) are shown on Figure 14.

4.2. 2022/2023/2024/2034 No-Build Traffic Scenario Capacity Analysis

Utilizing the 2022/2023/2024/2034 No-Build Weekday Peak Hour Traffic Volumes (Figures 5, 6, 7, and 14), capacity calculations were performed for the key study intersections. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2010 Edition). The capacity analyses were completed using HCS Version 7 methodology.

Under the 2022/2023/2024/2034 No-Build Traffic Scenario, all movements operate at level of service (LOS) “D” or better condition with the exception of the SBLR movement at the Hill Road and Kings Crossing intersection, which operates at LOS “F” under the 2022 No-Build PM Peak Hour. In addition, the EB and WB movements at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection operate at LOS “F” in the 2034 No-Build AM and PM Peak Hours. With recommended improvements in the No-Build Scenarios, all movements operate at LOS “D” or better condition.

For simplicity, the capacity analysis results for all scenarios are shown in Table 7 and Table 8 in Section 6.2 of the report. The 2022/2023/2024/2034 No-Build Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix D of the report.



INTERSECTION

- USE ROAD AND HILL ROAD STOP CONTROLLED
- HILL ROAD AND N S CROSSN STOP CONTROLLED
- DIE ROAD AND HILL ROAD INDUSTRIAL P STOP CONTROLLED

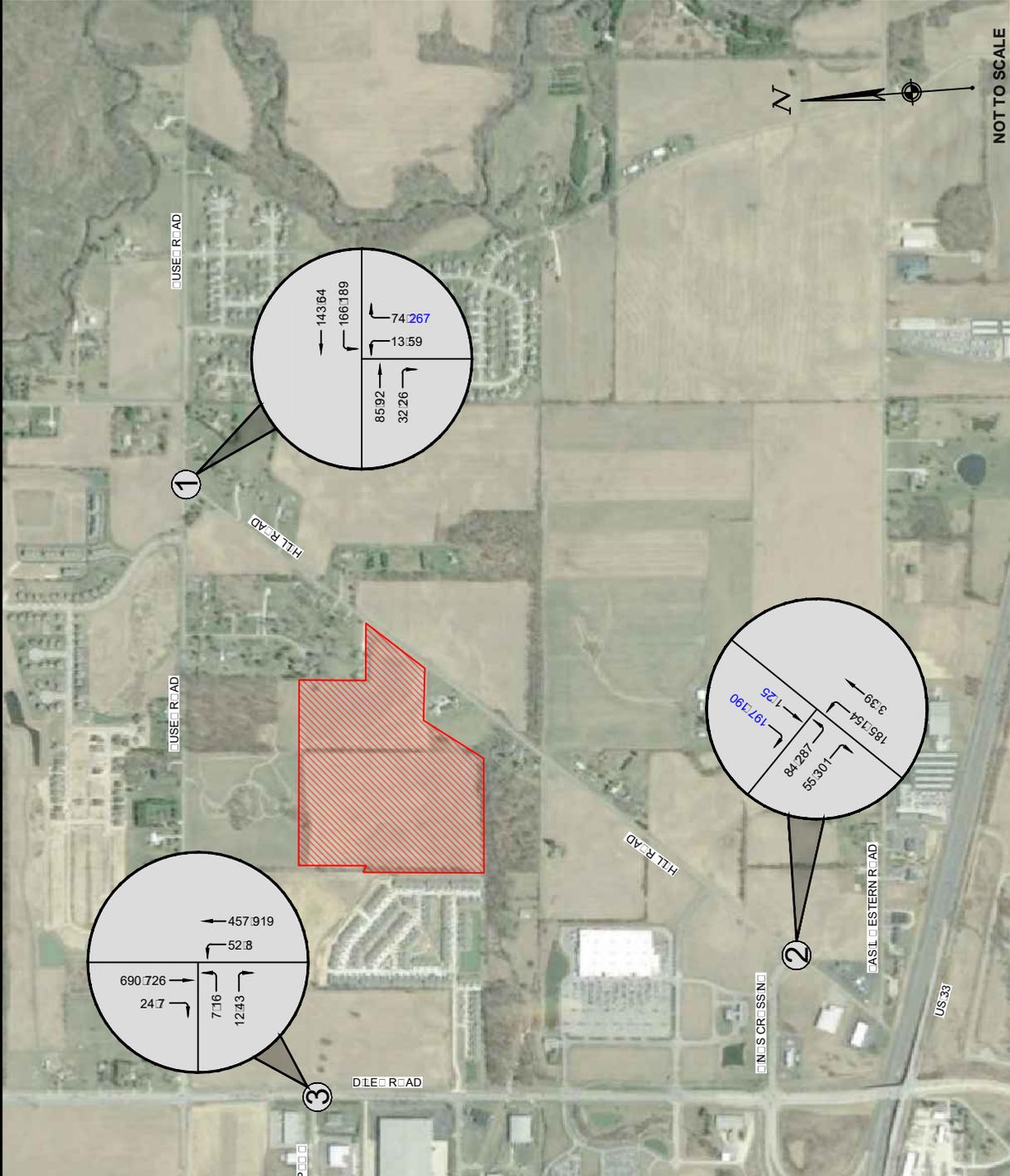
LEGEND

- SEE INTERSECTION
- LUMEN
- BALANCED LUMEN
- GREEN DATE DE

TOTAL 2022 NO LUMEN

AM PE HOUR 7:15 - 8:15 AM

PM PE HOUR 5:00 - 6:00 PM



NOT TO SCALE

FIGURE 5
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2022 NO LUMEN PE HOUR TRAFFIC LUMEN
RENEWATE RESIDENTIAL DEVELOPMENT
CANAL INCHESTER
CAR COUNT

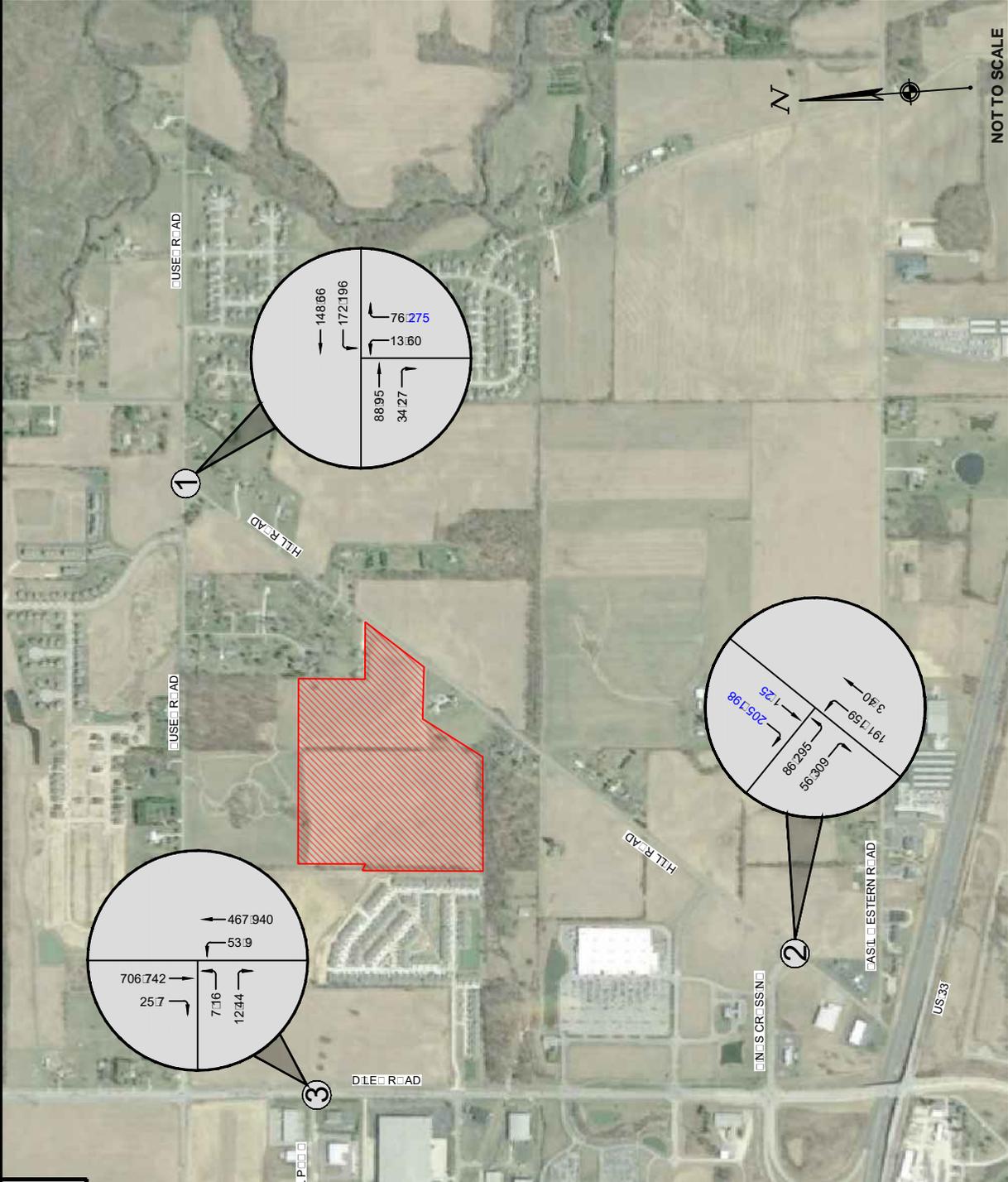


- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND N S CR S S N STOP CONTROLLED
 - DLE ROAD AND H O O E INDUSTRIAL P STOP CONTROLLED

LEGEND

- SEE INTERSECTION
- LUMI MOVEMENT
- BALANCED LUMI
- REENATE DE

TOTAL 2023 NO LUMI
 AM PEA HOUR: 7:15 - 8:15 AM
 PM PEA HOUR: 5:00 - 6:00 PM



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FIGURE 6
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2023 NO LUMI PEAK HOUR TRAFFIC LUMES
REENATE RESIDENTIAL DEVELOPMENT
CANAL INCHESTER
CARFIELD COUNTRY



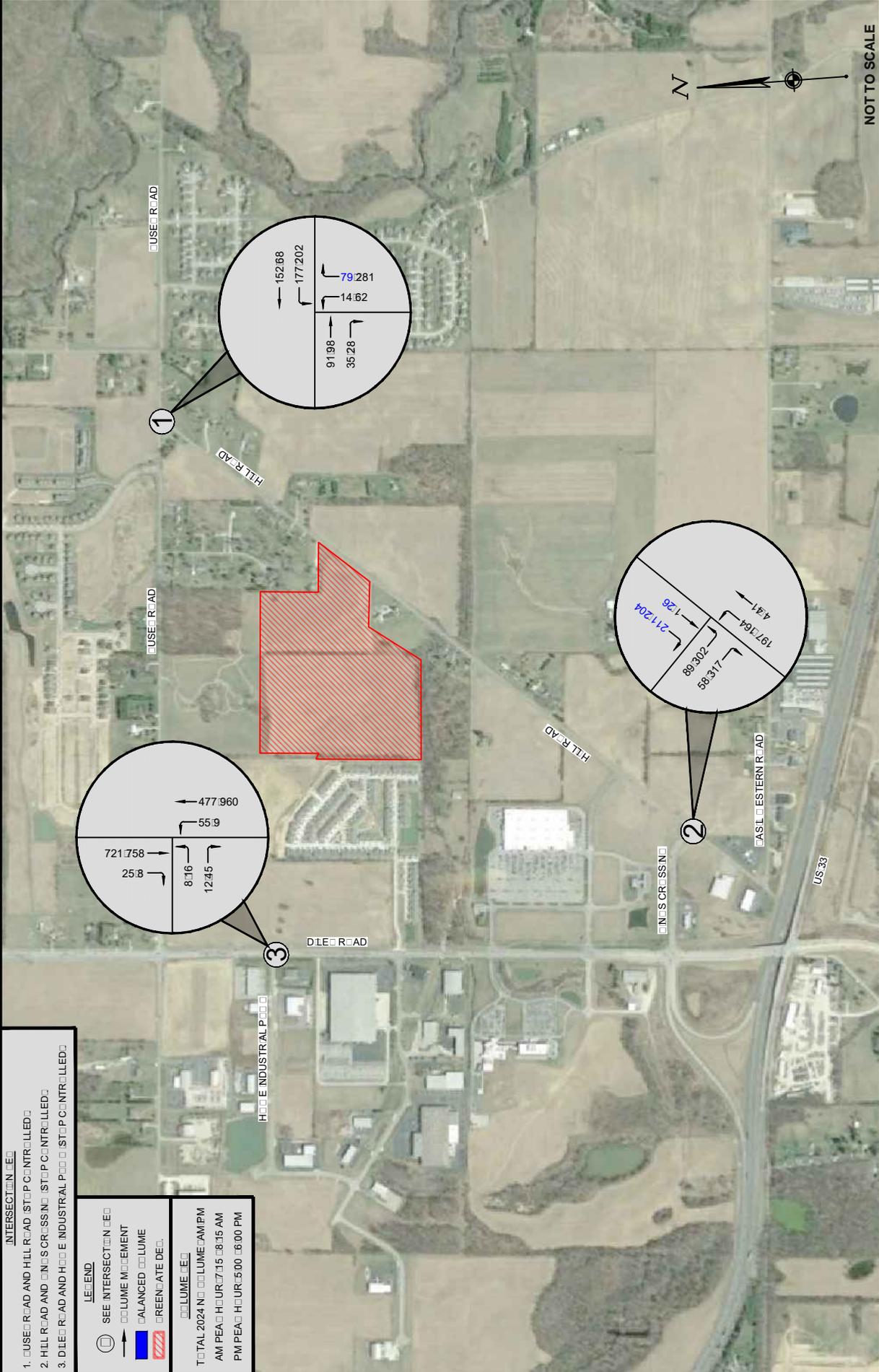


- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND N S CRESSN STOP CONTROLLED
 - DIE ROAD AND HILL ROAD INDUSTRIAL PORT STOP CONTROLLED

LEGEND

- SEE INTERSECTION
- LUMEN
- BALANCED LUMEN
- GREEN-DATE DE

TOTAL 2024 NO LUMEN
 AM PE HOUR 7:15 - 8:15 AM
 PM PE HOUR 5:00 - 6:00 PM

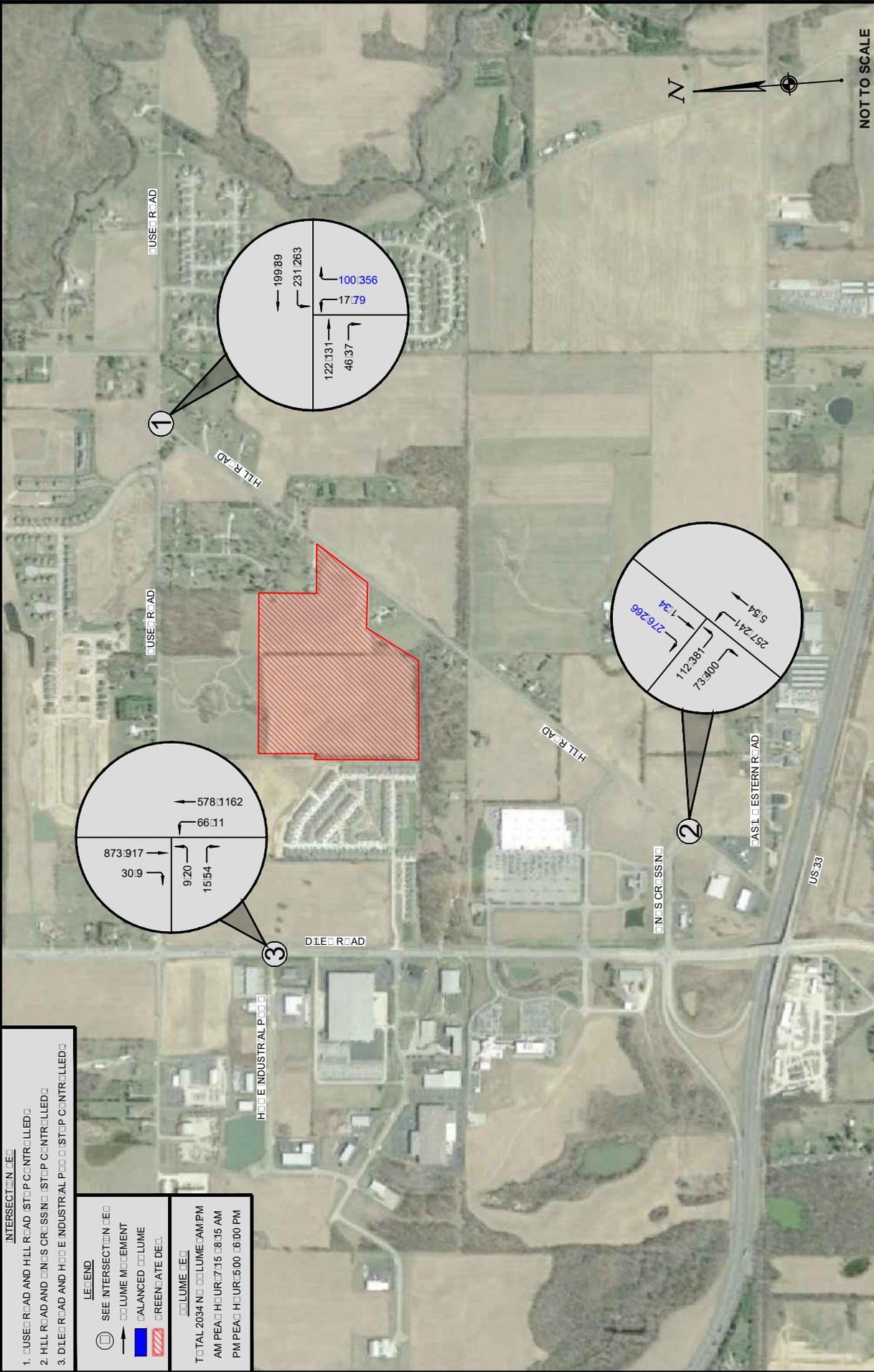


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2024 NUID EEDA PEAHOUR TRAILUMES	
REENATE RESIDENTIAL DEVELOPMENT	
CIT	CANAL INCHESTER
CAR	COUNT

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FIGURE 8
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2034 NORTH DILLON ROAD PEACH HOUR TRAFFIC VOLUMES
RENEWABLE RESIDENTIAL DEVELOPMENT
CITY OF WINCHESTER
CARFIELD COUNTY

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- INTERSECTION 1**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND EAST EASTERN ROAD STOP CONTROLLED
 - DILLON ROAD AND HILL ROAD INDUSTRIAL PORT STOP CONTROLLED

LEGEND

- SEE INTERSECTION 1
- VOLUME MOVEMENT
- BALANCED VOLUME
- GREEN-LITE DE

VOLUME

TOTAL 2034 NORTH DILLON ROAD PEACH HOUR TRAFFIC VOLUMES
 AM PEACH HOUR 7:15 - 8:15 AM
 PM PEACH HOUR 5:00 - 6:00 PM

INTERSECTION LEGEND

1. USE ROAD AND HILL ROAD STOP CONTROLLED

2. HILL ROAD AND REENATE DRIVE/ARD STOP CONTROLLED

3. HILL ROAD AND N S CORSSN STOP CONTROLLED

4. DIE ROAD AND HILL ROAD INDUSTRIAL P STOP CONTROLLED

NOTE: THE REENATE DRIVE AND HILL ROAD INTERSECTION IS SHOWN IN THE FUTURE EVEN THOUGH IT IS A NAILED SCENARIO. THE PURPOSE OF THIS FUTURE IS TO DETERMINE THE VOLUMES AT DIE ROAD AND HILL ROAD INDUSTRIAL P. REENATE DRIVE WITHOUT THE REENATE DEVELOPMENT.

LEGEND

SEE INTERSECTION VOLUME MOVEMENT

BALANCED VOLUME

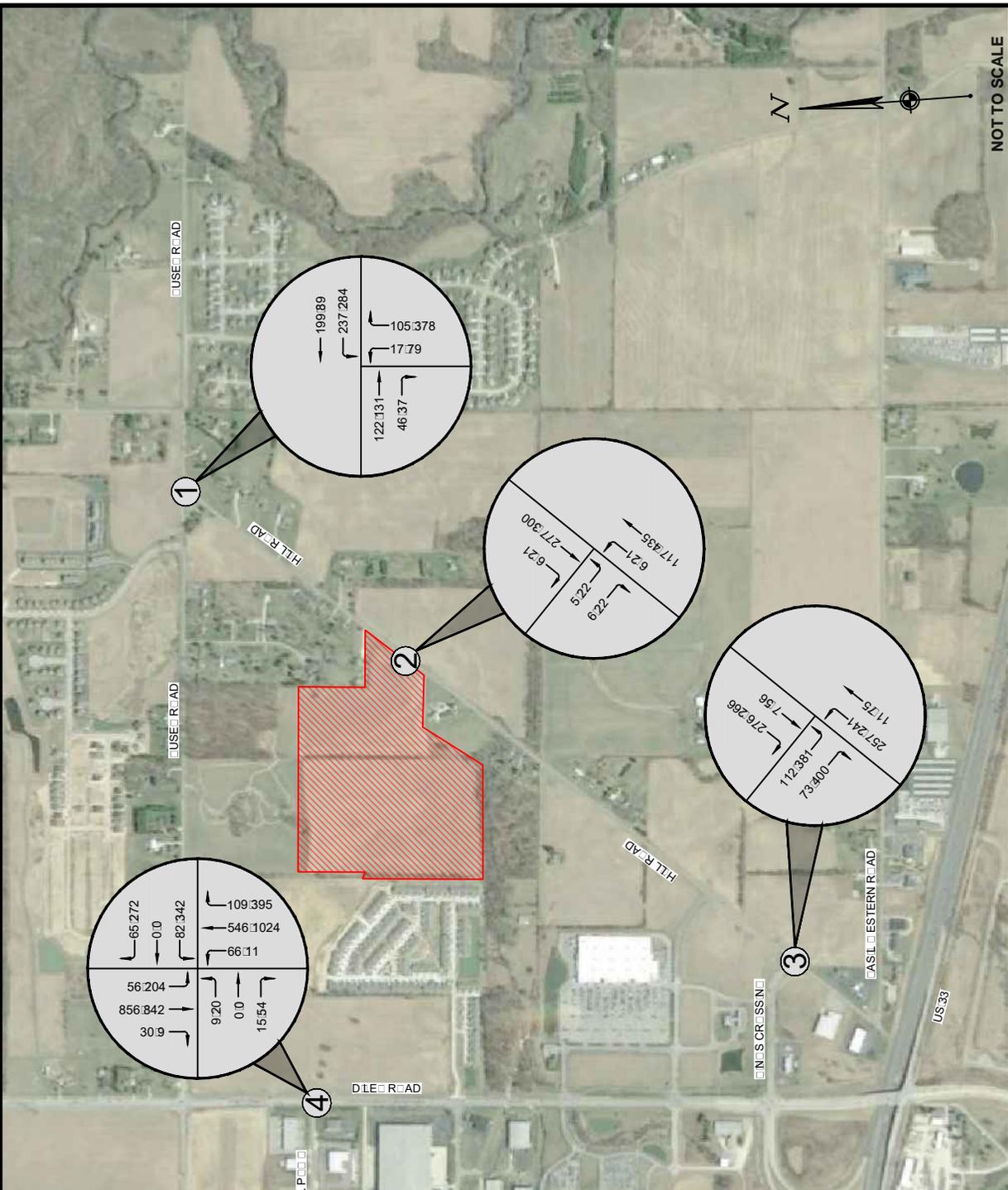
REENATE DEVELOPMENT

VOLUME LEGEND

TOTAL 2034 NO VOLUME/AM/PM

AM PEAK HOUR: 7:15 - 8:15 AM

PM PEAK HOUR: 5:00 - 6:00 PM



NOT TO SCALE

FIGURE 14

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2034 NO BUILD PEAK HOUR TRAFFIC VOLUMES WITH FUTURE DEVELOPMENT

REENATE RESIDENTIAL DEVELOPMENT

CITY OF WINCHESTER

CANAL WINCHESTER

TRAFFIC COUNT



5. Trip Generation

5.1. Greengate Development-Generated Traffic Volumes

Studies of similar developments throughout North America have shown that the amount of traffic generated will be functionally related to some unit of activity (i.e., number of fueling stations, gross floor area, service bays, etc). In development, site traffic fluctuates substantially on different days and hours throughout the year. Therefore, it is imperative to select an appropriate hourly volume on which to base the design of the external roadway and site access facilities. The Weekday AM and PM Peak Hours were selected based on the adjacent street traffic during this hour.

The 2022/2023/2024 Opening Year Build Traffic Scenarios include the proposed use of the Site as a Greengate Development that consists of:

- Phase I & II (Tentative 2022 Opening Year) 63 lots plus construction of Greengate Boulevard entrance.
- Phase III & V (Tentative 2023 Opening Year) 53 lots.
- Phase IV, VI, & VII (Tentative 2024 Opening Year) 75 lots.

For analysis purposes, the base variable units for the trip-generation rates were number dwelling units and KSF (1,000 SF = 1 KSF). The Greengate Development-Generated Traffic Volumes (Table 4) were calculated by utilizing data contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition.

Table 4
Greengate Development-Generated Traffic Volumes

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips								
				Weekday			Weekday AM Peak Hour			Weekday PM Peak Hour		
				Trips			Trips			Trips		
				Tot	In	Out	Tot	In	Out	Tot	In	Out
Phase I & II (2022 Tentative Opening Year)												
Single-Family Detached Housing	210	63	Lots	680	340	340	50	13	37	66	42	24
ITE Cat. 210 Entering (%) / Exiting (%)				100%	50%	50%	100%	25%	75%	100%	63%	37%
Phase III & V (2023 Tentative Opening Year)												
Single-Family Detached Housing	210	53	Lots	580	290	290	43	11	32	56	35	21
ITE Cat. 210 Entering (%) / Exiting (%)				100%	50%	50%	100%	25%	75%	100%	63%	37%
Phase IV, VI & VII (2024 Tentative Opening Year)												
Single-Family Detached Housing	210	75	Lots	798	399	399	58	14	44	77	49	28
ITE Cat. 210 Entering (%) / Exiting (%)				100%	50%	50%	100%	25%	75%	100%	63%	37%
TOTAL				2,058	1,029	1,029	151	38	113	199	126	73

5.2. Future Development-Generated Traffic Volumes

After discussion with the City of Canal Winchester, the proposed extension of Greengate Boulevard to intersect with Diley Road will tie into existing residential developments and a proposed future commercial development. Therefore, trips were estimated for the future growth at the Diley Road and Greengate Boulevard/Howe Industrial Parkway intersection. The future growth will consist of:

- Shopping Center with 304,920 SF
 - The future commercial development along Diley Road is unknown at this time. Therefore, the building size and land use were estimated. The building square footage is assumed based on a parcel size of 35 acres. Per the requirements of the City of Canal Winchester, the maximum lot coverage for buildings and parking is 80%. It was assumed that roughly 25% of the remaining area would be building square footage. The land use was assumed to be a shopping center.
- Multifamily Housing (Low-Rise) with 100 dwelling units
 - It is assumed that all of the existing dwelling units are one or two stories high. Per discussion with the City of Canal Winchester, roughly 100 of the existing dwelling units will re-route to use Greengate Boulevard once the extension is constructed.

**Table 5
 Future Development-Generated Traffic Volumes**

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips										
				Weekday			Weekday AM Peak Hour				Weekday PM Peak Hour			
				Trips			Trips				Trips			
				Tot	In	Out	Tot	In	Out	PB	Tot	In	Out	PB
2034 Opening Year														
Multifamily Housing (Low-Rise)	220	100	Lots	716	358	358	48	11	37	--	59	37	22	--
ITE Cat. 210 Entering (%)/Exiting (%)				100%	50%	50%	100%	23%	77%	0%	100%	63%	37%	0%
Shopping Center	820	304.92	KSF	12,832	6,416	6,416	287	117	72	98	1,240	391	423	426
ITE Cat. 210 Entering (%)/Exiting (%)				100%	50%	50%	100%	62%	38%	34%	100%	48%	52%	34%
TOTAL				13,548	6,774	6,774	335	128	109	98	1,299	428	445	426

Appendix E includes the ITE Trip Generation Category 210, 220, and 820 Sheets utilized to calculate the values presented in Table 4 and 5.

5.3. Directional Distribution of Greengate Development-Generated Traffic Volumes

The directional distribution of the development-generated traffic is a function of several variables. The assumptions and methods used in estimating the direction in which traffic will approach and depart the Site varies with several location-specific conditions such as:

- Size and type of the proposed development.
- Population distribution within the defined area of influence.
- Prevailing operating conditions on the existing street system.

The analysis of directional distribution is based on the observation that drivers normally will choose the fastest (not necessarily the most direct) routes to and from a given traffic generator.

The internal trip assignment was based upon the proposed Site Plan and the understanding of a residential developments’ operation. The traffic entering and exiting the residential development will not always travel the most direct route.

The anticipated directional distribution of trips generated by the proposed Greengate and Future Development are shown in Table 6. Additionally, Figure 9.A-9.B illustrates the directional distribution for the Greengate Development. Figure 9.C-9.D illustrate the directional distribution for the Future Development

Table 6
Directional Distribution of Greengate and Future Development-Generated Traffic Volumes

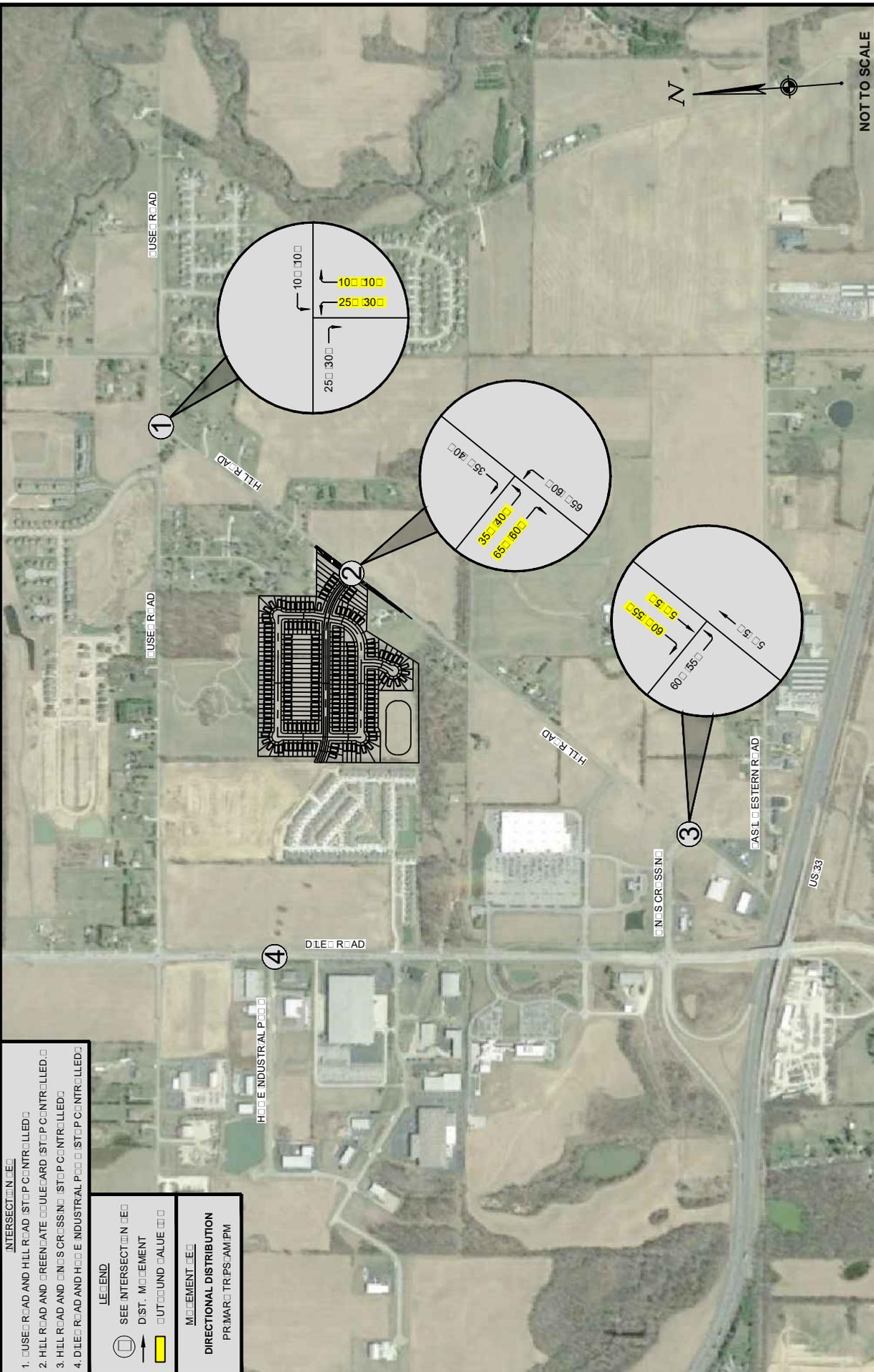
Route	Directional Distribution - Passenger Cars	
	Passenger Cars	
	AM Peak Hour	PM Peak Hour
Primary Trip Distribution – 2022, 2023, 2024 (Figure 9.A)		
To/From the East on Busey Road	10%/10%	10%/10%
To/From the West on Busey Road	25%/25%	30%/30%
To/From the West on Hill Road	5%/5%	5%/5%
To/From the North on Kings Crossing	60%/60%	55%/55%
TOTAL	100%/100%	100%/100%
Primary Trip Distribution – 2034 (Figure 9.B)		
To/From the East on Busey Road	10%/10%	10%/10%
To/From the West on Busey Road	5%/5%	5%/5%
To/From the West on Hill Road	5%/5%	5%/5%
To/From the North on Kings Crossing	30%/30%	28%/28%
To/From the North on Diley Road	20%/20%	25%/25%
To/From the South on Diley Road	30%/30%	27%/27%
TOTAL	100%/100%	100%/100%
Primary Trip Distribution – Future Development (Figure 9.C)		
To/From the East on Busey Road	5%/5%	5%/5%
To/From the West on Hill Road	5%/5%	5%/5%
To/From the North on Diley Road	30%/30%	30%/30%
To/From the South on Diley Road	60%/60%	60%/60%
TOTAL	100%/100%	100%/100%
Pass-by Trip Distribution – Future Development (Figure 9.D)		
To the North/From the South on Diley Road	65%/65%	65%/65%
From the South/To the North on Diley Road	35%/35%	35%/35%
TOTAL	100%/100%	100%/100%

Based upon the directional distributions listed in Table 6 and illustrated on Figures 9.A-9.D, the estimated Greengate Development and Future Development-Generated Weekday Peak Hour Traffic Volumes shown in Table 4 and Table 5 were distributed to the adjacent roadway system. The Greengate and Future Development Generated Weekday Peak Hour Traffic Volumes are illustrated on Figures 10.A-10.F.

- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE STOP CONTROLLED
 - HILL ROAD AND N. S. CROSSIN STOP CONTROLLED
 - DLEE ROAD AND HILL INDUSTRIAL PARK STOP CONTROLLED

- LEGEND**
- SEE INTERSECTION
 DIST. MOVEMENT
 OUTBOUND VALUE

- MOVEMENT**
- DIRECTIONAL DISTRIBUTION**
 PRIMARY TRIPS AM/PM



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FIGURE 9.A
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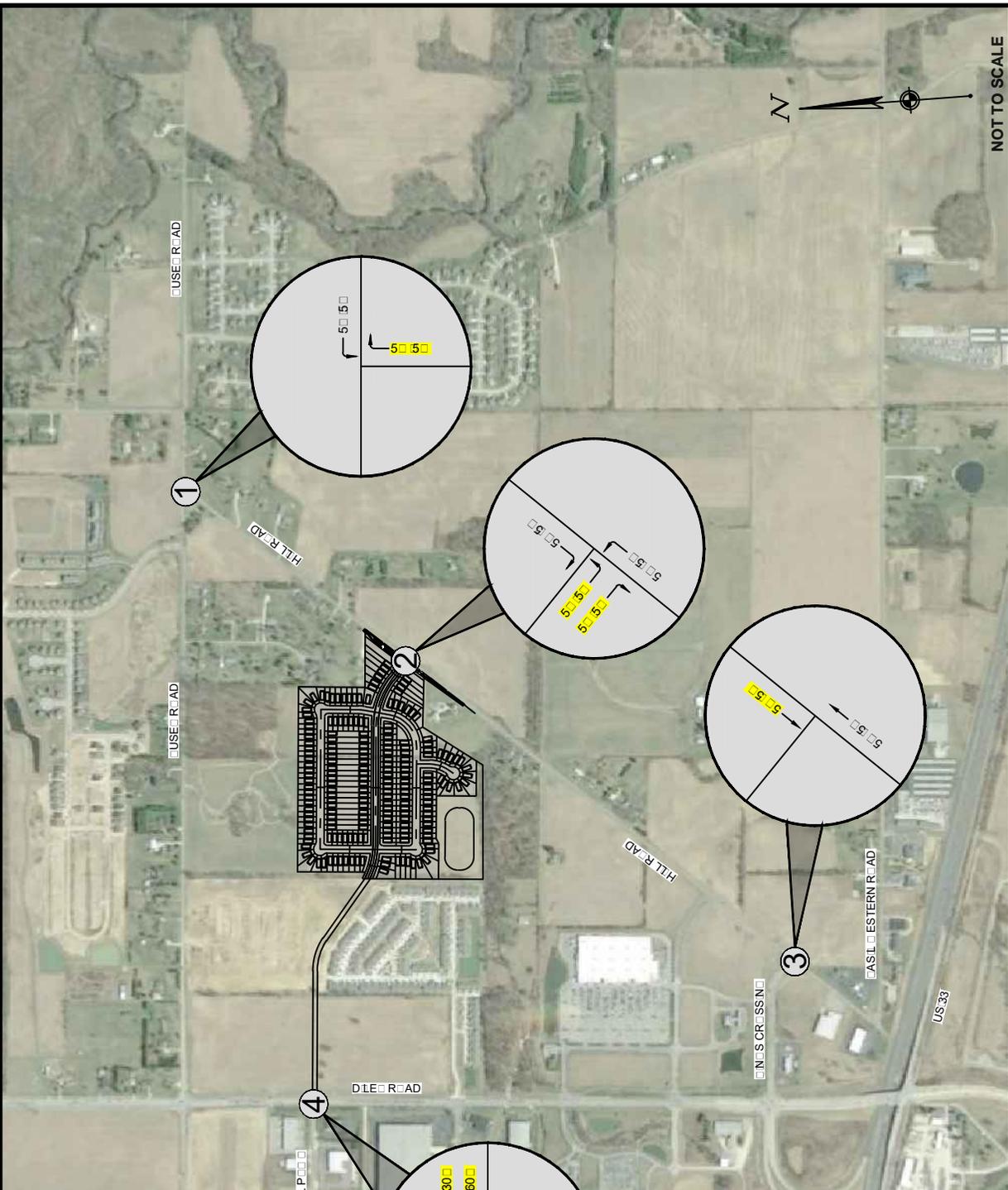
DIRECTIONAL DISTRIBUTION OF GENERATED TRAFFIC VOLUMES 2022-2023 AND 2024
REENATE RESIDENTIAL DEVELOPMENT
COUNTY CANAL INCHESTER
CANAL COUNT



- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE ROAD STOP CONTROLLED
 - HILL ROAD AND INDEPENDENCE ROAD STOP CONTROLLED
 - DLE ROAD AND HILL INDUSTRIAL PARK STOP CONTROLLED

- LEGEND**
- SEE INTERSECTION
 - DIST. MOVEMENT
 - OUTBOUND VALUE

- MOVEMENT**
- DIRECTIONAL DISTRIBUTION**
- PRIMARY TRIPS AM/PM



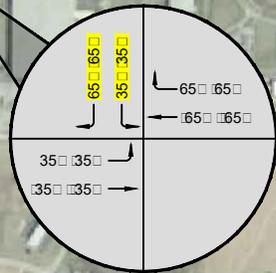
DIRECTORIAL DIST. FUTURE DEVELOPMENT GENERATED TRAFFIC VOLUMES 2034 PRIMARY	
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- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE DOUBLE STOP CONTROLLED
 - HILL ROAD AND INSCRIPSSON STOP CONTROLLED
 - DLEER ROAD AND HILL INDUSTRIAL PARK STOP CONTROLLED

- LEGEND**
- SEE INTERSECTION
- DIST. MOVEMENT
- OUTBOUND VALUE

- MOVEMENT**
- DIRECTIONAL DISTRIBUTION**
- PASS TRIPS AM/PM



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FIGURE 9.D
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DIRECTIONAL DIST. FUTURE DEVELOPER GENERATED TRAFFIC LUMES 2034 PASS
REENATE RESIDENTIAL DEVELOPMENT
CANAL INCHESTER
CARFIELD COUNTRY



- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE STOP CONTROLLED
 - HILL ROAD AND N/S CROSSIN STOP CONTROLLED
 - DLE ROAD AND HEE INDUSTRIAL P STOP CONTROLLED

TRIP GENERATION

AM	PM
IN	IN
OUT	OUT
13	37
42	24

LEGEND

SEE INTERSECTION

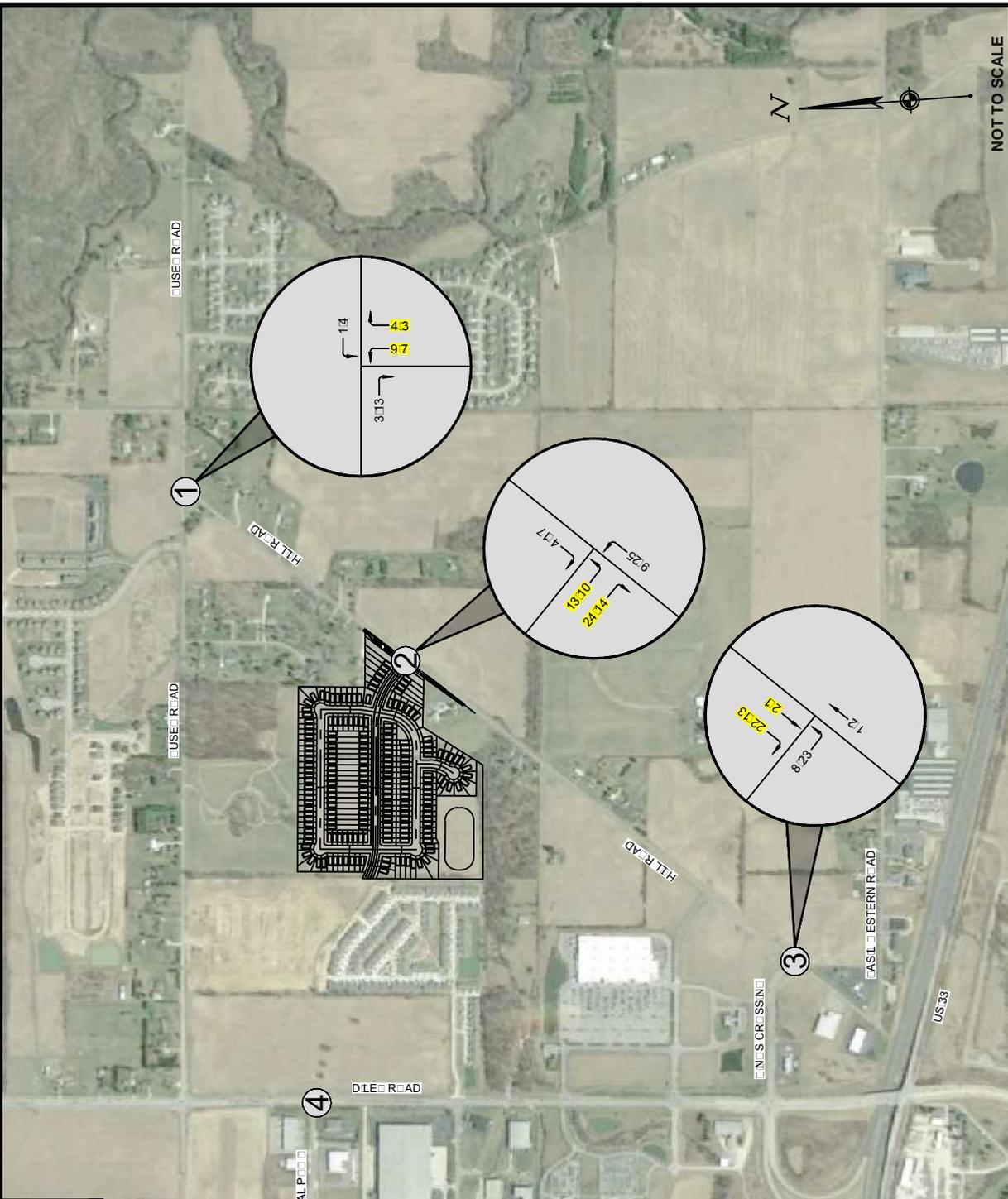
DIST. MOVEMENT

OUTBOUND VALUE

MOVEMENT

DIRECTIONAL DISTRIBUTION

PRIMARY TRIPS AM/PM



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FIGURE 10-A
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REENATE DE. GENERATED TRAFFIC VOLUMES 2022 PHASE 1
REENATE RESIDENTIAL DEVELOPMENT
CANAL INCHESTER
FIELD COUNT

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- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE STOP CONTROLLED
 - HILL ROAD AND S CROSS STOP CONTROLLED
 - DLE ROAD AND H INDUSTRIAL P STOP CONTROLLED

TRIP GENERATION

AM	PM
IN	IN
OUT	OUT
11 32 35 21	

LEGEND

SEE INTERSECTION

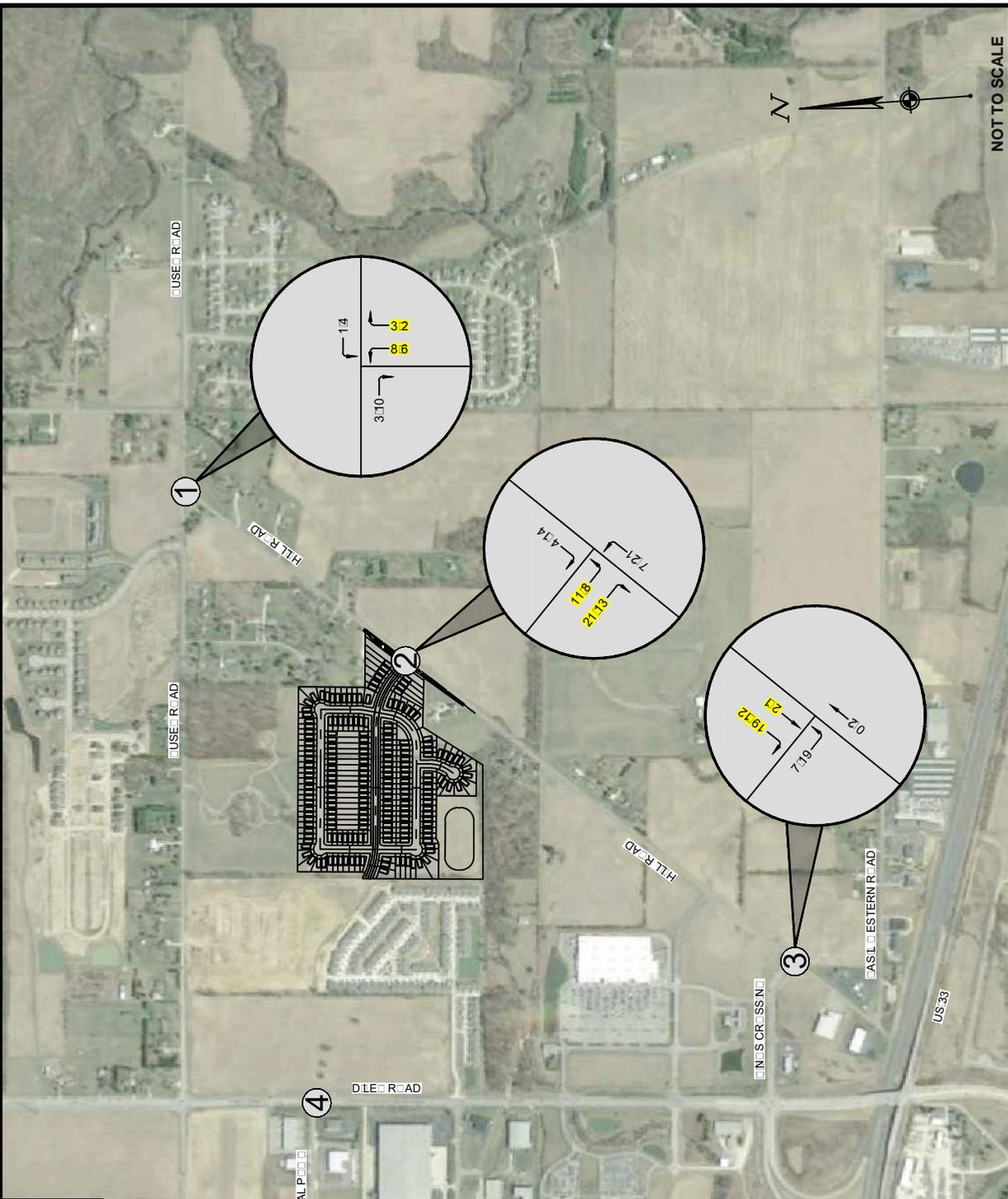
DIST. MOVEMENT

OUTBOUND VALUE

MOVEMENT

DIRECTIONAL DISTRIBUTION

PRIMARY TRIPS AM/PM



NOT TO SCALE

FIGURE 10
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REENATE DE. GENERATED TRAFFIC VOLUMES 2023 PHASE 3 5
REENATE RESIDENTIAL DEVELOPMENT
CANAL INCHESTER
CARFIELD COUNTRY



INTERSECTION LEGEND

1. USE ROAD AND HILL ROAD STOP CONTROLLED

2. HILL ROAD AND REENWATE DRIVE STOP CONTROLLED

3. HILL ROAD AND N/S CROSSIN STOP CONTROLLED

4. DLE ROAD AND HIE INDUSTRIAL P STOP CONTROLLED

LEGEND

SEE INTERSECTION

DIST. MOVEMENT

OUTBOUND VALUE

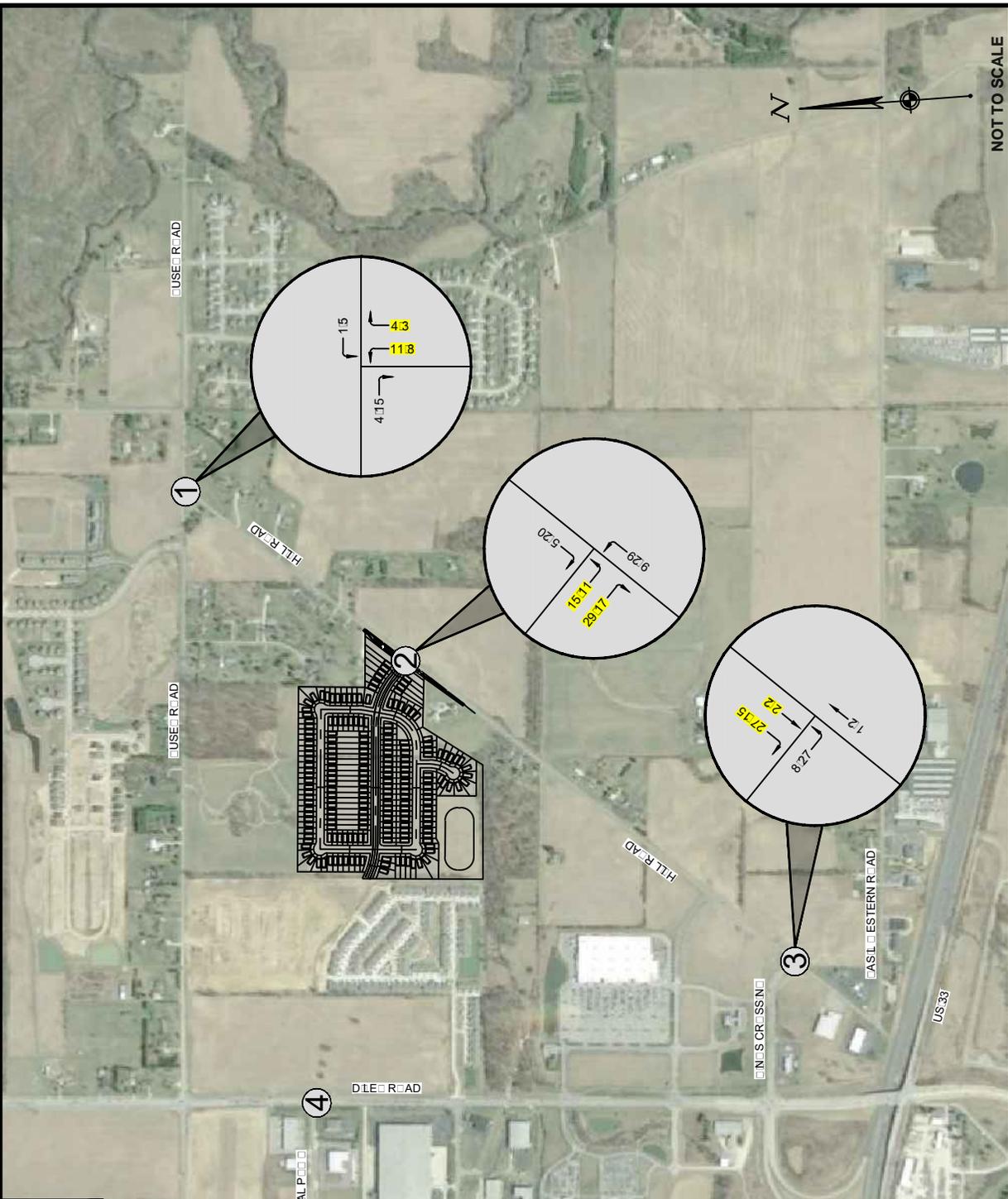
MOVEMENT

DIRECTIONAL DISTRIBUTION

PRIMARY TRIPS AM/PM

TRIP GENERATION

AM	PM
IN	IN
OUT	OUT



NOT TO SCALE

FIGURE 10-C

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REENWATE DEVELOPMENT

GENERATED TRAFFIC VOLUMES 2024 PHASE 4 6 7

REENWATE RESIDENTIAL DEVELOPMENT

CANAL INCHESTER

CARFIELD CUNTH



- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE/ARD STOP CONTROLLED
 - HILL ROAD AND N/S CROSSIN STOP CONTROLLED
 - DLE ROAD AND H/E INDUSTRIAL P STOP CONTROLLED

TRIP GENERATION

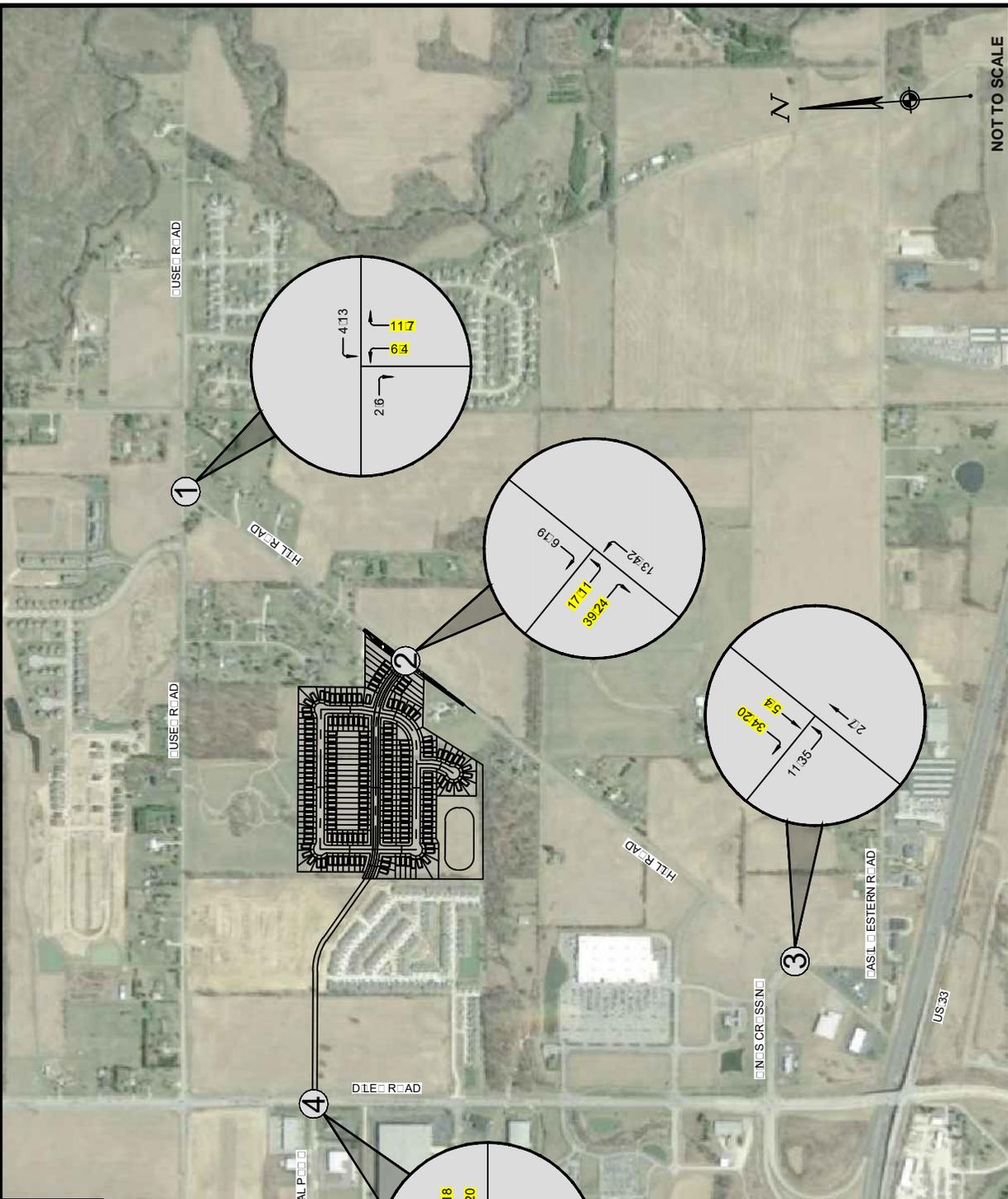
AM	PM
IN 38	OUT 113
OUT 126	IN 73

LEGEND

SEE INTERSECTION
 DIST. MOVEMENT
 OUTBOUND VALUE

MOVEMENT

DIRECTIONAL DISTRIBUTION
 PRIMARY TRIPS AM/PM



NOT TO SCALE

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 PAGE 35

REENATE DE. GENERATED TRAFFIC VOLUMES 2034 ALL PHASES

REENATE RESIDENTIAL DEVELOPMENT

CANAL INCHESTER

CARFIELD COUNTRY CLUB



- INTERSECTION**
- USE ROAD AND HILL ROAD STOP CONTROLLED
 - HILL ROAD AND REENATE DRIVE/ARD STOP CONTROLLED
 - HILL ROAD AND N S CROSSIN STOP CONTROLLED
 - DLE ROAD AND H E INDUSTRIAL P STOP CONTROLLED

LEGEND

SEE INTERSECTION

DIST. MOVEMENT

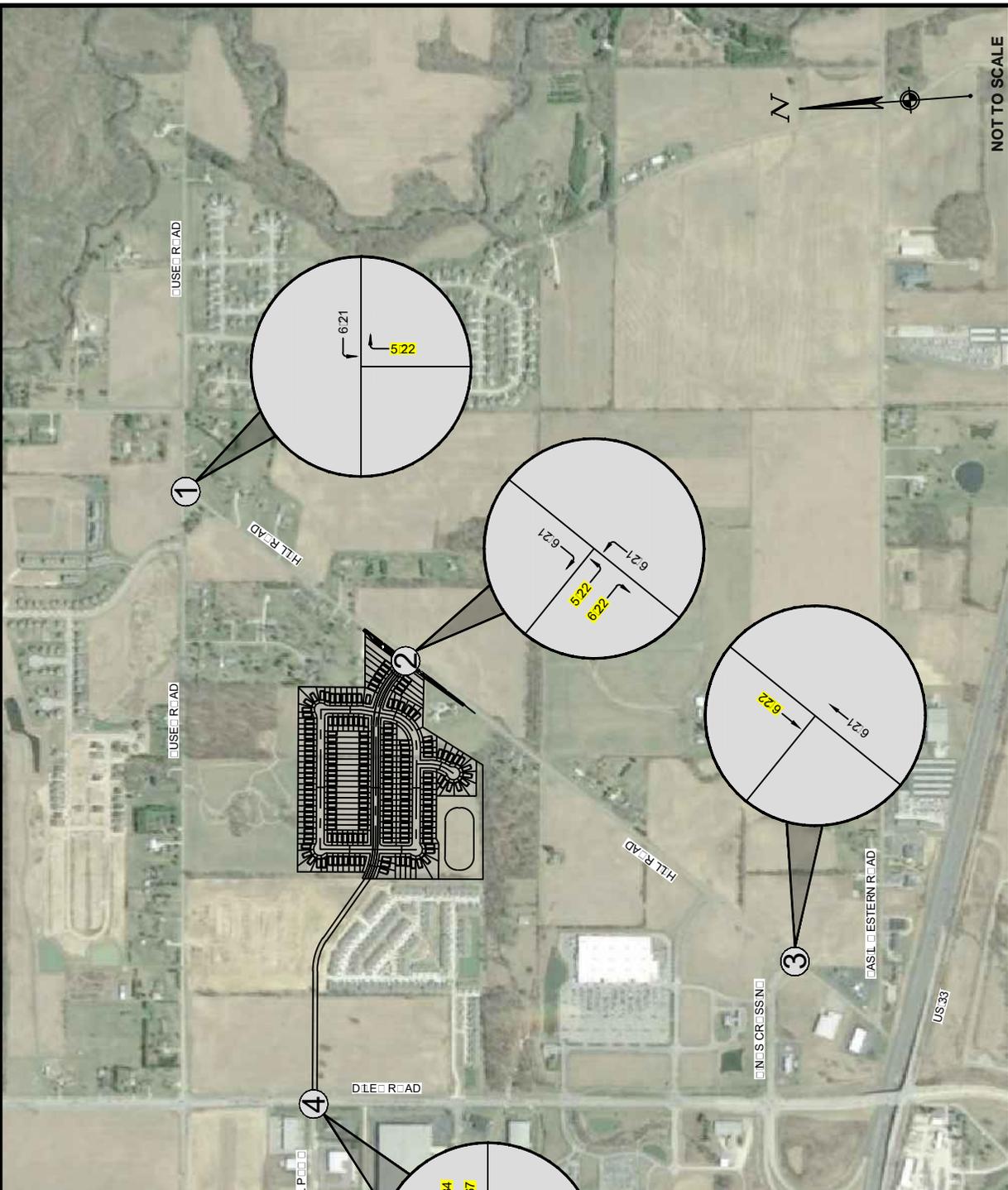
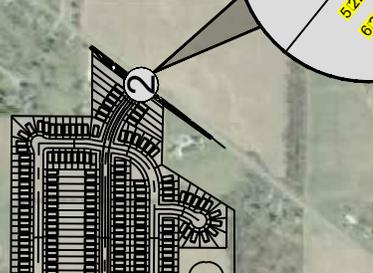
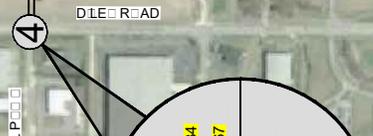
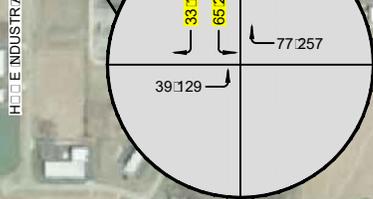
OUTBOUND VALUE

MOVEMENT

DIRECTIONAL DISTRIBUTION

PRIMAR TRPS AM/PM

TRP GENERATION		TRP GENERATION		TRP GENERATION	
RESIDENTIAL	COMMERCIAL	RESIDENTIAL	COMMERCIAL	RESIDENTIAL	COMMERCIAL
AM	PM	AM	PM	AM	PM
IN	OUT	IN	OUT	IN	OUT
37	22	72	423	109	445
128	428	128	428	128	428



NOT TO SCALE

FIGURE 10.E

DATE 01/20/2020

DESIGN 757010.01

DESIGN TMC

DRAWING TMC

CHECKED REM

PAGE 36

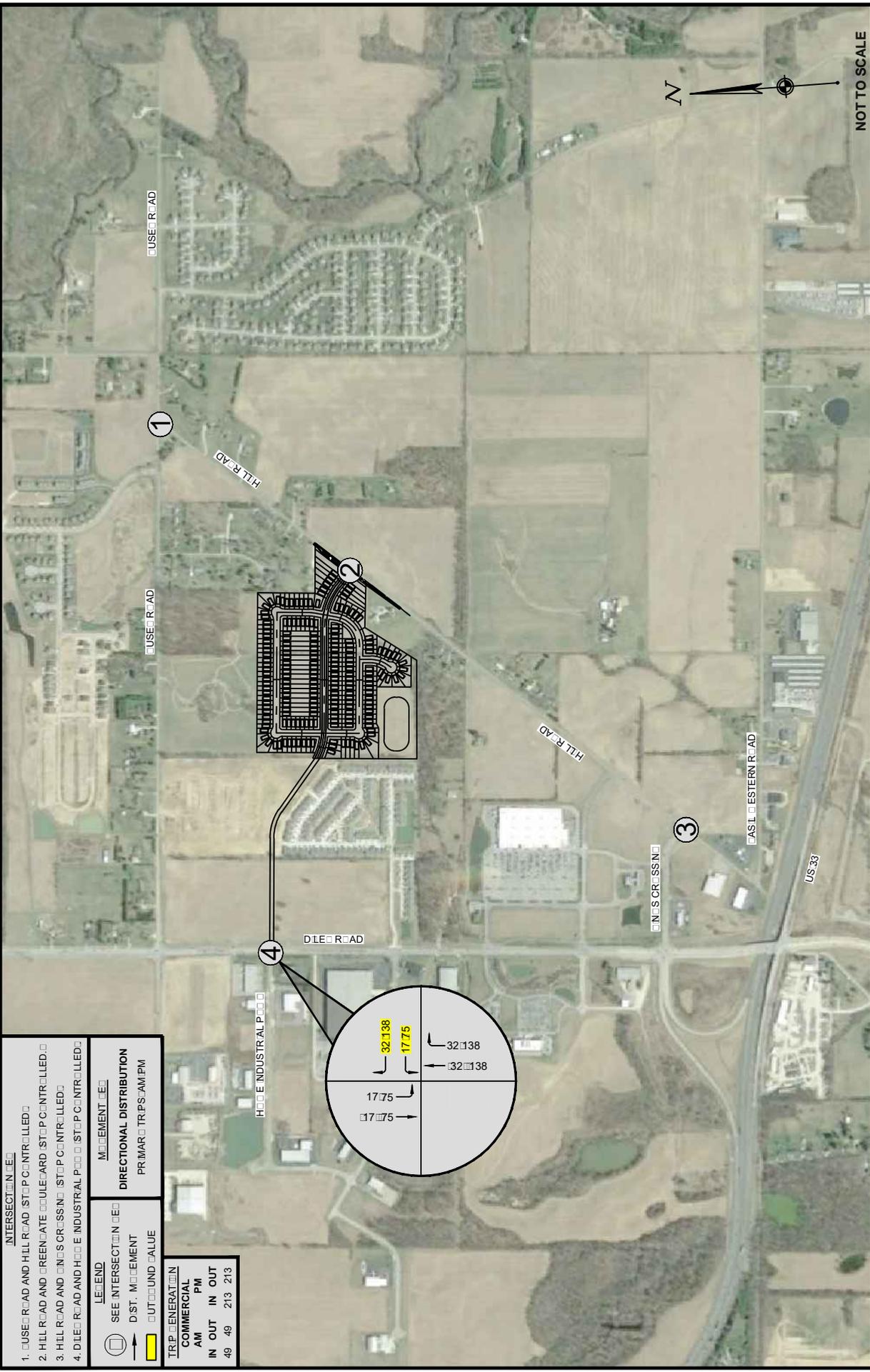


FUTURE DEVELOPER GENERATED TRAFFIC VOLUMES 2034 PRIMARY

REENATE RESIDENTIAL DEVELOPMENT

CANAL INCHESTER

CARFIELD COUNTY



NOT TO SCALE

INTERSECTION 1. USE ROAD AND HILL ROAD STOP CONTROLLED 2. HILL ROAD AND REENATE DRIVE STOP CONTROLLED 3. HILL ROAD AND N S CRESSN STOP CONTROLLED 4. DIESEL ROAD AND HILL ROAD STOP CONTROLLED	
LEGEND SEE INTERSECTION DIST. MOVEMENT OUTBOUND VALUE	MOVEMENT DIRECTIONAL DISTRIBUTION PRIMARY TRPS AM/PM
TRIP GENERATION COMMERCIAL AM IN 49 OUT 213 PM IN 213 OUT 49	

FIGURE NO.	10
DATE	01/20/2020
PROJECT NO.	757010.01
DESIGN	TMC
DRAWING	TMC
CHECKED	REM
PAGE	37

FUTURE DEVELOPMENT GENERATED TRAFFIC VOLUMES 2034 PRIMARY	
REENATE RESIDENTIAL DEVELOPMENT	
CITY	CANAL INCHESTER
CAR	COUNT



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6. Estimates of 2022/2023/2024/2034 Build Traffic in the Vicinity of the Site

6.1. 2022/2023/2024/2034 Build Traffic Volumes

The 2022/2023/2024/2034 Build traffic volumes in the vicinity of the Greengate Development are composed of the 2022/2023/2024/2034 No-Build Weekday Peak Hour Traffic Volumes (Figures 5-7, 14) and the estimated Greengate Development Generated Weekday Peak Hour Traffic Volumes for the specified year (Figures 10.A-10.F). Figures 11-13, 15 illustrate the 2022/2023/2024/2034 Build Weekday Peak Hour Traffic Volumes.

6.2. 2022/2023/2024/2034 Build Traffic Scenario Capacity Analysis

Utilizing the 2022/2023/2024/2034 Build Weekday Peak Hour Traffic Volumes (Figures 11-13, 15), capacity calculations were performed for the key study intersections and Site driveway. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2010 Edition). The capacity analyses were completed using HCS Version 7 methodology.

Under the 2022/2023/2024/2034 Build Traffic Scenario, all movements operate at level of service (LOS) "D" or better condition. In addition, all intersections have an overall LOS "C" or better condition.

For simplicity, the capacity analysis results for all scenarios are shown in Table 7 and Table 8 below. The 2022/2023/2024/2034 Build Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix F of the report.

- INTERSECTION**
1. USE ROAD AND HILL ROAD STOP CONTROLLED
 2. HILL ROAD AND REENATE DRIVE/ARD STOP CONTROLLED
 3. HILL ROAD AND NISSORSSN STOP CONTROLLED
 4. DIE ROAD AND HILL INDUSTRIAL P STOP CONTROLLED

LEGEND

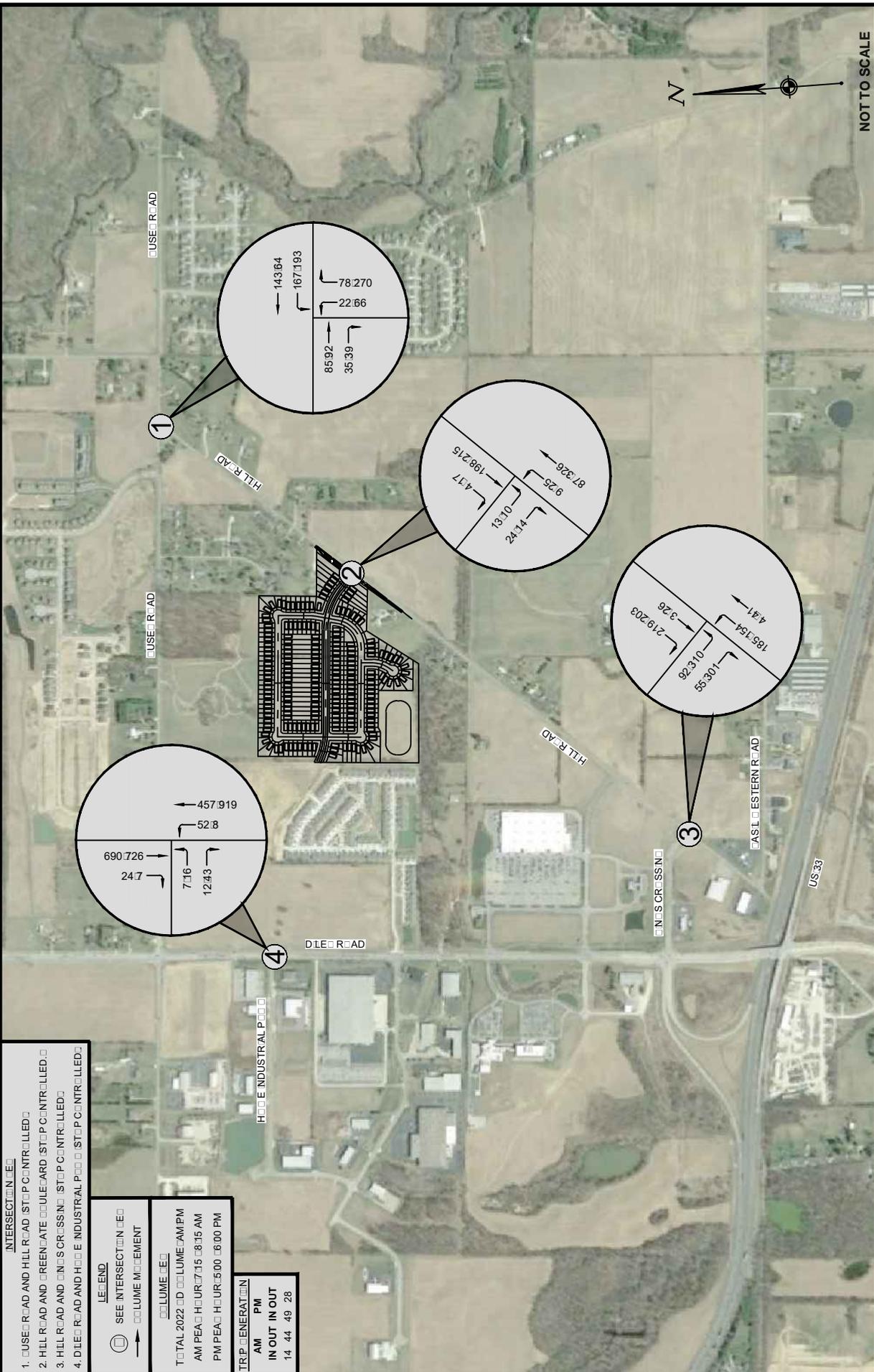
SEE INTERSECTION
 VOLUME MOVEMENT

VOLUME

TOTAL 2022 VOLUME AM/PM
 AM PEAK HOUR 7:15 - 8:15 AM
 PM PEAK HOUR 5:00 - 6:00 PM

TRIP GENERATION

AM PM
 IN OUT IN OUT
 14 44 49 28



NOT TO SCALE

DURE 11

DATE 01/20/2020

DESIGN 757010.01

DESIGN TMC

DRAWING TMC

CHECKED REM

PAGE 41

2022 BUILD EEDA PEAK HOUR TRAFFIC VOLUMES

REENATE RESIDENTIAL DEVELOPMENT

CANAL INCHESTER

CAR COUNT



- INTERSECTION**
1. USE ROAD AND HILL ROAD STOP CONTROLLED
 2. HILL ROAD AND REENATE DRIVE STOP CONTROLLED
 3. HILL ROAD AND N. S. CR. SSN STOP CONTROLLED
 4. DLE ROAD AND H. E. INDUSTRIAL P. STOP CONTROLLED

LEGEND

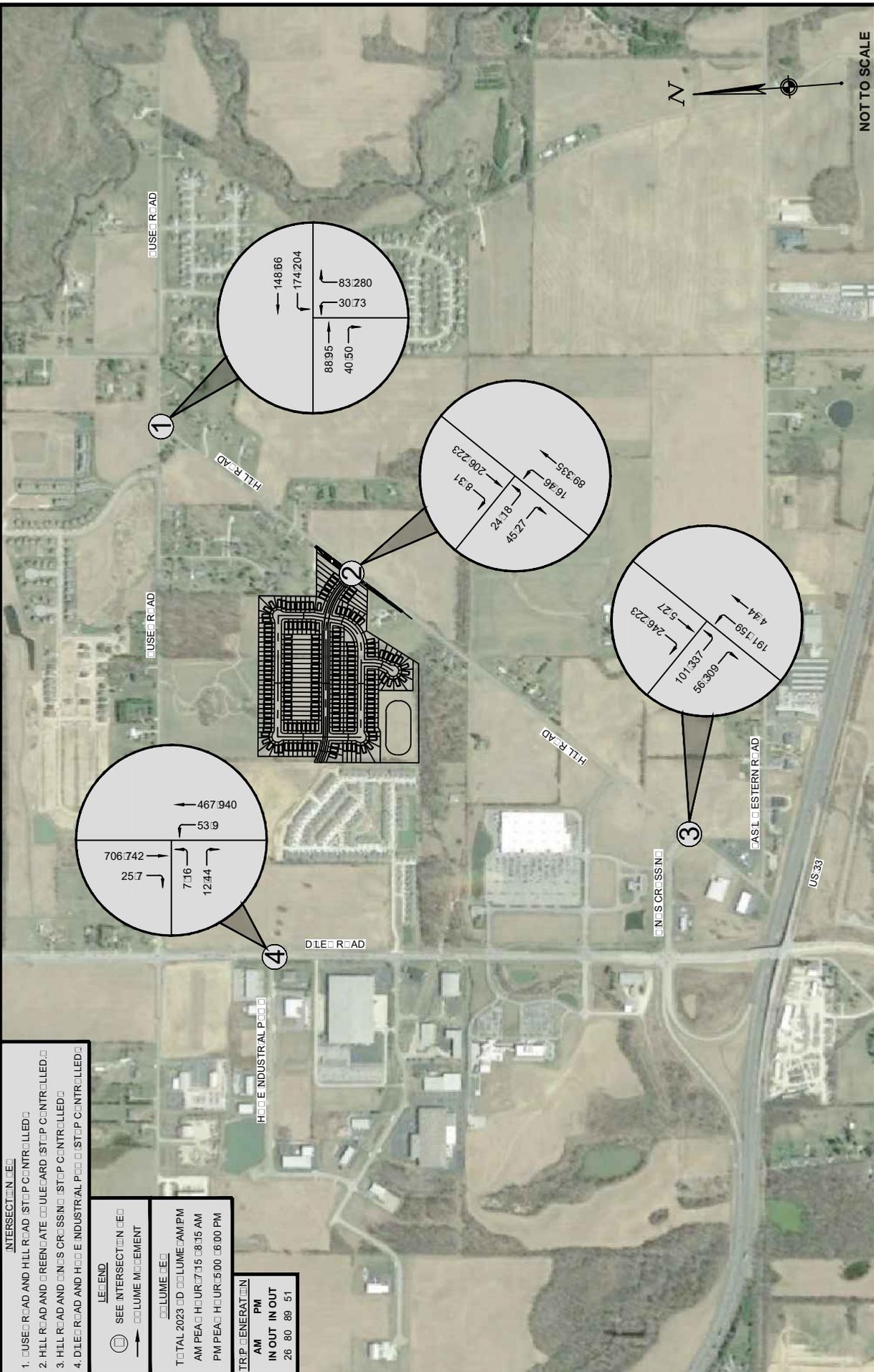
SEE INTERSECTION
 VOLUME MOVEMENT

VOLUME

TOTAL 2023 VOLUME AM/PM
 AM PEA HOUR: 7:15 - 8:15 AM
 PM PEA HOUR: 5:00 - 6:00 PM

TRIP GENERATION

AM IN OUT IN OUT
 26 80 89 51



NOT TO SCALE

FIGURE 12
DATE 01/20/2020
PROJECT 757010.01
DESIGNER TMC
DRAWING TMC
CHECKED REM
PAGE 42

2023 BUILD EEDA PEA HOUR TRAFFIC VOLUMES
REENATE RESIDENTIAL DEVELOPMENT
CANAL INCHESTER
CAR COUNT



- INTERSECTION**
1. USE ROAD AND HILL ROAD STOP CONTROLLED
 2. HILL ROAD AND REENATE DRIVE STOP CONTROLLED
 3. HILL ROAD AND N. S. CR. STOP CONTROLLED
 4. DLE ROAD AND HILL ROAD STOP CONTROLLED

LEGEND

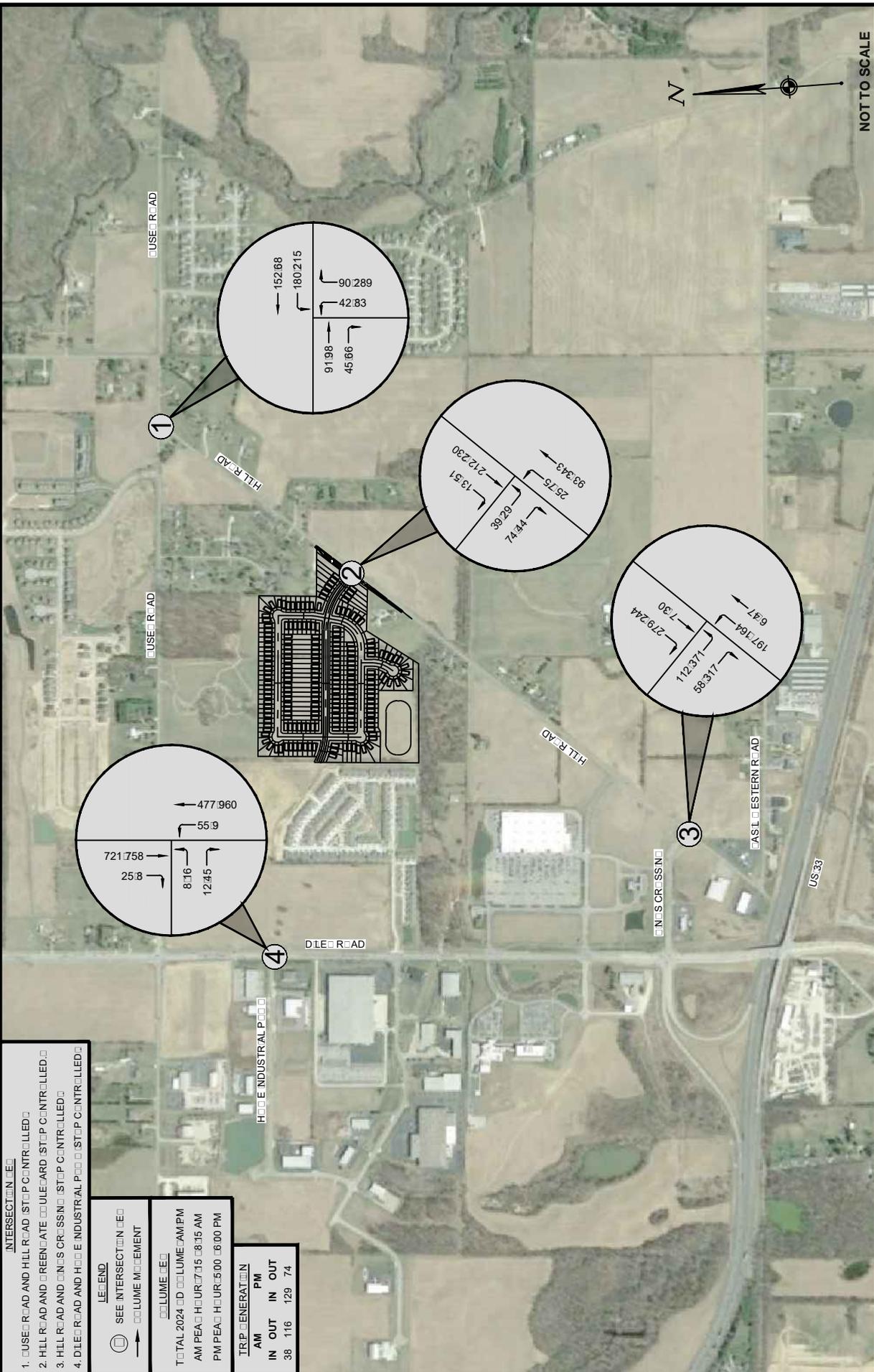
SEE INTERSECTION
 VOLUME MOVEMENT

VOLUME

TOTAL 2024
 AM PEAK HOUR: 7:15 - 8:15 AM
 PM PEAK HOUR: 5:00 - 6:00 PM

TRIP GENERATION

AM	PM
IN	OUT
38	116
129	74



NOT TO SCALE

FIGURE 13
DATE: 01/20/2020
PROJECT: 757010.01
DESIGN: TMC
DRAWING: TMC
CHECKED: REM
PAGE: 43

2024 BUILD EEDA PEAK HOUR TRAFFIC VOLUMES

REENATE RESIDENTIAL DEVELOPMENT

CANAL INCHESTER

FAIRFIELD COUNTY OHIO



- INTERSECTION**
1. USE ROAD AND HILL ROAD STOP CONTROLLED
 2. HILL ROAD AND REENATE DRIVE STOP CONTROLLED
 3. HILL ROAD AND IN'S CROSSING STOP CONTROLLED
 4. DIE ROAD AND HILL INDUSTRIAL STOP CONTROLLED

LEGEND

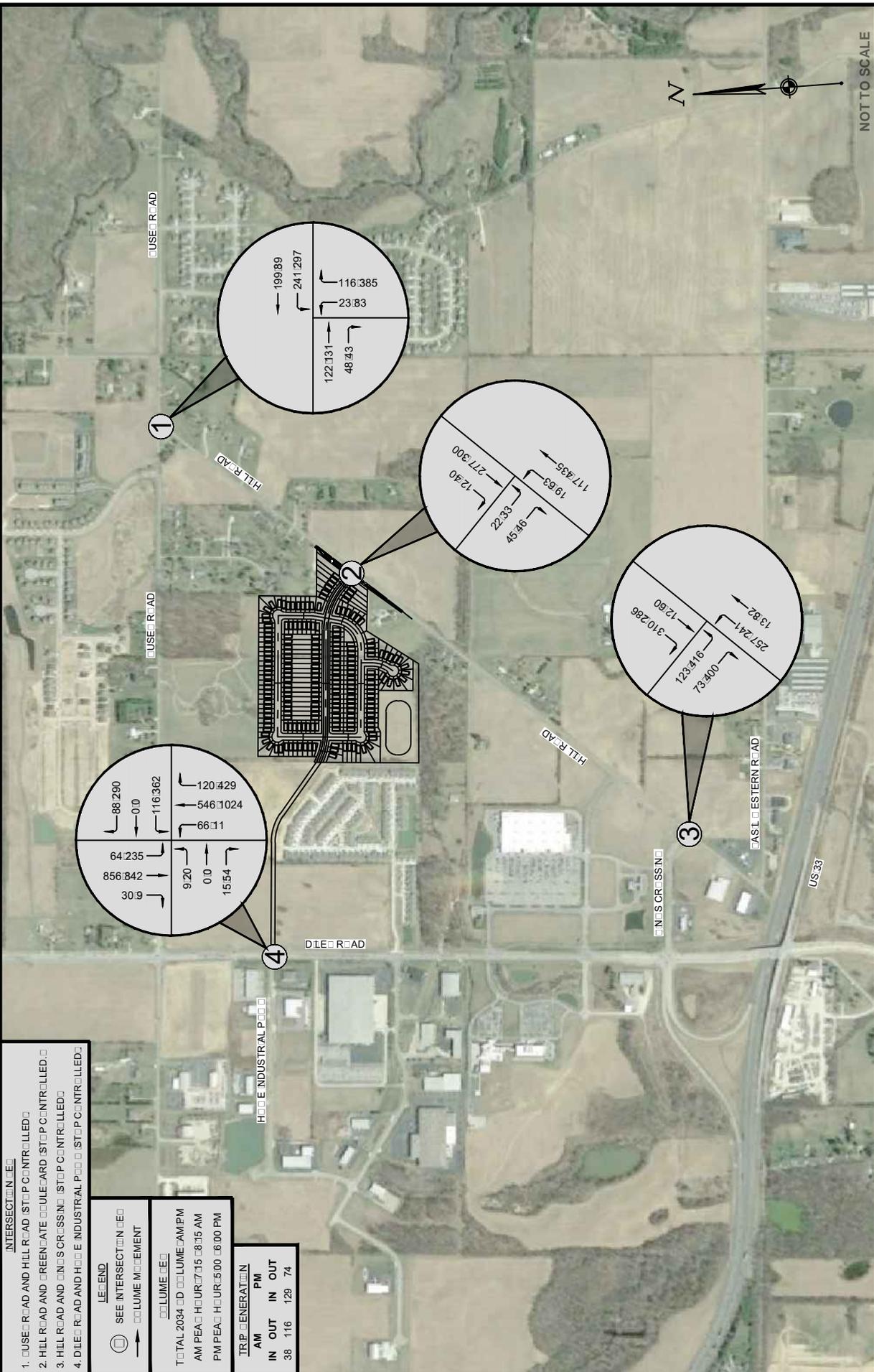
SEE INTERSECTION
 VOLUME MOVEMENT

VOLUME

TOTAL 2034 VOLUME AM/PM
 AM PEA HOUR 7:15 - 8:15 AM
 PM PEA HOUR 5:00 - 6:00 PM

TRIP GENERATION

AM	PM
IN	IN
OUT	OUT
38	116
129	74



DATE 01/20/2020
 DRAWING 757010.01
 TMC
 TMC
 REM
 44

2034 BUILD EEDA PEA HOUR TRAFFIC VOLUMES
 REENATE RESIDENTIAL DEVELOPMENT
 CANAL INCHESTER
 CAR COUNT

FIGURE 15
 NOT TO SCALE



7. Turn Lane Analysis

Right and left-turn lane analyses were completed using the turn lane warrant charts from the ODOT *Location & Design Manual – Volume I (July 2019)* and capacity analysis results. Based on discussions with the City of Canal Winchester and Fairfield County, a 45-mph design speed on Hill Road was to be used for the analyses, therefore, the high-speed turn lane warrant charts were used.

7.1. Right-Turn Lane Analysis

Table 9 provides a summary of the data utilized in the review of each study location for a right-turn lane.

**Table 9
 Year 2022-2034 Right-Turn Lane Warrant Review**

Intersection	Lane	Advancing Traffic (am/pm)	Right-Turn (am/pm)	Chart Used	Warranted
2022 No-Build Traffic Scenario					
Hill Road and Kings Crossing	WBR	198/215	197/190	Capacity	No/No
	SBR	139/588	55/301	Capacity	No/No
2022 Build Traffic Scenario					
Hill Road and Greengate Boulevard	WBR	202/232	4/14	401-6b	No/No
Hill Road and Kings Crossing	WBR	222/229	219/203	Capacity	No/No
	SBR	147/611	55/301	Capacity	No/No
2023 No-Build Traffic Scenario					
Hill Road and Kings Crossing	WBR	206/223	205/198	Capacity	No/No
	SBR	142/604	56/309	Capacity	No/No
2023 Build Traffic Scenario					
Hill Road and Greengate Boulevard	WBR	214/254	8/31	401-6b	No/No
Hill Road and Kings Crossing	WBR	251/250	246/223	Capacity	No/No
	SBR	157/646	56/309	Capacity	No/No
2024 No-Build Traffic Scenario					
Hill Road and Kings Crossing	WBR	212/230	211/204	Capacity	No/No
	SBR	147/619	58/317	Capacity	No/No
2024 Build Traffic Scenario					
Hill Road and Greengate Boulevard	WBR	225/281	13/51	401-6b	No/No
Hill Road and Kings Crossing	WBR	286/274	279/244	Capacity	No/No
	SBR	170/688	58/317	Capacity	No/No
2034 No-Build Traffic Scenario					
Hill Road and Greengate Boulevard	WBR	283/321	6/21	401-6b	No/No
Hill Road and Kings Crossing	WBR	283/322	276/266	Capacity	No/No
	SBR	185/781	73/400	Capacity	No/Yes
Diley Road & Howe Industrial Parkway/Greengate Boulevard	EBR	24/74	15/54	Capacity	No/No
	WBR	147/614	65/272	Capacity	No/No
	NBR	721/1430	109/395	Capacity	No/Yes
	SBR	942/1055	30/9	Capacity	No/No
2034 Build Traffic Scenario					
Hill Road and Greengate Boulevard	WBR	289/340	12/40	401-6b	No/No
Hill Road and Kings Crossing	WBR	322/346	310/286	Capacity	No/No
	SBR	196/816	73/400	Capacity	No/Yes
Diley Road & Howe Industrial Parkway/Greengate Boulevard	EBR	24/74	15/54	Capacity	No/No
	WBR	204/652	88/290	Capacity	No/No
	NBR	732/1464	120/429	Capacity	No/Yes
	SBR	950/1086	30/9	Capacity	No/No

7.2. Year 2022-2034 Right-Turn Lane Warrant Review Summary

According to capacity analysis results, a SB right-turn lane **is warranted** at the intersection of Hill Road and Kings Crossing starting in the 2034 No-Build Scenario. In addition, a NB right-turn lane **is warranted** at the intersection of Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection starting in the 2034 No-Build Scenario.

7.3. Left-Turn Lane Analysis

Table 10 provides a summary of the data utilized in the review of each study location for a left-turn lane.

Table 10
Year 2022-2034 Left-Turn Lane Warrant Review

Intersection	Lane	Advancing Traffic (am/pm)	Opposing Traffic (am/pm)	Left-Turn Volume (am/pm)	% Left Turns	Chart Used	Warranted
2022 No-Build Traffic Scenario							
Hill Road and Busey Road	NBL	87/326	309/253	13/59	15%/18%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	188/193	198/215	185/154	98%/80%	Capacity	No/No
	SBL	139/588	--	84/287	60%/49%	Capacity	No/No
2022 Build Traffic Scenario							
Hill Road and Busey Road	NBL	100/336	310/257	22/66	22%/20%	401-5b	No/Yes
Hill Road and Greengate Boulevard	EBL	96/351	202/232	9/25	9%/7%	401-5b	No/No
Hill Road and Kings Crossing	EBL	189/195	222/229	185/154	98%/79%	Capacity	No/No
	SBL	147/611	--	92/310	63%/51%	Capacity	No/No
2023 No-Build Traffic Scenario							
Hill Road and Busey Road	NBL	89/335	320/262	13/60	15%/18%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	194/199	206/223	191/159	98%/80%	Capacity	No/No
	SBL	142/604	--	86/295	61%/49%	Capacity	No/No
2023 Build Traffic Scenario							
Hill Road and Busey Road	NBL	113/353	322/270	30/73	27%/21%	401-5b	No/Yes
Hill Road and Greengate Boulevard	EBL	105/381	214/254	16/46	15%/12%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	195/203	251/250	191/159	98%/78%	Capacity	No/No
	SBL	157/646	--	101/337	64%/52%	Capacity	No/No
2024 No-Build Traffic Scenario							
Hill Road and Busey Road	NBL	93/343	329/270	14/62	15%/18%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	201/205	212/230	197/164	98%/80%	Capacity	No/No
	SBL	147/619	--	89/302	61%/49%	Capacity	No/No
2024 Build Traffic Scenario							
Hill Road and Busey Road	NBL	132/372	332/283	42/83	32%/22%	401-5b	No/Yes
Hill Road and Greengate Boulevard	EBL	118/418	225/281	25/75	21%/18%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	203/211	286/274	197/164	97%/78%	Capacity	No/No
	SBL	170/688	--	112/371	66%/54%	Capacity	No/No
2034 No-Build Traffic Scenario							
Hill Road and Busey Road	NBL	122/457	436/373	17/79	14%/17%	401-5b	No/Yes
Hill Road and Greengate Boulevard	EBL	123/456	283/321	6/21	5%/5%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	268/316	283/322	257/241	96%/76%	Capacity	No/No
	SBL	185/781	--	112/381	61%/49%	Capacity	No/Yes
Diley Road and Howe/Greengate	WBL	147/614	24/74	82/342	56%/56%	Capacity	No/Yes
2034 Build Traffic Scenario							
Hill Road and Busey Road	NBL	139/468	440/386	23/83	17%/18%	401-5b	No/Yes
Hill Road and Greengate Boulevard	EBL	136/498	289/340	19/63	14%/13%	401-5b	No/Yes
Hill Road and Kings Crossing	EBL	270/323	322/346	257/241	95%/75%	Capacity	No/No
	SBL	196/816	--	123/416	63%/51%	Capacity	No/Yes
Diley Road and Howe/Greengate	WBL	204/652	24/74	116/362	57%/56%	Capacity	No/Yes

7.4. Year 2022-2034 Left-Turn Lane Warrant Review Summary

According to ODOT Chart 401-5b, a NB left-turn lane **is warranted** at the intersection of Hill Road and Busey Road starting in the 2022 No-Build Scenario. In addition, an EB left-turn lane **is warranted** at the intersection of Hill Road and Greengate Boulevard during the PM Peak Hour starting in the 2023 Build Scenario. According to capacity analysis results, a SB left-turn lane **is warranted** at the intersection of Hill Road and Kings Crossing starting in the 2034 No-Build Scenario. In addition, a WB left-turn lane **is warranted** at the intersection of Diley Road and Howe Industrial Parkway/Greengate Boulevard starting in the 2034 No-Build Scenario.

ODOT Chart 401-5b and 401-6b are located in Appendix G of the report.

8. Queue Length Analysis

8.1. Queue Length Analysis Procedure and Results

Queue length and turn lane storage length calculations were completed based upon procedures in the ODOT Location & Design Manual – Volume I, Section 400. Specifically, ODOT sheet 401-9E – Basis for Computing Length of Turn Lanes and sheet 401-10E – Storage Length at Intersections were used. The queue length analysis was conducted to provide the final design length of existing/proposed turn lanes under the 2022/2023/2024 and 2034 Build Traffic Scenarios. Table 11 summarizes the queue lengths required for the AM Peak Hour while Table 12 summarizes the queue lengths for the PM Peak Hour. ODOT Queue Length Resources are located in Appendix H.



Table 11
Queue Length Analysis - Year 2022-2034 (AM Peak Hour)

Intersection	Direction	Storage Length	DHW	No. of Lanes	Cycles /Hour	Avg. Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Turn Lane Length (ft)*	Queue Exceeds Ex or Prop Storage?	
									A	B	C			
2022 No-Build Traffic Scenario														
2022 Built Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	13	1	60	0.2	45	50	--	175	175	175	--	No
Hill Road & Busey Road	NBL	(125')	22	1	60	0.4	45	50	--	175	175	175	--	No
	SBL	(50')	13	1	60	0.2	30	50	100	--	--	100	--	No
	SBR	--	24	1	60	0.4	30	50	--	--	--	50	--	--
2023 No-Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	13	1	60	0.2	45	50	--	175	175	175	--	No
2023 Built Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	30	1	60	0.5	45	50	--	175	175	175	--	No
	EBL	(125')	16	1	60	0.3	45	50	--	175	--	175	--	No
	SBL	(50')	24	1	60	0.4	30	50	100	--	--	100	--	No
Hill Road & Greengate Blvd	SBR	--	45	1	60	0.8	30	50	--	--	--	50	--	--
	2024 No-Build Traffic Scenario													
2024 Built Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	14	1	60	0.2	45	50	--	175	175	175	--	No
Hill Road & Busey Road	NBL	(125')	42	1	60	0.7	45	50	--	175	175	175	--	No
	EBL	(125')	25	1	60	0.4	45	50	--	175	175	175	--	No
	SBL	(50')	39	1	60	0.7	30	50	100	--	--	100	--	No
Hill Road & Greengate Blvd	SBR	--	74	1	60	1.2	30	50	--	--	--	50	--	--

* Includes 50' diverging taper. (XX) - Proposed



Table 11 (Continued)
Queue Length Analysis - Year 2022-2034 (AM Peak Hour)

Intersection	Direction	Storage Length	DHV	No. of Lanes	Cycles /Hour	Avg. Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length (ft)*	Queue Exceeds Ex or Prop Storage?
									A	B	C			
2034 No-Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	17	1	60	0.3	45	50	--	175	175	--	175	No
	EBL	(125')	6	1	60	0.1	45	50	--	175	175	--	175	No
	SBL	(50')	5	1	60	0.1	30	50	100	--	--	--	100	No
	SBR	--	6	1	60	0.1	30	50	--	--	--	50	--	--
	SBL	(250')	112	1	40	2.8	40	150	--	125	265	--	215	No
	SBR	--	73	1	40	1.8	40	100	--	--	--	100	--	--
	EBL	100'	9	1	36	0.3	30	50	100	--	--	--	100	No
	EBTR	--	15	1	36	0.4	30	50	--	--	--	50	--	--
Diley Road & Howe/Greengate	WBL	(325')	82	2	36	1.1	30	50	100	--	--	--	150	No
	WBTR	--	65	1	36	1.8	30	100	--	--	100	--	--	--
	NBL	110' (195')	66	1	36	1.8	50	100	--	225	245	--	375	Yes
	NBT	--	546	2	36	7.6	50	325	--	--	--	325	--	--
	NBR	(545')	109	1	36	3.0	50	150	--	225	295	--	375	No
	SBL	(450')	56	1	36	1.6	50	100	--	225	245	--	500	No
	SBTR	--	886	2	36	12.3	50	450	--	--	--	450	--	--
	2034 Build Traffic Scenario													
Hill Road & Busey Road	NBL	(125')	23	1	60	0.4	45	50	--	175	175	--	175	No
	EBL	(125')	19	1	60	0.3	45	50	--	175	175	--	175	No
Hill Road & Greengate Blvd	SBL	(50')	22	1	60	0.4	30	50	100	--	--	--	100	No
	SBR	--	45	1	60	0.8	30	50	--	--	50	--	--	--
Hill Road & Kings Crossing	SBL	(250')	123	1	40	3.1	40	150	--	125	265	--	215	No
	SBR	--	73	1	40	1.8	40	100	--	--	100	--	--	--
Diley Road & Howe/Greengate	EBL	100'	9	1	36	0.3	30	50	100	--	--	--	100	No
	EBTR	--	15	1	36	0.4	30	50	--	--	50	--	--	--
	WBL	(325')	116	2	36	1.6	30	100	150	--	--	--	150	No
	WBTR	--	88	1	36	2.4	30	100	--	--	100	--	--	--
	NBL	110' (195')	66	1	36	1.8	50	100	--	225	245	--	375	Yes
	NBT	--	546	2	36	7.6	50	325	--	--	--	325	--	--
Hill Road & Kings Crossing	NBR	(545')	120	1	36	3.3	50	150	--	225	295	--	375	No
	SBL	(450')	64	1	36	1.8	50	100	--	225	245	--	500	No
SBTR	--	886	2	36	12.3	50	450	--	--	--	450	--	--	

* Includes 50' diverging taper. (XX) - Proposed



Table 12
Queue Length Analysis - Year 2022-2034 (PM Peak Hour)

Intersection	Direction	Storage Length	DHW	No. of Lanes	Cycles /Hour	Avg. Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Turn Lane Length (ft)*	Queue Exceeds Ex or Prop Storage?	
									A	B	C			
2022 No-Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	59	1	60	1.0	45	50	--	175	175	175	--	No
2022 Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	66	1	60	1.1	45	50	--	175	175	175	--	No
Hill Road & Greengate Blvd	SBL	(50')	10	1	60	0.2	30	50	100	--	--	100	--	No
	SBR	--	14	1	60	0.2	30	50	--	--	--	50	--	--
2023 No-Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	60	1	60	1.0	45	50	--	175	175	175	--	No
2023 Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	73	1	60	1.2	45	50	--	175	175	175	--	No
Hill Road & Greengate Blvd	EBL	(125')	46	1	60	0.8	45	50	--	175	175	175	--	No
	SBL	(50')	18	1	60	0.3	30	50	100	--	--	100	--	No
	SBR	--	27	1	60	0.5	30	50	--	--	--	50	--	--
2024 No-Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	62	1	60	1.0	45	50	--	175	175	175	--	No
2024 Build Traffic Scenario														
Hill Road & Busey Road	NBL	(125')	83	1	60	1.4	45	50	--	175	175	175	--	No
Hill Road & Greengate Blvd	EBL	(125')	75	1	60	1.3	45	50	--	175	175	175	--	No
	SBL	(50')	29	1	60	0.5	30	50	100	--	--	100	--	No
	SBR	--	44	1	60	0.7	30	50	--	--	--	50	--	--

* Includes 50' diverging taper. (XX) - Proposed



Table 12 (Continued)
Queue Length Analysis - Year 2022-2034 (PM Peak Hour)

Intersection	Direction	Storage Length	DHW	No. of Lanes	Cycles /Hour	Avg. Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length (ft)*	Queue Exceeds Ex or Prop Storage?	
									A	B	C				
2034 No-Build Traffic Scenario															
Hill Road & Bussey Road	NBL	(125')	79	1	60	1.3	45	50	100	--	175	175	--	175	No
	EBL	(125')	21	1	60	0.4	45	50	--	--	175	175	--	175	No
	SBL	(50')	22	1	60	0.4	30	50	100	--	--	--	--	100	No
	SBR	--	22	1	60	0.4	30	50	--	--	--	--	50	--	--
	SBL	(250')	381	1	40	9.5	40	375	--	--	125	490	--	490	Yes
	SBR	--	400	1	40	10.0	40	375	--	--	--	--	375	--	--
	EBL	100'	20	1	36	0.6	30	50	100	--	--	--	--	150	No
	EBTR	--	54	1	36	1.5	30	100	--	--	--	--	100	--	--
Diley Road & Howe/Greengate	WBL	(325')	342	2	36	4.8	30	200	250	--	--	--	--	375	No
	WBTR	--	272	1	36	7.6	30	325	--	--	--	--	325	--	--
	NBL	110' (195')	11	1	36	0.3	50	50	--	--	225	195	--	550	Yes
	NBT	--	1024	2	36	14.2	50	500	--	--	--	--	500	--	--
	NBR	(545')	395	1	36	11.0	50	400	--	--	225	545	--	550	No
	SBL	(450')	204	1	36	5.7	50	250	--	--	225	395	--	500	No
	SBTR	--	851	2	36	11.8	50	450	--	--	--	--	450	--	--
2034 Build Traffic Scenario															
Hill Road & Bussey Road	NBL	(125')	83	1	60	1.4	45	50	--	--	175	175	--	175	No
	EBL	(125')	63	1	60	1.1	45	50	--	--	175	175	--	175	No
	SBL	(50')	33	1	60	0.6	30	50	100	--	--	--	--	100	No
	SBR	--	46	1	60	0.8	30	50	--	--	--	--	50	--	--
Hill Road & Kings Crossing	SBL	(250')	416	1	40	10.4	40	375	--	125	490	--	--	490	Yes
	SBR	--	400	1	40	10.0	40	375	--	--	--	--	375	--	--
	EBL	100'	20	1	36	0.6	30	50	100	--	--	--	--	150	No
	EBTR	--	54	1	36	1.5	30	100	--	--	--	--	100	--	--
Diley Road & Howe/Greengate	WBL	(325')	362	2	36	5.0	30	200	250	--	--	--	--	375	No
	WBTR	--	290	1	36	8.1	30	325	--	--	--	--	325	--	--
	NBL	110' (195')	11	1	36	0.3	50	50	--	--	225	195	--	550	Yes
	NBT	--	1024	2	36	14.2	50	500	--	--	--	--	500	--	--
	NBR	(545')	429	1	36	11.9	50	450	--	--	225	595	--	595	No
	SBL	(450')	235	1	36	6.5	50	275	--	--	225	420	--	500	No
SBTR	--	851	2	36	11.8	50	450	--	--	--	--	450	--	--	

* Includes 50' diverging taper. (XX) - Proposed

8.2. Queue Length Analysis Summary

CESO reviewed all study locations to determine if calculated queue lengths exceeded existing or proposed turn lane storage lengths. The queue length analysis revealed the following:

- The proposed SBL turn lane at the Hill Road and Kings Crossing intersection does not meet the ODOT required storage length due to physical constraints at the intersection.
- The NBL turn lane at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection does not meet the ODOT required backup length. Due to the minimal left-turning volume, the turn lane length was recommended to provide the ODOT required storage length only.
- All other queue lengths do not exceed the existing or proposed storage length.

9. Signal Warrant Analysis

The following Traffic Signal Warrant Study was performed according to the specifications stated in the Ohio Manual of Uniform Traffic Control Devices (OMUTCD), Section 4C, for the following intersections:

- Hill Road and Kings Crossing
- Diley Road and Howe Industrial Parkway/Greengate Boulevard

9.1. Traffic Signal Warrants

In accordance with the OMUTCD, Chapter 4C, the aforementioned study intersections were tested against the following nine (9) warrants:

- Warrant 1 – Eight-Hour Vehicular Volume.
- Warrant 2 – Four-Hour Vehicular Volume.
- Warrant 3 – Peak Hour.
- Warrant 4 – Pedestrian Volume.
- Warrant 5 – School Crossing.
- Warrant 6 – Coordinated Signal System.
- Warrant 7 – Crash Experience.
- Warrant 8 – Roadway Network.
- Warrant 9 – Intersection near a Grade Crossing.

While meeting one or more warrants is not considered sufficient justification for the installation of a traffic signal, it is necessary to do so before a signal can be considered.

Examination of the 9 warrants shows that not all warrants are appropriate for consideration at the studied locations. For example, it would not be appropriate to consider Warrant 4 – Pedestrian Volume or Warrant 5 – School Crossing at this location. **The specific warrants that were analyzed include Warrants 1, 2, and 3.** These warrants are discussed in the sections below.

Note: PC Warrants Version 2.0 was used for the Signal Warrant Analysis.

The volumes used in the Traffic Signal Warrant Study are attached in Appendix I.

It should be noted that according to the OMUTCD, when the 85th percentile speed of the major street traffic under study exceeds 40 mph or in an isolated community with a population of less than 10,000, the vehicular volume requirements for Warrants 1, 2, and 3 can be reduced to seventy percent (70%) of the vehicular volume requirements. The posted speed limit on Diley Road is 45 mph and the assumed design speed on Hill Road is 45 mph. Therefore, the seventy percent (70%) factor was applied at both intersections.

9.2. Warrant 1 – Eight Hour Vehicular Volume

According to the OMUTCD, two conditions need to be examined to determine if this warrant is satisfied. The Minimum Vehicular Volume condition (Condition A) "... is intended for application where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal." The Interruption of Continuous Traffic condition (Condition B) "... is intended for application where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street."

It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

The following conditions must exist for any eight (8) hours of an average day for a traffic control signal to be considered:

2022/2023/2024/2034 Traffic Scenarios – Hill Road and Kings Crossing (1 Lane Major/1 Lane Minor):

- Condition A: The major street traffic volume must exceed 350 vehicles (total of both approaches) per hour, while the minor street traffic volume must exceed 105 vehicles (higher volume approach) for the same eight (8) hours.
- Condition B: The major street traffic volume must exceed 525 vehicles (total of both approaches) per hour, while the minor street traffic volume must exceed 53 vehicles (higher volume approach) for the same eight (8) hours.
- Conditions A and B can be combined for locations where neither Condition A nor Condition B is satisfied. However, this combination should only be applied after a trial of other alternatives has failed to solve the traffic problems.

2022/2023/2024/2034 Traffic Scenarios – Diley Road and Howe/Greengate (2 Lane Major/2 Lane Minor):

- Condition A: The major street traffic volume must exceed 420 vehicles (total of both approaches) per hour, while the minor street traffic volume must exceed 140 vehicles (higher volume approach) for the same eight (8) hours.
- Condition B: The major street traffic volume must exceed 630 vehicles (total of both approaches) per hour, while the minor street traffic volume must exceed 70 vehicles (higher volume approach) for the same eight (8) hours.
- Conditions A and B can be combined for locations where neither Condition A nor Condition B is satisfied. However, this combination should only be applied after a trial of other alternatives has failed to solve the traffic problems.

Table 13 lists the Minimum Vehicular Volumes for Warrant 1 (Table 4C-1 from the OMUTCD).

Table 13
Minimum Vehicular Volumes for Warrant 1 (Table 4C-1 from the OMUTCD)
Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

^a Basic minimum hourly volume

^b Used for combination of Conditions A and B after adequate trial of other remedial measures

^c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

The traffic volumes were tested against the volume thresholds listed in Table 13 Minimum Vehicular Volumes for Warrant 1 (Table 4C-1 from the OMUTCD). Table 14 presents the results for the analysis of Warrant 1 – Eight-Hour Vehicular Volume.

Table 14
Summary of Warrant 1 – Eight-Hour Vehicular Volume

Traffic Scenario	Study Year	Warrant 1A Satisfied	Warrant 1B Satisfied	Warrant 1C Satisfied
Hill Road & Kings Crossing				
2022 No-Build Traffic Scenario	2022	No	No	No
2022 Build Traffic Scenario	2022	No	No	No
2023 No-Build Traffic Scenario	2023	No	No	No
2023 Build Traffic Scenario	2023	No	No	No
2024 No-Build Traffic Scenario	2024	No	No	No
2024 Build Traffic Scenario	2024	No	No	No
2034 No-Build Traffic Scenario	2034	Yes	No	No
2034 Build Traffic Scenario	2034	Yes	No	No
Diley Road & Howe/Greengate				
2034 No-Build Traffic Scenario	2034	Yes	Yes	Yes
2034 Build Traffic Scenario	2034	Yes	Yes	Yes

9.3. Warrant 2 – Four Hour Vehicular Volume

According to the OMUTCD, this warrant is “...intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.” Warrant 2 is satisfied when the vehicular volumes (summarized in Table 13) in each of four (4) hours of an average day fall above the appropriate curve of the graphs labeled as Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume. Table 15 presents the results for the analysis of Warrant 2 – Four-Hour Vehicular Volume.

**Table 15
 Summary of Warrant 2 – Four-Hour Vehicular Volume**

Traffic Scenario	Study Year	Warrant Satisfied
Hill Road & Kings Crossing		
2022 No-Build Traffic Scenario	2022	No
2022 Build Traffic Scenario	2022	No
2023 No-Build Traffic Scenario	2023	No
2023 Build Traffic Scenario	2023	Yes
2024 No-Build Traffic Scenario	2024	No
2024 Build Traffic Scenario	2024	Yes
2034 No-Build Traffic Scenario	2034	Yes
2034 Build Traffic Scenario	2034	Yes
Diley Road & Howe/Greengate		
2034 No-Build Traffic Scenario	2034	Yes
2034 Build Traffic Scenario	2034	Yes

9.4. Warrant 3 – Peak Hour

According to the OMUTCD, this warrant “...is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.”

A traffic control signal will be considered if the criteria in either of the following two categories are met:

- A. If all three of the following conditions exist for the same one (1) hour (any four consecutive 15-minute periods) of an average day:
 - The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, and;
 - The volume on the same minor-street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, and;
 - The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four or more approaches.
- B. For one hour of an average day, the vehicular volumes fall above the appropriate curve of the graphs labeled as Figure 4C-4. Warrant 3, Peak Hour.

Table 16 presents the results for the analysis of Warrant 3 – Peak-Hour Vehicular Volume.

Table 16
Summary of Warrant 3 – Peak Hour

Traffic Scenario	Study Year	Warrant 3A Satisfied	Warrant 3B Satisfied
Hill Road & Kings Crossing			
2022 No-Build Traffic Scenario	2022	Yes	Yes
2022 Build Traffic Scenario	2022	Yes	Yes
2023 No-Build Traffic Scenario	2023	Yes	Yes
2023 Build Traffic Scenario	2023	Yes	Yes
2024 No-Build Traffic Scenario	2024	Yes	Yes
2024 Build Traffic Scenario	2024	Yes	Yes
2034 No-Build Traffic Scenario	2034	Yes	Yes
2034 Build Traffic Scenario	2034	Yes	Yes
Diley Road & Howe/Greengate			
2034 No-Build Traffic Scenario	2034	Yes	Yes
2034 Build Traffic Scenario	2034	Yes	Yes

9.5. Traffic Signal Warrant Study Summary

The following summary was generated based upon the findings in the Traffic Signal Warrant Study.

- Warrant 1 – Eight-Hour Vehicular Volume **is satisfied** at the intersection of Hill Road & Kings Crossing under the 2034 No-Build and Build Scenarios and **is satisfied** at the intersection of Diley Road & Howe/Greengate under the 2034 No-Build and Build Traffic Scenarios.
- Warrant 2 – Four-Hour Vehicular Volume **is satisfied** at the intersection of Hill Road & Kings Crossing under the 2034 No-Build and 2023/2024/2034 Build Traffic Scenario and **is satisfied** at the intersection of Diley Road & Howe/Greengate under the 2034 No-Build and Build Traffic Scenarios.
- Warrant 3 – Peak Hour Vehicular Volume **is satisfied** at the intersection of Hill Road and Kings Crossing under all No-Build and Build Traffic Scenarios and **is satisfied** at the intersection of Diley Road & Howe/Greengate under all No-Build and Build Traffic Scenarios.
- Based on satisfying multiple warrants, CESO recommends that a signal be installed at both of the study intersections.

Detailed Signal Warrant Study calculations are located in Appendix I of the report.

10. Summary of Recommendations

10.1. Recommendations

Based upon the results of the Traffic Impact Study conducted for the proposed Greengate Development, CESO has generated the following summary of recommendations. All recommendations are illustrated on Figures 16.A-16D.

2022 No-Build Traffic Scenario (Responsibility – Others):

Hill Road & Busey Road:

- Construct NB to WB left-turn lane to provide 125 feet of storage plus a 50-foot taper.

Hill Road & Kings Crossing:

- Construct 2-phase traffic signal with a 90 second cycle length.

2022 Build Traffic Scenario, Tentative Opening Year for Phase I & II – 63 Lots (Responsibility – Cap 5 Development):

Hill Road & Greengate Boulevard:

- Construct full access roadway connection to Hill Road, which will be named 'Greengate Boulevard'. Provide one outbound left-turn lane, one outbound right-turn lane, and one inbound lane. The outbound left-turn lane shall provide 50 feet of storage plus a 50-foot taper. Control Greengate Boulevard with one stop sign.

2023 Build Traffic Scenario, Tentative Opening Year for Phase III & V – 53 Lots (Responsibility – Cap 5 Development):

Hill Road & Greengate Boulevard:

- Construct EB to NB left-turn lane to provide 125 feet of storage plus a 50-foot taper.

2034 No-Build Traffic Scenario (Responsibility – Others):

Hill Road & Kings Crossing:

- Construct SB to EB left-turn lane to provide 250 feet of storage plus a 50-foot taper.

Diley Road & Howe Industrial Parkway/Greengate Boulevard:

- Construct extension of Greengate Boulevard to connect with Diley Road. Provide two outbound left-turn lanes, one outbound thru-right turn lane, and one inbound lane. Construct the dual WB to SB left-turn lanes to provide 325 feet of storage plus a 50-foot taper.
- Extend NB to WB left-turn lane to provide 195 feet of storage plus a 50-foot taper.
- Construct NB to EB right-turn lane to provide 545 feet of storage plus a 50-foot taper.
- Construct SB to EB left-turn lane to provide 450 feet of storage plus a 50-foot taper.
- Construct 4-phase traffic signal with a 100 second cycle length. Provide a right-turn overlap for the NB to EB right-turn lane.



2034 Build Traffic Scenario, All Phases Constructed (Responsibility – Cap 5 Development):

- No further improvements are required.



NOT TO SCALE

FIGURE 16-A
DATE 01/20/2020
DRAWING 757010.01
DESIGNING TMC
DRAWING TMC
CHECKED REM
PAGE 61

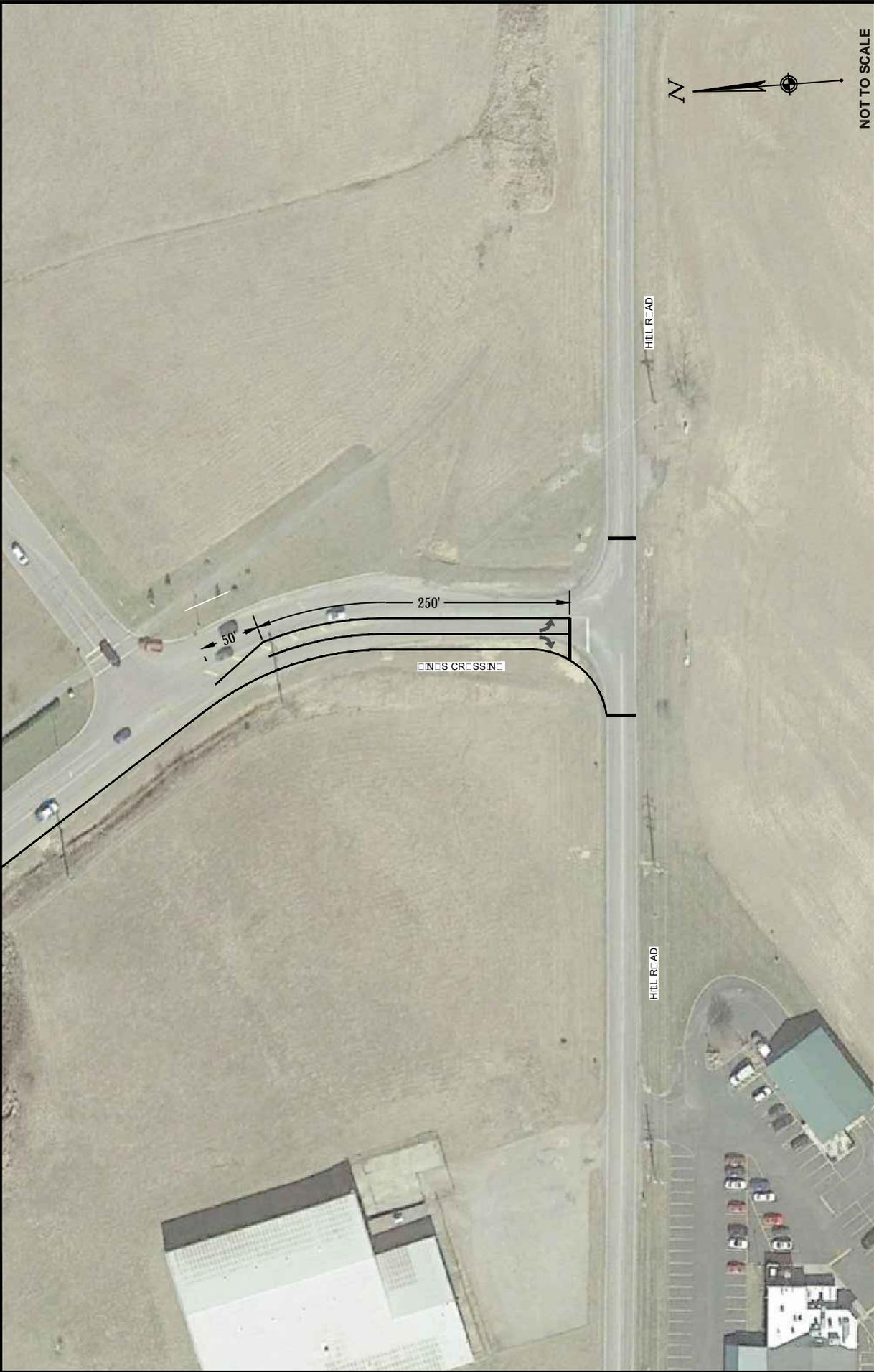
RECOMMENDED IMPROVEMENTS AT INTERSECTION OF HILL ROAD AND USE ROAD

REENTRANT RESIDENTIAL DEVELOPMENT

CANAL INCHESTER

COUNT





NOT TO SCALE

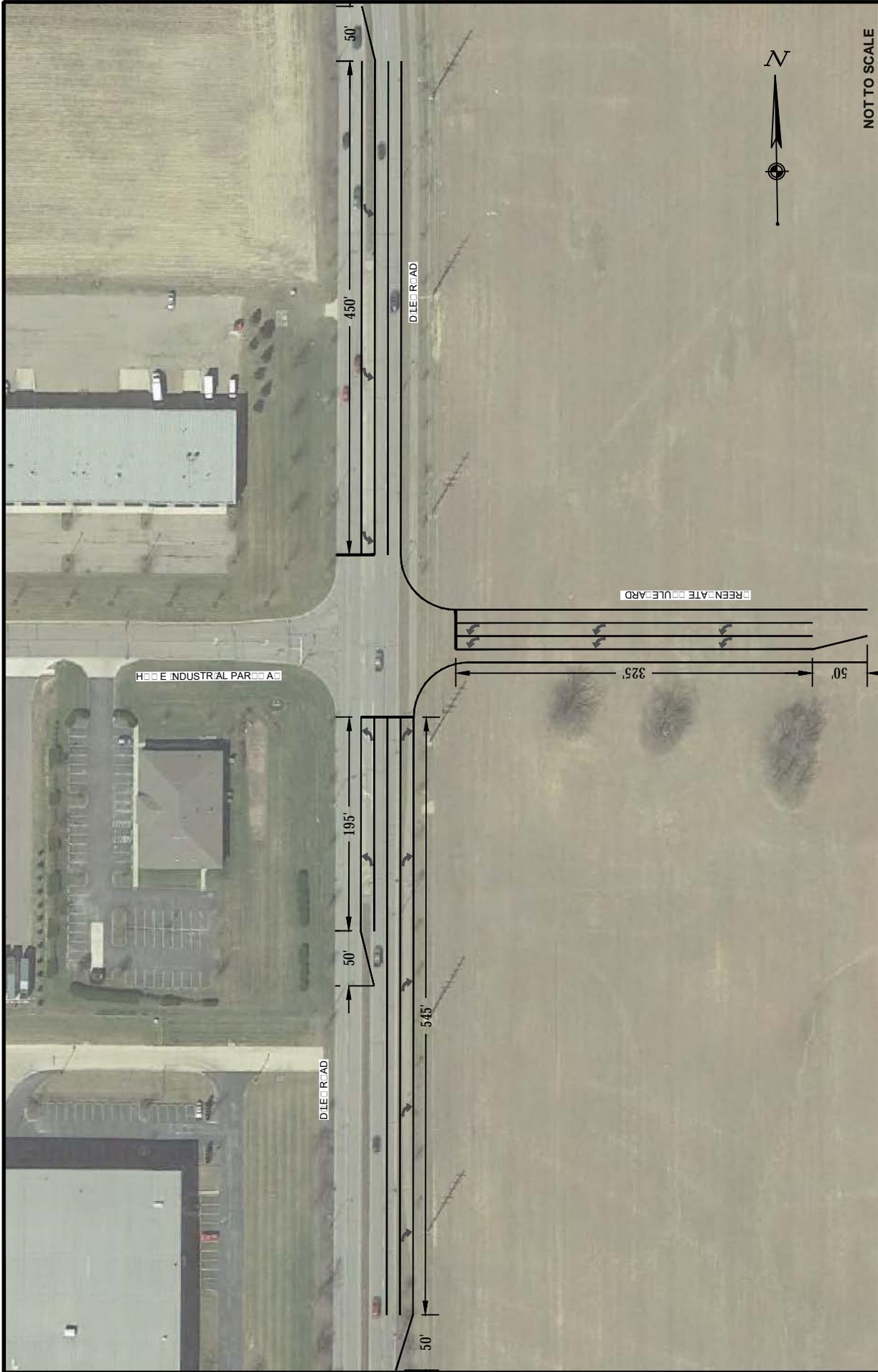
FIGURE 16-C
DATE 01/20/2020
DRAWING NO. 757010.01
DESIGNING TMC
DRAWING TMC
CHECKED REM
PAGE 63

RECOMMENDED IMPROVEMENTS AT INTERSECTIONS OF HILL ROAD AND CROSS ROAD

REINSTATE RESIDENTIAL DEVELOPMENT

CITY OF CHESTER CANAL CHESTER COUNTY FIELD COUNT





NOT TO SCALE

FIGURE 16.D
DATE 01/20/2020
PROJECT 757010.01
DESIGN TMC
DRAWING TMC
CHECKED REM
PAGE 64

RECOMMENDED IMPROVEMENTS AT INTERSECTIONS AT DILE ROAD AND HOO E INDUSTRIAL PARK A

RENEWABLE RESIDENTIAL DEVELOPMENT

CITY OF WINCHESTER

CARFIELD COUNTY



APPENDIX A
MEMORANDUM OF UNDERSTANDING BETWEEN
CESO/CITY OF CANAL WINCHESTER DATED 01-20-20

MEMORANDUM OF UNDERSTANDING

TO: William Sims, City of Canal Winchester Construction Services Administrator
Mathew Peoples, City of Canal Winchester DPS

CC: Jon Buchanon, P.E., CESO Project Manager

FROM: Robert Matko, PE, PS, PTOE, CESO Engineering Manager

DATE: January 20, 2020

SUBJECT: Traffic Impact Study Scope
Proposed Residential Development
West side of Hill Road, South of Busey Road
City of Canal Winchester, Ohio

The following TIS Scope was prepared based on past experience with traffic impact studies within the City of Canal Winchester area. Please review the following tasks and provide your concurrence prior to commencing with the study.

Traffic Impact Study Scope:

The proposed Residential Development is a subdivision located on the west side of Hill Road, south of Busey Road, within the City of Canal Winchester, Fairfield County, OH. The Residential Development is proposing to develop 197 lots over three (3) phases consisting of the following:

- Phase I (2022 Opening Year):
 - Single-Family Detached Housing – 75 Lots.
- Phase II (2023 Opening Year):
 - Single-Family Detached Housing – 61 Lots.
- Phase III (2024 Opening Year):
 - Single-Family Detached Housing – 61 Lots.

1. Conduct weekday (Tuesday – Thursday) peak hour (6:00 – 9:00 am and 3:00 – 6:00 pm) turning movement traffic counts at the following study intersections.

- Hill Road & Busey Road (stop sign controlled)
- Hill Road & Kings Crossing (stop sign controlled)
- Diley Road & Howe Industrial Parkway (Stop Controlled)

Traffic counts will be conducted by our sub-consultant (Miovision) and will be video collected and downloaded for the above referenced hours.

2. Inventory the existing roadway system (existing traffic controls, signage, and lane geometry).

3. Perform capacity analysis (Existing Traffic Scenario ~ 2019) at the study intersections during the peak study hours.

Perform capacity analyses using procedures documented in the most recent edition of the Highway Capacity Manual (HCS 7.8.5) at the study intersections utilizing 2019 Existing traffic volumes during the study peak hour time periods.

4. Traffic Growth Rate

CESO will contact the City of Canal Winchester/MORPC for growth rates to be used in the analysis. This growth rate will be applied to the 2019 Weekday Peak Hour Traffic Volumes to arrive at 2022/2023/2024 and 2034 Weekday Peak Hour No-Build Traffic Volumes.

5. 2022/2023 and 2024 No-Build Traffic Volumes

Apply growth rate from #4 to the 2019 Existing weekday peak hour traffic volumes to arrive at 2022/2023 and 2024 No-Build Traffic Volumes.

6. Perform capacity analysis (2022/2023 and 2024 No-Build Traffic Scenario) at the study intersections during the peak study hours.

Perform capacity analyses using procedures documented in the most recent edition of the Highway Capacity Manual (HCS 7.8.5) at the study intersections utilizing 2022/2023 and 2024 No-Build traffic volumes during the study peak hour time periods.

7. Prepare trip generation

Prepare trip generation for the proposed Residential Development using the Institute of Transportation Engineers *Trip Generation* manual, 10th edition.

8. Determine directional distribution of development traffic

The directional distribution of Residential Development traffic will be based on population and existing traffic patterns within the study area.

9. Assign project traffic.

Based on the traffic projections, the Residential Development generated traffic volumes will be assigned to the adjacent street network.

10. 2022/2023 and 2024 Build Traffic Volumes.

Add 2022/2023 and 2024 No-Build traffic volumes to the Residential Development Site Generated traffic to arrive at 2022/2023 and 2024 Build Traffic Volumes.

11. Perform capacity analysis (2022/2023 and 2024 Build Traffic Scenario) at the study intersections and site driveways during the peak study hours.

Perform capacity analyses using procedures documented in the most recent edition of the Highway Capacity Manual (HCS 7.8.5) at the study intersections and site driveways utilizing 2022/2023 and 2024 Build traffic volumes during the study peak hour time periods.

12. 2034 No-Build Traffic Volumes

Apply growth rate from #4 to the 2019 Existing weekday peak hour traffic volumes for fifteen (15) years to arrive at 2034 No-Build Traffic Volumes.

13. Perform capacity analysis (2034 No-Build Traffic Scenario) at the study intersections during the peak study hours.

Perform capacity analyses using procedures documented in the most recent edition of the Highway Capacity Manual (HCS 7.8.5) at the study intersections utilizing 2034 No-Build traffic volumes during the study peak hour time periods.

14. 2034 Design Year traffic scenario

2034 Design Year traffic volumes consist of adding the 2034 No-Build traffic volumes with the Residential Development Generated traffic volumes.

15. Perform capacity analysis (2034 Design Year Traffic Scenario) at the study intersections and Site Driveways during the peak study hours.

Perform capacity analyses using procedures documented in the most recent edition of the Highway Capacity Manual (HCS 7.8.5) at the study intersections and site driveway utilizing 2030 Design Year traffic volumes during the study peak hour time periods.

16. Perform turn lane warrant/queuing analysis

Perform turn lane warrant/queuing analysis to determine if turn lanes or turn lane extensions are required at the study intersections and Site Driveway(s).

17. Based on Projected traffic volumes, recommend geometry for the proposed Residential Development.

Based on the projected volumes from the analysis, CESO will recommend the geometry for the proposed Residential Development including turn lane length calculations at the study intersections and site driveway(s) per ODOT L&D Manual, Figure 401-9E. In addition, turn lane length determinations for study access points/intersections will also need to consider queue lengths predicted by capacity analysis for the design year.

18. Prepare a written report summarizing the study process, conclusions, and recommendations

Prepare a detailed report and submit to the City of Canal Winchester for review and approval.

APPENDIX B
EXISTING TRAFFIC COUNT DATA

Hill Road & Busey Road - TMC

Thu Dec 12, 2019

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732093, Location: 39.857599, -82.763316



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Busey Rd Eastbound				Busey Rd Westbound				Hill Rd Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2019-12-12 6:00AM	2	8	0	10	42	5	0	47	0	4	0	4	61
6:15AM	3	14	0	17	31	7	0	38	3	12	0	15	70
6:30AM	10	7	0	17	38	18	0	56	1	17	0	18	91
6:45AM	15	8	0	23	53	19	0	72	5	19	0	24	119
Hourly Total	30	37	0	67	164	49	0	213	9	52	0	61	341
7:00AM	9	12	0	21	31	22	0	53	1	12	0	13	87
7:15AM	13	9	0	22	40	26	0	66	3	17	0	20	108
7:30AM	34	2	0	36	39	38	0	77	1	16	0	17	130
7:45AM	22	11	0	33	44	31	0	75	4	20	0	24	132
Hourly Total	78	34	0	112	154	117	0	271	9	65	0	74	457
8:00AM	7	7	0	14	27	34	0	61	4	12	0	16	91
8:15AM	17	4	0	21	33	13	0	46	3	23	0	26	93
8:30AM	12	14	0	26	37	15	0	52	3	15	0	18	96
8:45AM	6	6	0	12	36	19	0	55	8	15	0	23	90
Hourly Total	42	31	0	73	133	81	0	214	18	65	0	83	370
3:00PM	17	11	0	28	48	37	0	85	6	38	0	44	157
3:15PM	23	5	0	28	30	14	0	44	3	42	0	45	117
3:30PM	27	3	0	30	35	21	0	56	6	28	0	34	120
3:45PM	20	8	0	28	45	22	0	67	12	28	0	40	135
Hourly Total	87	27	0	114	158	94	0	252	27	136	0	163	529
4:00PM	17	8	0	25	37	29	0	66	8	53	0	61	152
4:15PM	22	12	0	34	54	14	0	68	9	56	0	65	167
4:30PM	26	11	0	37	30	12	0	42	8	50	0	58	137
4:45PM	20	12	0	32	31	15	0	46	13	45	0	58	136
Hourly Total	85	43	0	128	152	70	0	222	38	204	0	242	592
5:00PM	20	4	0	24	44	14	0	58	13	59	0	72	154
5:15PM	16	5	0	21	48	14	0	62	9	60	0	69	152
5:30PM	26	6	0	32	36	14	0	50	20	66	0	86	168
5:45PM	20	8	0	28	42	16	0	58	12	53	0	65	151
Hourly Total	82	23	0	105	170	58	0	228	54	238	0	292	625
Total	404	195	0	599	931	469	0	1400	155	760	0	915	2914
% Approach	67.4%	32.6%	0%	-	66.5%	33.5%	0%	-	16.9%	83.1%	0%	-	-
% Total	13.9%	6.7%	0%	20.6%	31.9%	16.1%	0%	48.0%	5.3%	26.1%	0%	31.4%	-
Lights	382	190	0	572	908	444	0	1352	155	751	0	906	2830
% Lights	94.6%	97.4%	0%	95.5%	97.5%	94.7%	0%	96.6%	100%	98.8%	0%	99.0%	97.1%
Articulated Trucks and Single-Unit Trucks	8	1	0	9	12	11	0	23	0	7	0	7	39
% Articulated Trucks and Single-Unit Trucks	2.0%	0.5%	0%	1.5%	1.3%	2.3%	0%	1.6%	0%	0.9%	0%	0.8%	1.3%
Buses	14	4	0	18	11	14	0	25	0	2	0	2	45
% Buses	3.5%	2.1%	0%	3.0%	1.2%	3.0%	0%	1.8%	0%	0.3%	0%	0.2%	1.5%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Busey Road - TMC

Thu Dec 12, 2019

Full Length (6 AM-9 AM, 3 PM-6 PM)

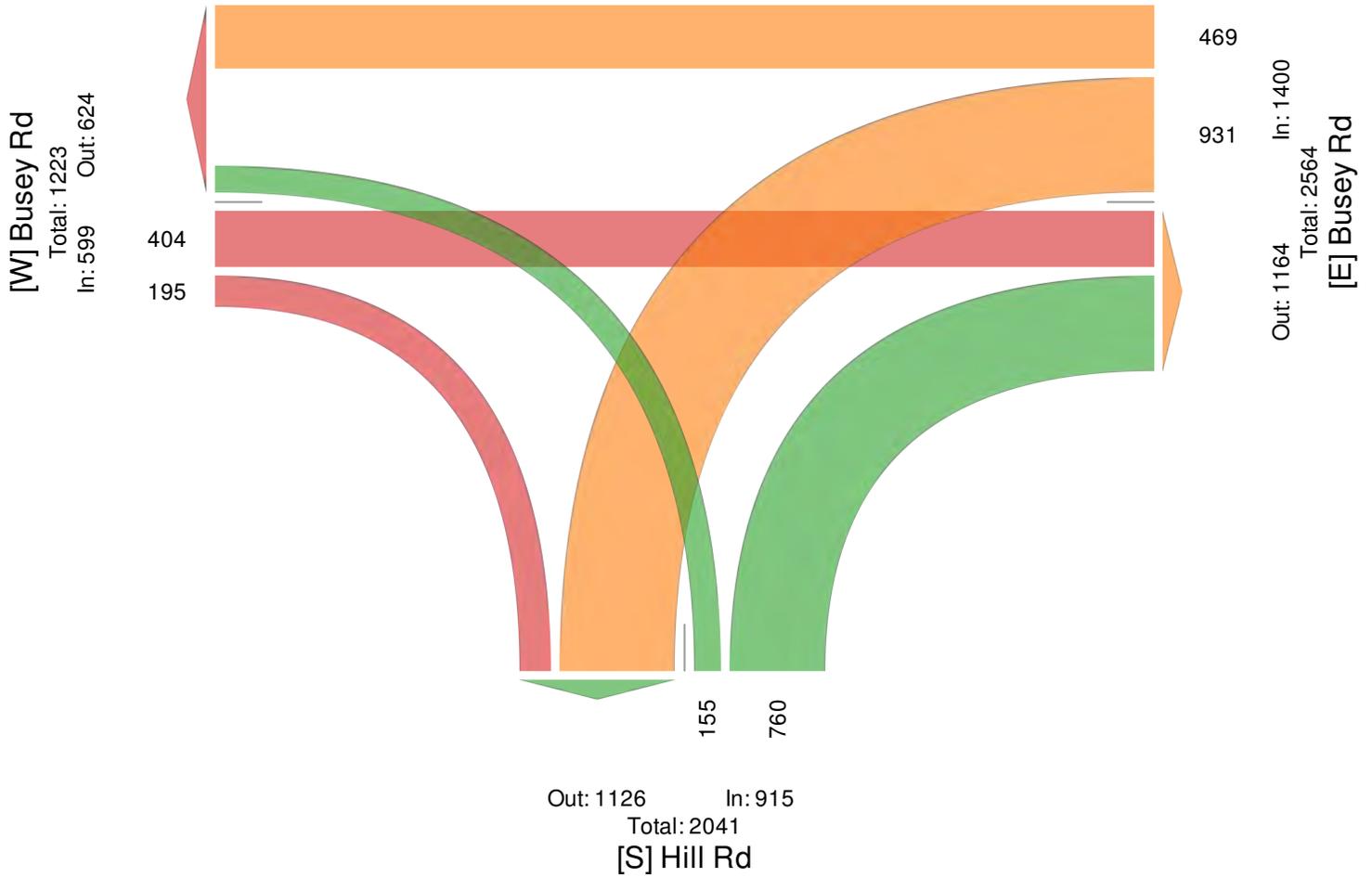
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732093, Location: 39.857599, -82.763316



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Hill Road & Busey Road - TMC

Thu Dec 12, 2019

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732093, Location: 39.857599, -82.763316



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Busey Rd Eastbound				Busey Rd Westbound				Hill Rd Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2019-12-12 7:15AM	13	9	0	22	40	26	0	66	3	17	0	20	108
7:30AM	34	2	0	36	39	38	0	77	1	16	0	17	130
7:45AM	22	11	0	33	44	31	0	75	4	20	0	24	132
8:00AM	7	7	0	14	27	34	0	61	4	12	0	16	91
Total	76	29	0	105	150	129	0	279	12	65	0	77	461
% Approach	72.4%	27.6%	0%	-	53.8%	46.2%	0%	-	15.6%	84.4%	0%	-	-
% Total	16.5%	6.3%	0%	22.8%	32.5%	28.0%	0%	60.5%	2.6%	14.1%	0%	16.7%	-
PHF	0.559	0.659	-	0.729	0.852	0.849	-	0.906	0.750	0.813	-	0.802	0.873
Lights	73	29	0	102	140	125	0	265	12	63	0	75	442
% Lights	96.1%	100%	0%	97.1%	93.3%	96.9%	0%	95.0%	100%	96.9%	0%	97.4%	95.9%
Articulated Trucks and Single-Unit Trucks	1	0	0	1	5	2	0	7	0	2	0	2	10
% Articulated Trucks and Single-Unit Trucks	1.3%	0%	0%	1.0%	3.3%	1.6%	0%	2.5%	0%	3.1%	0%	2.6%	2.2%
Buses	2	0	0	2	5	2	0	7	0	0	0	0	9
% Buses	2.6%	0%	0%	1.9%	3.3%	1.6%	0%	2.5%	0%	0%	0%	0%	2.0%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Busey Road - TMC

Thu Dec 12, 2019

AM Peak (7:15 AM - 8:15 AM)

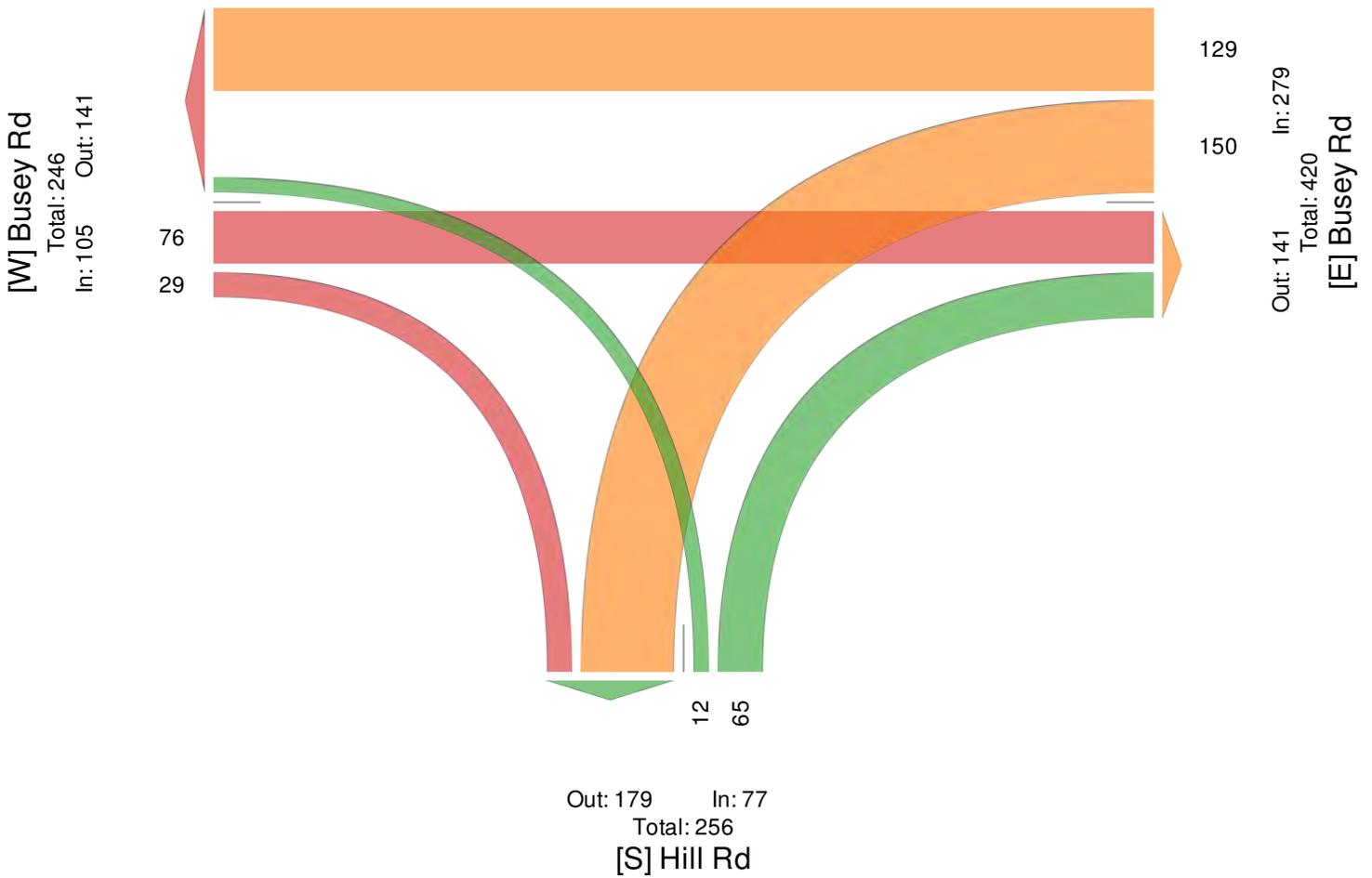
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732093, Location: 39.857599, -82.763316



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Hill Road & Busey Road - TMC

Thu Dec 12, 2019

PM Peak (5 PM - 6 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732093, Location: 39.857599, -82.763316



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Busey Rd Eastbound				Busey Rd Westbound				Hill Rd Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2019-12-12 5:00PM	20	4	0	24	44	14	0	58	13	59	0	72	154
5:15PM	16	5	0	21	48	14	0	62	9	60	0	69	152
5:30PM	26	6	0	32	36	14	0	50	20	66	0	86	168
5:45PM	20	8	0	28	42	16	0	58	12	53	0	65	151
Total	82	23	0	105	170	58	0	228	54	238	0	292	625
% Approach	78.1%	21.9%	0%	-	74.6%	25.4%	0%	-	18.5%	81.5%	0%	-	-
% Total	13.1%	3.7%	0%	16.8%	27.2%	9.3%	0%	36.5%	8.6%	38.1%	0%	46.7%	-
PHF	0.788	0.719	-	0.820	0.885	0.906	-	0.919	0.675	0.902	-	0.849	0.930
Lights	78	23	0	101	170	58	0	228	54	238	0	292	621
% Lights	95.1%	100%	0%	96.2%	100%	100%	0%	100%	100%	100%	0%	100%	99.4%
Articulated Trucks and Single-Unit Trucks	4	0	0	4	0	0	0	0	0	0	0	0	4
% Articulated Trucks and Single-Unit Trucks	4.9%	0%	0%	3.8%	0%	0%	0%	0%	0%	0%	0%	0%	0.6%
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Busey Road - TMC

Thu Dec 12, 2019

PM Peak (5 PM - 6 PM) - Overall Peak Hour

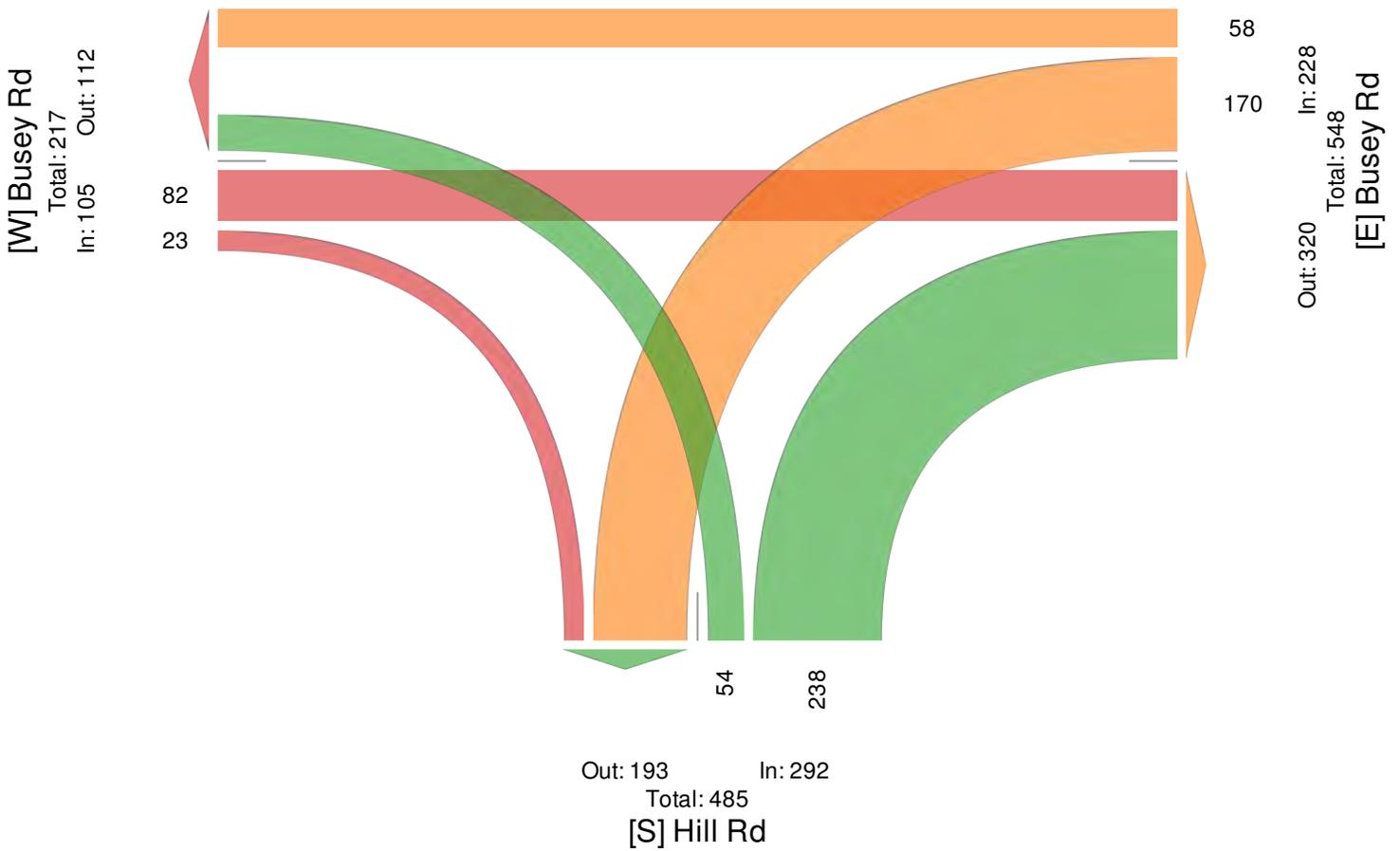
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732093, Location: 39.857599, -82.763316



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Hill Road & Kings Crossing - Merged - TMC

Thu Dec 12, 2019

Full Length ()

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 754697, Location: ,



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Kings Crossing Eastbound				Hill Westbound				Kings Crossing Southbound				Int
Time	L	T	U	App	T	R	U	App	L	R	U	App	Int
2019-12-12 6:00AM	45	0	0	45	0	44	0	44	6	4	0	10	99
6:15AM	44	0	0	44	0	46	0	46	13	7	0	20	110
6:30AM	44	1	0	45	0	42	0	42	15	9	0	24	111
6:45AM	45	2	0	47	0	67	0	67	25	3	0	28	142
Hourly Total	178	3	0	181	0	199	0	199	59	23	0	82	462
7:00AM	58	2	0	60	1	48	0	49	11	9	0	20	129
7:15AM	31	0	0	31	0	46	0	46	20	11	0	31	108
7:30AM	49	1	0	50	0	44	0	44	19	14	0	33	127
7:45AM	52	1	0	53	0	52	0	52	22	16	0	38	143
Hourly Total	190	4	0	194	1	190	0	191	72	50	0	122	507
8:00AM	35	1	0	36	1	34	0	35	15	9	0	24	95
8:15AM	35	1	0	36	1	38	0	39	24	8	0	32	107
8:30AM	22	0	0	22	4	47	0	51	17	12	0	29	102
8:45AM	25	0	0	25	0	44	0	44	23	10	0	33	102
Hourly Total	117	2	0	119	6	163	0	169	79	39	0	118	406
9:00AM	29	1	0	30	1	45	0	46	26	13	0	39	115
9:15AM	23	1	0	24	1	38	0	39	19	12	0	31	94
9:30AM	22	1	0	23	2	27	0	29	17	25	0	42	94
9:45AM	25	0	0	25	1	23	0	24	14	14	0	28	77
Hourly Total	99	3	0	102	5	133	0	138	76	64	0	140	380
10:00AM	11	2	0	13	1	30	0	31	21	10	0	31	75
10:15AM	17	1	0	18	2	36	0	38	18	17	0	35	91
10:30AM	18	3	0	21	4	31	0	35	19	16	0	35	91
10:45AM	24	3	0	27	4	27	0	31	15	13	0	28	86
Hourly Total	70	9	0	79	11	124	0	135	73	56	0	129	343
11:00AM	20	3	0	23	1	20	0	21	22	6	0	28	72
11:15AM	21	4	0	25	1	40	0	41	17	23	0	40	106
11:30AM	18	0	0	18	1	23	0	24	22	10	0	32	74
11:45AM	16	1	0	17	2	38	0	40	20	19	0	39	96
Hourly Total	75	8	0	83	5	121	0	126	81	58	0	139	348
12:00PM	28	5	0	33	3	35	0	38	26	25	0	51	122
12:15PM	16	4	0	20	0	33	0	33	28	25	0	53	106
12:30PM	18	2	0	20	2	24	0	26	33	22	0	55	101
12:45PM	20	0	0	20	4	38	0	42	15	18	0	33	95
Hourly Total	82	11	0	93	9	130	0	139	102	90	0	192	424
1:00PM	23	0	0	23	1	35	0	36	24	19	0	43	102
1:15PM	10	1	0	11	3	28	0	31	24	19	0	43	85
1:30PM	33	2	0	35	1	27	0	28	25	29	0	54	117
1:45PM	15	4	0	19	0	39	0	39	17	31	0	48	106
Hourly Total	81	7	0	88	5	129	0	134	90	98	0	188	410
2:00PM	13	3	0	16	0	10	0	10	24	20	0	44	70
2:15PM	17	3	0	20	2	29	0	31	32	26	0	58	109
2:30PM	13	3	0	16	1	31	0	32	30	18	0	48	96
2:45PM	29	4	0	33	3	38	0	41	35	32	0	67	141
Hourly Total	72	13	0	85	6	108	0	114	121	96	0	217	416
3:00PM	18	2	0	20	3	59	0	62	42	50	0	92	174
3:15PM	26	6	0	32	3	35	0	38	41	42	0	83	153
3:30PM	39	0	0	39	4	34	0	38	34	37	0	71	148
3:45PM	28	4	0	32	5	39	0	44	40	47	0	87	163
Hourly Total	111	12	0	123	15	167	0	182	157	176	0	333	638
4:00PM	30	3	0	33	5	39	0	44	58	55	0	113	190
4:15PM	23	1	0	24	5	58	0	63	64	50	0	114	201
4:30PM	36	6	0	42	5	43	0	48	52	62	0	114	204
4:45PM	26	6	0	32	6	39	0	45	53	61	0	114	191

Leg Direction	Kings Crossing Eastbound				Hill Westbound				Kings Crossing Southbound				
Time	L	T	U	App	T	R	U	App	L	R	U	App	Int
Hourly Total	115	16	0	131	21	179	0	200	227	228	0	455	786
5:00PM	37	10	0	47	7	38	0	45	63	66	0	129	221
5:15PM	26	7	0	33	3	52	0	55	66	70	0	136	224
5:30PM	36	12	0	48	6	40	0	46	69	62	0	131	225
5:45PM	40	6	0	46	6	42	0	48	65	78	0	143	237
Hourly Total	139	35	0	174	22	172	0	194	263	276	0	539	907
Total	1329	123	0	1452	106	1815	0	1921	1400	1254	0	2654	6027
% Approach	91.5%	8.5%	0%	-	5.5%	94.5%	0%	-	52.8%	47.2%	0%	-	-
% Total	22.1%	2.0%	0%	24.1%	1.8%	30.1%	0%	31.9%	23.2%	20.8%	0%	44.0%	-
Lights	1283	121	0	1404	102	1775	0	1877	1375	1217	0	2592	5873
% Lights	96.5%	98.4%	0%	96.7%	96.2%	97.8%	0%	97.7%	98.2%	97.0%	0%	97.7%	97.4%
Articulated Trucks and Single-Unit Trucks	42	2	0	44	2	23	0	25	21	33	0	54	123
% Articulated Trucks and Single-Unit Trucks	3.2%	1.6%	0%	3.0%	1.9%	1.3%	0%	1.3%	1.5%	2.6%	0%	2.0%	2.0%
Buses	4	0	0	4	2	17	0	19	4	4	0	8	31
% Buses	0.3%	0%	0%	0.3%	1.9%	0.9%	0%	1.0%	0.3%	0.3%	0%	0.3%	0.5%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Kings Crossing - Merged - TMC

Thu Dec 12, 2019

Full Length ()

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 754697, Location: ,



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Kings Crossing

Total: 5798

In: 2654

Out: 3144

1254

1400

[W] Kings Crossing

Total: 2812

In: 1452 Out: 1360

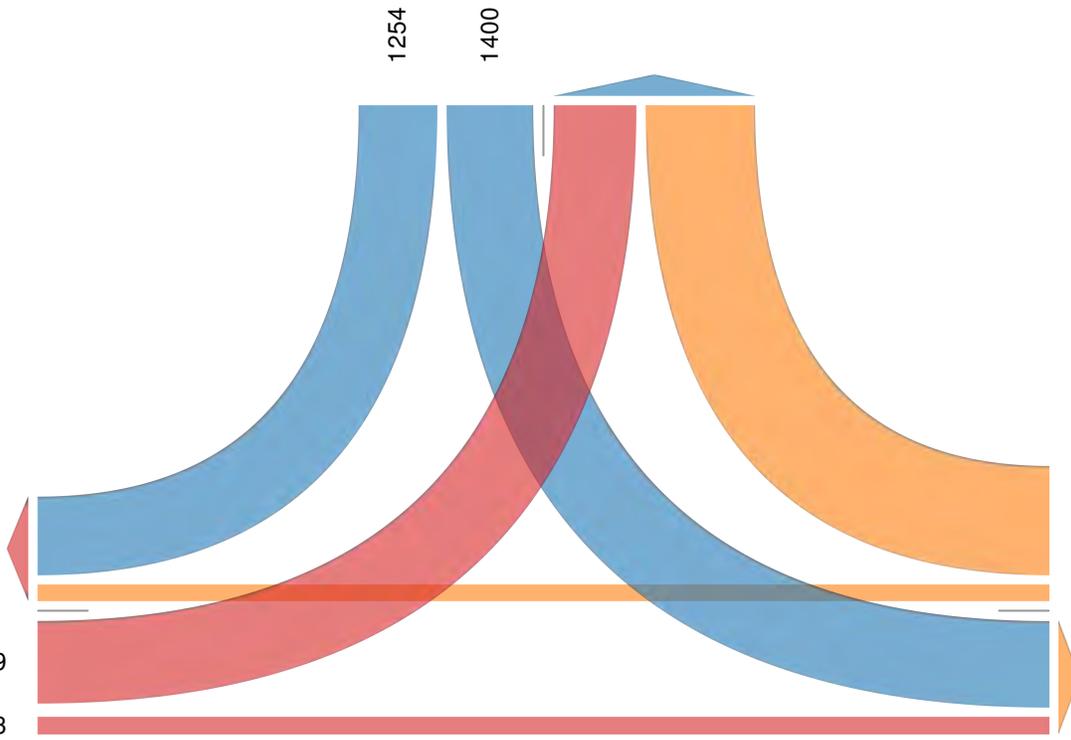
1329
123

1815
106

Out: 1523 In: 1921

Total: 3444

[E] Hill



Hill Road & Kings Crossing - TMC

Thu Dec 12, 2019

AM Peak (7 AM - 8 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732094, Location: 39.8455, -82.777523



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hill Rd Eastbound				Hill Rd Westbound				Kings Crossing Southbound				Int
	L	T	U	App	T	R	U	App	L	R	U	App	
2019-12-12 7:00AM	58	2	0	60	1	48	0	49	11	9	0	20	129
7:15AM	31	0	0	31	0	46	0	46	20	11	0	31	108
7:30AM	49	1	0	50	0	44	0	44	19	14	0	33	127
7:45AM	52	1	0	53	0	52	0	52	22	16	0	38	143
Total	190	4	0	194	1	190	0	191	72	50	0	122	507
% Approach	97.9%	2.1%	0%	-	0.5%	99.5%	0%	-	59.0%	41.0%	0%	-	-
% Total	37.5%	0.8%	0%	38.3%	0.2%	37.5%	0%	37.7%	14.2%	9.9%	0%	24.1%	-
PHF	0.819	0.500	-	0.808	0.250	0.913	-	0.918	0.818	0.781	-	0.803	0.886
Lights	182	4	0	186	0	183	0	183	70	48	0	118	487
% Lights	95.8%	100%	0%	95.9%	0%	96.3%	0%	95.8%	97.2%	96.0%	0%	96.7%	96.1%
Articulated Trucks and Single-Unit Trucks	6	0	0	6	0	3	0	3	2	0	0	2	11
% Articulated Trucks and Single-Unit Trucks	3.2%	0%	0%	3.1%	0%	1.6%	0%	1.6%	2.8%	0%	0%	1.6%	2.2%
Buses	2	0	0	2	1	4	0	5	0	2	0	2	9
% Buses	1.1%	0%	0%	1.0%	100%	2.1%	0%	2.6%	0%	4.0%	0%	1.6%	1.8%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Kings Crossing - TMC

Thu Dec 12, 2019

AM Peak (7 AM - 8 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732094, Location: 39.8455, -82.777523



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Kings Crossing

Total: 502

In: 122

Out: 380

50 72



Hill Road & Kings Crossing - TMC

Thu Dec 12, 2019

Forced Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732094, Location: 39.8455, -82.777523



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hill Rd Eastbound				Hill Rd Westbound				Kings Crossing Southbound				Int
	L	T	U	App	T	R	U	App	L	R	U	App	
2019-12-12 7:15AM	31	0	0	31	0	46	0	46	20	11	0	31	108
7:30AM	49	1	0	50	0	44	0	44	19	14	0	33	127
7:45AM	52	1	0	53	0	52	0	52	22	16	0	38	143
8:00AM	35	1	0	36	1	34	0	35	15	9	0	24	95
Total	167	3	0	170	1	176	0	177	76	50	0	126	473
% Approach	98.2%	1.8%	0%	-	0.6%	99.4%	0%	-	60.3%	39.7%	0%	-	-
% Total	35.3%	0.6%	0%	35.9%	0.2%	37.2%	0%	37.4%	16.1%	10.6%	0%	26.6%	-
PHF	0.803	0.750	-	0.802	0.250	0.846	-	0.851	0.864	0.781	-	0.829	0.827
Lights	162	3	0	165	1	166	0	167	75	48	0	123	455
% Lights	97.0%	100%	0%	97.1%	100%	94.3%	0%	94.4%	98.7%	96.0%	0%	97.6%	96.2%
Articulated Trucks and Single-Unit Trucks	4	0	0	4	0	5	0	5	1	0	0	1	10
% Articulated Trucks and Single-Unit Trucks	2.4%	0%	0%	2.4%	0%	2.8%	0%	2.8%	1.3%	0%	0%	0.8%	2.1%
Buses	1	0	0	1	0	5	0	5	0	2	0	2	8
% Buses	0.6%	0%	0%	0.6%	0%	2.8%	0%	2.8%	0%	4.0%	0%	1.6%	1.7%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Kings Crossing - TMC

Thu Dec 12, 2019

Forced Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732094, Location: 39.8455, -82.777523



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Kings Crossing

Total: 469

In: 126

Out: 343

50 76



Hill Road & Kings Crossing - TMC

Thu Dec 12, 2019

PM Peak (5 PM - 6 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732094, Location: 39.8455, -82.777523



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hill Rd Eastbound				Hill Rd Westbound				Kings Crossing Southbound				Int
	L	T	U	App	T	R	U	App	L	R	U	App	
2019-12-12 5:00PM	37	10	0	47	7	38	0	45	63	66	0	129	221
5:15PM	26	7	0	33	3	52	0	55	66	70	0	136	224
5:30PM	36	12	0	48	6	40	0	46	69	62	0	131	225
5:45PM	40	6	0	46	6	42	0	48	65	78	0	143	237
Total	139	35	0	174	22	172	0	194	263	276	0	539	907
% Approach	79.9%	20.1%	0%	-	11.3%	88.7%	0%	-	48.8%	51.2%	0%	-	-
% Total	15.3%	3.9%	0%	19.2%	2.4%	19.0%	0%	21.4%	29.0%	30.4%	0%	59.4%	-
PHF	0.869	0.729	-	0.906	0.786	0.827	-	0.882	0.953	0.885	-	0.942	0.957
Lights	139	35	0	174	22	172	0	194	263	275	0	538	906
% Lights	100%	100%	0%	100%	100%	100%	0%	100%	100%	99.6%	0%	99.8%	99.9%
Articulated Trucks and Single-Unit Trucks	0	0	0	0	0	0	0	0	0	1	0	1	1
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.4%	0%	0.2%	0.1%
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

* L: Left, R: Right, T: Thru, U: U-Turn

Hill Road & Kings Crossing - TMC

Thu Dec 12, 2019

PM Peak (5 PM - 6 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 732094, Location: 39.8455, -82.777523



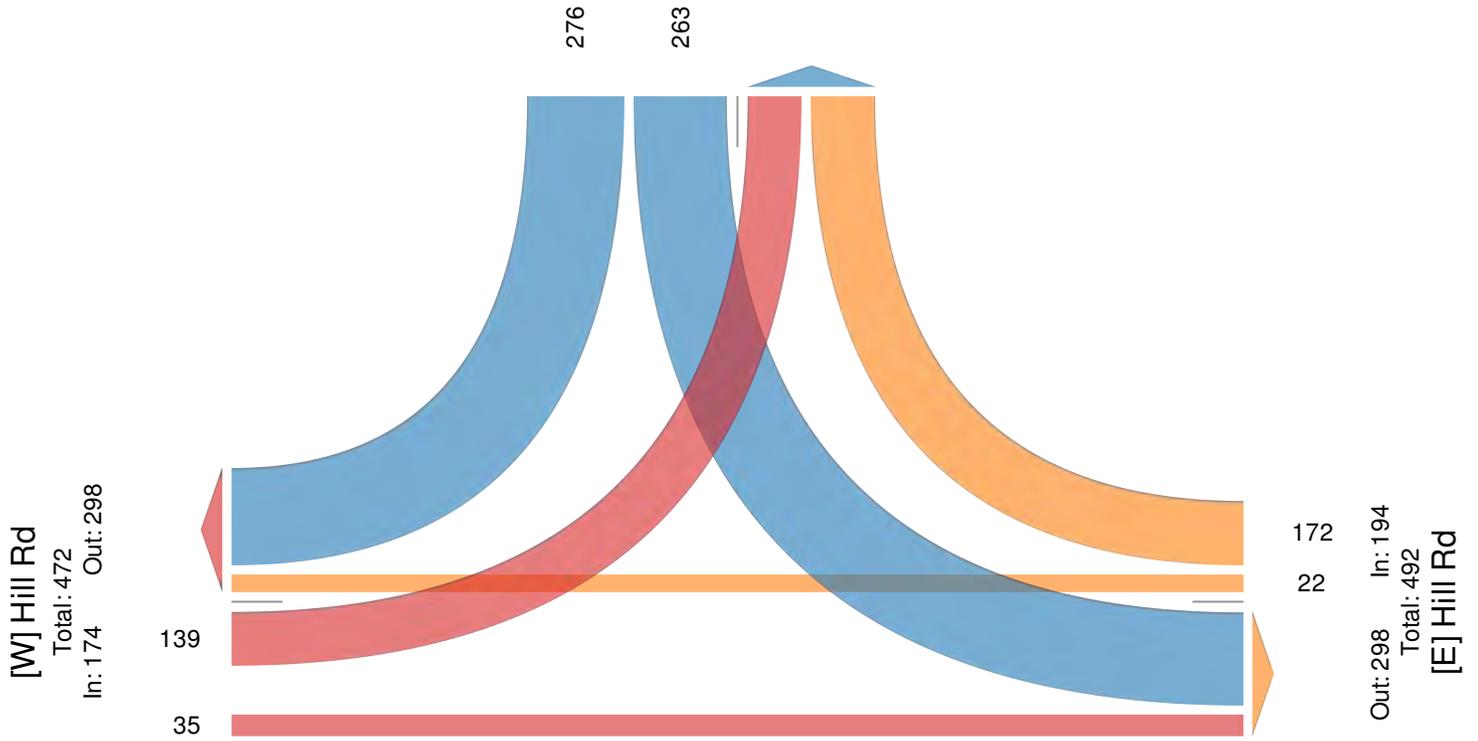
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Kings Crossing

Total: 850

In: 539

Out: 311



Diley Road & Howe Industrial Pkwy - Merged - TMC

Thu Jan 9, 2020

Full Length ()

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 754696, Location: ,



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
2020-01-09 6:00AM	0	0	0	0	4	38	0	42	114	1	0	115	157
6:15AM	0	2	0	2	4	71	0	75	112	0	0	112	189
6:30AM	0	0	0	0	3	139	0	142	125	4	0	129	271
6:45AM	3	2	0	5	8	135	0	143	159	8	0	167	315
Hourly Total	3	4	0	7	19	383	0	402	510	13	0	523	932
7:00AM	3	2	0	5	4	106	0	110	166	6	0	172	287
7:15AM	1	2	0	3	7	110	0	117	169	5	0	174	294
7:30AM	2	0	0	2	14	117	0	131	164	3	0	167	300
7:45AM	1	3	0	4	18	117	0	135	169	7	0	176	315
Hourly Total	7	7	0	14	43	450	0	493	668	21	0	689	1196
8:00AM	3	6	0	9	11	93	0	104	158	8	0	166	279
8:15AM	1	4	0	5	6	84	0	90	175	8	0	183	278
8:30AM	2	8	0	10	10	102	0	112	160	4	0	164	286
8:45AM	0	3	0	3	6	104	0	110	126	2	0	128	241
Hourly Total	6	21	0	27	33	383	0	416	619	22	0	641	1084
9:00AM	0	5	0	5	3	87	0	90	100	2	0	102	197
9:15AM	0	2	0	2	5	71	0	76	113	1	0	114	192
9:30AM	1	0	0	1	3	78	0	81	137	0	0	137	219
9:45AM	0	2	0	2	2	85	0	87	126	1	0	127	216
Hourly Total	1	9	0	10	13	321	0	334	476	4	0	480	824
10:00AM	4	1	0	5	3	92	0	95	111	1	0	112	212
10:15AM	1	1	0	2	0	80	0	80	96	0	0	96	178
10:30AM	1	2	0	3	1	98	0	99	110	2	0	112	214
10:45AM	4	6	0	10	1	88	0	89	92	2	0	94	193
Hourly Total	10	10	0	20	5	358	0	363	409	5	0	414	797
11:00AM	3	4	0	7	2	92	0	94	88	3	0	91	192
11:15AM	3	6	0	9	4	87	0	91	114	2	0	116	216
11:30AM	0	6	0	6	2	106	0	108	114	2	0	116	230
11:45AM	3	10	0	13	8	117	0	125	125	5	0	130	268
Hourly Total	9	26	0	35	16	402	0	418	441	12	0	453	906
12:00PM	2	14	0	16	9	155	0	164	133	5	0	138	318
12:15PM	5	2	0	7	4	98	0	102	107	3	0	110	219
12:30PM	2	5	0	7	6	112	0	118	122	5	0	127	252
12:45PM	2	3	0	5	8	113	1	122	139	4	0	143	270
Hourly Total	11	24	0	35	27	478	1	506	501	17	0	518	1059
1:00PM	3	6	0	9	8	92	0	100	123	4	0	127	236
1:15PM	2	4	0	6	2	119	0	121	115	7	0	122	249
1:30PM	6	2	0	8	5	94	0	99	129	4	0	133	240
1:45PM	3	2	0	5	1	92	0	93	131	4	0	135	233
Hourly Total	14	14	0	28	16	397	0	413	498	19	0	517	958
2:00PM	4	5	0	9	5	130	1	136	128	1	0	129	274
2:15PM	1	2	0	3	2	117	0	119	131	3	0	134	256
2:30PM	3	1	0	4	6	156	1	163	138	3	0	141	308
2:45PM	6	10	0	16	4	137	0	141	108	1	0	109	266
Hourly Total	14	18	0	32	17	540	2	559	505	8	0	513	1104
3:00PM	1	4	0	5	5	144	1	150	149	2	0	151	306
3:15PM	0	5	0	5	3	177	0	180	153	1	0	154	339
3:30PM	6	12	0	18	4	195	0	199	151	0	0	151	368
3:45PM	1	6	0	7	0	160	0	160	151	3	0	154	321
Hourly Total	8	27	0	35	12	676	1	689	604	6	0	610	1334
4:00PM	3	16	0	19	2	175	0	177	179	1	0	180	376
4:15PM	5	4	0	9	4	203	0	207	167	1	0	168	384
4:30PM	6	7	0	13	3	202	0	205	181	2	0	183	401
4:45PM	4	7	0	11	1	170	0	171	175	1	0	176	358

Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
Hourly Total	18	34	0	52	10	750	0	760	702	5	0	707	1519
5:00PM	5	20	0	25	2	223	0	225	172	3	0	175	425
5:15PM	5	8	0	13	0	207	0	207	184	3	0	187	407
5:30PM	4	7	0	11	4	242	0	246	167	1	0	168	425
5:45PM	1	6	0	7	2	207	0	209	171	0	0	171	387
Hourly Total	15	41	0	56	8	879	0	887	694	7	0	701	1644
Total	116	235	0	351	219	6017	4	6240	6627	139	0	6766	13357
% Approach	33.0%	67.0%	0%	-	3.5%	96.4%	0.1%	-	97.9%	2.1%	0%	-	-
% Total	0.9%	1.8%	0%	2.6%	1.6%	45.0%	0%	46.7%	49.6%	1.0%	0%	50.7%	-
Lights	108	218	0	326	205	5837	4	6046	6459	131	0	6590	12962
% Lights	93.1%	92.8%	0%	92.9%	93.6%	97.0%	100%	96.9%	97.5%	94.2%	0%	97.4%	97.0%
Articulated Trucks and Single-Unit Trucks	7	16	0	23	14	167	0	181	151	7	0	158	362
% Articulated Trucks and Single-Unit Trucks	6.0%	6.8%	0%	6.6%	6.4%	2.8%	0%	2.9%	2.3%	5.0%	0%	2.3%	2.7%
Buses	1	1	0	2	0	13	0	13	17	1	0	18	33
% Buses	0.9%	0.4%	0%	0.6%	0%	0.2%	0%	0.2%	0.3%	0.7%	0%	0.3%	0.2%

* L: Left, R: Right, T: Thru, U: U-Turn

Diley Road & Howe Industrial Pkwy - Merged - TMC

Thu Jan 9, 2020

Full Length ()

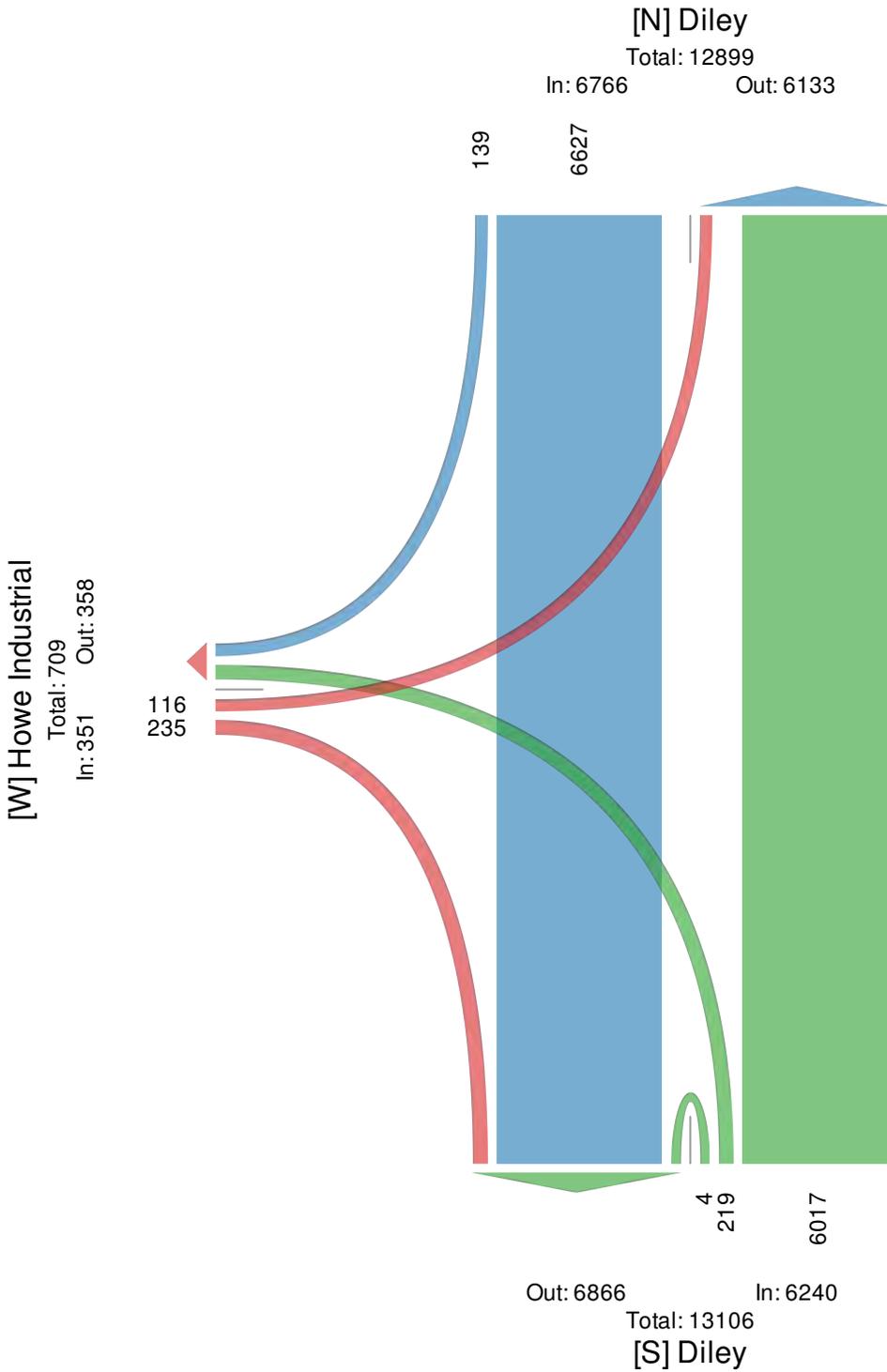
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 754696, Location: ,



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Diley Road & Howe Industrial Pkwy - TMC

Thu Jan 9, 2020

AM Peak (6:45 AM - 7:45 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 739028, Location: 39.855832, -82.780544



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				Int
	L	R	U	App	L	T	U	App	T	R	U	App	
2020-01-09 6:45AM	3	2	0	5	8	135	0	143	159	8	0	167	315
7:00AM	3	2	0	5	4	106	0	110	166	6	0	172	287
7:15AM	1	2	0	3	7	110	0	117	169	5	0	174	294
7:30AM	2	0	0	2	14	117	0	131	164	3	0	167	300
Total	9	6	0	15	33	468	0	501	658	22	0	680	1196
% Approach	60.0%	40.0%	0%	-	6.6%	93.4%	0%	-	96.8%	3.2%	0%	-	-
% Total	0.8%	0.5%	0%	1.3%	2.8%	39.1%	0%	41.9%	55.0%	1.8%	0%	56.9%	-
PHF	0.750	0.750	-	0.750	0.589	0.867	-	0.876	0.973	0.688	-	0.977	0.949
Lights	9	5	0	14	33	454	0	487	652	22	0	674	1175
% Lights	100%	83.3%	0%	93.3%	100%	97.0%	0%	97.2%	99.1%	100%	0%	99.1%	98.2%
Articulated Trucks and Single-Unit Trucks	0	1	0	1	0	12	0	12	4	0	0	4	17
% Articulated Trucks and Single-Unit Trucks	0%	16.7%	0%	6.7%	0%	2.6%	0%	2.4%	0.6%	0%	0%	0.6%	1.4%
Buses	0	0	0	0	0	2	0	2	2	0	0	2	4
% Buses	0%	0%	0%	0%	0%	0.4%	0%	0.4%	0.3%	0%	0%	0.3%	0.3%

* L: Left, R: Right, T: Thru, U: U-Turn

Diley Road & Howe Industrial Pkwy - TMC

Thu Jan 9, 2020

AM Peak (6:45 AM - 7:45 AM)

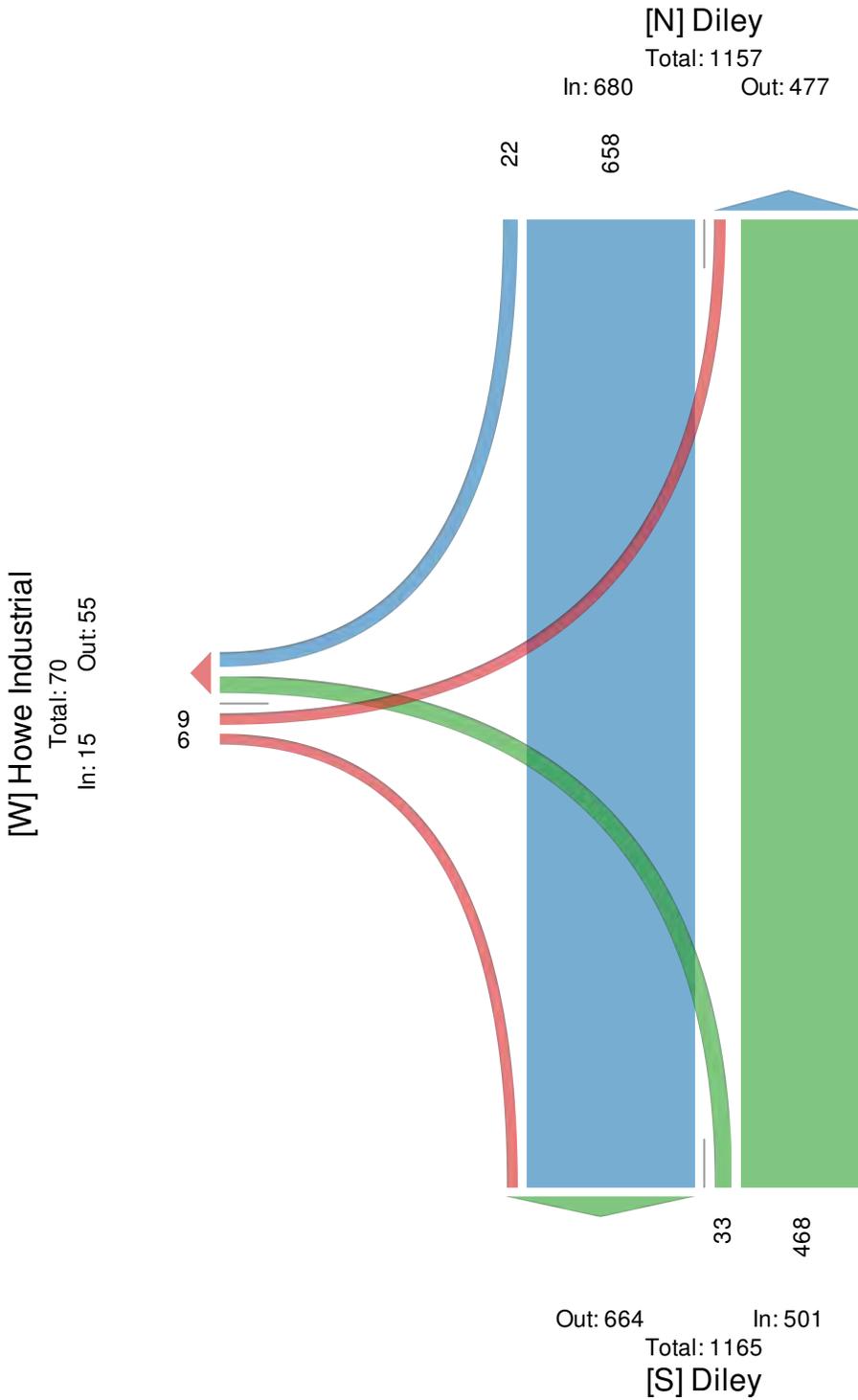
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 739028, Location: 39.855832, -82.780544



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Diley Road & Howe Industrial Pkwy - TMC

Thu Jan 9, 2020

Forced Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 739028, Location: 39.855832, -82.780544



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				Int
	L	R	U	App	L	T	U	App	T	R	U	App	
2020-01-09 7:15AM	1	2	0	3	7	110	0	117	169	5	0	174	294
7:30AM	2	0	0	2	14	117	0	131	164	3	0	167	300
7:45AM	1	3	0	4	18	117	0	135	169	7	0	176	315
8:00AM	3	6	0	9	11	93	0	104	158	8	0	166	279
Total	7	11	0	18	50	437	0	487	660	23	0	683	1188
% Approach	38.9%	61.1%	0%	-	10.3%	89.7%	0%	-	96.6%	3.4%	0%	-	-
% Total	0.6%	0.9%	0%	1.5%	4.2%	36.8%	0%	41.0%	55.6%	1.9%	0%	57.5%	-
PHF	0.583	0.458	-	0.500	0.694	0.934	-	0.902	0.976	0.719	-	0.970	0.943
Lights	5	10	0	15	48	415	0	463	647	22	0	669	1147
% Lights	71.4%	90.9%	0%	83.3%	96.0%	95.0%	0%	95.1%	98.0%	95.7%	0%	98.0%	96.5%
Articulated Trucks and Single-Unit Trucks	2	1	0	3	2	20	0	22	8	1	0	9	34
% Articulated Trucks and Single-Unit Trucks	28.6%	9.1%	0%	16.7%	4.0%	4.6%	0%	4.5%	1.2%	4.3%	0%	1.3%	2.9%
Buses	0	0	0	0	0	2	0	2	5	0	0	5	7
% Buses	0%	0%	0%	0%	0%	0.5%	0%	0.4%	0.8%	0%	0%	0.7%	0.6%

* L: Left, R: Right, T: Thru, U: U-Turn

Diley Road & Howe Industrial Pkwy - TMC

Thu Jan 9, 2020

Forced Peak (7:15 AM - 8:15 AM)

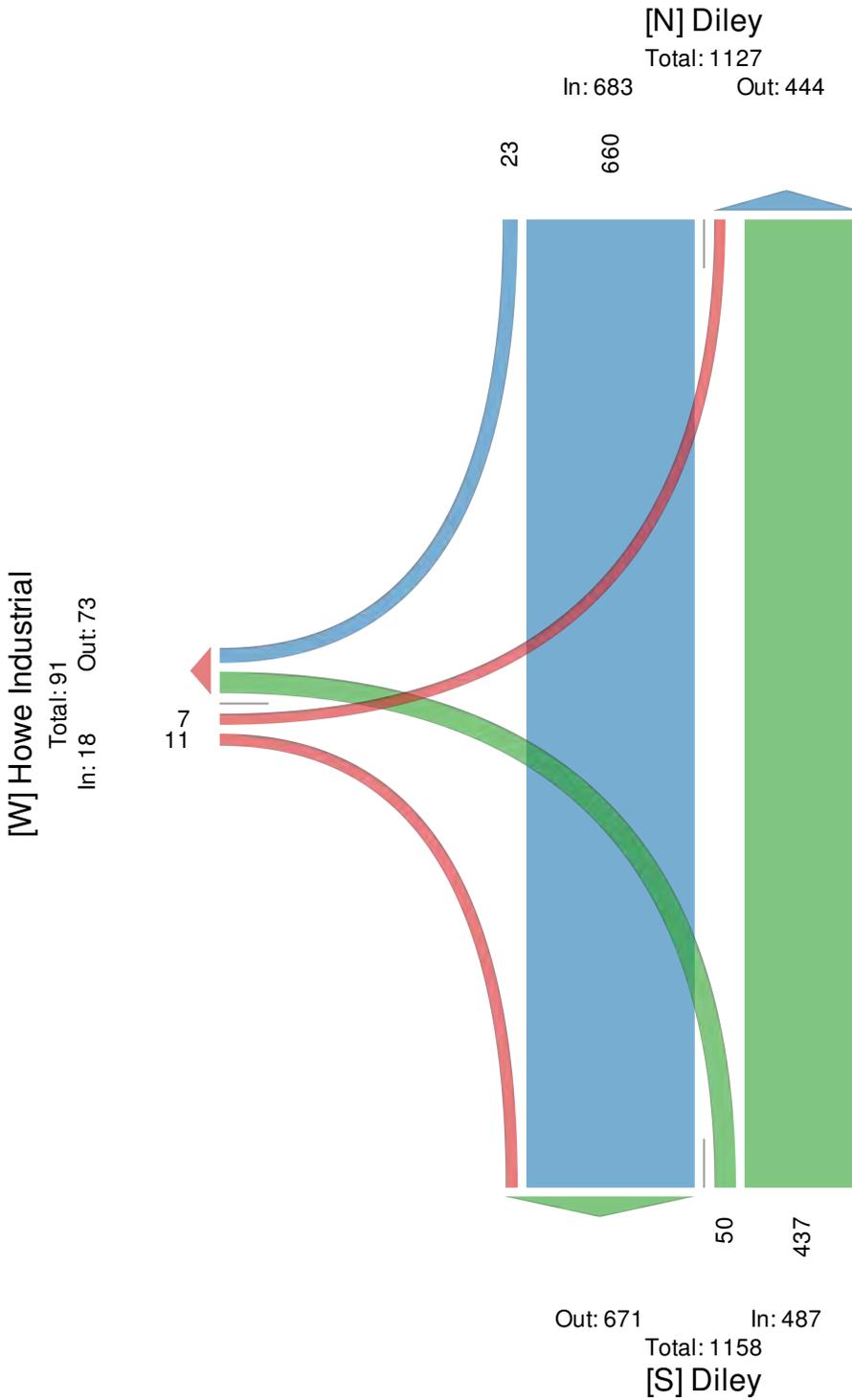
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 739028, Location: 39.855832, -82.780544



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Diley Road & Howe Industrial Pkwy - TMC

Thu Jan 9, 2020

PM Peak (5 PM - 6 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 739028, Location: 39.855832, -82.780544



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
2020-01-09 5:00PM	5	20	0	25	2	223	0	225	172	3	0	175	425
5:15PM	5	8	0	13	0	207	0	207	184	3	0	187	407
5:30PM	4	7	0	11	4	242	0	246	167	1	0	168	425
5:45PM	1	6	0	7	2	207	0	209	171	0	0	171	387
Total	15	41	0	56	8	879	0	887	694	7	0	701	1644
% Approach	26.8%	73.2%	0%	-	0.9%	99.1%	0%	-	99.0%	1.0%	0%	-	-
% Total	0.9%	2.5%	0%	3.4%	0.5%	53.5%	0%	54.0%	42.2%	0.4%	0%	42.6%	-
PHF	0.750	0.513	-	0.560	0.500	0.908	-	0.901	0.943	0.583	-	0.937	0.967
Lights	15	41	0	56	8	873	0	881	689	7	0	696	1633
% Lights	100%	100%	0%	100%	100%	99.3%	0%	99.3%	99.3%	100%	0%	99.3%	99.3%
Articulated Trucks and Single-Unit Trucks	0	0	0	0	0	6	0	6	5	0	0	5	11
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	0%	0%	0.7%	0%	0.7%	0.7%	0%	0%	0.7%	0.7%
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

* L: Left, R: Right, T: Thru, U: U-Turn

Diley Road & Howe Industrial Pkwy - TMC

Thu Jan 9, 2020

PM Peak (5 PM - 6 PM) - Overall Peak Hour

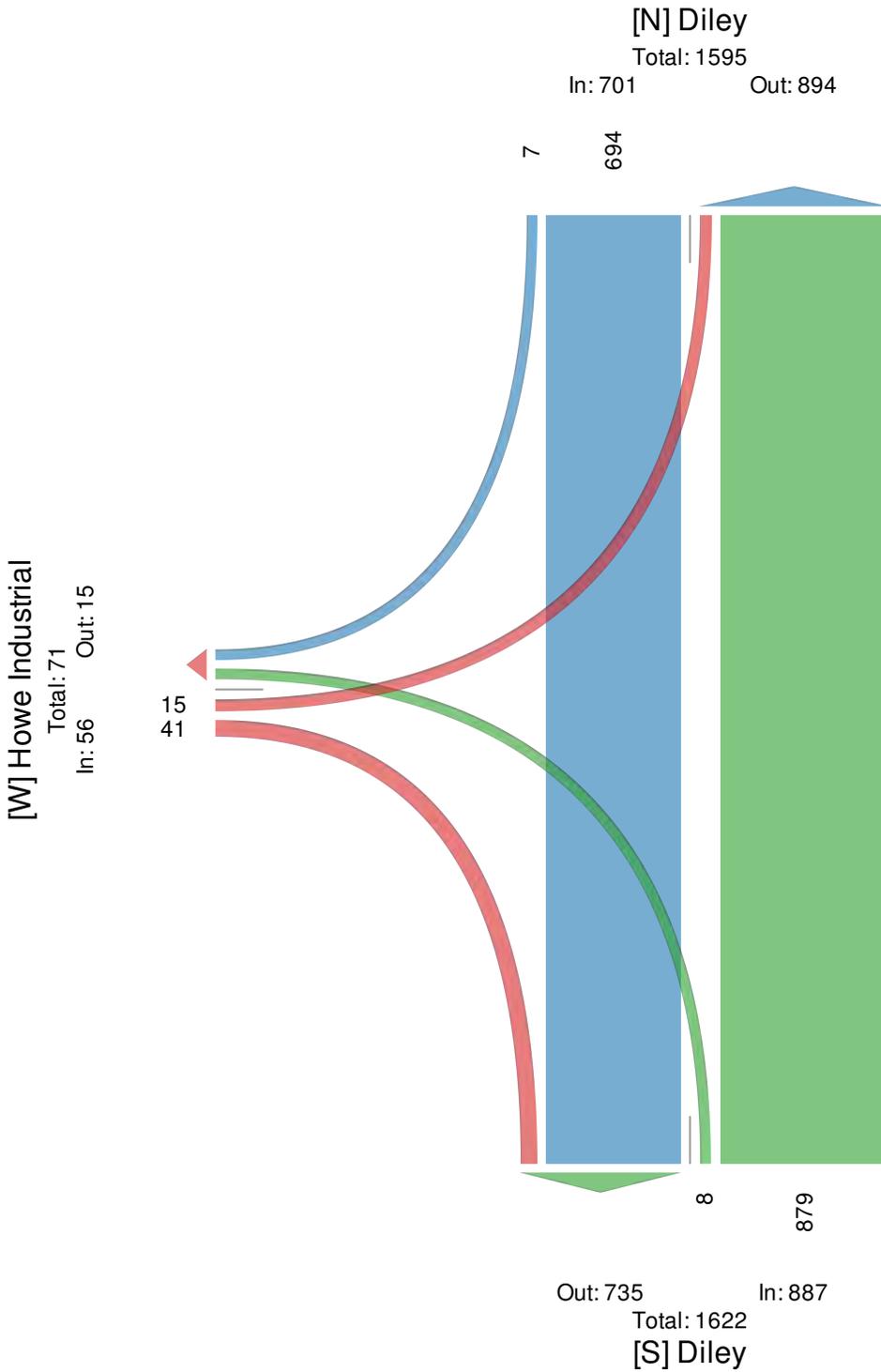
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)

All Movements

ID: 739028, Location: 39.855832, -82.780544



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

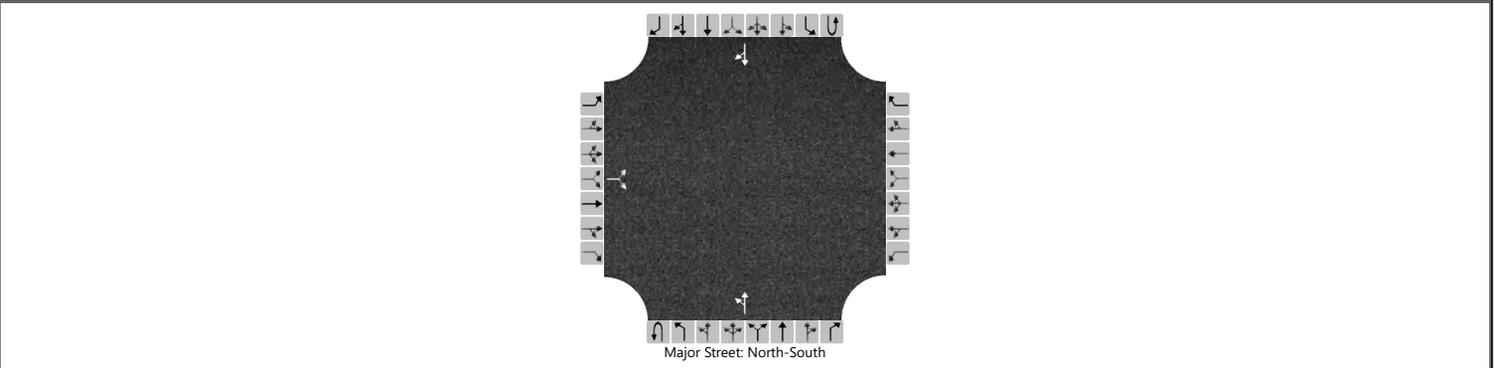


APPENDIX C
EXISTING TRAFFIC SCENARIO CAPACITY
ANALYSIS SUMMARY SHEETS

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2019	North/South Street	HILL/BUSEY				
Time Analyzed	EXISTING AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		76		29						12	68				150	129
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

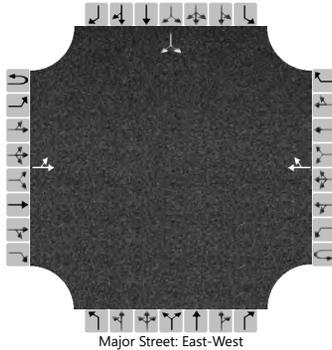
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			114							13							
Capacity, c (veh/h)			688							1269							
v/c Ratio			0.17							0.01							
95% Queue Length, Q ₉₅ (veh)			0.6							0.0							
Control Delay (s/veh)			11.3							7.9							
Level of Service (LOS)			B							A							
Approach Delay (s/veh)		11.3								1.3							
Approach LOS		B															

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	KINGS CROSSING & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HILL RD
Analysis Year	2019	North/South Street	KINGS CROSSING
Time Analyzed	EXISTING AM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		167	3				1	178						77		50
Percent Heavy Vehicles (%)		3												1		4
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.41		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.51		3.34

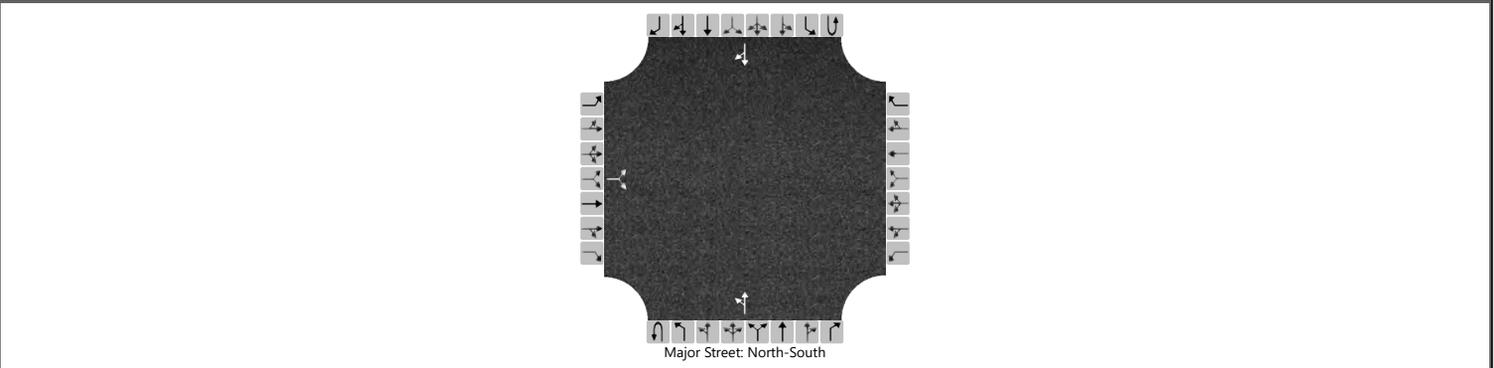
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		182														138	
Capacity, c (veh/h)		1373														600	
v/c Ratio		0.13														0.23	
95% Queue Length, Q ₉₅ (veh)		0.5														0.9	
Control Delay (s/veh)		8.0														12.8	
Level of Service (LOS)		A														B	
Approach Delay (s/veh)		7.9												12.8			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2019	North/South Street	HILL/BUSEY				
Time Analyzed	EXISTING PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		82		23						54	244				171	58
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

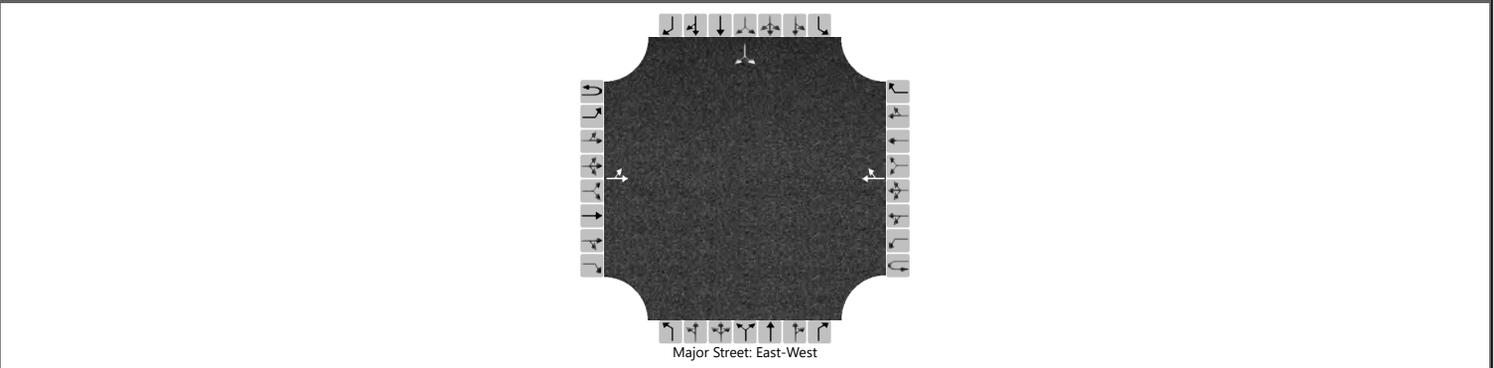
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			114							59						
Capacity, c (veh/h)			486							1329						
v/c Ratio			0.24							0.04						
95% Queue Length, Q ₉₅ (veh)			0.9							0.1						
Control Delay (s/veh)			14.7							7.8						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		14.7								1.8						
Approach LOS		B														

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	KINGS CROSSING & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HILL RD
Analysis Year	2019	North/South Street	KINGS CROSSING
Time Analyzed	EXISTING PM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	0	0		0	1	0	
Configuration		LT						TR							LR	
Volume (veh/h)		139	35				22	172					263		276	
Percent Heavy Vehicles (%)		0											0		1	
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		151														586	
Capacity, c (veh/h)		1372														658	
v/c Ratio		0.11														0.89	
95% Queue Length, Q ₉₅ (veh)		0.4														11.0	
Control Delay (s/veh)		7.9														38.7	
Level of Service (LOS)		A														E	
Approach Delay (s/veh)		6.5												38.7			
Approach LOS														E			

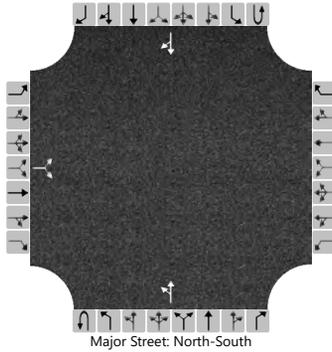
APPENDIX D
2022/2023/2024/2034 NO-BUILD TRAFFIC SCENARIO
CAPACITY ANALYSIS SUMMARY SHEETS

2022 NO-BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0	
Configuration			LR							LT						TR	
Volume (veh/h)		85		32						13	74				166	143	
Percent Heavy Vehicles (%)		4		0						0							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

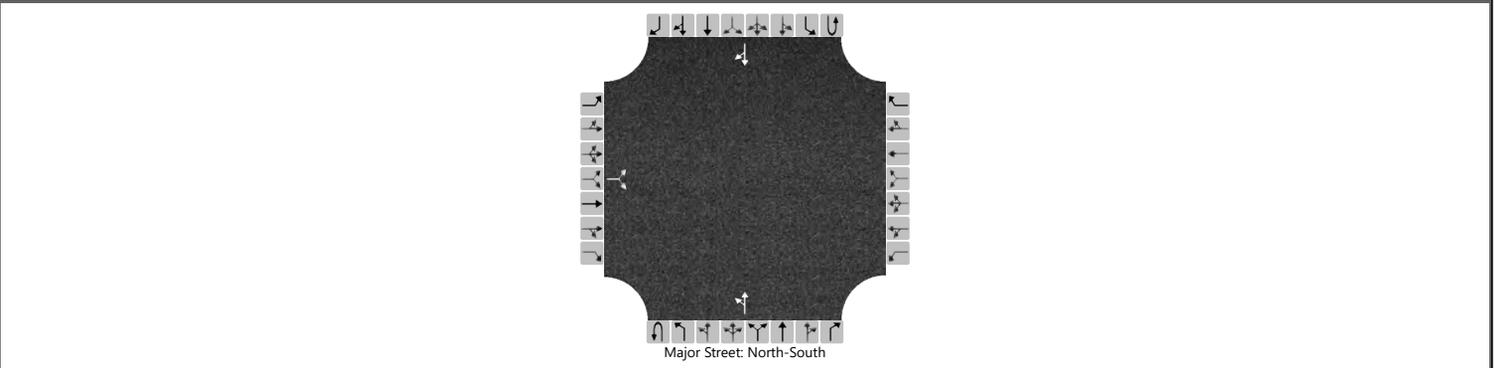
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			127							14							
Capacity, c (veh/h)			659							1235							
v/c Ratio			0.19							0.01							
95% Queue Length, Q ₉₅ (veh)			0.7							0.0							
Control Delay (s/veh)			11.8							7.9							
Level of Service (LOS)			B							A							
Approach Delay (s/veh)		11.8								1.3							
Approach LOS		B															

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		85		32						13	74				166	143
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

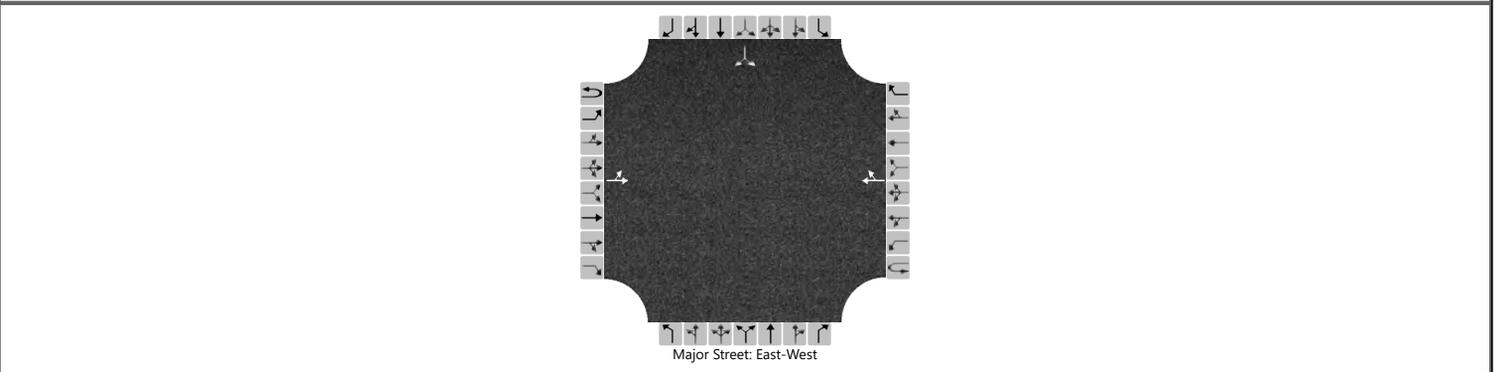
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			127							14						
Capacity, c (veh/h)			659							1235						
v/c Ratio			0.19							0.01						
95% Queue Length, Q ₉₅ (veh)			0.7							0.0						
Control Delay (s/veh)			11.8							7.9						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		11.8								1.3						
Approach LOS		B														

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	KINGS CROSSING & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2022	North/South Street	KINGS CROSSING				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	0	0		0	1	0	
Configuration		LT						TR							LR	
Volume (veh/h)		185	3				1	197					84		55	
Percent Heavy Vehicles (%)		3											1		4	
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.41		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.51		3.34

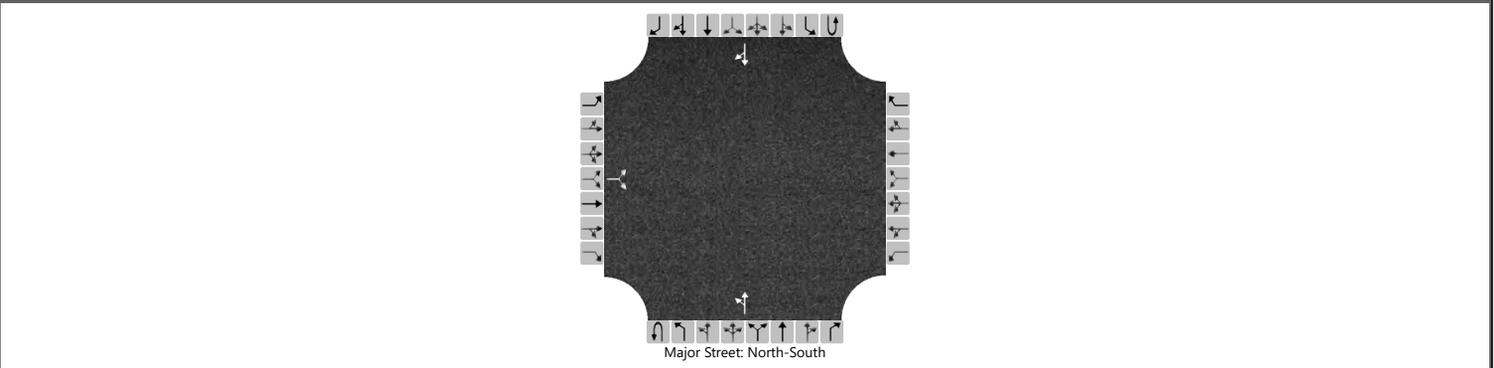
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		201														151	
Capacity, c (veh/h)		1349														562	
v/c Ratio		0.15														0.27	
95% Queue Length, Q ₉₅ (veh)		0.5														1.1	
Control Delay (s/veh)		8.1														13.8	
Level of Service (LOS)		A														B	
Approach Delay (s/veh)		8.0												13.8			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0	
Configuration			LR							LT						TR	
Volume (veh/h)		92		26						59	267				189	64	
Percent Heavy Vehicles (%)		5		0						0							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

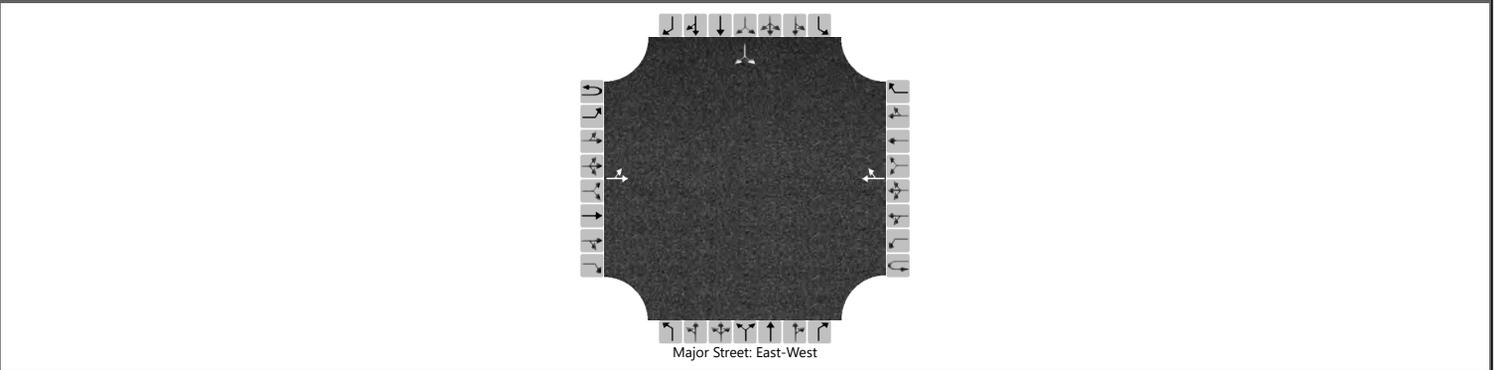
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			128							64							
Capacity, c (veh/h)			449							1300							
v/c Ratio			0.29							0.05							
95% Queue Length, Q ₉₅ (veh)			1.2							0.2							
Control Delay (s/veh)			16.2							7.9							
Level of Service (LOS)			C							A							
Approach Delay (s/veh)		16.2								1.8							
Approach LOS		C															

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	KINGS CROSSING & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HILL RD
Analysis Year	2022	North/South Street	KINGS CROSSING
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		154	39				25	190						287		301
Percent Heavy Vehicles (%)		0												0		1
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

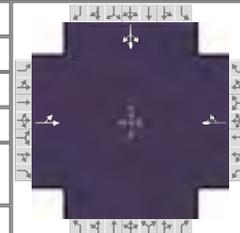
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		167														639	
Capacity, c (veh/h)		1346														620	
v/c Ratio		0.12														1.03	
95% Queue Length, Q ₉₅ (veh)		0.4														16.7	
Control Delay (s/veh)		8.1														70.2	
Level of Service (LOS)		A														F	
Approach Delay (s/veh)		6.6												70.2			
Approach LOS													F				

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	3			1	197				84	0	55

Signal Information																		
Cycle, s	90.0	Reference Phase	2															
Offset, s	0	Reference Point	End															
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0	1		2		3		4	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	5		6		7		8	
				Red	2.0	2.0	0.0	0.0	0.0	0.0								

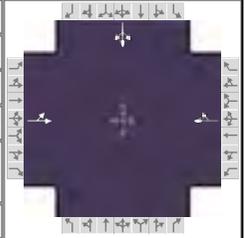
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	3			1	197				84	0	55
Initial Queue (Q _b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h	1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h		None			None						None	
Heavy Vehicles (P _{HV}), %		3			6						2	
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (AT)	3	3			3	3				3	3	3
Upstream Filtering (I)	1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft		12.0			12.0						12.0	
Turn Bay Length, ft		0			0						0	
Grade (P _g), %		0			0			0			0	
Speed Limit, mi/h	45	45			45	45				35	35	35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s		54.0		54.0				24.0
Yellow Change Interval (Y), s		4.0		4.0				4.0
Red Clearance Interval (R _c), s		2.0		2.0				2.0
Minimum Green (G _{min}), s		10		10				10
Start-Up Lost Time (I _t), s	2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s	2.0	2.0		2.0			2.0	2.0
Passage (PT), s		2.0		2.0				2.0
Recall Mode		Min		Min				Off
Dual Entry		Yes		Yes				Yes
Walk (Walk), s				0.0		0.0		0.0
Pedestrian Clearance Time (PC), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft				9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking		0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	3			1	197				84	0	55

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	2.0	2.0	0.0	0.0	0.0	0.0		

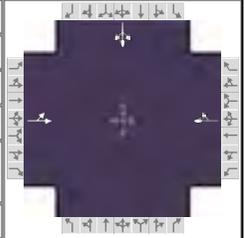
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R _c), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g _s), s		16.7		7.9				8.4
Green Extension Time (g _e), s		0.9		0.9				0.2
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	204			215						151		
Adjusted Saturation Flow Rate (s), veh/h/ln	1039			1536						1698		
Queue Service Time (g _s), s	8.9			5.9						6.4		
Cycle Queue Clearance Time (g _c), s	14.7			5.9						6.4		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	703			922						453		
Volume-to-Capacity Ratio (X)	0.291			0.234						0.334		
Back of Queue (Q), ft/ln (95 th percentile)	91.8			76.1						116.2		
Back of Queue (Q), veh/ln (95 th percentile)	3.6			2.9						4.6		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d ₁), s/veh	11.8			8.4						26.6		
Incremental Delay (d ₂), s/veh	0.1			0.0						0.2		
Initial Queue Delay (d ₃), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	11.8			8.4						26.7		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	11.8	B		8.4	A		0.0			26.7	C	
Intersection Delay, s/veh / LOS	14.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.82	A	0.84	A			0.74	A

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	3			1	197				84	0	55

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

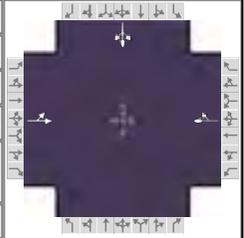
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.560	0.560		1.000	0.848					0.908	0.908	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.560		0.000	0.848					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f_{LPB})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1022	17	0	0	8	1528				1026	0	672
Proportion of Vehicles Arriving on Green (P)	0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)		0.04			0.04						0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0		6.0				4.0
Green Ratio (g/C)		0.60		0.60				0.27
Permitted Saturation Flow Rate (s_p), veh/h/ln		1185		1436				0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1811				0
Permitted Effective Green Time (g_p), s		54.0		0.0				0.0
Permitted Service Time (g_u), s		48.1		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		8.9						
Time to First Blockage (g_i), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{ts}), s		0.0						
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	0.681	0.000		0.681	0.000		0.972	0.000		0.972	0.000	
Pedestrian F_s / F_{delay}	0.000	0.079		0.000	0.079		0.000	0.157		0.000	0.159	
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	1200.00	7.20		1200.00	7.20			50.14			52.27	
Bicycle F_w / F_v	-3.64	0.34		-3.64	0.36		-3.64			-3.64	0.25	

HCS7 Signalized Intersection Results Graphical Summary

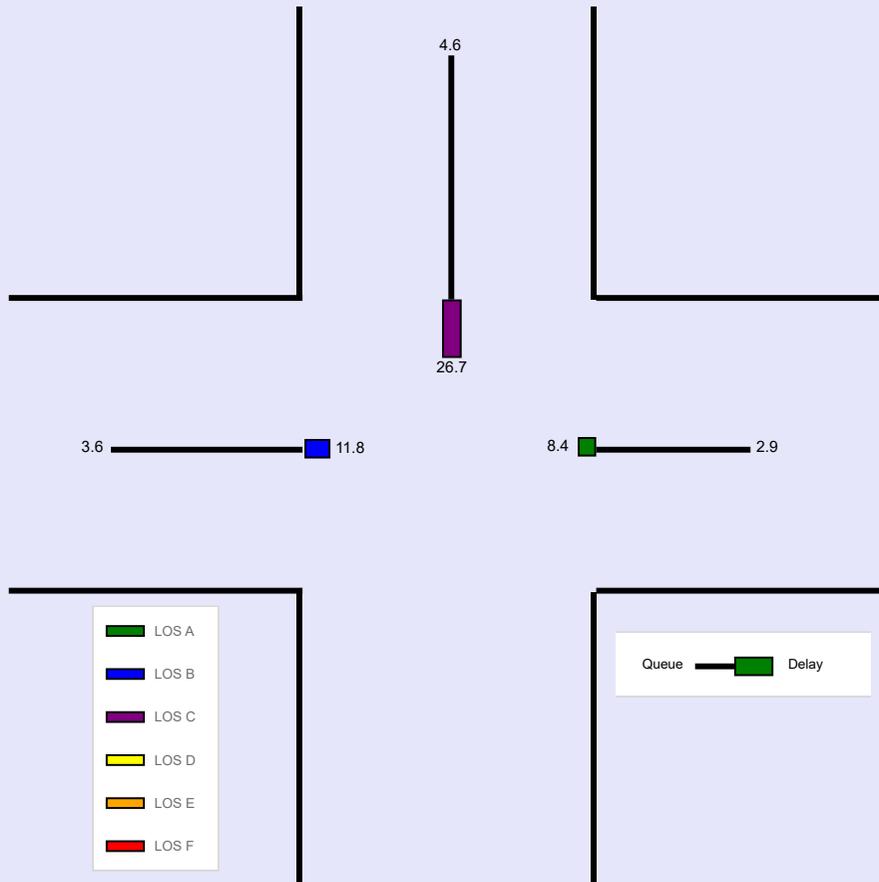
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	3			1	197				84	0	55

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

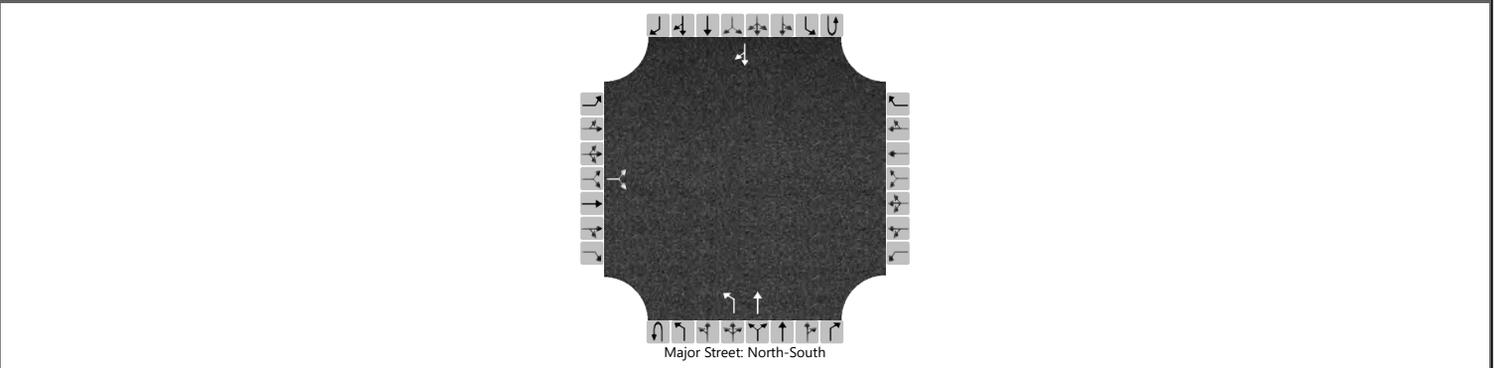
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		91.8			76.1						116.2	
Back of Queue (Q), veh/ln (95 th percentile)		3.6			2.9						4.6	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		11.8			8.4						26.7	
Level of Service (LOS)		B			A						C	
Approach Delay, s/veh / LOS	11.8		B	8.4		A	0.0			26.7		C
Intersection Delay, s/veh / LOS	14.5						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD AM PEAK W/ IMP	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0		1	1	0		0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		85		32						13	74				166	143
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

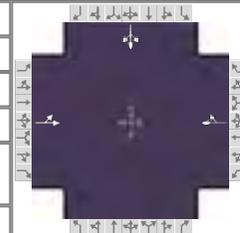
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			127							14						
Capacity, c (veh/h)			659							1235						
v/c Ratio			0.19							0.01						
95% Queue Length, Q ₉₅ (veh)			0.7							0.0						
Control Delay (s/veh)			11.8							7.9						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		11.8								1.2						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	154	39			25	190				287	0	301

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	34.0	44.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

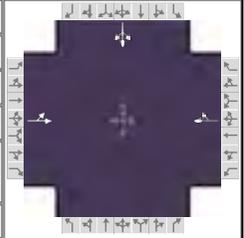
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	154	39			25	190				287	0	301
Initial Queue (Q _b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h	1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h		None			None						None	
Heavy Vehicles (P _{HV}), %		0			0						1	
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (AT)	3	3			3	3				3	3	3
Upstream Filtering (I)	1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft		12.0			12.0						12.0	
Turn Bay Length, ft		0			0						0	
Grade (P _g), %		0			0			0			0	
Speed Limit, mi/h	45	45			45	45				35	35	35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s		34.0		34.0				44.0
Yellow Change Interval (Y), s		4.0		4.0				4.0
Red Clearance Interval (R _c), s		2.0		2.0				2.0
Minimum Green (G _{min}), s		10		10				10
Start-Up Lost Time (I _t), s	2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s	2.0	2.0		2.0			2.0	2.0
Passage (PT), s		2.0		2.0				2.0
Recall Mode		Min		Min				Off
Dual Entry		Yes		Yes				Yes
Walk (Walk), s				0.0		0.0		0.0
Pedestrian Clearance Time (PC), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft				9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking			0.50	No		0.50	No			No		0.50

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	154	39			25	190				287	0	301

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	34.0	44.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	2.0	2.0	0.0	0.0	0.0	0.0		

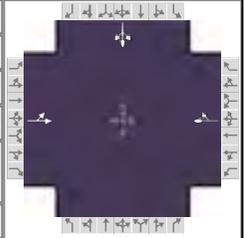
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		40.0		40.0				50.0
Change Period, (Y+R _c), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.3		3.3				3.2
Queue Clearance Time (g _s), s		23.4		11.3				30.0
Green Extension Time (g _e), s		0.8		0.9				1.4
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.01		0.00				0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	210			234						639		
Adjusted Saturation Flow Rate (s), veh/h/ln	946			1639						1688		
Queue Service Time (g _s), s	12.1			9.3						28.0		
Cycle Queue Clearance Time (g _c), s	21.4			9.3						28.0		
Green Ratio (g/C)	0.38			0.38						0.49		
Capacity (c), veh/h	429			619						825		
Volume-to-Capacity Ratio (X)	0.489			0.377						0.774		
Back of Queue (Q), ft/ln (95 th percentile)	164			147.7						410.7		
Back of Queue (Q), veh/ln (95 th percentile)	6.6			5.9						16.3		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d ₁), s/veh	27.3			20.3						18.9		
Incremental Delay (d ₂), s/veh	0.3			0.1						4.2		
Initial Queue Delay (d ₃), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	27.6			20.5						23.1		
Level of Service (LOS)	C			C						C		
Approach Delay, s/veh / LOS	27.6	C		20.5	C		0.0			23.1	C	
Intersection Delay, s/veh / LOS	23.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.40	A	1.40	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.83	A	0.87	A			1.54	B

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	154	39			25	190				287	0	301

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	34.0	44.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

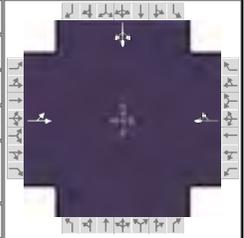
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.498	0.498		1.000	0.863					0.896	0.896	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.498		0.000	0.863					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f_{LPB})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	755	191	0	0	191	1449				824	0	864
Proportion of Vehicles Arriving on Green (P)	0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.49	0.00	0.49
Incremental Delay Factor (k)		0.04			0.04						0.29	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0		6.0				4.0
Green Ratio (g/C)		0.38		0.38				0.49
Permitted Saturation Flow Rate (s_p), veh/h/ln		1165		1386				0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1900				
Permitted Effective Green Time (g_p), s		34.0		0.0				0.0
Permitted Service Time (g_u), s		24.7		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		12.1						
Time to First Blockage (g_i), s		0.5		34.0				0.0
Queue Service Time Before Blockage (g_{ts}), s		0.5						
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	0.681	0.000		0.681	0.000		0.972	0.000		0.972	0.000	
Pedestrian F_s / F_{delay}	0.000	0.115		0.000	0.115		0.000	0.157		0.000	0.159	
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	755.56	17.42		755.56	17.42			50.14			52.27	
Bicycle F_w / F_v	-3.64	0.35		-3.64	0.39		-3.64			-3.64	1.05	

HCS7 Signalized Intersection Results Graphical Summary

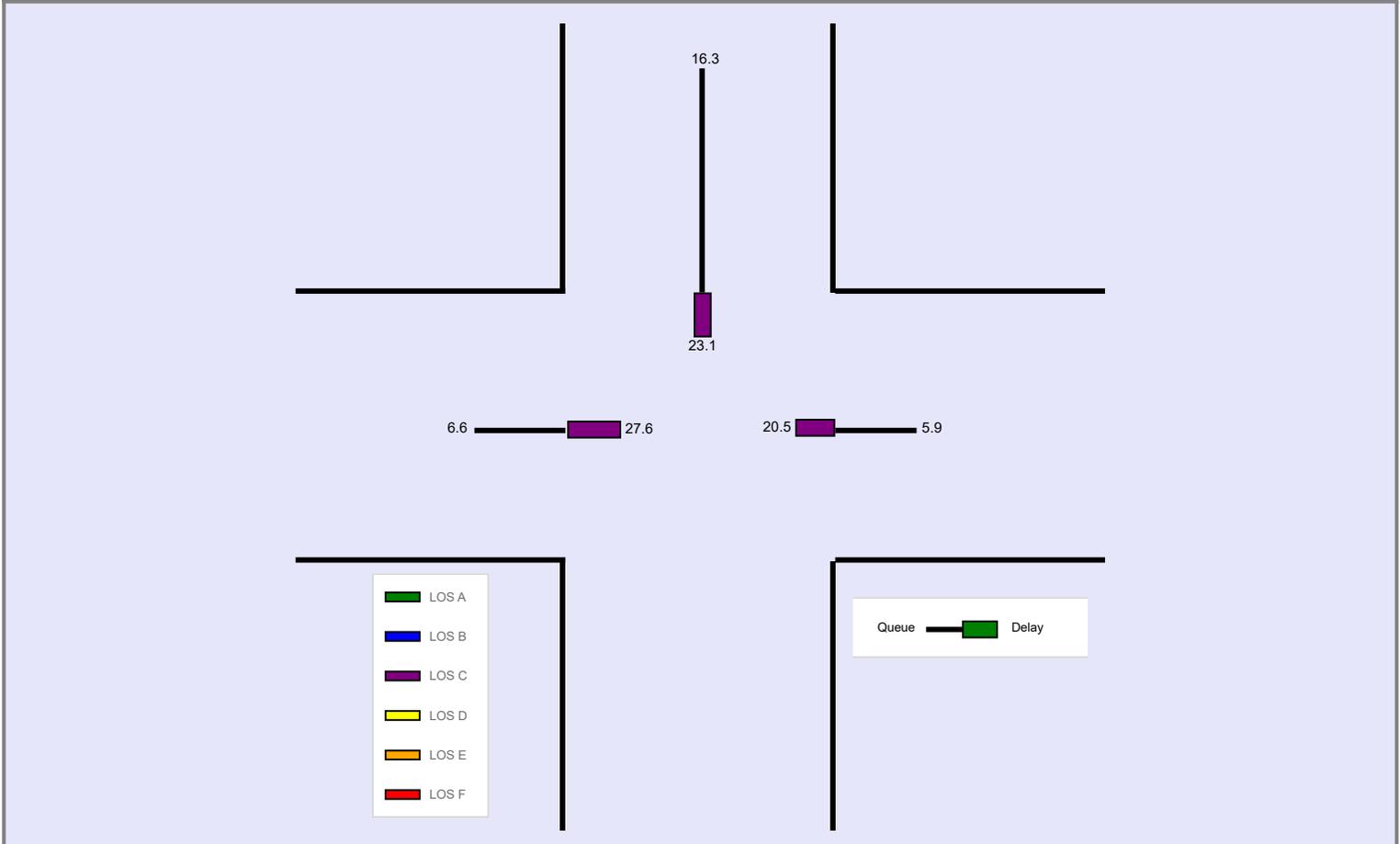
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	154	39			25	190				287	0	301

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On											
Force Mode	Fixed	Simult. Gap N/S	On											
				Green	34.0	44.0	0.0	0.0	0.0	0.0				
				Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

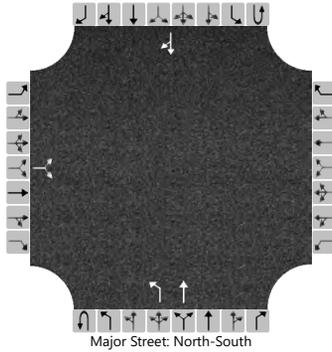
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		164			147.7						410.7	
Back of Queue (Q), veh/ln (95 th percentile)		6.6			5.9						16.3	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		27.6			20.5						23.1	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	27.6		C	20.5		C	0.0			23.1		C
Intersection Delay, s/veh / LOS	23.4						C					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD PM PEAK W/ IMP	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		92		26						59	267				189	64
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

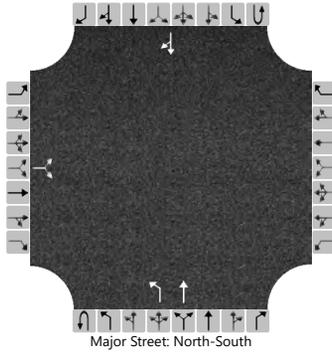
Flow Rate, v (veh/h)			128							64						
Capacity, c (veh/h)			453							1300						
v/c Ratio			0.28							0.05						
95% Queue Length, Q ₉₅ (veh)			1.2							0.2						
Control Delay (s/veh)			16.1							7.9						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		16.1								1.4						
Approach LOS		C														

2023 NO-BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2023	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		88		34						13	76				172	148
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

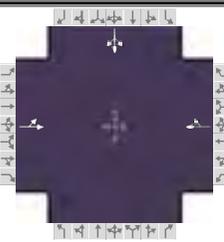
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			133							14						
Capacity, c (veh/h)			651							1222						
v/c Ratio			0.20							0.01						
95% Queue Length, Q ₉₅ (veh)			0.8							0.0						
Control Delay (s/veh)			11.9							8.0						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		11.9								1.2						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2023 NO-BUILD		Analysis Period	1> 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				191	3			1	205				86	0	56

Signal Information				Phase Diagram											
Cycle, s	90.0	Reference Phase	2	↩	↪	↩	↪	↩	↪	↩	↪	↩	↪	↩	↪
Offset, s	0	Reference Point	End	Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

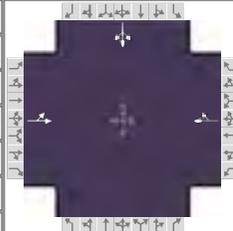
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				191	3			1	205				86	0	56
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						2		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (I _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	191	3			1	205				86	0	56

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

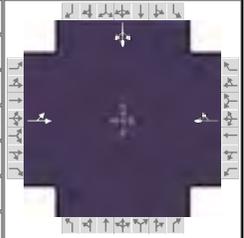
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g_s), s		17.5		8.1				8.6
Green Extension Time (g_e), s		1.0		1.0				0.2
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	211			224						154		
Adjusted Saturation Flow Rate (s), veh/h/ln	1024			1536						1698		
Queue Service Time (g_s), s	9.4			6.1						6.6		
Cycle Queue Clearance Time (g_c), s	15.5			6.1						6.6		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	694			922						453		
Volume-to-Capacity Ratio (X)	0.304			0.243						0.341		
Back of Queue (Q), ft/ln (95 th percentile)	96.6			79.8						119		
Back of Queue (Q), veh/ln (95 th percentile)	3.8			3.0						4.7		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	12.0			8.4						26.6		
Incremental Delay (d_2), s/veh	0.1			0.1						0.2		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	12.1			8.5						26.8		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	12.1	B		8.5	A		0.0			26.8	C	
Intersection Delay, s/veh / LOS	14.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.84	A	0.86	A			0.74	A

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	191	3			1	205				86	0	56

Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
				Red	2.0	2.0	0.0	0.0	0.0	0.0					

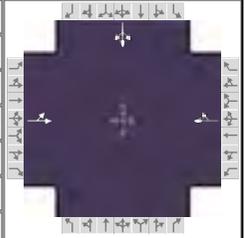
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.552	0.552		1.000	0.848					0.908	0.908	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.552		0.000	0.848					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f_{LPB})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1008	16	0	0	7	1528				1029	0	670
Proportion of Vehicles Arriving on Green (P)	0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)		0.04			0.04						0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0		6.0				4.0
Green Ratio (g/C)		0.60		0.60				0.27
Permitted Saturation Flow Rate (s_p), veh/h/ln		1175		1436				0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1811				
Permitted Effective Green Time (g_p), s		54.0		0.0				0.0
Permitted Service Time (g_u), s		47.9		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		9.4						
Time to First Blockage (g_t), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{ts}), s		0.0						
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000	0.000	
Pedestrian F_s / F_{delay}	0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000	0.159	0.159	
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	1200.00	7.20	1200.00	7.20		50.14		50.14			52.27	
Bicycle F_w / F_v	-3.64	0.35	-3.64	0.37	-3.64		-3.64		-3.64		0.25	

HCS7 Signalized Intersection Results Graphical Summary

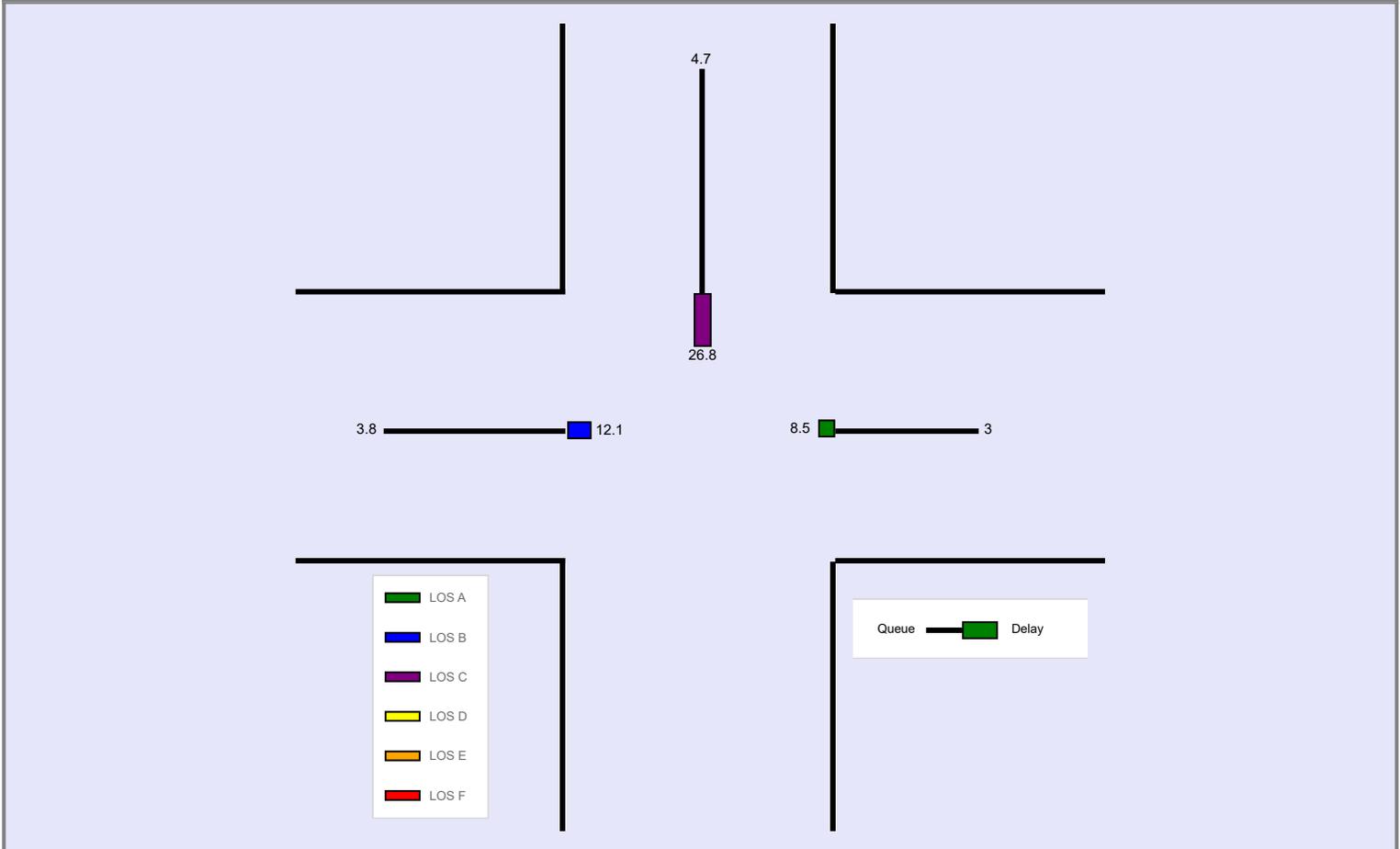
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	191	3			1	205				86	0	56

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

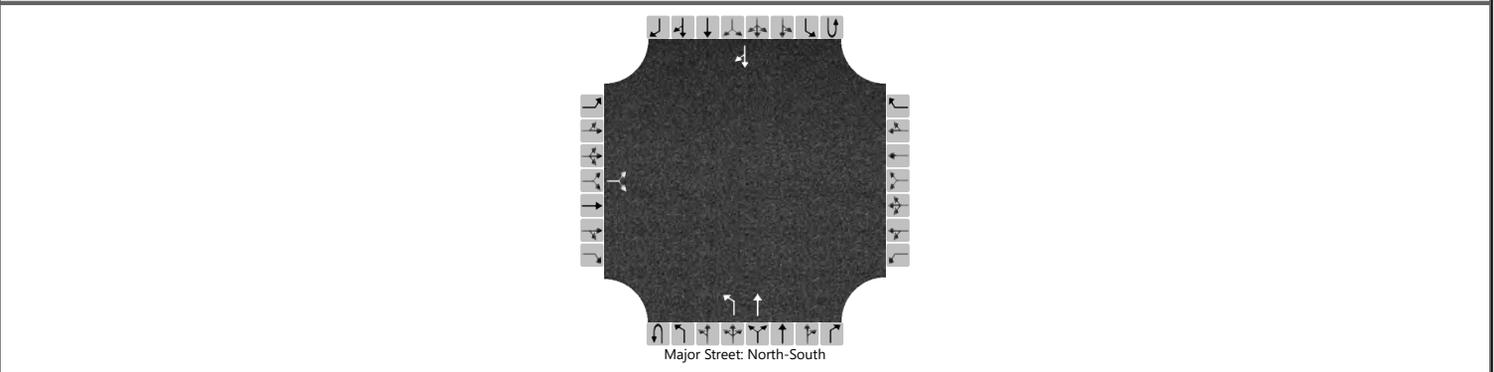
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		96.6			79.8						119	
Back of Queue (Q), veh/ln (95 th percentile)		3.8			3.0						4.7	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		12.1			8.5						26.8	
Level of Service (LOS)		B			A						C	
Approach Delay, s/veh / LOS	12.1		B	8.5		A	0.0			26.8		C
Intersection Delay, s/veh / LOS	14.6						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2023	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		95		27						60	275				196	66
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

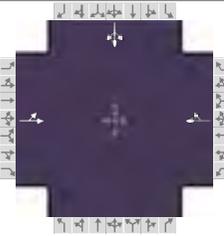
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			133							65						
Capacity, c (veh/h)			442							1289						
v/c Ratio			0.30							0.05						
95% Queue Length, Q ₉₅ (veh)			1.2							0.2						
Control Delay (s/veh)			16.6							7.9						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		16.6								1.4						
Approach LOS		C														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2023 NO-BUILD		Analysis Period	1> 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				159	40			25	198				295	0	309

Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	34.0	44.0	0.0	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0					

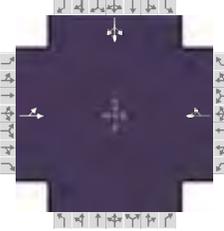
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				159	40			25	198				295	0	309
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h					None			None						None	
Heavy Vehicles (P _{HV}), %					0			0						1	
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft					12.0			12.0						12.0	
Turn Bay Length, ft					0			0						0	
Grade (P _g), %					0			0			0			0	
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			34.0		34.0				44.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (I _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB			
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25	
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0	
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No	
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0	
Pedestrian Signal / Occupied Parking					0.50			No		0.50		No			0.50	

HCS7 Signalized Intersection Results Summary

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other				
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR			PHF	0.92				
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD			Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus								
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				159	40			25	198				295	0	309

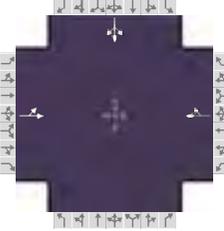
Signal Information				Signal Phases										
Cycle, s	90.0	Reference Phase	2	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩
Offset, s	0	Reference Point	End	Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase			2		6				4
Case Number			8.0		8.0				12.0
Phase Duration, s			40.0		40.0				50.0
Change Period, (Y+R _c), s			6.0		6.0				6.0
Max Allow Headway (MAH), s			3.3		3.3				3.2
Queue Clearance Time (g _s), s			24.5		11.7				31.3
Green Extension Time (g _e), s			0.8		1.0				1.4
Phase Call Probability			1.00		1.00				1.00
Max Out Probability			0.03		0.00				0.02

Movement Group Results		EB			WB			NB			SB		
Approach Movement		L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h		216			242						657		
Adjusted Saturation Flow Rate (s), veh/h/ln		924			1638						1688		
Queue Service Time (g _s), s		12.8			9.7						29.3		
Cycle Queue Clearance Time (g _c), s		22.5			9.7						29.3		
Green Ratio (g/C)		0.38			0.38						0.49		
Capacity (c), veh/h		421			619						825		
Volume-to-Capacity Ratio (X)		0.514			0.392						0.795		
Back of Queue (Q), ft/ln (95 th percentile)		172.3			154.8						430.8		
Back of Queue (Q), veh/ln (95 th percentile)		6.9			6.2						17.1		
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00		
Uniform Delay (d ₁), s/veh		27.9			20.4						19.2		
Incremental Delay (d ₂), s/veh		0.5			0.2						5.0		
Initial Queue Delay (d ₃), s/veh		0.0			0.0						0.0		
Control Delay (d), s/veh		28.4			20.6						24.2		
Level of Service (LOS)		C			C						C		
Approach Delay, s/veh / LOS		28.4	C		20.6	C		0.0			24.2	C	
Intersection Delay, s/veh / LOS		24.3						C					

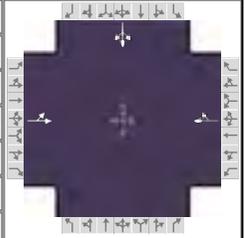
Multimodal Results		EB		WB		NB		SB	
Pedestrian LOS Score / LOS		1.40	A	1.40	A	1.73	B	1.73	B
Bicycle LOS Score / LOS		0.84	A	0.89	A			1.57	B

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information										
Agency	CESO					Duration, h	0.250									
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other									
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR			PHF	0.92									
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD			Analysis Period	1 > 7:00									
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus													
Project Description	GREENGATE DEVELOPMENT TIS															
Demand Information				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				159	40			25	198				295	0	309	
Signal Information																
Cycle, s	90.0	Reference Phase	2							1	2	3	4			
Offset, s	0	Reference Point	End	Green	34.0	44.0	0.0	0.0	0.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	5	6	7	8		
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R	
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Heavy Vehicles and Grade Factor (f_{HVg})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000	
Parking Activity Adjustment Factor (f_p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Bus Blockage Adjustment Factor (f_{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Lane Utilization Adjustment Factor (f_{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Left-Turn Adjustment Factor (f_{LT})				0.486	0.486		1.000	0.862					0.896	0.896		
Right-Turn Adjustment Factor (f_{RT})					0.000	0.486		0.000	0.862					0.000	0.000	
Left-Turn Pedestrian Adjustment Factor (f_{LPB})				1.000			1.000						1.000			
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})						1.000			1.000						1.000	
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Movement Saturation Flow Rate (s), veh/h				738	186	0	0	184	1455				825	0	864	
Proportion of Vehicles Arriving on Green (P)				0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.49	0.00	0.49	
Incremental Delay Factor (k)					0.05			0.04						0.31		
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R					
Lost Time (t_L)					6.0		6.0					4.0				
Green Ratio (g/C)					0.38		0.38					0.49				
Permitted Saturation Flow Rate (s_p), veh/h/ln					1156		1385					0				
Shared Saturation Flow Rate (s_{sh}), veh/h/ln					0		1900									
Permitted Effective Green Time (g_p), s					34.0		0.0					0.0				
Permitted Service Time (g_u), s					24.3		0.0					0.0				
Permitted Queue Service Time (g_{ps}), s					12.8											
Time to First Blockage (g_t), s					0.5		34.0					0.0				
Queue Service Time Before Blockage (g_{ts}), s					0.5											
Protected Right Saturation Flow (s_R), veh/h/ln																
Protected Right Effective Green Time (g_R), s																
Multimodal				EB			WB			NB			SB			
Pedestrian F_w / F_v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000			
Pedestrian F_s / F_{delay}				0.000	0.115	0.000	0.115	0.000	0.157	0.000	0.157	0.000	0.159			
Pedestrian M_{corner} / M_{cw}																
Bicycle c_b / d_b				755.56	17.42	755.56	17.42		50.14			52.27				
Bicycle F_w / F_v				-3.64	0.36	-3.64	0.40	-3.64				-3.64	1.08			

HCS7 Signalized Intersection Results Graphical Summary

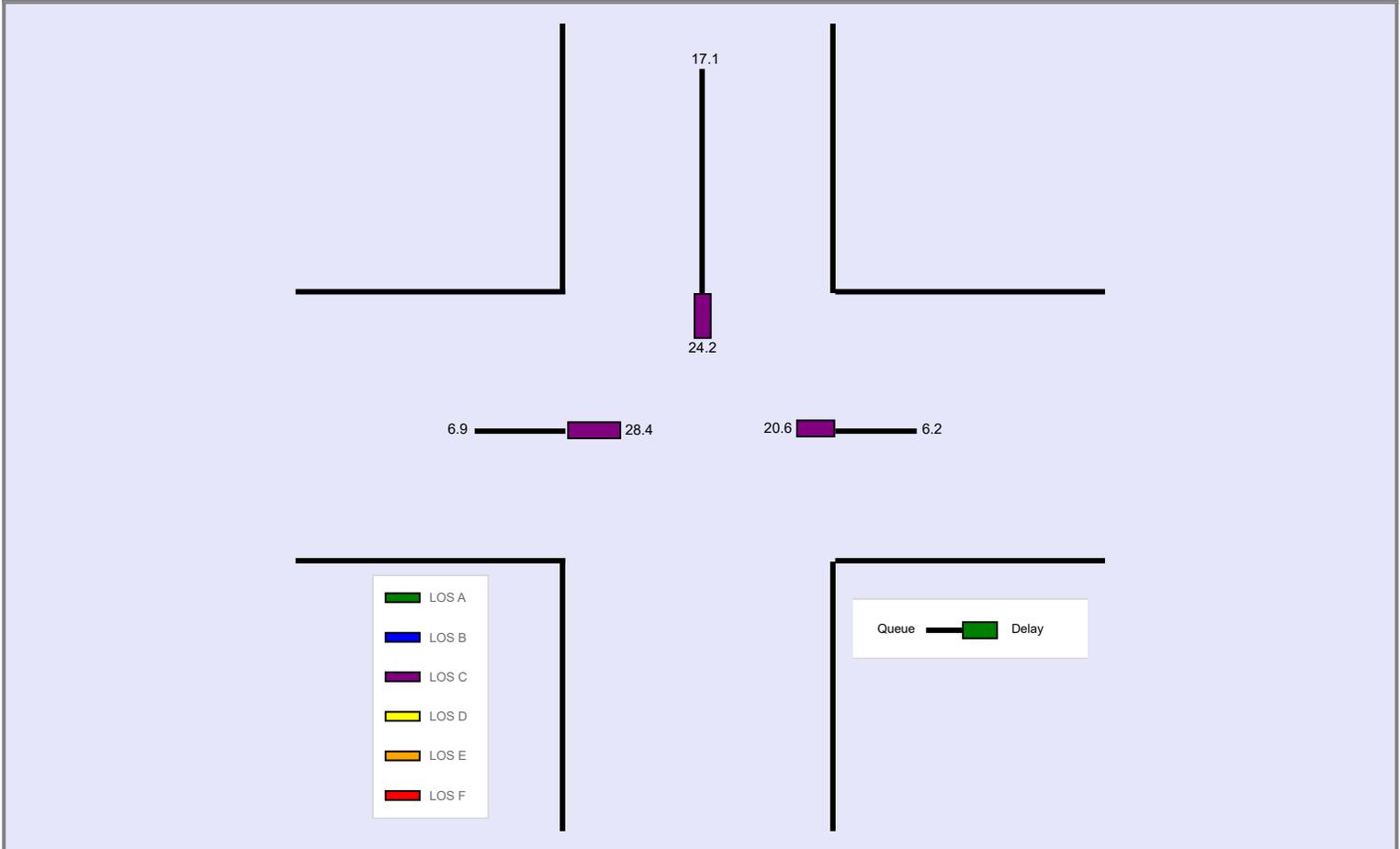
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	159	40			25	198				295	0	309

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		172.3			154.8						430.8	
Back of Queue (Q), veh/ln (95 th percentile)		6.9			6.2						17.1	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		28.4			20.6						24.2	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	28.4		C	20.6		C	0.0			24.2		C
Intersection Delay, s/veh / LOS	24.3						C					

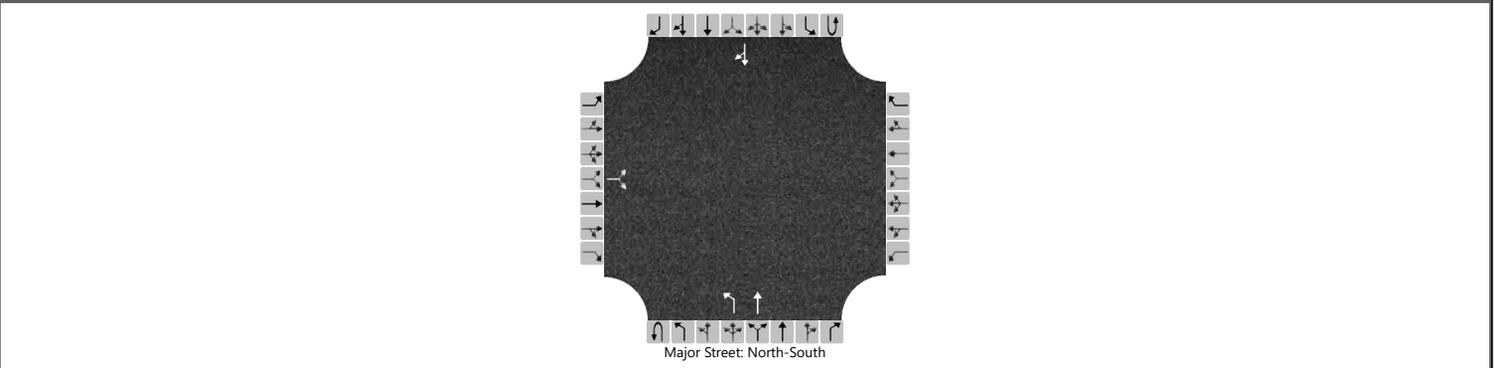


2024 NO-BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2024	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		91		35						14	79				177	152
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

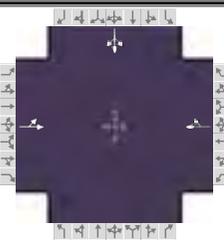
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

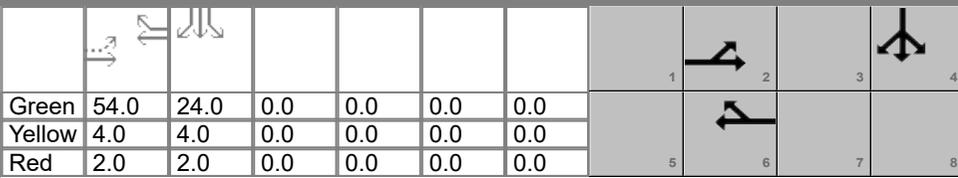
Flow Rate, v (veh/h)			137							15						
Capacity, c (veh/h)			640							1212						
v/c Ratio			0.21							0.01						
95% Queue Length, Q ₉₅ (veh)			0.8							0.0						
Control Delay (s/veh)			12.2							8.0						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		12.2								1.2						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other				
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR			PHF	0.92				
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD			Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus								
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				197	4			1	211				89	0	58

Signal Information				Signal Phases										
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On											
Force Mode	Fixed	Simult. Gap N/S	On											
				Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

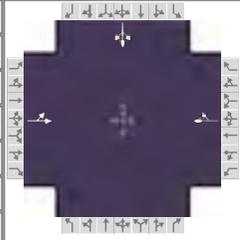
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				197	4			1	211				89	0	58
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						2		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	197	4			1	211				89	0	58

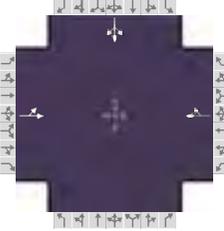
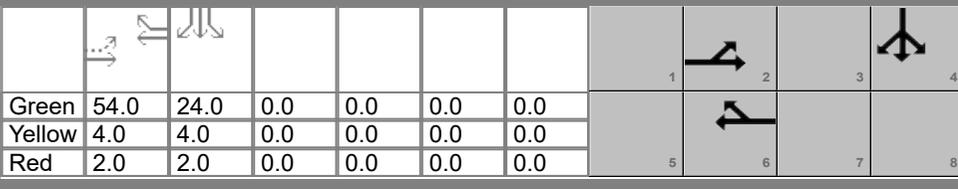
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g_s), s		18.2		8.4				8.9
Green Extension Time (g_e), s		1.0		1.0				0.2
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	218			230						160		
Adjusted Saturation Flow Rate (s), veh/h/ln	1016			1536						1698		
Queue Service Time (g_s), s	9.9			6.4						6.9		
Cycle Queue Clearance Time (g_c), s	16.2			6.4						6.9		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	689			922						453		
Volume-to-Capacity Ratio (X)	0.317			0.250						0.353		
Back of Queue (Q), ft/ln (95 th percentile)	101.5			82.4						123.6		
Back of Queue (Q), veh/ln (95 th percentile)	4.0			3.1						4.9		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	12.2			8.5						26.7		
Incremental Delay (d_2), s/veh	0.1			0.1						0.2		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	12.3			8.5						26.9		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	12.3	B		8.5	A		0.0			26.9	C	
Intersection Delay, s/veh / LOS	14.7						B					

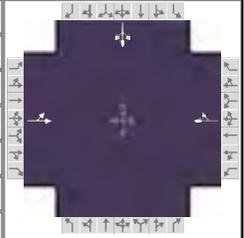
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.85	A	0.87	A			0.75	A

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other								
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92								
Urban Street	HILL RD		Analysis Year	2024 NO-BUILD		Analysis Period	1 > 7:00								
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus											
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				197	4			1	211				89	0	58
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
Green				54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow				4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red				2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f _{LT})				0.547	0.547		1.000	0.848					0.908	0.908	
Right-Turn Adjustment Factor (f _{RT})					0.000	0.547		0.000	0.848					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f _{LPB})				1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})						1.000			1.000						1.000
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h				996	20	0	0	7	1529				1028	0	670
Proportion of Vehicles Arriving on Green (P)				0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)					0.04			0.04						0.04	
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t _L)					6.0		6.0				4.0				
Green Ratio (g/C)					0.60		0.60				0.27				
Permitted Saturation Flow Rate (s _p), veh/h/ln					1168		1434				0				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1811								
Permitted Effective Green Time (g _p), s					54.0		0.0				0.0				
Permitted Service Time (g _u), s					47.6		0.0				0.0				
Permitted Queue Service Time (g _{ps}), s					9.9										
Time to First Blockage (g _t), s					0.0		54.0				0.0				
Queue Service Time Before Blockage (g _{ts}), s					0.0										
Protected Right Saturation Flow (s _R), veh/h/ln															
Protected Right Effective Green Time (g _R), s															
Multimodal				EB			WB			NB			SB		
Pedestrian F _w / F _v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F _s / F _{delay}				0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M _{corner} / M _{cw}															
Bicycle c _b / d _b				1200.00	7.20	1200.00	7.20		50.14			52.27			
Bicycle F _w / F _v				-3.64	0.36	-3.64	0.38	-3.64			-3.64	0.26			

HCS7 Signalized Intersection Results Graphical Summary

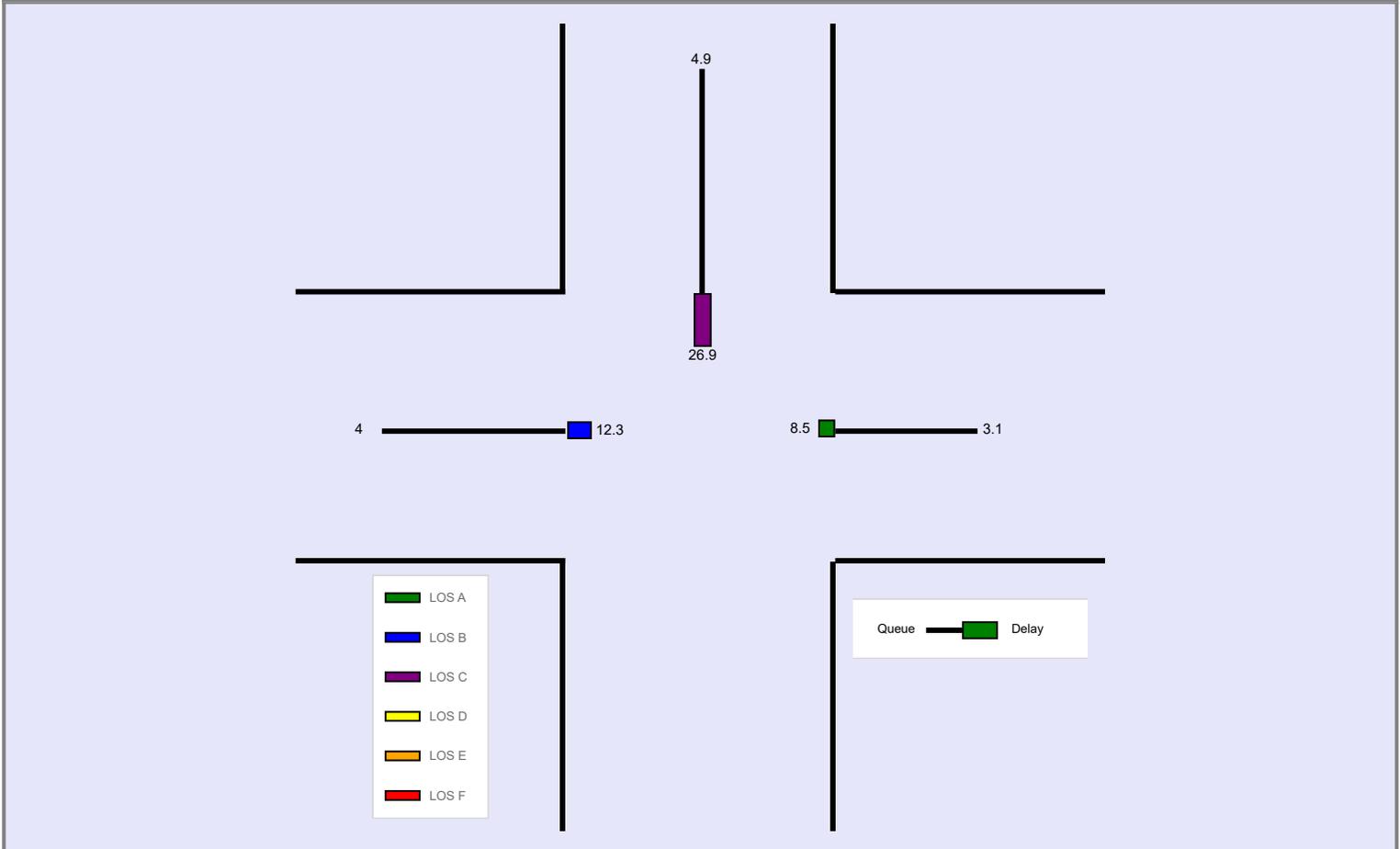
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	197	4			1	211				89	0	58

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

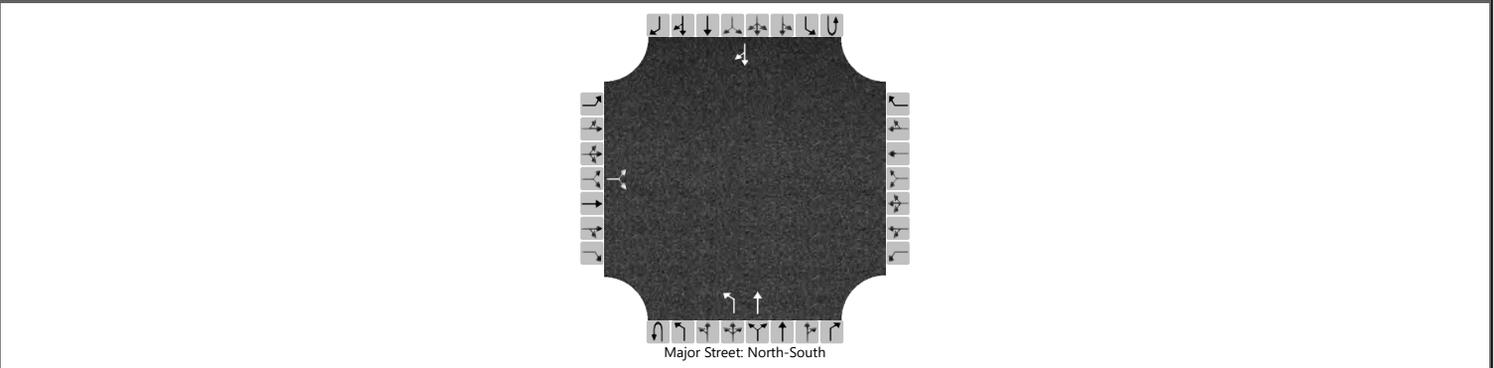
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		101.5			82.4							123.6
Back of Queue (Q), veh/ln (95 th percentile)		4.0			3.1							4.9
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00							0.00
Control Delay (d), s/veh		12.3			8.5							26.9
Level of Service (LOS)		B			A							C
Approach Delay, s/veh / LOS	12.3		B	8.5		A	0.0			26.9		C
Intersection Delay, s/veh / LOS	14.7						B					



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	BUSEY & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	BUSEY RD
Analysis Year	2024	North/South Street	HILL/BUSEY
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		98		28						62	281				202	68
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

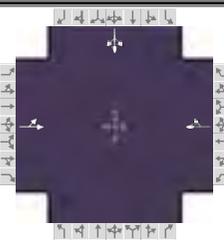
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			137							67						
Capacity, c (veh/h)			431							1280						
v/c Ratio			0.32							0.05						
95% Queue Length, Q ₉₅ (veh)			1.3							0.2						
Control Delay (s/veh)			17.2							8.0						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		17.2								1.4						
Approach LOS		C														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2024 NO-BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				164	41			26	204				302	0	317

Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	34.0	44.0	0.0	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0					

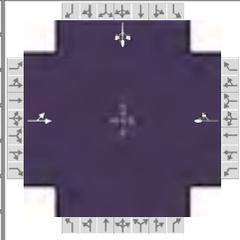
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				164	41			26	204				302	0	317
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				0			0						1		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			34.0		34.0				44.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	CESO			Duration, h	0.250		
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other		
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92		
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1 > 7:00		
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus				
Project Description	GREENGATE DEVELOPMENT TIS						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	164	41			26	204				302	0	317

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
		Red	2.0	2.0	0.0	0.0	0.0	0.0				

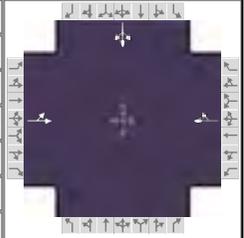
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		40.0		40.0				50.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.3		3.3				3.2
Queue Clearance Time (g_s), s		25.5		12.1				32.5
Green Extension Time (g_e), s		0.8		1.0				1.4
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.05		0.00				0.03

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	223			250						673		
Adjusted Saturation Flow Rate (s), veh/h/ln	905			1638						1688		
Queue Service Time (g_s), s	13.5			10.1						30.5		
Cycle Queue Clearance Time (g_c), s	23.5			10.1						30.5		
Green Ratio (g/C)	0.38			0.38						0.49		
Capacity (c), veh/h	414			619						825		
Volume-to-Capacity Ratio (X)	0.539			0.404						0.815		
Back of Queue (Q), ft/ln (95 th percentile)	181.1			160						450.6		
Back of Queue (Q), veh/ln (95 th percentile)	7.2			6.4						17.9		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	28.4			20.6						19.5		
Incremental Delay (d_2), s/veh	0.8			0.2						5.9		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	29.2			20.7						25.5		
Level of Service (LOS)	C			C						C		
Approach Delay, s/veh / LOS	29.2	C		20.7	C		0.0			25.5	C	
Intersection Delay, s/veh / LOS	25.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.40	A	1.40	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.86	A	0.90	A			1.60	B

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	164	41			26	204				302	0	317

Signal Information				Signal Phases								
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

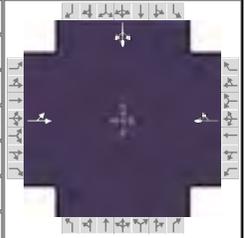
Saturation Flow / Delay	L			T			R			L			T			R		
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.992	1.000	1.000	1.000	1.000	
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Left-Turn Adjustment Factor (f_{LT})	0.476	0.476		1.000	0.862							0.896	0.896					
Right-Turn Adjustment Factor (f_{RT})		0.000	0.476		0.000	0.862							0.000	0.000				
Left-Turn Pedestrian Adjustment Factor (f_{LPB})	1.000			1.000								1.000						
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})			1.000			1.000											1.000	
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Movement Saturation Flow Rate (s), veh/h	724	181	0	0	185	1453						824	0	865				
Proportion of Vehicles Arriving on Green (P)	0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.49				
Incremental Delay Factor (k)		0.08			0.04								0.33					

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0		6.0				4.0
Green Ratio (g/C)		0.38		0.38				0.49
Permitted Saturation Flow Rate (s_p), veh/h/ln		1148		1383				0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1900				
Permitted Effective Green Time (g_p), s		34.0		0.0				0.0
Permitted Service Time (g_u), s		23.9		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		13.5						
Time to First Blockage (g_t), s		0.5		34.0				0.0
Queue Service Time Before Blockage (g_{ts}), s		0.5						
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000	0.000	
Pedestrian F_s / F_{delay}	0.000	0.115	0.000	0.115	0.000	0.157	0.000	0.157	0.000	0.159	0.159	
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	755.56	17.42	755.56	17.42		50.14					52.27	
Bicycle F_w / F_v	-3.64	0.37	-3.64	0.41	-3.64						1.11	

HCS7 Signalized Intersection Results Graphical Summary

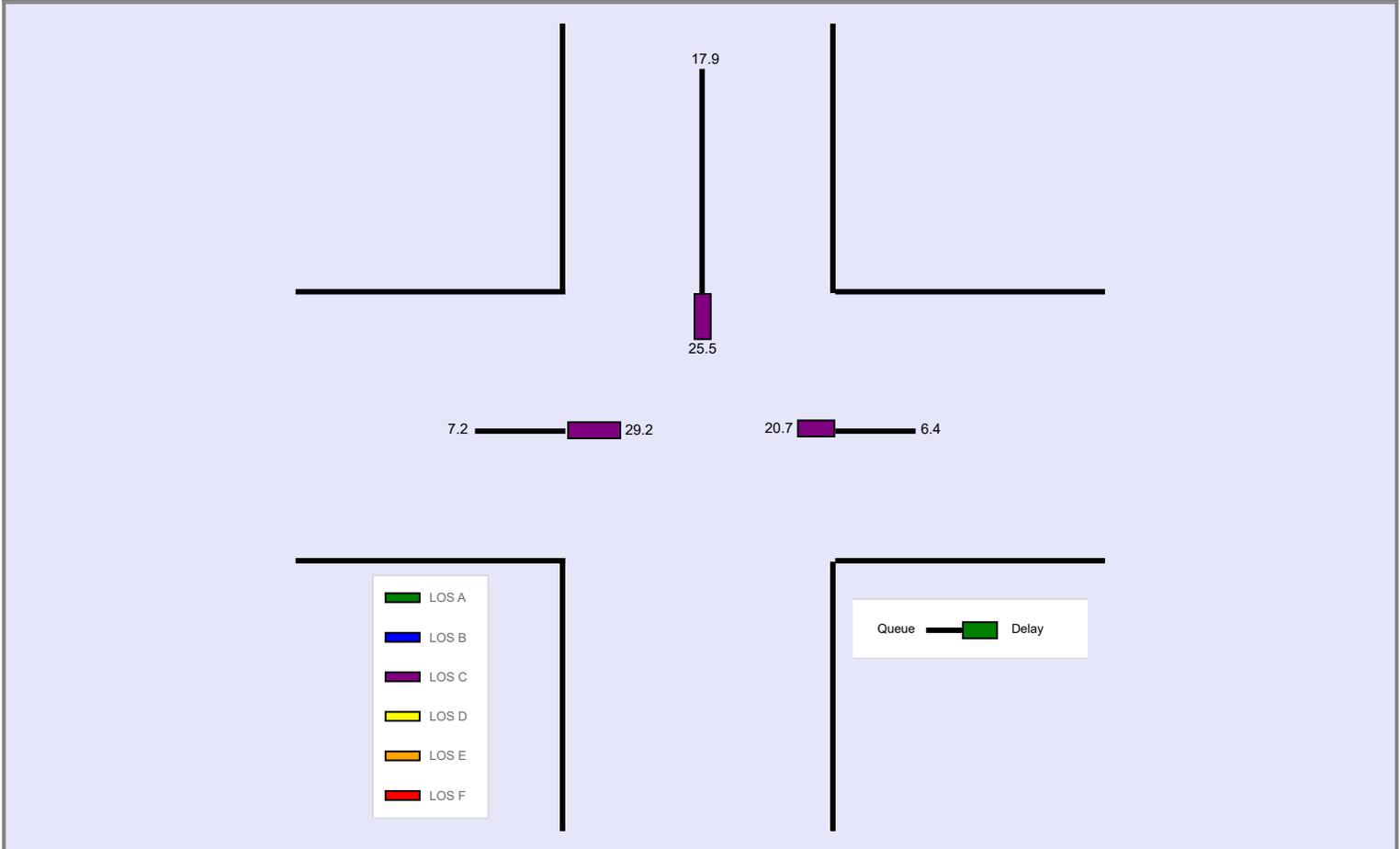
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	164	41			26	204				302	0	317

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
		Red	2.0	2.0	0.0	0.0	0.0	0.0				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		181.1			160						450.6	
Back of Queue (Q), veh/ln (95 th percentile)		7.2			6.4						17.9	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		29.2			20.7						25.5	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	29.2		C	20.7		C	0.0			25.5		C
Intersection Delay, s/veh / LOS	25.2						C					

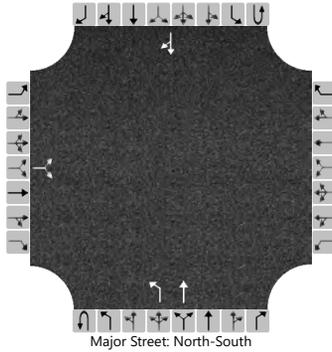


2034 NO-BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2034	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		122		46						17	105				237	199
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			183							18						
Capacity, c (veh/h)			545							1099						
v/c Ratio			0.33							0.02						
95% Queue Length, Q ₉₅ (veh)			1.5							0.1						
Control Delay (s/veh)			14.9							8.3						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		14.9								1.2						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2034 NO-BUILD		Analysis Period	1> 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										

Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	11			7	276				112	0	73

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

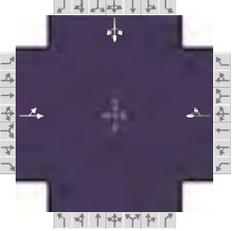
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	11			7	276				112	0	73
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						2		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	257	11			7	276				112	0	73

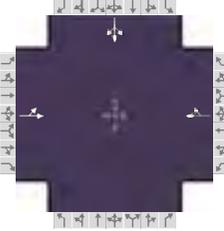
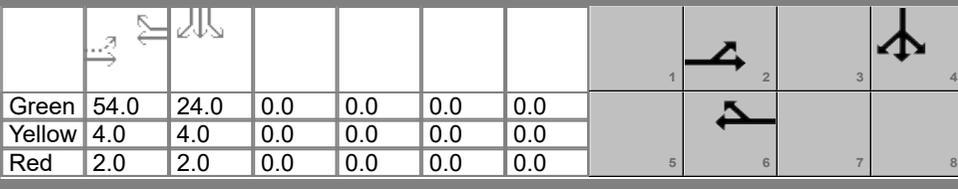
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.5		3.5				3.2
Queue Clearance Time (g_s), s		27.3		11.0				10.9
Green Extension Time (g_e), s		1.5		1.5				0.3
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	291			308						201		
Adjusted Saturation Flow Rate (s), veh/h/ln	905			1541						1698		
Queue Service Time (g_s), s	16.4			9.0						8.9		
Cycle Queue Clearance Time (g_c), s	25.3			9.0						8.9		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	621			924						453		
Volume-to-Capacity Ratio (X)	0.469			0.333						0.444		
Back of Queue (Q), ft/ln (95 th percentile)	163.1			117						160.1		
Back of Queue (Q), veh/ln (95 th percentile)	6.4			4.5						6.3		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	15.2			9.0						27.5		
Incremental Delay (d_2), s/veh	0.2			0.1						0.3		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	15.4			9.1						27.7		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	15.4	B		9.1	A		0.0			27.7	C	
Intersection Delay, s/veh / LOS	16.1						B					

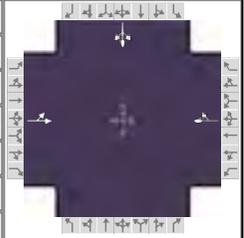
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.97	A	1.00	A			0.82	A

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other								
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR			PHF	0.92								
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD			Analysis Period	1 > 7:00								
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus												
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	11			7	276				112	0	73
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
Green				54.0	24.0	0.0	0.0	0.0	0.0						
Yellow				4.0	4.0	0.0	0.0	0.0	0.0						
Red				2.0	2.0	0.0	0.0	0.0	0.0						
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})				1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f_p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})				0.488	0.488		1.000	0.851					0.908	0.908	
Right-Turn Adjustment Factor (f_{RT})					0.000	0.488		0.000	0.851					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f_{LPB})				1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})						1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h				868	37	0	0	38	1503				1028	0	670
Proportion of Vehicles Arriving on Green (P)				0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)					0.04			0.04						0.04	
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t_L)					6.0		6.0					4.0			
Green Ratio (g/C)					0.60		0.60				0.27				
Permitted Saturation Flow Rate (s_p), veh/h/ln					1089		1425				0				
Shared Saturation Flow Rate (s_{sh}), veh/h/ln					0		1811								
Permitted Effective Green Time (g_p), s					54.0		0.0				0.0				
Permitted Service Time (g_u), s					45.0		0.0				0.0				
Permitted Queue Service Time (g_{ps}), s					16.4										
Time to First Blockage (g_t), s					0.1		54.0				0.0				
Queue Service Time Before Blockage (g_{ts}), s					0.1										
Protected Right Saturation Flow (s_R), veh/h/ln															
Protected Right Effective Green Time (g_R), s															
Multimodal				EB			WB			NB			SB		
Pedestrian F_w / F_v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F_s / F_{delay}				0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000			
Pedestrian M_{corner} / M_{cw}															
Bicycle c_b / d_b				1200.00	7.20	1200.00	7.20		50.14		52.27				
Bicycle F_w / F_v				-3.64	0.48	-3.64	0.51	-3.64		-3.64	0.33				

HCS7 Signalized Intersection Results Graphical Summary

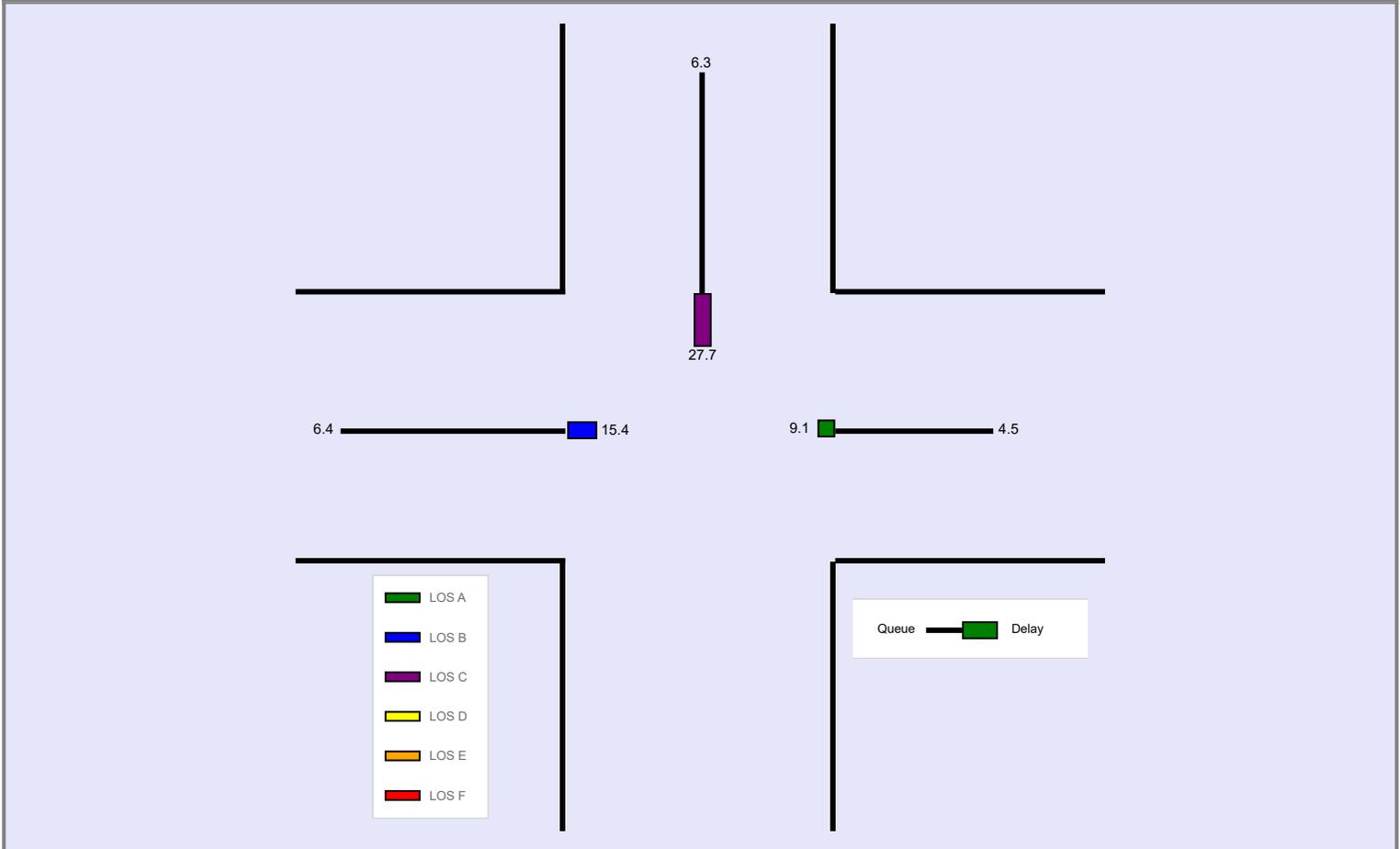
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	11			7	276				112	0	73

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

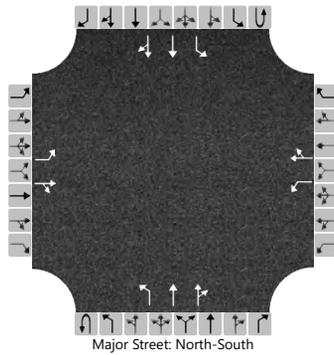
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		163.1			117						160.1	
Back of Queue (Q), veh/ln (95 th percentile)		6.4			4.5						6.3	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		15.4			9.1						27.7	
Level of Service (LOS)		B			A						C	
Approach Delay, s/veh / LOS	15.4		B	9.1		A	0.0			27.7		C
Intersection Delay, s/veh / LOS	16.1						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	DILEY & HOWE/GREENGATE				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HOWE/GREENGATE				
Analysis Year	2034	North/South Street	DILEY RD				
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		1	1	0		1	1	0	0	1	2	0	0	1	2	0	
Configuration		L		TR		L		TR		L	T	TR		L	T	TR	
Volume (veh/h)		9	1	15		82	1	65	0	66	546	109	0	56	856	30	
Percent Heavy Vehicles (%)		29	0	9		0	0	0	0	4			0	0			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5	6.5	6.9		7.5	6.5	6.9		4.1				4.1		
Critical Headway (sec)		8.08	6.50	7.08		7.50	6.50	6.90		4.18				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.79	4.00	3.39		3.50	4.00	3.30		2.24				2.20		

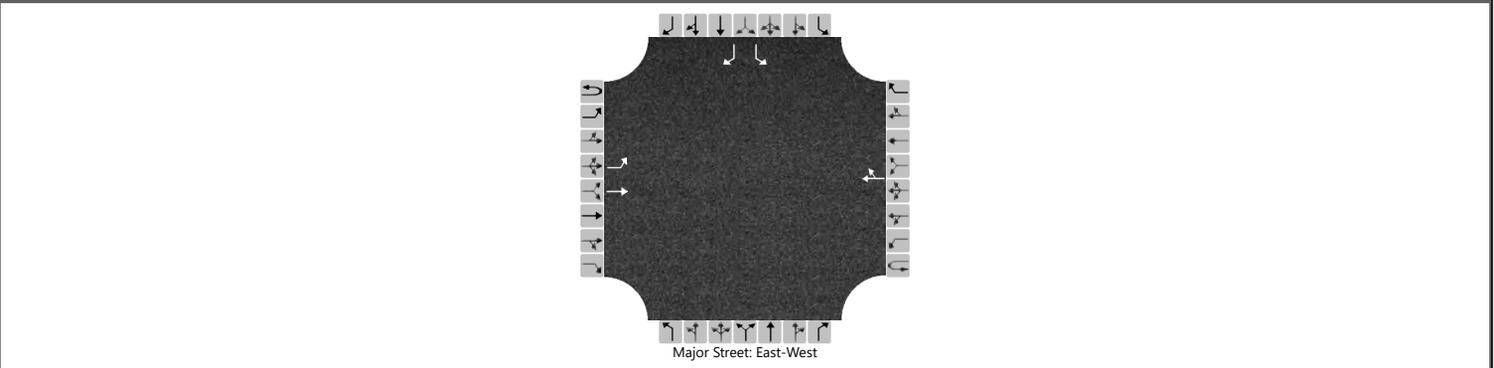
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10		17		89		72		72				61			
Capacity, c (veh/h)		49		512		87		646		698				897			
v/c Ratio		0.20		0.03		1.02		0.11		0.10				0.07			
95% Queue Length, Q ₉₅ (veh)		0.7		0.1		5.9		0.4		0.3				0.2			
Control Delay (s/veh)		95.4		12.3		188.2		11.3		10.7				9.3			
Level of Service (LOS)		F		B		F		B		B				A			
Approach Delay (s/veh)		42.2				109.3				1.0				0.6			
Approach LOS		E				F											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	GREENGATE & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HILL RD
Analysis Year	2034	North/South Street	GREENGATE BLVD
Time Analyzed	NO-BUILD AM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		6	117				277	6						5		6
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)																0
Right Turn Channelized																No
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

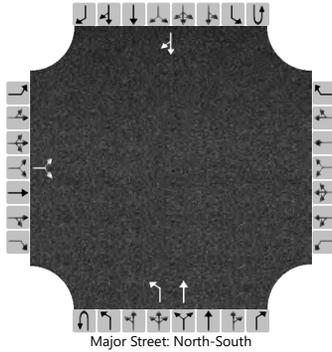
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7												5		7	
Capacity, c (veh/h)		1264												572		740	
v/c Ratio		0.01												0.01		0.01	
95% Queue Length, Q ₉₅ (veh)		0.0												0.0		0.0	
Control Delay (s/veh)		7.9												11.4		9.9	
Level of Service (LOS)		A												B		A	
Approach Delay (s/veh)		0.4												10.6			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2034	North/South Street	HILL/BUSEY				
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		131		37						79	378				284	89
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

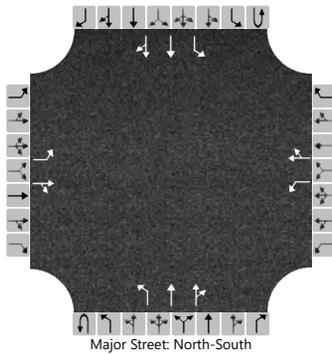
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			183							86						
Capacity, c (veh/h)			310							1164						
v/c Ratio			0.59							0.07						
95% Queue Length, Q ₉₅ (veh)			3.5							0.2						
Control Delay (s/veh)			32.1							8.3						
Level of Service (LOS)			D							A						
Approach Delay (s/veh)		32.1								1.4						
Approach LOS		D														

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	DILEY & HOWE/GREENGATE
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HOWE/GREENGATE
Analysis Year	2034	North/South Street	DILEY RD
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		1	1	0		1	1	0	0	1	2	0	0	1	2	0	
Configuration		L		TR		L		TR		L	T	TR		L	T	TR	
Volume (veh/h)		20	1	54		342	1	272	0	11	1024	395	0	204	842	9	
Percent Heavy Vehicles (%)		0	0	0		0	0	0	0	0			0	0			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

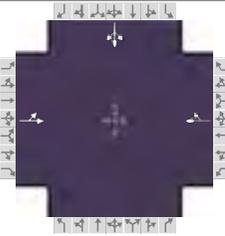
Base Critical Headway (sec)		7.5	6.5	6.9		7.5	6.5	6.9		4.1				4.1		
Critical Headway (sec)		7.50	6.50	6.90		7.50	6.50	6.90		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22		60		372		297		12				222			
Capacity, c (veh/h)		3		552		11		347		747				436			
v/c Ratio		6.71		0.11		33.63		0.86		0.02				0.51			
95% Queue Length, Q ₉₅ (veh)		4.2		0.4		48.0		7.9		0.0				2.8			
Control Delay (s/veh)		4635.8		12.3		15341.0		53.9		9.9				21.5			
Level of Service (LOS)		F		B		F		F		A				C			
Approach Delay (s/veh)		1245.3				8555.0				0.1				4.2			
Approach LOS		F				F											

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2034 NO-BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				241	75			56	266				381	0	400

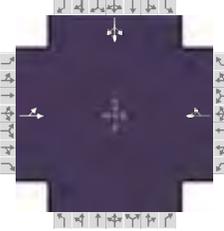
Signal Information				Phase Diagram										
Cycle, s	90.0	Reference Phase	2	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩
Offset, s	0	Reference Point	End	Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				241	75			56	266				381	0	400
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				0			0						1		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

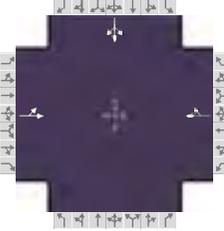
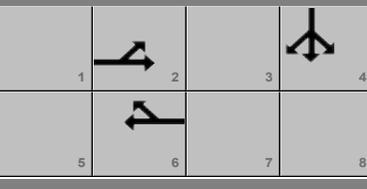
Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			34.0		34.0				44.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

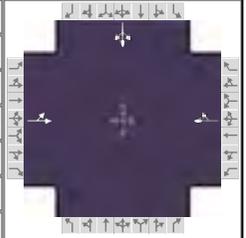
General Information						Intersection Information												
Agency	CESO					Duration, h	0.250											
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other											
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92											
Urban Street	HILL RD		Analysis Year	2034 NO-BUILD		Analysis Period	1 > 7:00											
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus														
Project Description	GREENGATE DEVELOPMENT TIS																	
Demand Information						EB			WB			NB			SB			
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h						241	75			56	266				381	0	400	
Signal Information																		
Cycle, s	90.0	Reference Phase	2															
Offset, s	0	Reference Point	End															
Uncoordinated	Yes	Simult. Gap E/W	On			Green	34.0	44.0	0.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On			Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
						Red	2.0	2.0	0.0	0.0	0.0	0.0						
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase							2		6				4					
Case Number							8.0		8.0				12.0					
Phase Duration, s							40.0		40.0				50.0					
Change Period, (Y+R _c), s							6.0		6.0				6.0					
Max Allow Headway (MAH), s							3.4		3.4				3.2					
Queue Clearance Time (g _s), s							36.0		17.0				46.0					
Green Extension Time (g _e), s							0.0		1.6				0.0					
Phase Call Probability							1.00		1.00				1.00					
Max Out Probability							1.00		0.00				1.00					
Movement Group Results						EB			WB			NB			SB			
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement						5	2			6	16				7	4	14	
Adjusted Flow Rate (v), veh/h						343			350						849			
Adjusted Saturation Flow Rate (s), veh/h/ln						657			1654						1688			
Queue Service Time (g _s), s						19.0			15.0						44.0			
Cycle Queue Clearance Time (g _c), s						34.0			15.0						44.0			
Green Ratio (g/C)						0.38			0.38						0.49			
Capacity (c), veh/h						319			625						825			
Volume-to-Capacity Ratio (X)						1.077			0.560						1.028			
Back of Queue (Q), ft/ln (95 th percentile)						503.9			231.3						839.9			
Back of Queue (Q), veh/ln (95 th percentile)						20.2			9.3						33.3			
Queue Storage Ratio (RQ) (95 th percentile)						0.00			0.00						0.00			
Uniform Delay (d ₁), s/veh						37.5			22.1						23.0			
Incremental Delay (d ₂), s/veh						72.6			0.7						38.8			
Initial Queue Delay (d ₃), s/veh						0.0			0.0						0.0			
Control Delay (d), s/veh						110.1			22.8						61.8			
Level of Service (LOS)						F			C						F			
Approach Delay, s/veh / LOS						110.1	F	22.8	C	0.0		61.8	E					
Intersection Delay, s/veh / LOS						63.7						E						
Multimodal Results						EB			WB			NB			SB			
Pedestrian LOS Score / LOS						1.40	A	1.40	A	1.73	B	1.73	B					
Bicycle LOS Score / LOS						1.05	A	1.07	A			1.89	B					

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information										
Agency	CESO					Duration, h	0.250									
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other									
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92									
Urban Street	HILL RD		Analysis Year	2034 NO-BUILD		Analysis Period	1 > 7:00									
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus												
Project Description	GREENGATE DEVELOPMENT TIS															
Demand Information				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				241	75			56	266				381	0	400	
Signal Information																
Cycle, s	90.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	Yes	Simult. Gap E/W	On													
Force Mode	Fixed	Simult. Gap N/S	On													
Green				34.0	44.0	0.0	0.0	0.0	0.0							
Yellow				4.0	4.0	0.0	0.0	0.0	0.0							
Red				2.0	2.0	0.0	0.0	0.0	0.0							
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R	
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000	
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Left-Turn Adjustment Factor (f _{LT})				0.346	0.346		1.000	0.871					0.896	0.896		
Right-Turn Adjustment Factor (f _{RT})					0.000	0.346		0.000	0.871					0.000	0.000	
Left-Turn Pedestrian Adjustment Factor (f _{LPB})				1.000			1.000						1.000			
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})						1.000			1.000						1.000	
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Movement Saturation Flow Rate (s), veh/h				501	156	0	0	288	1366				824	0	865	
Proportion of Vehicles Arriving on Green (P)				0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.49	0.00	0.49	
Incremental Delay Factor (k)					0.50			0.10						0.50		
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R					
Lost Time (t _L)					6.0		6.0					4.0				
Green Ratio (g/C)					0.38		0.38					0.49				
Permitted Saturation Flow Rate (s _p), veh/h/ln					1047		1338					0				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1900									
Permitted Effective Green Time (g _p), s					34.0		0.0					0.0				
Permitted Service Time (g _u), s					19.0		0.0					0.0				
Permitted Queue Service Time (g _{ps}), s					19.0											
Time to First Blockage (g _t), s					0.1		34.0					0.0				
Queue Service Time Before Blockage (g _{ts}), s					0.1											
Protected Right Saturation Flow (s _R), veh/h/ln																
Protected Right Effective Green Time (g _R), s																
Multimodal				EB			WB			NB			SB			
Pedestrian F _w / F _v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000			
Pedestrian F _s / F _{delay}				0.000	0.115	0.000	0.115	0.000	0.157	0.000	0.157	0.000	0.159			
Pedestrian M _{corner} / M _{cw}																
Bicycle c _b / d _b				755.56	17.42	755.56	17.42		50.14			52.27				
Bicycle F _w / F _v				-3.64	0.57	-3.64	0.58	-3.64				-3.64	1.40			

HCS7 Signalized Intersection Results Graphical Summary

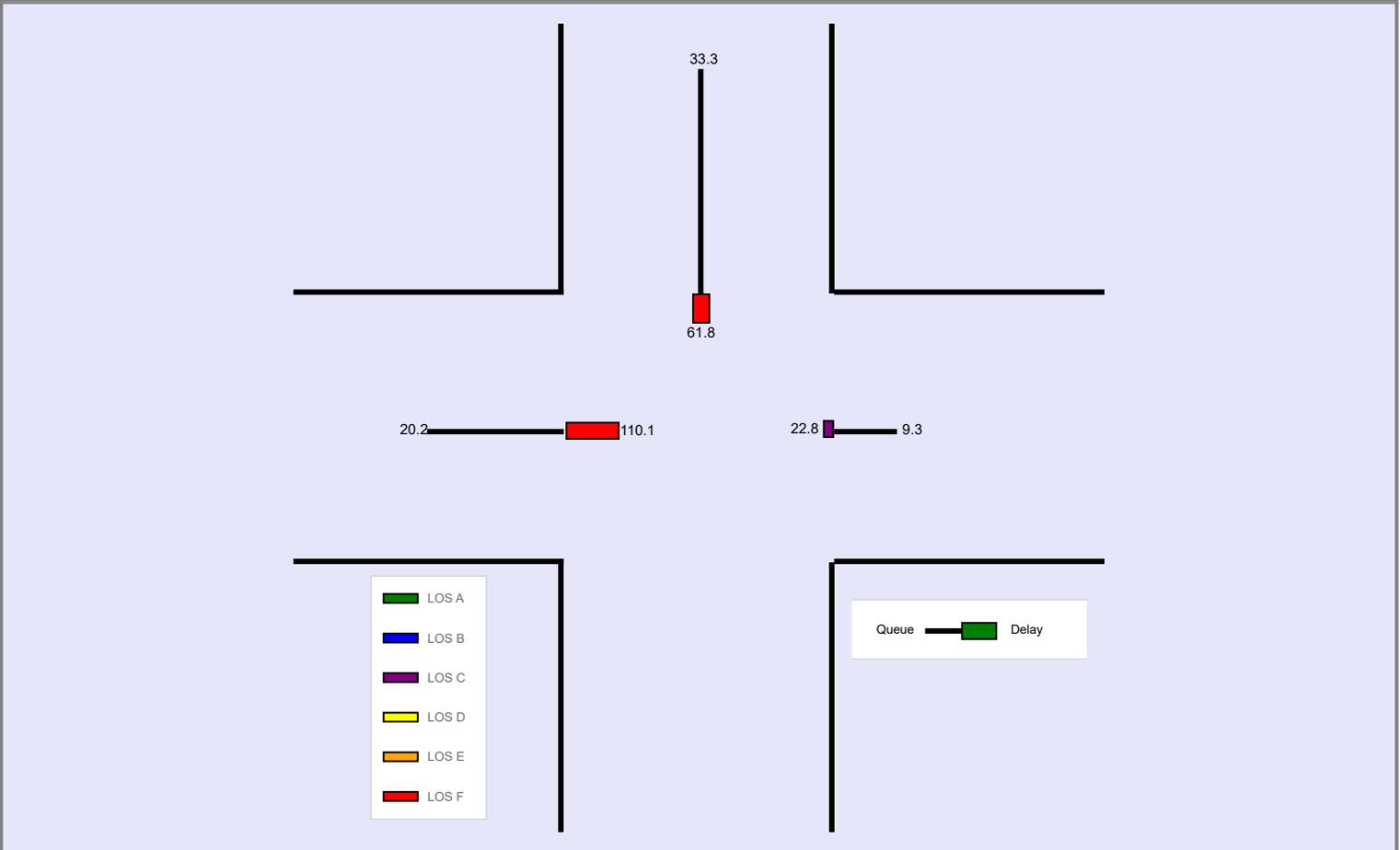
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	241	75			56	266				381	0	400

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow		4.0	4.0	0.0	0.0	0.0	0.0				
		Red		2.0	2.0	0.0	0.0	0.0	0.0				

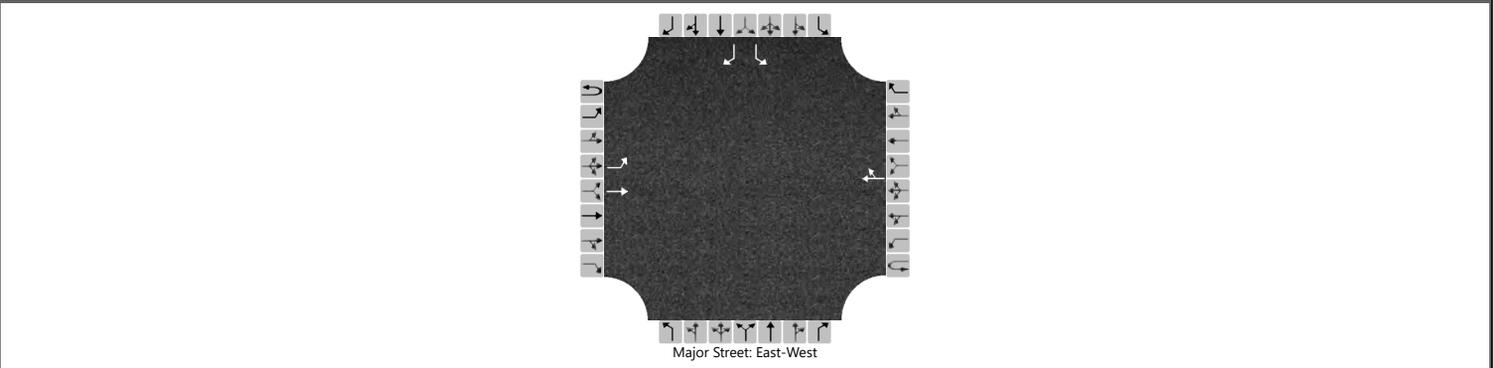
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		503.9			231.3							839.9
Back of Queue (Q), veh/ln (95 th percentile)		20.2			9.3							33.3
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00							0.00
Control Delay (d), s/veh		110.1			22.8							61.8
Level of Service (LOS)		F			C							F
Approach Delay, s/veh / LOS	110.1		F	22.8		C	0.0			61.8		E
Intersection Delay, s/veh / LOS	63.7						E					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2034	North/South Street	GREENGATE BLVD				
Time Analyzed	NO-BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		21	435				300	21						22		22
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)																0
Right Turn Channelized																No
Median Type Storage	Undivided															

Critical and Follow-up Headways

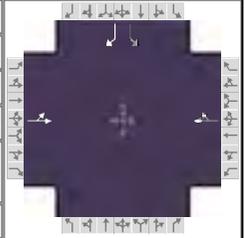
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		23												24		24	
Capacity, c (veh/h)		1221												325		709	
v/c Ratio		0.02												0.07		0.03	
95% Queue Length, Q ₉₅ (veh)		0.1												0.2		0.1	
Control Delay (s/veh)		8.0												17.0		10.3	
Level of Service (LOS)		A												C		B	
Approach Delay (s/veh)		0.4												13.6			
Approach LOS														B			

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	11			7	276				112		73

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	2.0	2.0	0.0	0.0	0.0	0.0		

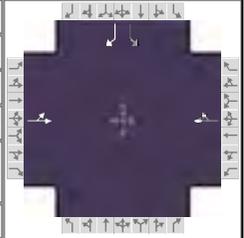
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	11			7	276				112		73
Initial Queue (Q _b), veh/h	0	0			0	0				0		0
Base Saturation Flow Rate (s ₀), veh/h	1900	1900			1900	1900				1900		1900
Parking (N _m), man/h		None			None						None	
Heavy Vehicles (P _{HV}), %		3			6					0		0
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N _b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (AT)	3	3			3	3				3		3
Upstream Filtering (I)	1.00	1.00			1.00	1.00				1.00		1.00
Lane Width (W), ft		12.0			12.0					12.0		12.0
Turn Bay Length, ft		0			0					250		0
Grade (P _g), %		0			0			0			0	
Speed Limit, mi/h	45	45			45	45				35		35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s		54.0		54.0				24.0
Yellow Change Interval (Y), s		4.0		4.0				4.0
Red Clearance Interval (R _c), s		2.0		2.0				2.0
Minimum Green (G _{min}), s		10		10				10
Start-Up Lost Time (I _t), s	2.0	2.0		2.0			2.0	
Extension of Effective Green (e), s	2.0	2.0		2.0			2.0	
Passage (PT), s		2.0		2.0				2.0
Recall Mode		Min		Min				Off
Dual Entry		Yes		Yes				Yes
Walk (Walk), s				0.0		0.0		0.0
Pedestrian Clearance Time (PC), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft				9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking			0.50	No		0.50	No			No		0.50

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	257	11			7	276				112		73

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	2.0	2.0	0.0	0.0	0.0	0.0		

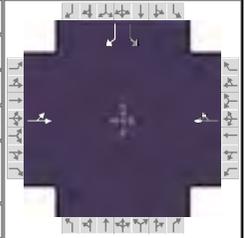
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				9.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R _c), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.5		3.5				3.2
Queue Clearance Time (g _s), s		27.3		11.0				6.8
Green Extension Time (g _e), s		1.5		1.5				0.3
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (v), veh/h	291			308						122		
Adjusted Saturation Flow Rate (s), veh/h/ln	905			1541						1810		
Queue Service Time (g _s), s	16.4			9.0						4.8		
Cycle Queue Clearance Time (g _c), s	25.3			9.0						4.8		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	621			924						483		
Volume-to-Capacity Ratio (X)	0.469			0.333						0.252		
Back of Queue (Q), ft/ln (95 th percentile)	163.1			117						89.9		
Back of Queue (Q), veh/ln (95 th percentile)	6.4			4.5						3.6		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.36		
Uniform Delay (d ₁), s/veh	15.2			9.0						25.9		
Incremental Delay (d ₂), s/veh	0.2			0.1						0.1		
Initial Queue Delay (d ₃), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	15.4			9.1						26.0		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	15.4	B		9.1	A		0.0			25.8	C	
Intersection Delay, s/veh / LOS	15.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.68	A	1.65	B	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.97	A	1.00	A				F

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	11			7	276				112		73

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

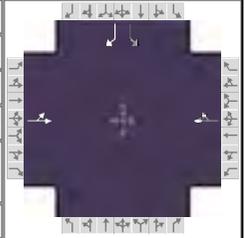
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.488	0.488		1.000	0.851					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.488		0.000	0.851					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{LPb})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPb})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	868	37	0	0	38	1503				1810	0	1610
Proportion of Vehicles Arriving on Green (P)	0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)		0.04			0.04					0.04		0.04

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0		6.0				4.0
Green Ratio (g/C)		0.60		0.60				0.27
Permitted Saturation Flow Rate (s_p), veh/h/ln		1089		1425				1810
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1811				
Permitted Effective Green Time (g_p), s		54.0		0.0				0.0
Permitted Service Time (g_u), s		45.0		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		16.4						
Time to First Blockage (g_i), s		0.1		54.0				0.0
Queue Service Time Before Blockage (g_{ts}), s		0.1						
Protected Right Saturation Flow (s_R), veh/h/ln								0
Protected Right Effective Green Time (g_R), s								0.0

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	0.000	0.000	0.972	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F_s / F_{delay}	0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	1200.00	7.20	1200.00	7.20		50.14					52.27	
Bicycle F_w / F_v	-3.64	0.48	-3.64	0.51	-3.64						-3.64	

HCS7 Signalized Intersection Results Graphical Summary

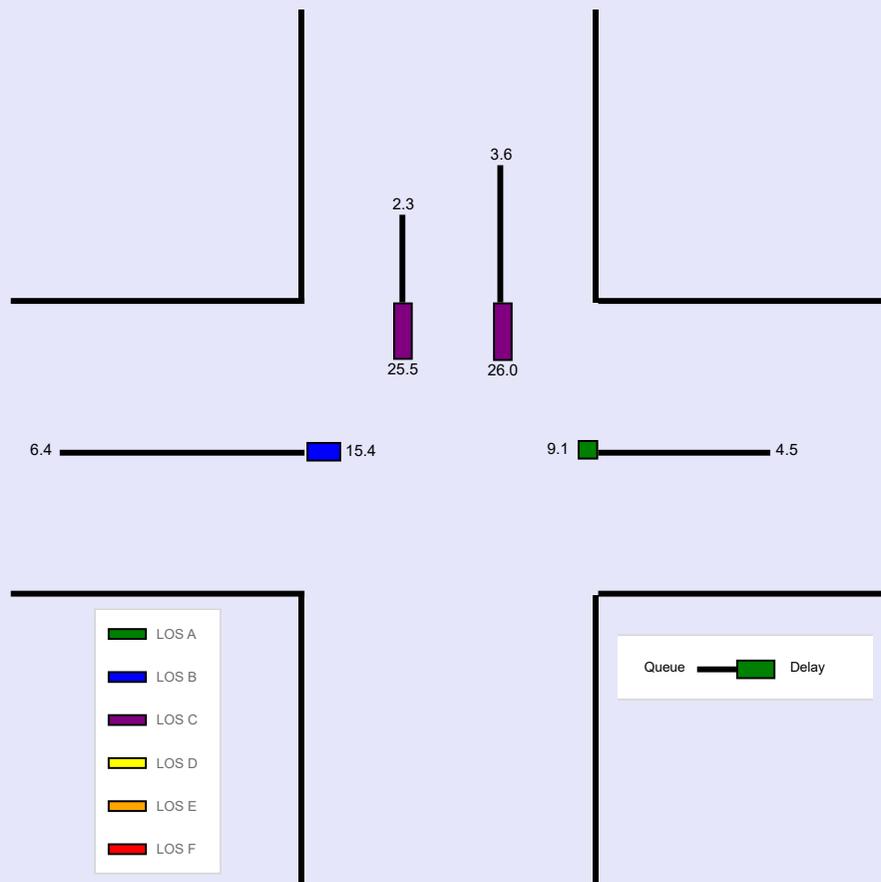
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	257	11			7	276				112		73

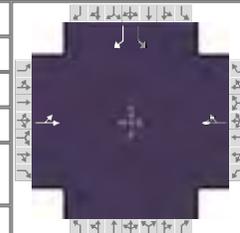
Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Back of Queue (Q), ft/ln (95 th percentile)		163.1			117					89.9		57.5
Back of Queue (Q), veh/ln (95 th percentile)		6.4			4.5					3.6		2.3
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00					0.36		0.00
Control Delay (d), s/veh		15.4			9.1					26.0		25.5
Level of Service (LOS)		B			A					C		C
Approach Delay, s/veh / LOS	15.4		B	9.1		A	0.0			25.8		C
Intersection Delay, s/veh / LOS	15.6						B					



HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	241	75			56	266				381		400

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	42.0	36.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

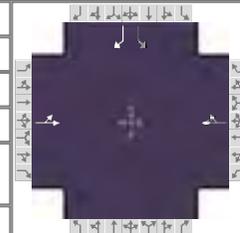
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	241	75			56	266				381		400
Initial Queue (Q _b), veh/h	0	0			0	0				0		0
Base Saturation Flow Rate (s _o), veh/h	1900	1900			1900	1900				1900		1900
Parking (N _m), man/h		None			None						None	
Heavy Vehicles (P _{HV}), %		0			0					0		0
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N _b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (AT)	3	3			3	3				3		3
Upstream Filtering (I)	1.00	1.00			1.00	1.00				1.00		1.00
Lane Width (W), ft		12.0			12.0					12.0		12.0
Turn Bay Length, ft		0			0					250		0
Grade (P _g), %		0			0			0			0	
Speed Limit, mi/h	45	45			45	45				35		35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s		42.0		42.0				36.0
Yellow Change Interval (Y), s		4.0		4.0				4.0
Red Clearance Interval (R _c), s		2.0		2.0				2.0
Minimum Green (G _{min}), s		10		10				10
Start-Up Lost Time (I _t), s	2.0	2.0		2.0			2.0	
Extension of Effective Green (e), s	2.0	2.0		2.0			2.0	
Passage (PT), s		2.0		2.0				2.0
Recall Mode		Min		Min				Off
Dual Entry		Yes		Yes				Yes
Walk (Walk), s				0.0		0.0		0.0
Pedestrian Clearance Time (PC), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft				9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking			0.50	No		0.50	No			No		0.50

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	241	75			56	266				381		400

Signal Information																		
Cycle, s	90.0	Reference Phase	2															
Offset, s	0	Reference Point	End															
Uncoordinated	Yes	Simult. Gap E/W	On	Green	42.0	36.0	0.0	0.0	0.0	0.0	1		2		3		4	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	5		6		7		8	
				Red	2.0	2.0	0.0	0.0	0.0	0.0	5		6		7		8	

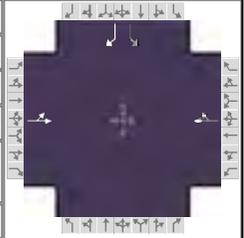
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				9.0
Phase Duration, s		48.0		48.0				42.0
Change Period, (Y+R _c), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g _s), s		38.9		14.9				22.0
Green Extension Time (g _e), s		0.7		1.7				1.8
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		1.00		0.00				0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (v), veh/h	343			350						414		
Adjusted Saturation Flow Rate (s), veh/h/ln	837			1654						1810		
Queue Service Time (g _s), s	24.0			12.9						16.0		
Cycle Queue Clearance Time (g _c), s	36.9			12.9						16.0		
Green Ratio (g/C)	0.47			0.47						0.40		
Capacity (c), veh/h	461			772						724		
Volume-to-Capacity Ratio (X)	0.745			0.453						0.572		
Back of Queue (Q), ft/ln (95 th percentile)	286.2			194.9						267.9		
Back of Queue (Q), veh/ln (95 th percentile)	11.4			7.8						10.7		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						1.07		
Uniform Delay (d ₁), s/veh	27.9			16.2						21.0		
Incremental Delay (d ₂), s/veh	5.8			0.2						0.7		
Initial Queue Delay (d ₃), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	33.6			16.4						21.7		
Level of Service (LOS)	C			B						C		
Approach Delay, s/veh / LOS	33.6	C		16.4	B		0.0			23.1	C	
Intersection Delay, s/veh / LOS	23.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.70	A	1.67	B	1.73	B	1.73	B
Bicycle LOS Score / LOS	1.05	A	1.07	A				F

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h	241	75				56	266					381	400

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	42.0	36.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

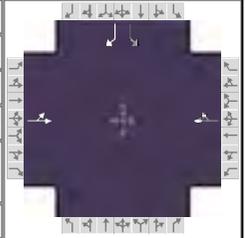
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.441	0.441		1.000	0.871					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.441		0.000	0.871					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	638	199	0	0	288	1366				1810	0	1610
Proportion of Vehicles Arriving on Green (P)	0.47	0.47	0.00	0.00	0.47	0.47	0.00	0.00	0.00	0.40	0.00	0.40
Incremental Delay Factor (k)		0.27			0.04					0.11		0.20

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0		6.0				4.0
Green Ratio (g/C)		0.47		0.47				0.40
Permitted Saturation Flow Rate (s_p), veh/h/ln		1047		1338				1810
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1900				
Permitted Effective Green Time (g_p), s		42.0		0.0				0.0
Permitted Service Time (g_u), s		29.1		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		24.0						
Time to First Blockage (g_i), s		0.5		42.0				0.0
Queue Service Time Before Blockage (g_{ts}), s		0.5						
Protected Right Saturation Flow (s_R), veh/h/ln								0
Protected Right Effective Green Time (g_R), s								0.0

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	0.000	0.000	0.972	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F_s / F_{delay}	0.000	0.102	0.000	0.102	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	933.33	12.80	933.33	12.80		50.14					52.27	
Bicycle F_w / F_v	-3.64	0.57	-3.64	0.58	-3.64						-3.64	

HCS7 Signalized Intersection Results Graphical Summary

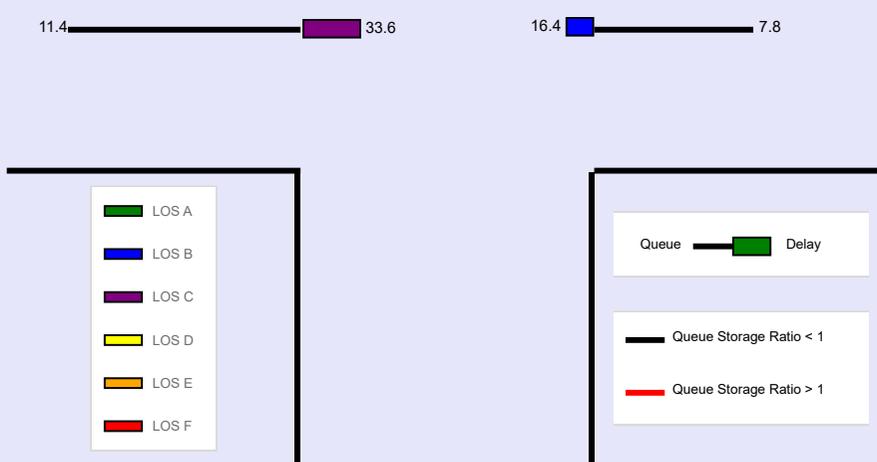
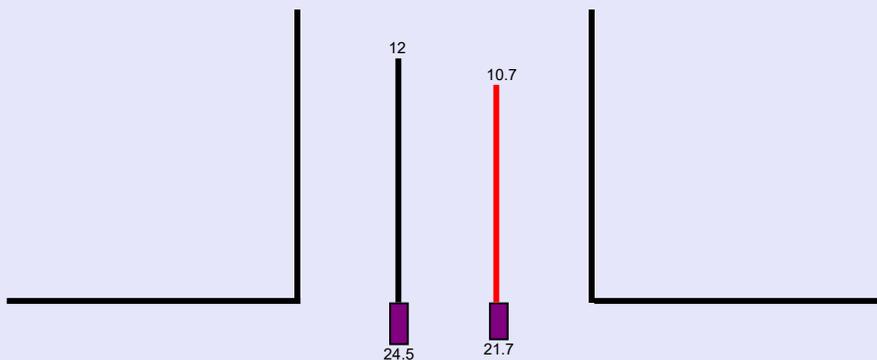
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	241	75			56	266				381		400

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	42.0	36.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	2.0	2.0	0.0	0.0	0.0	0.0		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Back of Queue (Q), ft/ln (95 th percentile)		286.2			194.9					267.9		299.4
Back of Queue (Q), veh/ln (95 th percentile)		11.4			7.8					10.7		12.0
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00					1.07		0.00
Control Delay (d), s/veh		33.6			16.4					21.7		24.5
Level of Service (LOS)		C			B					C		C
Approach Delay, s/veh / LOS	33.6	C		16.4	B		0.0			23.1		C
Intersection Delay, s/veh / LOS	23.9						C					



APPENDIX E
ITE TRIP GENERATION CATEGORY
210, 220, & 820 SHEETS

Land Use: 210

Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 903, 925, 936

Single-Family Detached Housing (210)

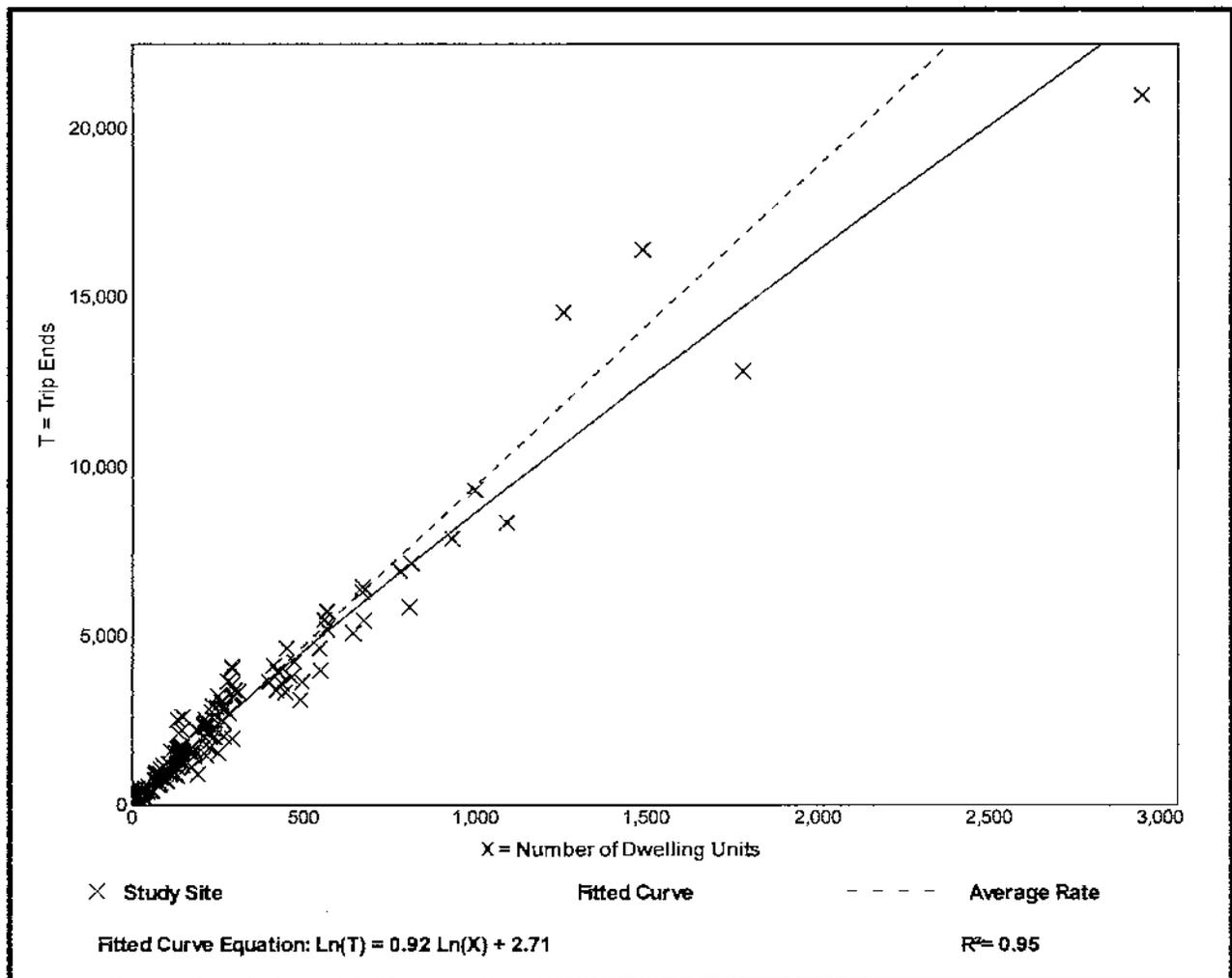
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Single-Family Detached Housing (210)

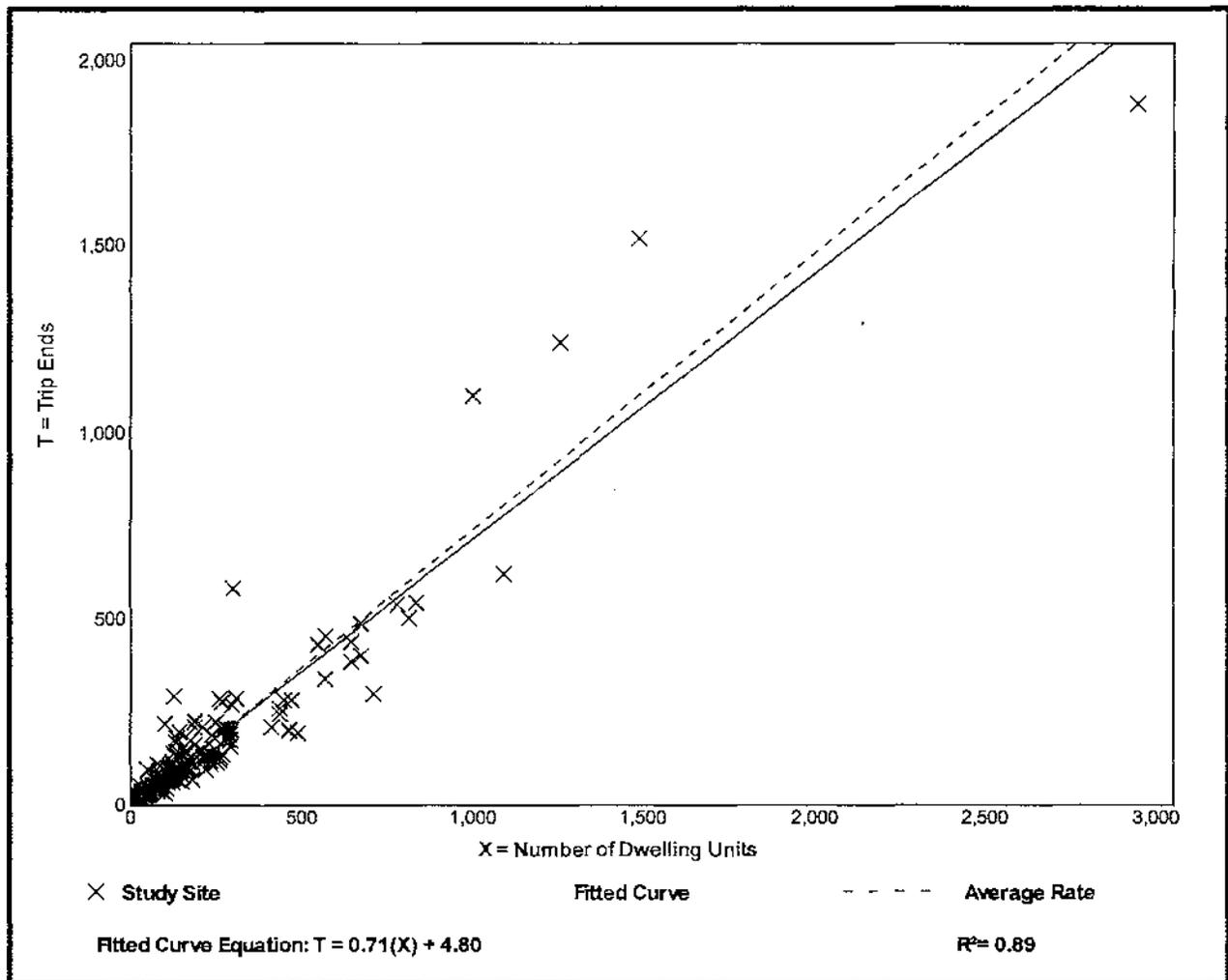
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban
 Number of Studies: 173
 Avg. Num. of Dwelling Units: 219
 Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 190

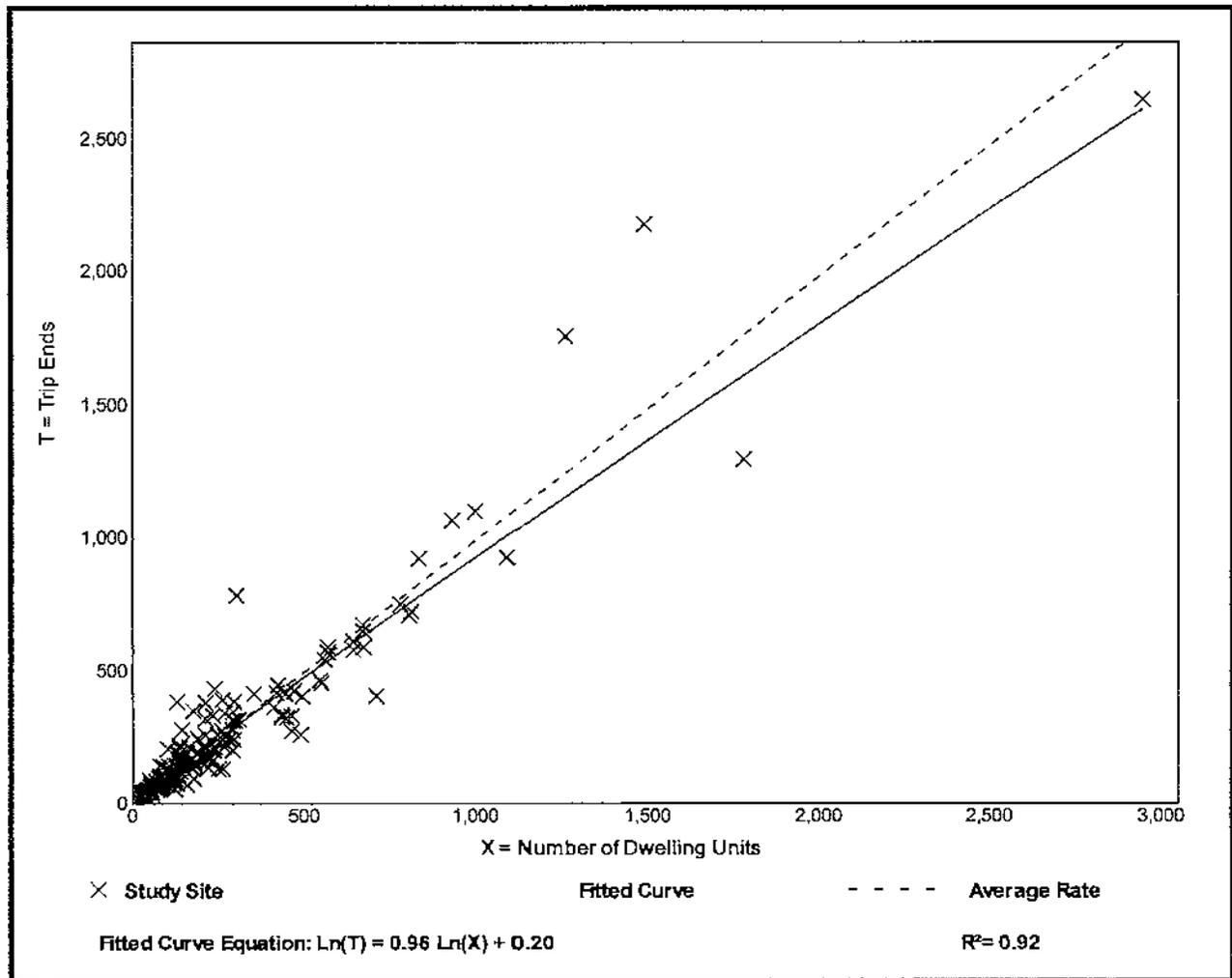
Avg. Num. of Dwelling Units: 242

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



February 28, 2020

Traffic Impact Study – Proposed Greengate Development

City of Canal Winchester, Ohio

CESO Trip Generation Calculations – 2022 Opening Year Build Traffic Scenario (Phase 1 & 2):

ITE 210 – Single-Family Detached Housing

For Weekday → 50% Enter/50% Exit

$\text{Ln}(T) = [0.92 \times \text{Ln}(63 \text{ Dwelling Units})] + 2.71$; $T = 679.72 \approx 680 \text{ Trips}$ (For Even Number)

$680 \text{ Trips} \times 0.50 \text{ (50\%)} = 340 \text{ Trips Enter/340 Trips Exit}$

For AM Peak Hour → 25% Enter/75% Exit

$T = 0.71 \times (63 \text{ Dwelling Units}) + 4.80$; $T = 49.53 \approx 50 \text{ Trips}$

$50 \text{ Trips} \times 0.25 \text{ (25\%)} = 13 \text{ Trips Enter}$

$50 \text{ Trips} \times 0.75 \text{ (75\%)} = 37 \text{ Trips Exit}$

For PM Peak Hour → 63% Enter/37% Exit

$\text{Ln}(T) = [0.96 \times \text{Ln}(63 \text{ Dwelling Units})] + 0.20$; $T = 65.20 \approx 66 \text{ Trips}$

$66 \text{ Trips} \times 0.63 \text{ (63\%)} = 42 \text{ Trips Enter}$

$66 \text{ Trips} \times 0.37 \text{ (37\%)} = 24 \text{ Trips Exit}$

February 28, 2020

Traffic Impact Study – Proposed Greengate Development

City of Canal Winchester, Ohio

CESO Trip Generation Calculations – 2023 Opening Year Build Traffic Scenario (Phase 3 & 5):

ITE 210 – Single-Family Detached Housing

For Weekday → 50% Enter/50% Exit

$\ln(T) = [0.92 \times \ln(53 \text{ Dwelling Units})] + 2.71$; $T = 579.79 \approx 580 \text{ Trips}$ (For Even Number)

$580 \text{ Trips} \times 0.50 \text{ (50\%)} = 290 \text{ Trips Enter/290 Trips Exit}$

For AM Peak Hour → 25% Enter/75% Exit

$T = 0.71 \times (53 \text{ Dwelling Units}) + 4.80$; $T = 42.43 \approx 43 \text{ Trips}$

$43 \text{ Trips} \times 0.25 \text{ (25\%)} = 11 \text{ Trips Enter}$

$43 \text{ Trips} \times 0.75 \text{ (75\%)} = 32 \text{ Trips Exit}$

For PM Peak Hour → 63% Enter/37% Exit

$\ln(T) = [0.96 \times \ln(53 \text{ Dwelling Units})] + 0.20$; $T = 55.23 \approx 56 \text{ Trips}$

$56 \text{ Trips} \times 0.63 \text{ (63\%)} = 35 \text{ Trips Enter}$

$56 \text{ Trips} \times 0.37 \text{ (37\%)} = 21 \text{ Trips Exit}$

February 28, 2020

Traffic Impact Study – Proposed Greengate Development

City of Canal Winchester, Ohio

CESO Trip Generation Calculations – 2024 Opening Year Build Traffic Scenario (Phase 4, 6 & 7):

ITE 210 – Single-Family Detached Housing

For Weekday → 50% Enter/50% Exit

$\ln(T) = [0.92 \times \ln(75 \text{ Dwelling Units})] + 2.71$; $T = 797.98 \approx 798 \text{ Trips}$ (For Even Number)

$798 \text{ Trips} \times 0.50 \text{ (50\%)} = 399 \text{ Trips Enter/399 Trips Exit}$

For AM Peak Hour → 25% Enter/75% Exit

$T = 0.71 \times (75 \text{ Dwelling Units}) + 4.80$; $T = 58.05 \approx 58 \text{ Trips}$

$58 \text{ Trips} \times 0.25 \text{ (25\%)} = 14 \text{ Trips Enter}$

$58 \text{ Trips} \times 0.75 \text{ (75\%)} = 44 \text{ Trips Exit}$

For PM Peak Hour → 63% Enter/37% Exit

$\ln(T) = [0.96 \times \ln(75 \text{ Dwelling Units})] + 0.20$; $T = 77.07 \approx 77 \text{ Trips}$

$77 \text{ Trips} \times 0.63 \text{ (63\%)} = 49 \text{ Trips Enter}$

$77 \text{ Trips} \times 0.37 \text{ (37\%)} = 28 \text{ Trips Exit}$

March 2, 2020

Traffic Impact Study – Proposed Greengate Development

City of Canal Winchester, Ohio

CESO Trip Generation Calculations – 2034 Opening Year (Existing Residential Development):

ITE 220 – Multifamily Housing (Low-Rise)

For Weekday → 50% Enter/50% Exit

$$T = [7.56 \times (100 \text{ Dwelling Units})] - 40.86; T = 715.14 \approx 716 \text{ Trips (For Even Number)}$$

$$716 \text{ Trips} \times 0.50 \text{ (50\%)} = 358 \text{ Trips Enter/358 Trips Exit}$$

For AM Peak Hour → 23% Enter/77% Exit

$$\ln(T) = [0.95 \times \ln(100 \text{ Dwelling Units})] - 0.51; T = 47.70 \approx 48 \text{ Trips}$$

$$48 \text{ Trips} \times 0.23 \text{ (23\%)} = 11 \text{ Trips Enter}$$

$$48 \text{ Trips} \times 0.77 \text{ (77\%)} = 37 \text{ Trips Exit}$$

For PM Peak Hour → 63% Enter/37% Exit

$$\ln(T) = [0.89 \times \ln(100 \text{ Dwelling Units})] - 0.02; T = 59.06 \approx 59 \text{ Trips}$$

$$59 \text{ Trips} \times 0.63 \text{ (63\%)} = 37 \text{ Trips Enter}$$

$$59 \text{ Trips} \times 0.37 \text{ (37\%)} = 22 \text{ Trips Exit}$$

March 3, 2020

Traffic Impact Study – Proposed Greengate Development

City of Canal Winchester, Ohio

CESO Trip Generation Calculations – 2034 Opening Year (Proposed Commercial Development):

ITE 820 – Shopping Center

For Weekday → 50% Enter/50% Exit

$\ln(T) = [0.68 \times \ln(304.92 \text{ KSF})] + 5.57$; $T = 12,831.18 \approx 12,832 \text{ Trips}$ (For Even Number)

$12,832 \text{ Trips} \times 0.50 \text{ (50\%)} = 6,416 \text{ Trips Enter/6,416 Trips Exit}$

For AM Peak Hour → 62% Enter/38% Exit

$T = 0.94 \times 304.92 \text{ KSF}$; $T = 286.62 \approx 287 \text{ Trips}$

Pass-by Trips = $0.34 \text{ (34\%)} \times 287 \text{ Trips} = 98 \text{ Trips}$

*Insufficient data available for the AM Peak Hour, therefore the PM pass-by percentage was used.

Pass-by Trips = $98 \text{ Trips} \times 0.50 \text{ (50\%)} = 49 \text{ Trips Enter/49 Trips Exit}$

Primary Trips = $287 - 98 = 189 \text{ Trips}$

Primary Trips = $189 \times 0.62 \text{ (62\%)}$ and $189 \times 0.38 \text{ (38\%)} = 117 \text{ Trips Enter/72 Trips Exit}$

For PM Peak Hour → 48% Enter/52% Exit

$\ln(T) = [0.74 \times \ln(304.92 \text{ KSF})] + 2.89$; $T = 1,239.96 \approx 1,240 \text{ Trips}$

Pass-by Trips = $0.34 \text{ (34\%)} \times 1,240 \text{ Trips} = 426 \text{ Trips}$

Pass-by Trips = $426 \text{ Trips} \times 0.50 \text{ (50\%)} = 213 \text{ Trips Enter/213 Trips Exit}$

Primary Trips = $1,240 - 426 = 814 \text{ Trips}$

Primary Trips = $814 \times 0.48 \text{ (48\%)}$ and $814 \times 0.52 \text{ (52\%)} = 391 \text{ Trips Enter/423 Trips Exit}$

Land Use: 220

Multifamily Housing (Low-Rise)

Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors). Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), and off-campus student apartment (Land Use 225) are related land uses.

Additional Data

In prior editions of *Trip Generation Manual*, the low-rise multifamily housing sites were further divided into rental and condominium categories. An investigation of vehicle trip data found no clear differences in trip making patterns between the rental and condominium sites within the ITE database. As more data are compiled for future editions, this land use classification can be reinvestigated.

For the three sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.72 residents per occupied dwelling unit.

For the two sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96.2 percent of the total dwelling units were occupied.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Time-of-day distribution data for this land use are presented in Appendix A. For the 10 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:45 and 5:45 p.m., respectively. For the one site with Saturday data, the overall highest vehicle volume was counted between 9:45 and 10:45 a.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 11:45 a.m. and 12:45 p.m.

For the one dense multi-use urban site with 24-hour count data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:00 and 8:00 a.m. and 6:15 and 7:15 p.m., respectively.

For the three sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.72 residents per occupied dwelling unit.

The average numbers of person trips per vehicle trip at the five general urban/suburban sites at which both person trip and vehicle trip data were collected were as follows:

- 1.13 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.21 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in British Columbia (CAN), California, District of Columbia, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Minnesota, New Jersey, New York, Ontario, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Virginia, and Washington.

It is expected that the number of bedrooms and number of residents are likely correlated to the number of trips generated by a residential site. Many of the studies included in this land use did not indicate the total number of bedrooms. To assist in the future analysis of this land use, it is important that this information be collected and included in trip generation data submissions.

Source Numbers

168, 187, 188, 204, 211, 300, 305, 306, 319, 320, 321, 357, 390, 412, 418, 525, 530, 571, 579, 583, 864, 868, 869, 870, 896, 903, 918, 946, 947, 948, 951

Multifamily Housing (Low-Rise) (220)

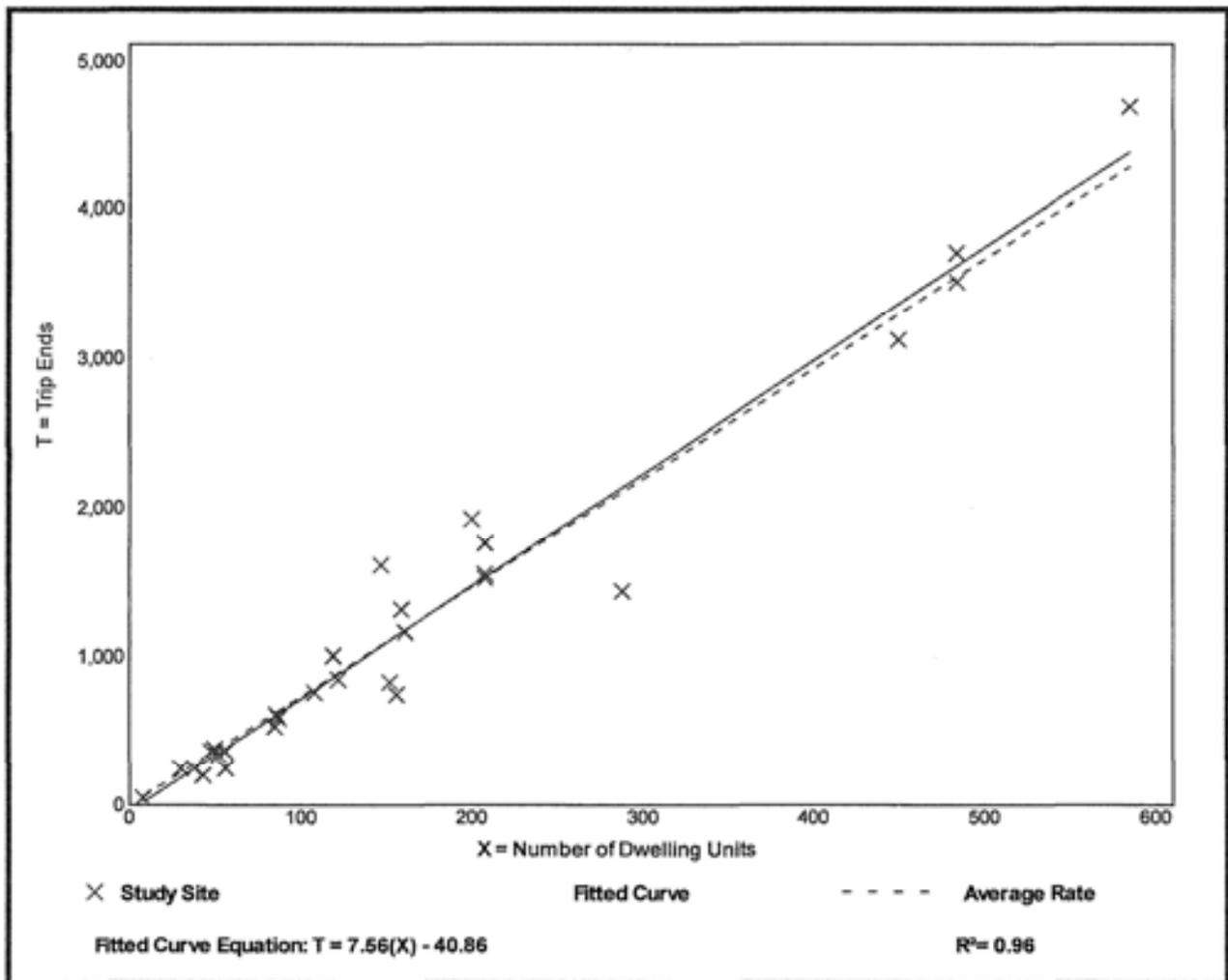
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 29
Avg. Num. of Dwelling Units: 168
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.32	4.45 - 10.97	1.31

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 42

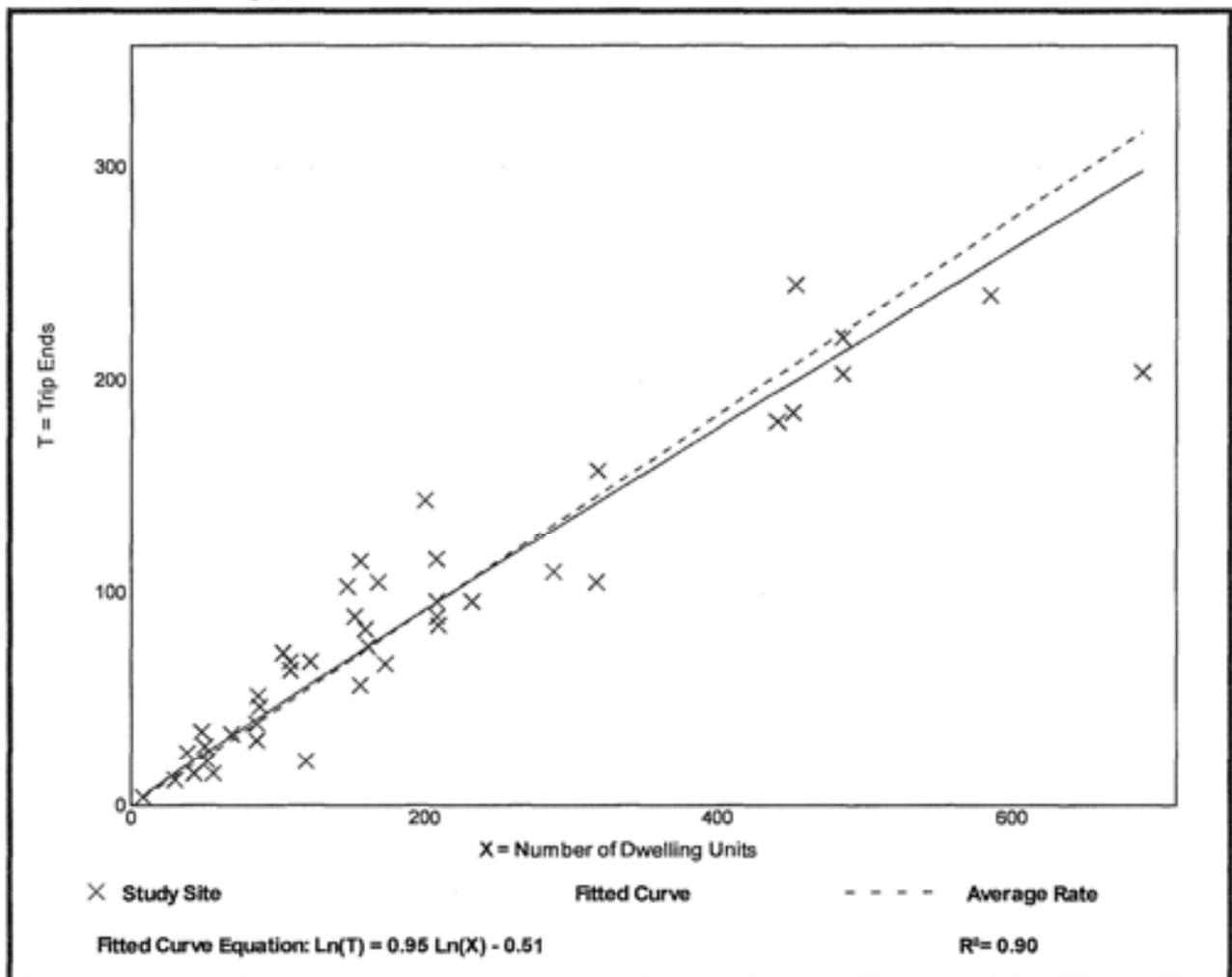
Avg. Num. of Dwelling Units: 199

Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 50

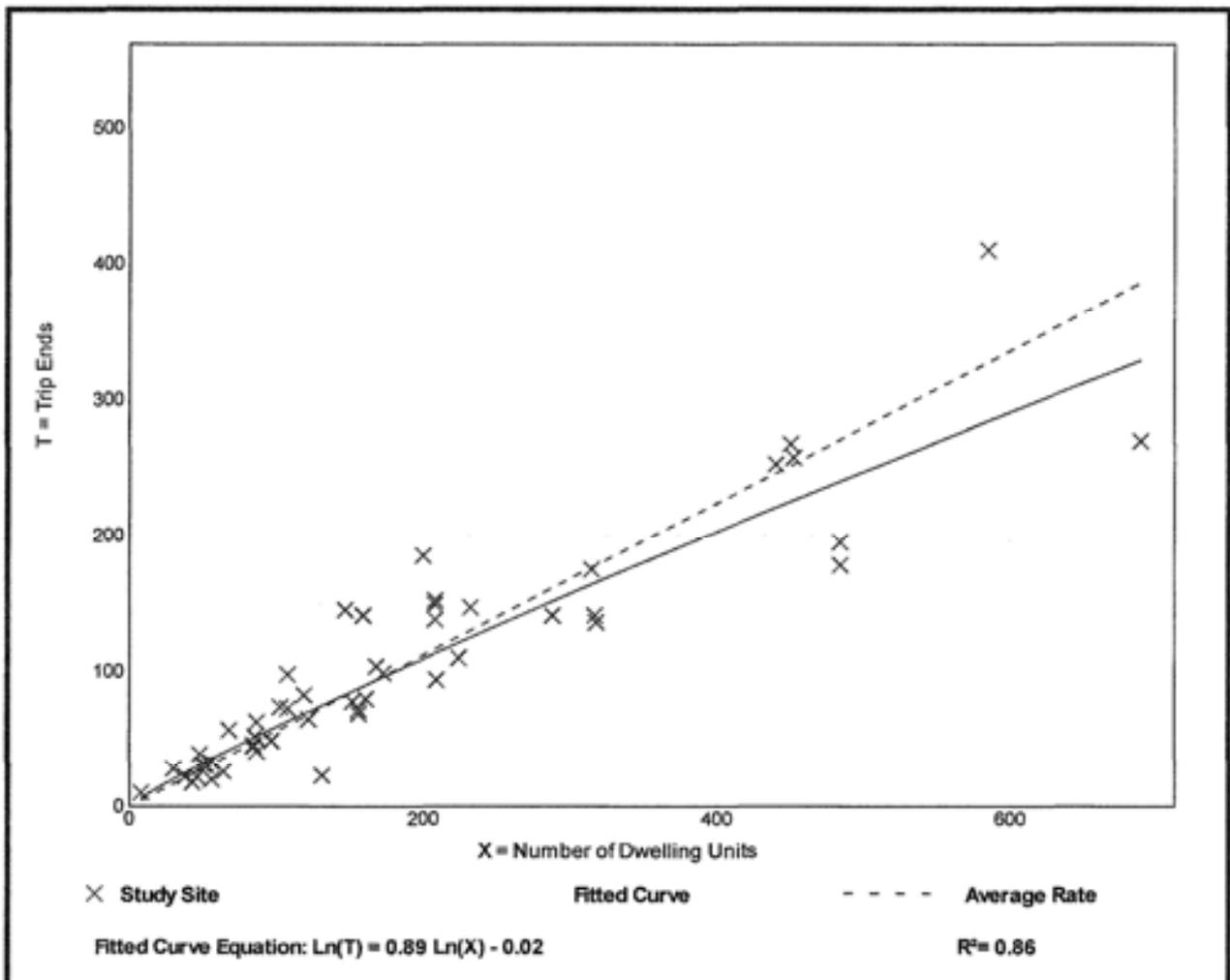
Avg. Num. of Dwelling Units: 187

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



Land Use: 820

Shopping Center

Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands. Factory outlet center (Land Use 823) is a related use.

Additional Data

Shopping centers, including neighborhood centers, community centers, regional centers, and super regional centers, were surveyed for this land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities (for example, ice skating rinks or indoor miniature golf courses).

Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied included peripheral buildings, it can be assumed that some of the data show their effect.

The vehicle trips generated at a shopping center are based upon the total GLA of the center. In cases of smaller centers without an enclosed mall or peripheral buildings, the GLA could be the same as the gross floor area of the building.

Time-of-day distribution data for this land use are presented in Appendix A. For the 10 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 11:45 a.m. and 12:45 p.m. and 12:15 and 1:15 p.m., respectively.

The average numbers of person trips per vehicle trip at the 27 general urban/suburban sites at which both person trip and vehicle trip data were collected were as follows:

- 1.31 during Weekday, AM Peak Hour of Generator
- 1.43 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.46 during Weekday, PM Peak Hour of Generator

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), British Columbia (CAN), California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

Source Numbers

105, 110, 154, 156, 159, 186, 190, 198, 199, 202, 204, 211, 213, 239, 251, 259, 260, 269, 294, 295, 299, 300, 301, 304, 305, 307, 308, 309, 310, 311, 314, 315, 316, 317, 319, 358, 365, 376, 385, 390, 400, 404, 414, 420, 423, 428, 437, 440, 442, 444, 446, 507, 562, 580, 598, 629, 658, 702, 715, 728, 868, 870, 871, 880, 899, 908, 912, 915, 926, 936, 944, 946, 960, 961, 962, 973, 974, 978

Shopping Center (820)

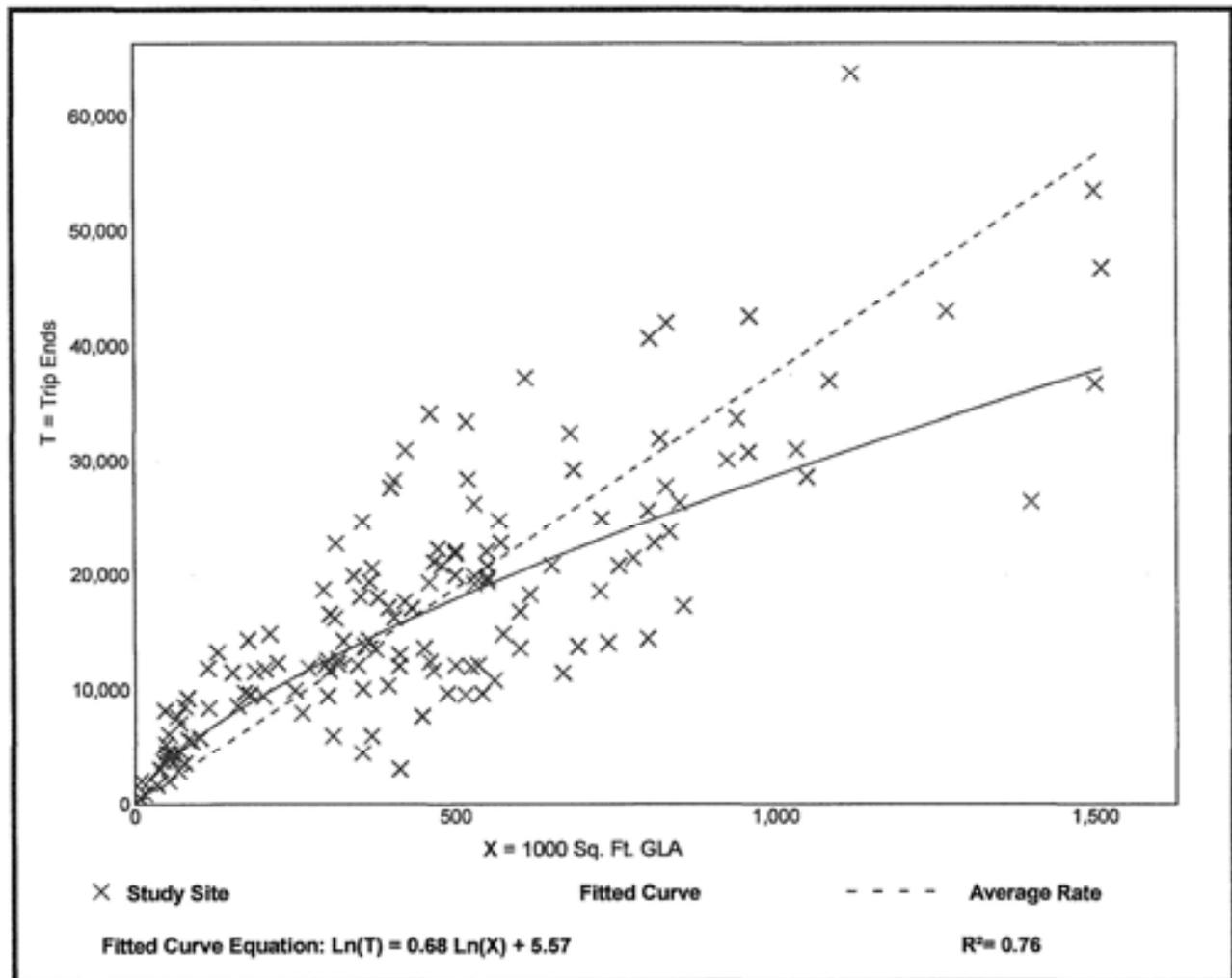
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 147
1000 Sq. Ft. GLA: 453
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.75	7.42 - 207.98	16.41

Data Plot and Equation



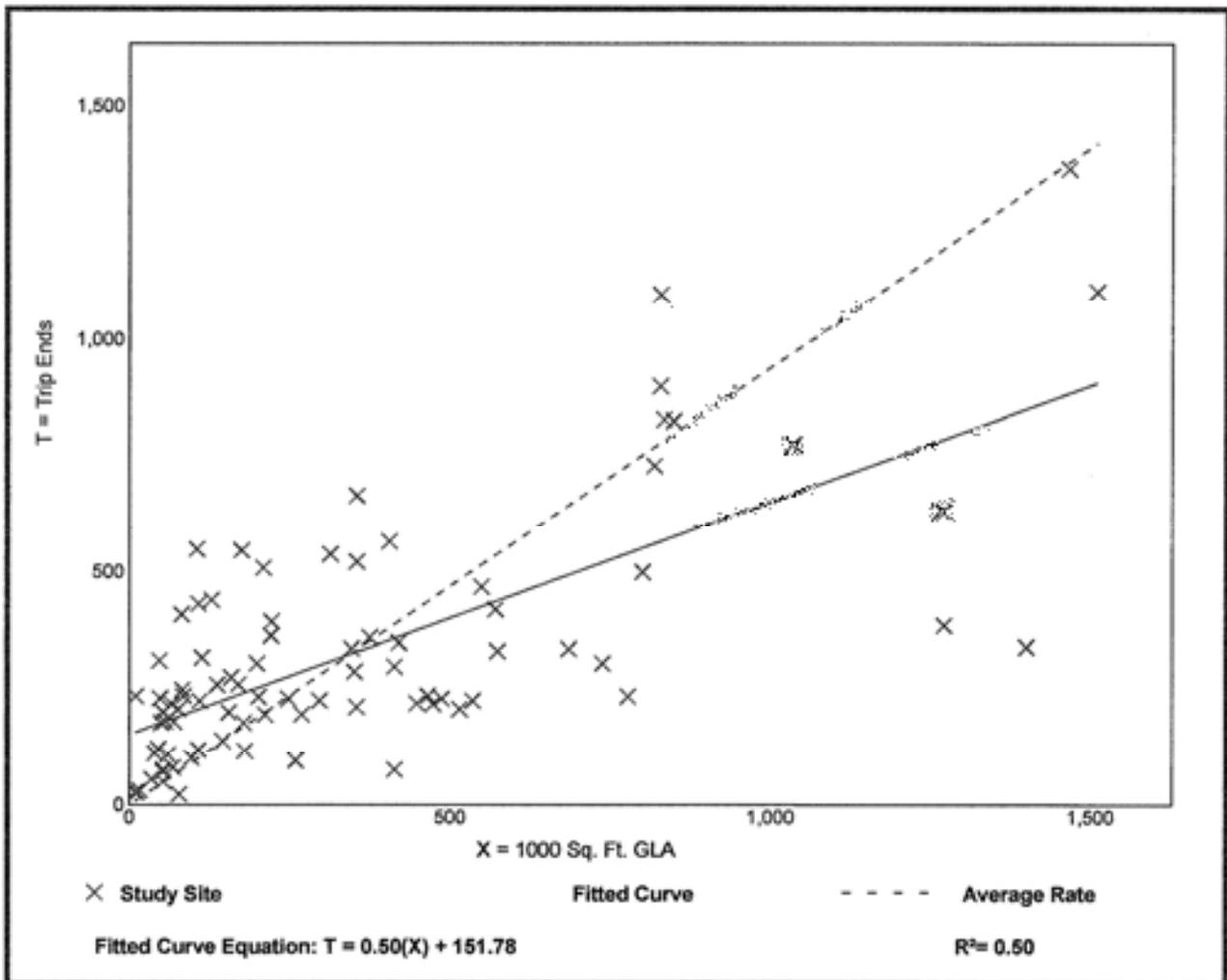
Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 84
 1000 Sq. Ft. GLA: 351
 Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



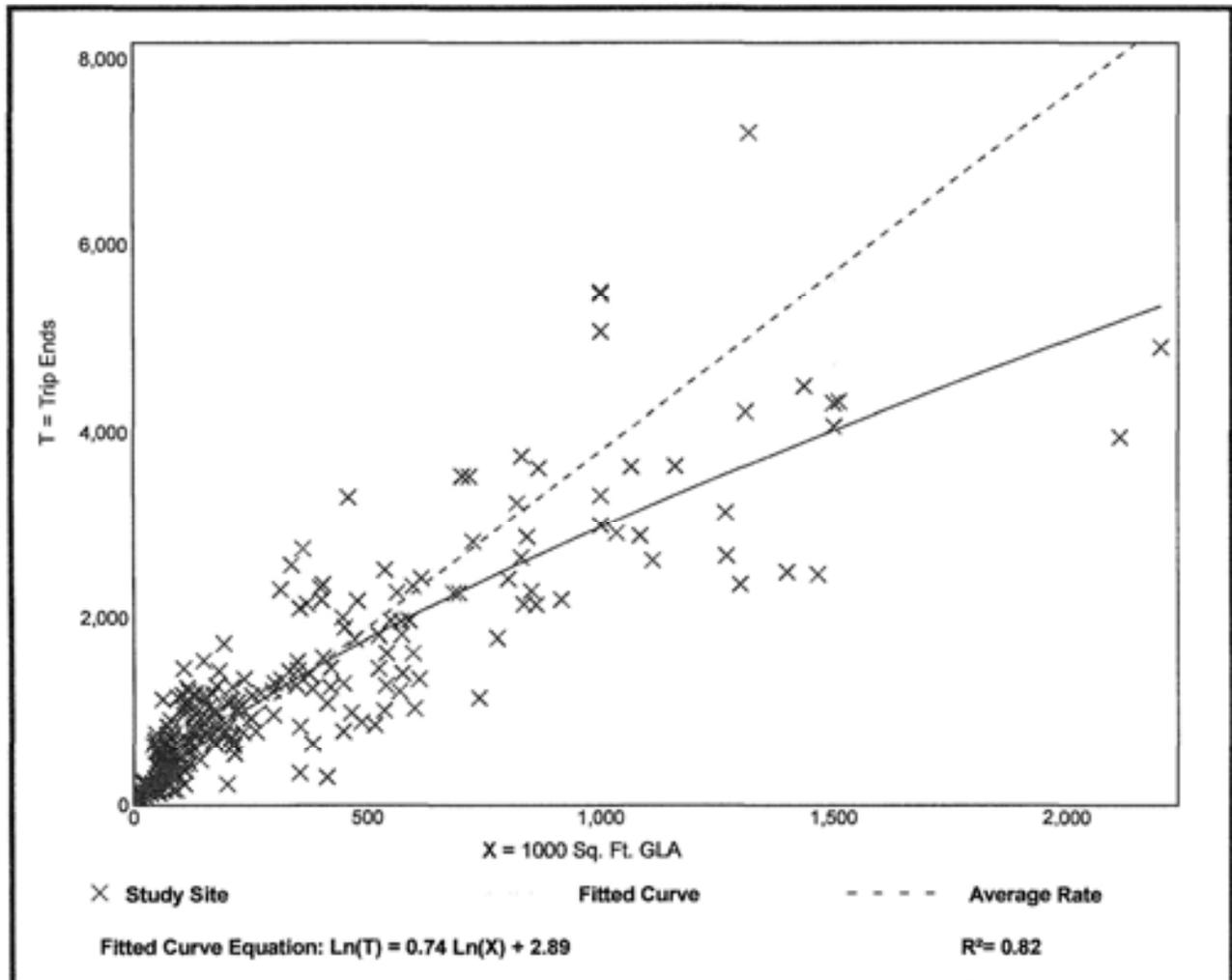
Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 261
 1000 Sq. Ft. GLA: 327
 Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



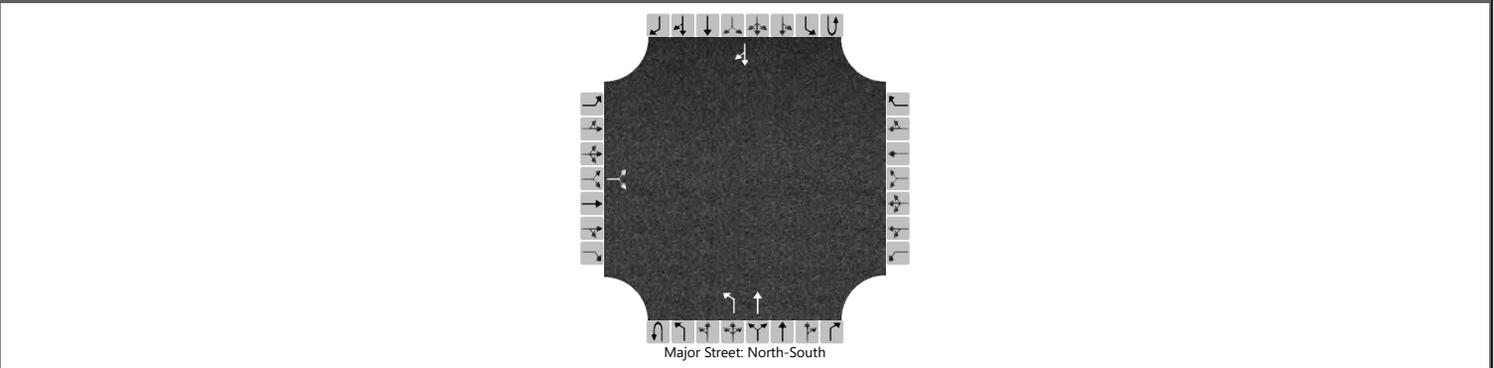
APPENDIX F
2022/2023/2024/2034 BUILD TRAFFIC SCENARIO
CAPACITY ANALYSIS SUMMARY SHEETS

2022 BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		85		35						22	78				167	143
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

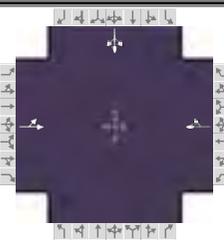
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			130							24						
Capacity, c (veh/h)			641							1234						
v/c Ratio			0.20							0.02						
95% Queue Length, Q ₉₅ (veh)			0.8							0.1						
Control Delay (s/veh)			12.0							8.0						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		12.0								1.8						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2022 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				185	4			3	219				92	0	55

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

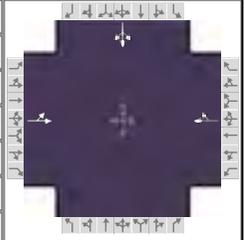
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				185	4			3	219				92	0	55
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						2		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (I _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	4			3	219				92	0	55

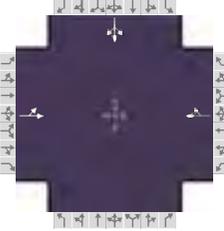
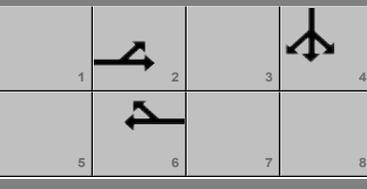
Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R _c), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g _s), s		18.0		8.7				8.8
Green Extension Time (g _e), s		1.0		1.0				0.2
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	205			241						160		
Adjusted Saturation Flow Rate (s), veh/h/ln	999			1538						1702		
Queue Service Time (g _s), s	9.3			6.7						6.8		
Cycle Queue Clearance Time (g _c), s	16.0			6.7						6.8		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	679			923						454		
Volume-to-Capacity Ratio (X)	0.303			0.261						0.352		
Back of Queue (Q), ft/ln (95 th percentile)	95.5			87.6						123.6		
Back of Queue (Q), veh/ln (95 th percentile)	3.7			3.3						4.9		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d ₁), s/veh	12.3			8.5						26.7		
Incremental Delay (d ₂), s/veh	0.1			0.1						0.2		
Initial Queue Delay (d ₃), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	12.4			8.6						26.9		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	12.4	B		8.6	A		0.0			26.9	C	
Intersection Delay, s/veh / LOS	14.7						B					

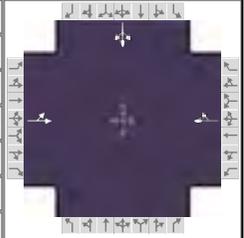
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.83	A	0.89	A			0.75	A

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other								
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR			PHF	0.92								
Urban Street	HILL RD	Analysis Year	2022 BUILD			Analysis Period	1 > 7:00								
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus												
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				185	4			3	219				92	0	55
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f _{LT})				0.539	0.539		1.000	0.849					0.910	0.910	
Right-Turn Adjustment Factor (f _{RT})					0.000	0.539		0.000	0.849					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f _{LPB})				1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})						1.000			1.000						1.000
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h				978	21	0	0	21	1517				1065	0	637
Proportion of Vehicles Arriving on Green (P)				0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)					0.04			0.04						0.04	
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t _L)					6.0		6.0					4.0			
Green Ratio (g/C)					0.60		0.60				0.27				
Permitted Saturation Flow Rate (s _p), veh/h/ln					1157		1434				0				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1811								
Permitted Effective Green Time (g _p), s					54.0		0.0				0.0				
Permitted Service Time (g _u), s					47.3		0.0				0.0				
Permitted Queue Service Time (g _{ps}), s					9.3										
Time to First Blockage (g _t), s					0.0		54.0				0.0				
Queue Service Time Before Blockage (g _{ts}), s					0.0										
Protected Right Saturation Flow (s _R), veh/h/ln															
Protected Right Effective Green Time (g _R), s															
Multimodal				EB			WB			NB		SB			
Pedestrian F _w / F _v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000				
Pedestrian F _s / F _{delay}				0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.159				
Pedestrian M _{corner} / M _{cw}															
Bicycle c _b / d _b				1200.00	7.20	1200.00	7.20		50.14		52.27				
Bicycle F _w / F _v				-3.64	0.34	-3.64	0.40	-3.64		-3.64	0.26				

HCS7 Signalized Intersection Results Graphical Summary

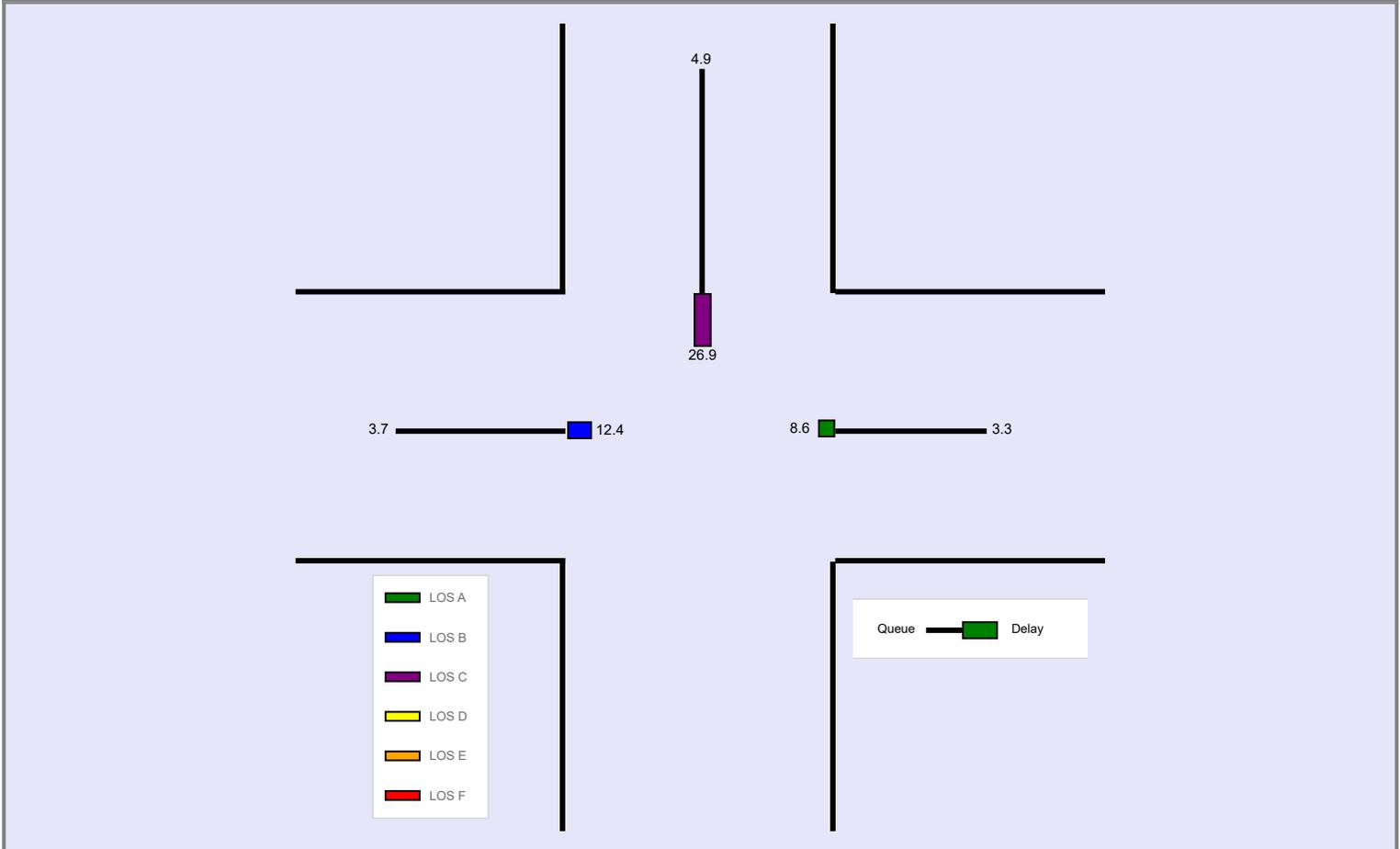
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	185	4			3	219				92	0	55

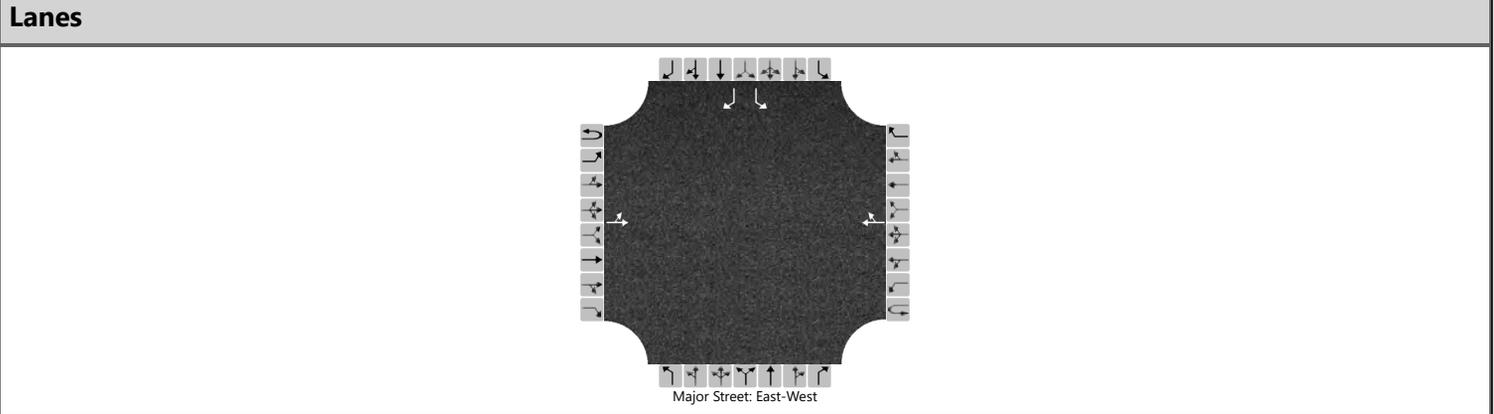
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		95.5			87.6							123.6
Back of Queue (Q), veh/ln (95 th percentile)		3.7			3.3							4.9
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00							0.00
Control Delay (d), s/veh		12.4			8.6							26.9
Level of Service (LOS)		B			A							C
Approach Delay, s/veh / LOS	12.4		B	8.6		A	0.0			26.9		C
Intersection Delay, s/veh / LOS	14.7						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2022	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	
Configuration		LT						TR					L		R	
Volume (veh/h)		9	87				198	4					13		24	
Percent Heavy Vehicles (%)		0											0		0	
Proportion Time Blocked																
Percent Grade (%)															0	
Right Turn Channelized															No	
Median Type Storage							Undivided									

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

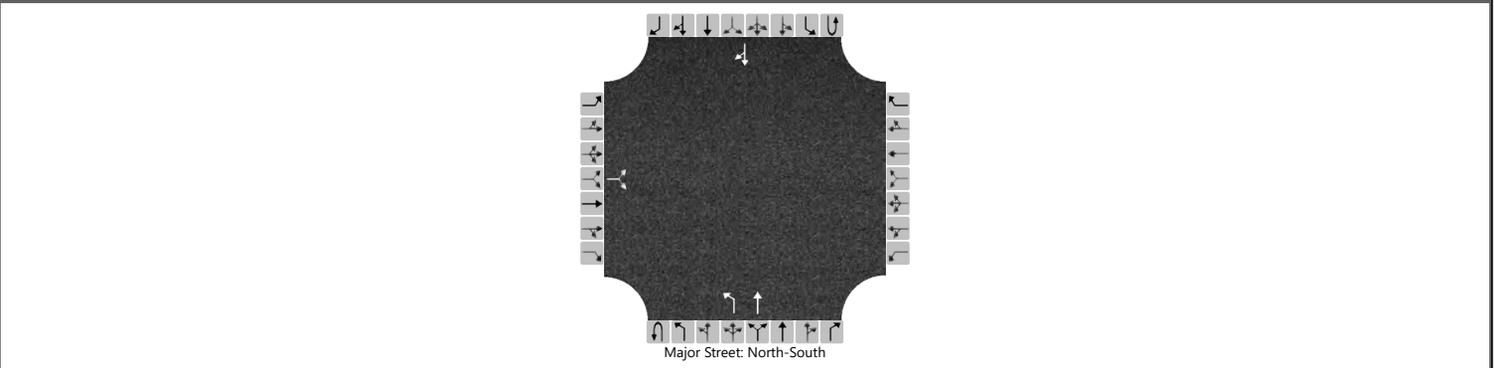
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10												14		26
Capacity, c (veh/h)		1362												662		827
v/c Ratio		0.01												0.02		0.03
95% Queue Length, Q ₉₅ (veh)		0.0												0.1		0.1
Control Delay (s/veh)		7.7												10.6		9.5
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)		0.8												9.9		
Approach LOS														A		

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2022	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		92		39						66	270				193	64
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

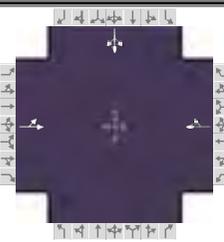
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			142							72						
Capacity, c (veh/h)			459							1295						
v/c Ratio			0.31							0.06						
95% Queue Length, Q ₉₅ (veh)			1.3							0.2						
Control Delay (s/veh)			16.3							7.9						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		16.3								1.6						
Approach LOS		C														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2022 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				154	41			26	203				310	0	301

Signal Information				Timing (s)								Phase Diagram					
Cycle, s	90.0	Reference Phase	2														
Offset, s	0	Reference Point	End	Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

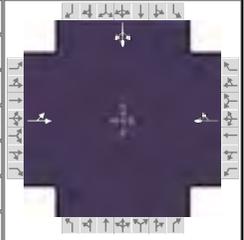
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				154	41			26	203				310	0	301
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				0			0						1		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			34.0		34.0				44.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	154	41			26	203				310	0	301

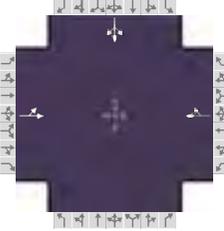
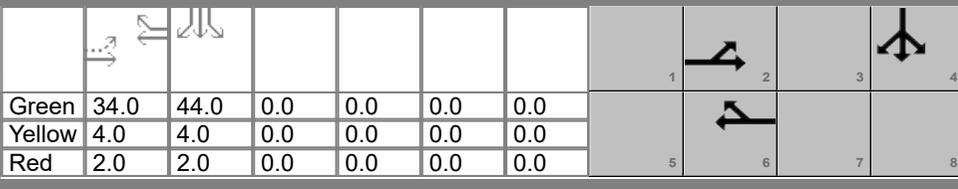
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		40.0		40.0				50.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.3		3.3				3.2
Queue Clearance Time (g_s), s		24.5		12.0				31.7
Green Extension Time (g_e), s		0.8		1.0				1.4
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.03		0.00				0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	212			249						664		
Adjusted Saturation Flow Rate (s), veh/h/ln	913			1639						1692		
Queue Service Time (g_s), s	12.5			10.0						29.7		
Cycle Queue Clearance Time (g_c), s	22.5			10.0						29.7		
Green Ratio (g/C)	0.38			0.38						0.49		
Capacity (c), veh/h	417			619						827		
Volume-to-Capacity Ratio (X)	0.509			0.402						0.803		
Back of Queue (Q), ft/ln (95 th percentile)	169.2			159.3						438.6		
Back of Queue (Q), veh/ln (95 th percentile)	6.8			6.4						17.4		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	27.9			20.5						19.3		
Incremental Delay (d_2), s/veh	0.4			0.2						5.3		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	28.4			20.7						24.7		
Level of Service (LOS)	C			C						C		
Approach Delay, s/veh / LOS	28.4	C		20.7	C		0.0			24.7	C	
Intersection Delay, s/veh / LOS	24.5						C					

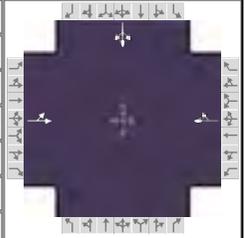
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.40	A	1.40	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.84	A	0.90	A			1.58	B

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information								
Agency	CESO					Duration, h	0.250							
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other							
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92							
Urban Street	HILL RD		Analysis Year	2022 BUILD		Analysis Period	1 > 7:00							
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus										
Project Description	GREENGATE DEVELOPMENT TIS													
Demand Information			EB			WB			NB			SB		
Approach Movement			L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h			154	41			26	203				310	0	301
Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On											
Force Mode	Fixed	Simult. Gap N/S	On											
Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saturation Flow / Delay			L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f _w)			1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f _{HVg})			1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000
Parking Activity Adjustment Factor (f _p)			1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f _{bb})			1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f _a)			1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f _{LU})			1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f _{LT})			0.481	0.481		1.000	0.862					0.898	0.898	
Right-Turn Adjustment Factor (f _{RT})				0.000	0.481		0.000	0.862					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f _{LPB})			1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})					1.000			1.000						1.000
Work Zone Adjustment Factor (f _{wz})			1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f _{DDI})			1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h			721	192	0	0	186	1453				859	0	834
Proportion of Vehicles Arriving on Green (P)			0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.49	0.00	0.49
Incremental Delay Factor (k)				0.05			0.04						0.32	
Signal Timing / Movement Groups			EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t _L)				6.0		6.0				4.0				
Green Ratio (g/C)				0.38		0.38				0.49				
Permitted Saturation Flow Rate (s _p), veh/h/ln				1149		1383				0				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln				0		1900								
Permitted Effective Green Time (g _p), s				34.0		0.0				0.0				
Permitted Service Time (g _u), s				24.0		0.0				0.0				
Permitted Queue Service Time (g _{ps}), s				12.5										
Time to First Blockage (g _t), s				0.5		34.0				0.0				
Queue Service Time Before Blockage (g _{ts}), s				0.5										
Protected Right Saturation Flow (s _R), veh/h/ln														
Protected Right Effective Green Time (g _R), s														
Multimodal			EB			WB			NB			SB		
Pedestrian F _w / F _v			0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F _s / F _{delay}			0.000	0.115	0.000	0.115	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M _{corner} / M _{cw}														
Bicycle c _b / d _b			755.56	17.42	755.56	17.42		50.14			52.27			
Bicycle F _w / F _v			-3.64	0.35	-3.64	0.41	-3.64				-3.64	1.10		

HCS7 Signalized Intersection Results Graphical Summary

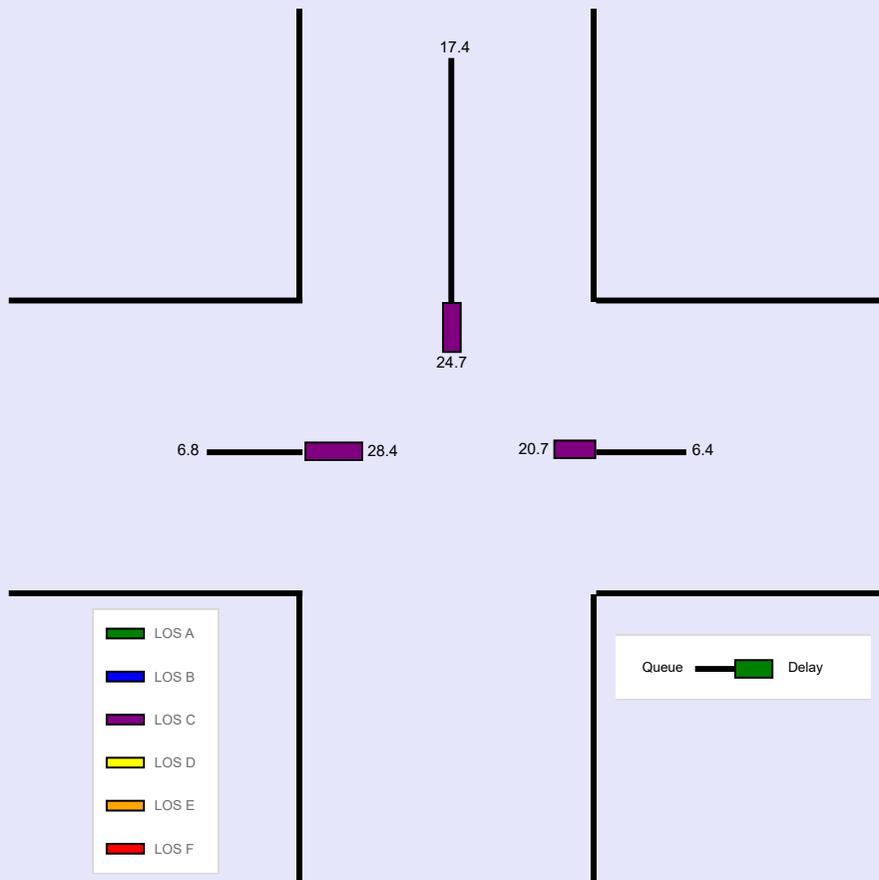
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	154	41			26	203				310	0	301

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
		Red	2.0	2.0	0.0	0.0	0.0	0.0				

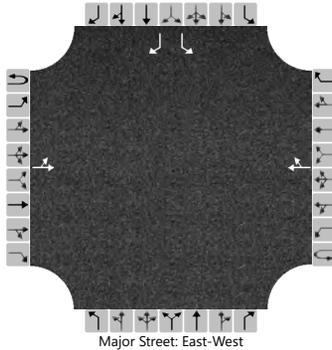
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		169.2			159.3						438.6	
Back of Queue (Q), veh/ln (95 th percentile)		6.8			6.4						17.4	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		28.4			20.7						24.7	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	28.4		C	20.7		C	0.0			24.7		C
Intersection Delay, s/veh / LOS	24.5						C					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2022	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		LT						TR						L		R
Volume (veh/h)		25	326				215	17						10		14
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)																0
Right Turn Channelized																No
Median Type Storage																Undivided

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

Delay, Queue Length, and Level of Service

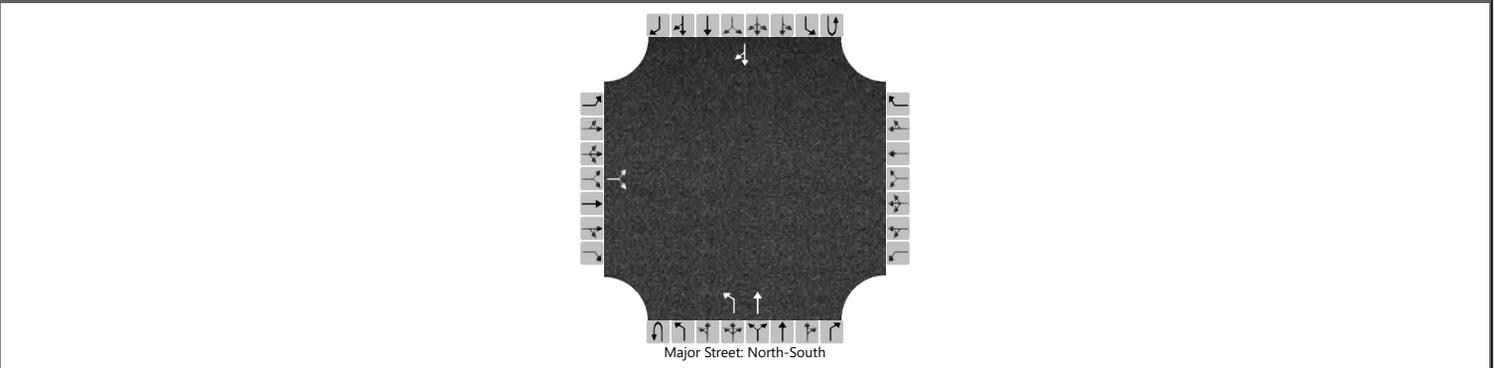
Flow Rate, v (veh/h)		27												11		15
Capacity, c (veh/h)		1325												425		801
v/c Ratio		0.02												0.03		0.02
95% Queue Length, Q ₉₅ (veh)		0.1												0.1		0.1
Control Delay (s/veh)		7.8												13.7		9.6
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)																11.3
Approach LOS																B

2023 BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2023	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		88		40						30	83				174	148
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

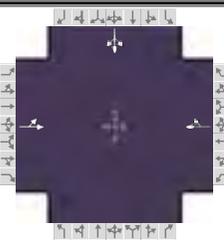
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			139							33						
Capacity, c (veh/h)			618							1220						
v/c Ratio			0.22							0.03						
95% Queue Length, Q ₉₅ (veh)			0.9							0.1						
Control Delay (s/veh)			12.5							8.0						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		12.5								2.1						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2023 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				191	4			5	246				101	0	56

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0				

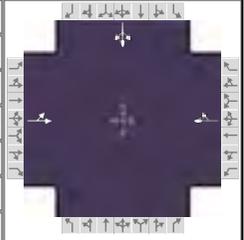
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				191	4			5	246				101	0	56
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						2		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	191	4			5	246				101	0	56

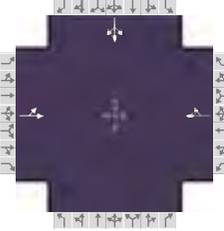
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g_s), s		20.0		9.8				9.3
Green Extension Time (g_e), s		1.1		1.1				0.3
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	212			273						171		
Adjusted Saturation Flow Rate (s), veh/h/ln	949			1539						1706		
Queue Service Time (g_s), s	10.3			7.8						7.3		
Cycle Queue Clearance Time (g_c), s	18.0			7.8						7.3		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	649			924						455		
Volume-to-Capacity Ratio (X)	0.327			0.295						0.375		
Back of Queue (Q), ft/ln (95 th percentile)	103.7			100.9						132.9		
Back of Queue (Q), veh/ln (95 th percentile)	4.1			3.8						5.2		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	13.1			8.8						26.9		
Incremental Delay (d_2), s/veh	0.1			0.1						0.2		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	13.2			8.8						27.1		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	13.2	B		8.8	A		0.0			27.1	C	
Intersection Delay, s/veh / LOS	15.0						B					

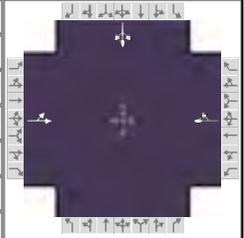
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.84	A	0.94	A			0.77	A

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information											
Agency	CESO					Duration, h	0.250										
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other										
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92										
Urban Street	HILL RD		Analysis Year	2023 BUILD		Analysis Period	1 > 7:00										
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus													
Project Description	GREENGATE DEVELOPMENT TIS																
Demand Information				EB			WB			NB			SB				
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R		
Demand (v), veh/h				191	4			5	246				101	0	56		
Signal Information																	
Cycle, s	90.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0							
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0							
				Red	2.0	2.0	0.0	0.0	0.0	0.0							
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R		
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000		
Heavy Vehicles and Grade Factor (f_{HVg})				1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000		
Parking Activity Adjustment Factor (f_p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000		
Bus Blockage Adjustment Factor (f_{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000		
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000		
Lane Utilization Adjustment Factor (f_{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Left-Turn Adjustment Factor (f_{LT})				0.512	0.512		1.000	0.850					0.912	0.912			
Right-Turn Adjustment Factor (f_{RT})					0.000	0.512		0.000	0.850					0.000	0.000		
Left-Turn Pedestrian Adjustment Factor (f_{LPB})				1.000			1.000						1.000				
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})						1.000			1.000						1.000		
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000		
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000		
Movement Saturation Flow Rate (s), veh/h				930	19	0	0	31	1509				1097	0	608		
Proportion of Vehicles Arriving on Green (P)				0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27		
Incremental Delay Factor (k)					0.04			0.04						0.04			
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R						
Lost Time (t_L)					6.0		6.0					4.0					
Green Ratio (g/C)					0.60		0.60					0.27					
Permitted Saturation Flow Rate (s_p), veh/h/ln					1124		1434					0					
Shared Saturation Flow Rate (s_{sh}), veh/h/ln					0		1811										
Permitted Effective Green Time (g_p), s					54.0		0.0					0.0					
Permitted Service Time (g_u), s					46.2		0.0					0.0					
Permitted Queue Service Time (g_{ps}), s					10.3												
Time to First Blockage (g_t), s					0.0		54.0					0.0					
Queue Service Time Before Blockage (g_{ts}), s					0.0												
Protected Right Saturation Flow (s_R), veh/h/ln																	
Protected Right Effective Green Time (g_R), s																	
Multimodal				EB			WB			NB			SB				
Pedestrian F_w / F_v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000				
Pedestrian F_s / F_{delay}				0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000	0.159				
Pedestrian M_{corner} / M_{cw}																	
Bicycle c_b / d_b				1200.00	7.20	1200.00	7.20			50.14			52.27				
Bicycle F_w / F_v				-3.64	0.35	-3.64	0.45	-3.64				-3.64	0.28				

HCS7 Signalized Intersection Results Graphical Summary

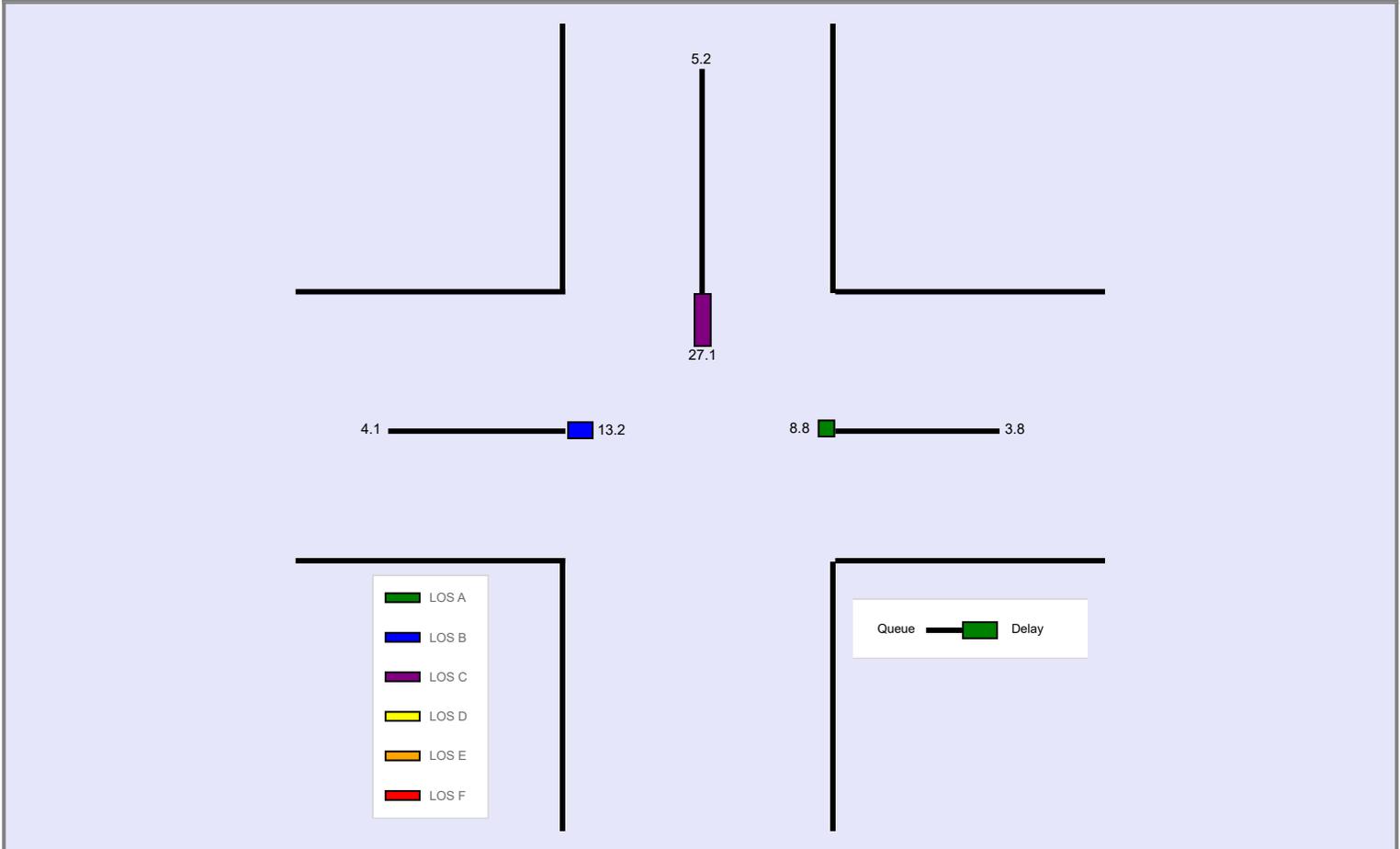
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	191	4			5	246				101	0	56

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

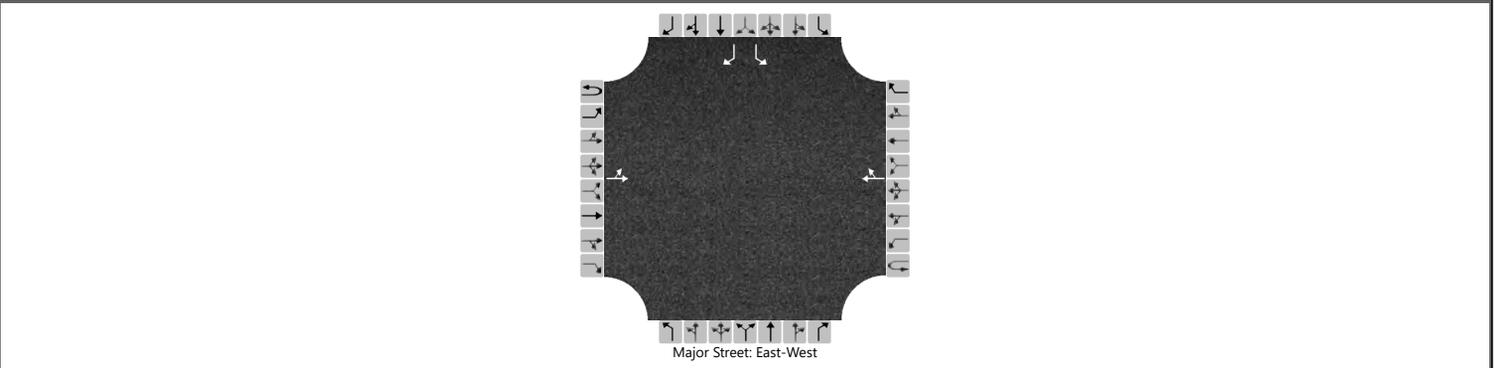
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		103.7			100.9						132.9	
Back of Queue (Q), veh/ln (95 th percentile)		4.1			3.8						5.2	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		13.2			8.8						27.1	
Level of Service (LOS)		B			A						C	
Approach Delay, s/veh / LOS	13.2		B	8.8		A	0.0			27.1		C
Intersection Delay, s/veh / LOS	15.0						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2023	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	
Configuration		LT						TR					L		R	
Volume (veh/h)		16	89				206	8					24		45	
Percent Heavy Vehicles (%)		0											0		0	
Proportion Time Blocked																
Percent Grade (%)															0	
Right Turn Channelized															No	
Median Type Storage							Undivided									

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

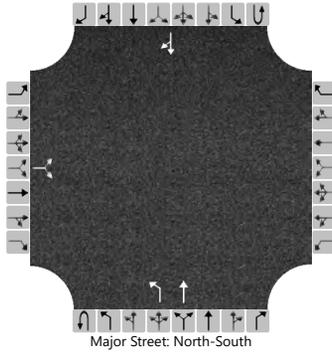
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		17												26		49
Capacity, c (veh/h)		1347												634		816
v/c Ratio		0.01												0.04		0.06
95% Queue Length, Q ₉₅ (veh)		0.0												0.1		0.2
Control Delay (s/veh)		7.7												10.9		9.7
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)							1.3									10.1
Approach LOS																B

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2023	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		95		50						73	280				204	66
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

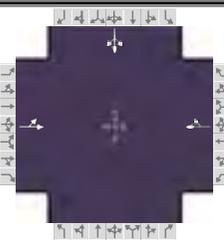
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			158							79						
Capacity, c (veh/h)			448							1280						
v/c Ratio			0.35							0.06						
95% Queue Length, Q ₉₅ (veh)			1.6							0.2						
Control Delay (s/veh)			17.3							8.0						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		17.3								1.7						
Approach LOS		C														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2023 BUILD		Analysis Period	1> 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				159	44			27	223				337	0	309

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	34.0	44.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

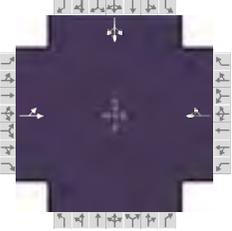
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				159	44			27	223				337	0	309
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				0			0						1		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			34.0		34.0				44.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	159	44			27	223				337	0	309

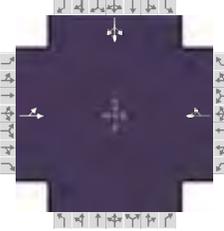
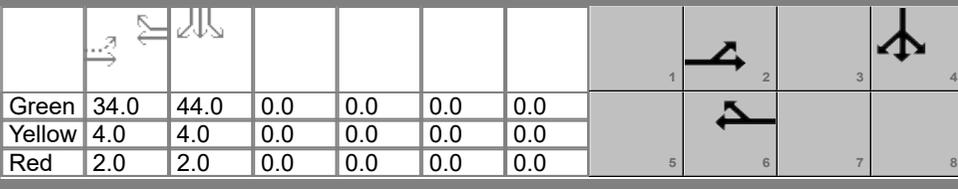
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
		Red	2.0	2.0	0.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		40.0		40.0				50.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.3		3.3				3.2
Queue Clearance Time (g_s), s		26.7		13.1				34.5
Green Extension Time (g_e), s		0.7		1.1				1.4
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.11		0.00				0.08

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	221			272						702		
Adjusted Saturation Flow Rate (s), veh/h/ln	861			1637						1695		
Queue Service Time (g_s), s	13.6			11.1						32.5		
Cycle Queue Clearance Time (g_c), s	24.7			11.1						32.5		
Green Ratio (g/C)	0.38			0.38						0.49		
Capacity (c), veh/h	396			618						829		
Volume-to-Capacity Ratio (X)	0.557			0.439						0.847		
Back of Queue (Q), ft/ln (95 th percentile)	184.7			177						488.3		
Back of Queue (Q), veh/ln (95 th percentile)	7.4			7.1						19.4		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	29.2			20.9						20.1		
Incremental Delay (d_2), s/veh	1.0			0.2						7.8		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	30.2			21.1						27.9		
Level of Service (LOS)	C			C						C		
Approach Delay, s/veh / LOS	30.2	C		21.1	C		0.0			27.9	C	
Intersection Delay, s/veh / LOS	26.8						C					

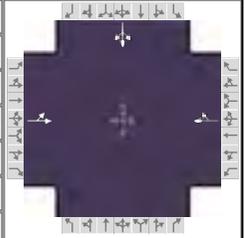
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.40	A	1.40	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.85	A	0.94	A			1.65	B

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information										
Agency	CESO					Duration, h	0.250									
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other									
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92									
Urban Street	HILL RD		Analysis Year	2023 BUILD		Analysis Period	1 > 7:00									
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus												
Project Description	GREENGATE DEVELOPMENT TIS															
Demand Information				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				159	44			27	223				337	0	309	
Signal Information																
Cycle, s	90.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	Yes	Simult. Gap E/W	On													
Force Mode	Fixed	Simult. Gap N/S	On													
Green				34.0	44.0	0.0	0.0	0.0	0.0							
Yellow				4.0	4.0	0.0	0.0	0.0	0.0							
Red				2.0	2.0	0.0	0.0	0.0	0.0							
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R	
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000	
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Left-Turn Adjustment Factor (f _{LT})				0.453	0.453		1.000	0.862					0.899	0.899		
Right-Turn Adjustment Factor (f _{RT})					0.000	0.453		0.000	0.862					0.000	0.000	
Left-Turn Pedestrian Adjustment Factor (f _{LPB})				1.000			1.000						1.000			
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})						1.000			1.000						1.000	
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Movement Saturation Flow Rate (s), veh/h				674	187	0	0	177	1460				884	0	811	
Proportion of Vehicles Arriving on Green (P)				0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.49	0.00	0.49	
Incremental Delay Factor (k)					0.09			0.04						0.36		
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R					
Lost Time (t _L)					6.0		6.0					4.0				
Green Ratio (g/C)					0.38		0.38					0.49				
Permitted Saturation Flow Rate (s _p), veh/h/ln					1125		1379					0				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1900									
Permitted Effective Green Time (g _p), s					34.0		0.0					0.0				
Permitted Service Time (g _u), s					22.9		0.0					0.0				
Permitted Queue Service Time (g _{ps}), s					13.6											
Time to First Blockage (g _t), s					0.6		34.0					0.0				
Queue Service Time Before Blockage (g _{ts}), s					0.6											
Protected Right Saturation Flow (s _R), veh/h/ln																
Protected Right Effective Green Time (g _R), s																
Multimodal				EB			WB			NB			SB			
Pedestrian F _w / F _v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000			
Pedestrian F _s / F _{delay}				0.000	0.115	0.000	0.115	0.000	0.157	0.000	0.157	0.000	0.159			
Pedestrian M _{corner} / M _{cw}																
Bicycle c _b / d _b				755.56	17.42	755.56	17.42			50.14			52.27			
Bicycle F _w / F _v				-3.64	0.36	-3.64	0.45	-3.64				-3.64	1.16			

HCS7 Signalized Intersection Results Graphical Summary

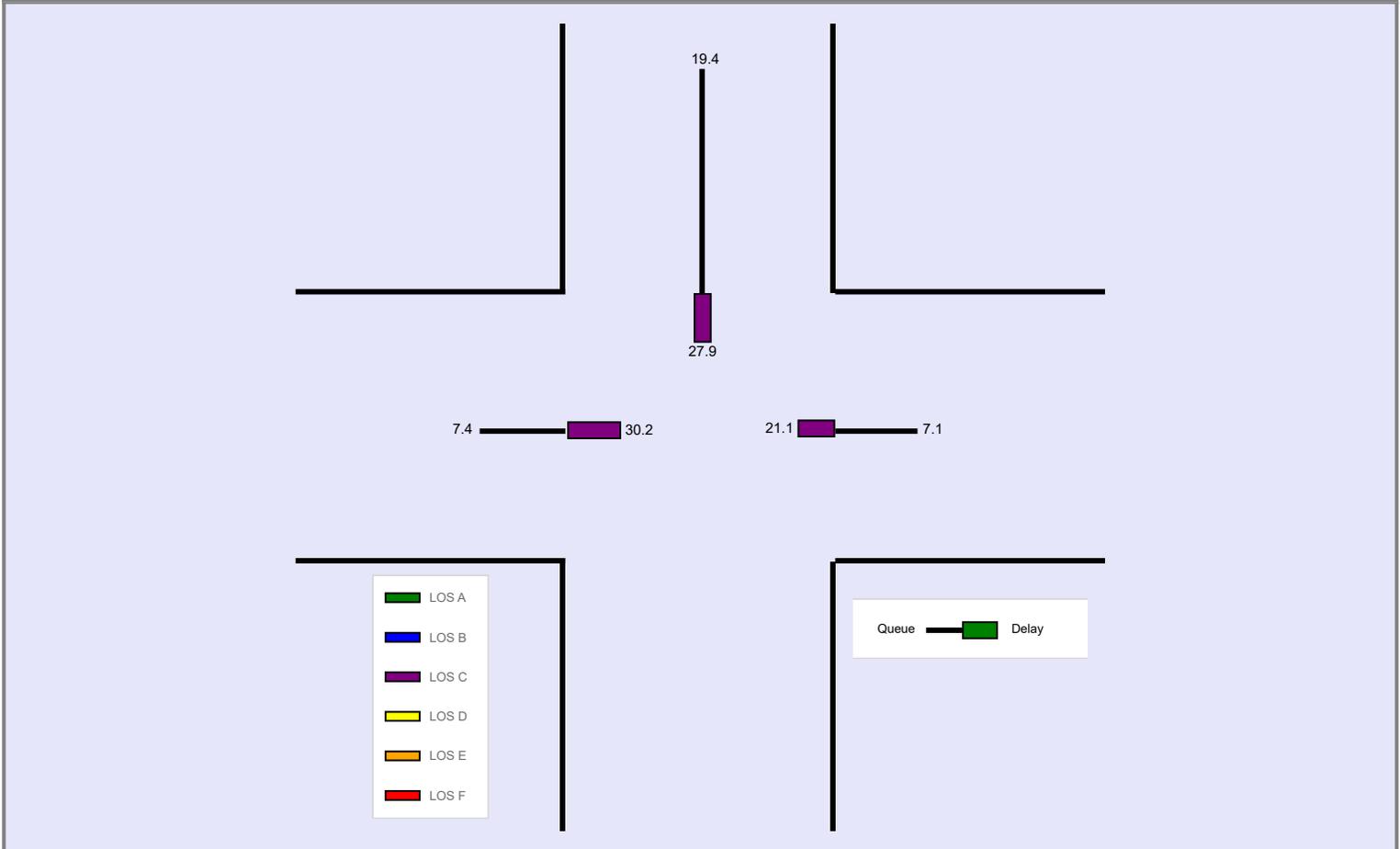
General Information				Intersection Information			
Agency	CESO			Duration, h	0.250		
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other		
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92		
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1 > 7:00		
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus				
Project Description	GREENGATE DEVELOPMENT TIS						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	159	44			27	223				337	0	309

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow		4.0	4.0	0.0	0.0	0.0	0.0				
		Red		2.0	2.0	0.0	0.0	0.0	0.0				

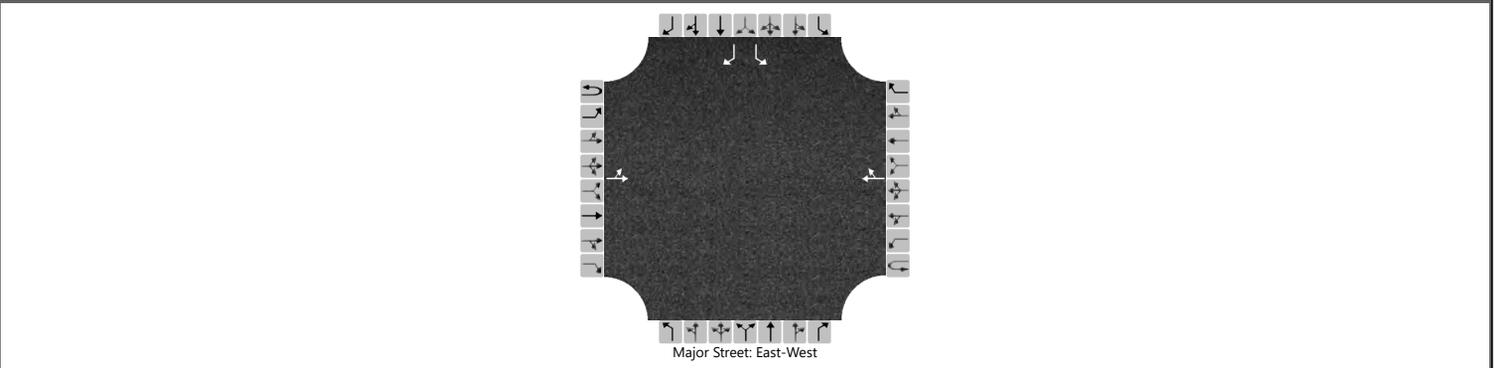
Movement Group Results	EB			WB			NB			SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	
Back of Queue (Q), ft/ln (95 th percentile)		184.7			177						488.3		
Back of Queue (Q), veh/ln (95 th percentile)		7.4			7.1						19.4		
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00		
Control Delay (d), s/veh		30.2			21.1						27.9		
Level of Service (LOS)		C			C						C		
Approach Delay, s/veh / LOS	30.2		C	21.1		C	0.0				27.9		C
Intersection Delay, s/veh / LOS	26.8						C						



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2023	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	
Configuration		LT						TR						L		R
Volume (veh/h)		46	335				223	31						18		27
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized														No		
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

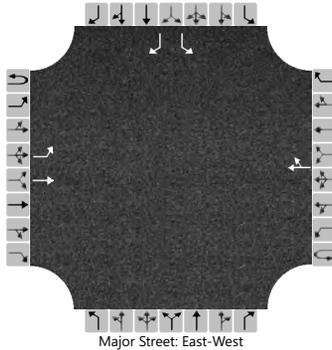
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		50												20		29	
Capacity, c (veh/h)		1299												377		784	
v/c Ratio		0.04												0.05		0.04	
95% Queue Length, Q ₉₅ (veh)		0.1												0.2		0.1	
Control Delay (s/veh)		7.9												15.1		9.8	
Level of Service (LOS)		A												C		A	
Approach Delay (s/veh)		1.3												11.9			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	GREENGATE & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HILL RD
Analysis Year	2023	North/South Street	GREENGATE BLVD
Time Analyzed	BUILD AM PEAK W/ IMP	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		16	89				206	8						24		45
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized													No			
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

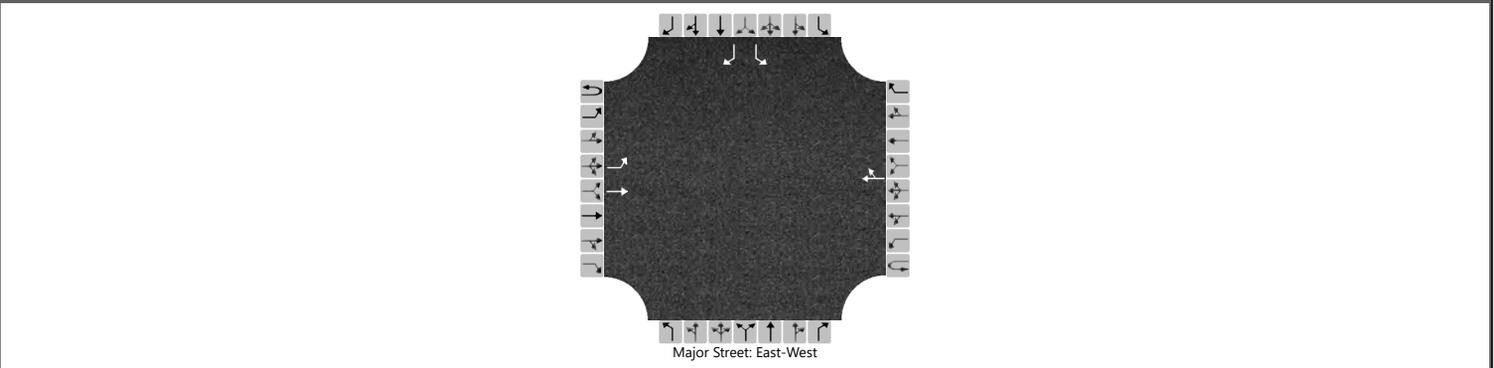
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		17												26		49
Capacity, c (veh/h)		1347												635		816
v/c Ratio		0.01												0.04		0.06
95% Queue Length, Q ₉₅ (veh)		0.0												0.1		0.2
Control Delay (s/veh)		7.7												10.9		9.7
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)	1.2												10.1			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2023	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD PM PEAK W/ IMP	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		46	335				223	31						18		27
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)																0
Right Turn Channelized																No
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

Delay, Queue Length, and Level of Service

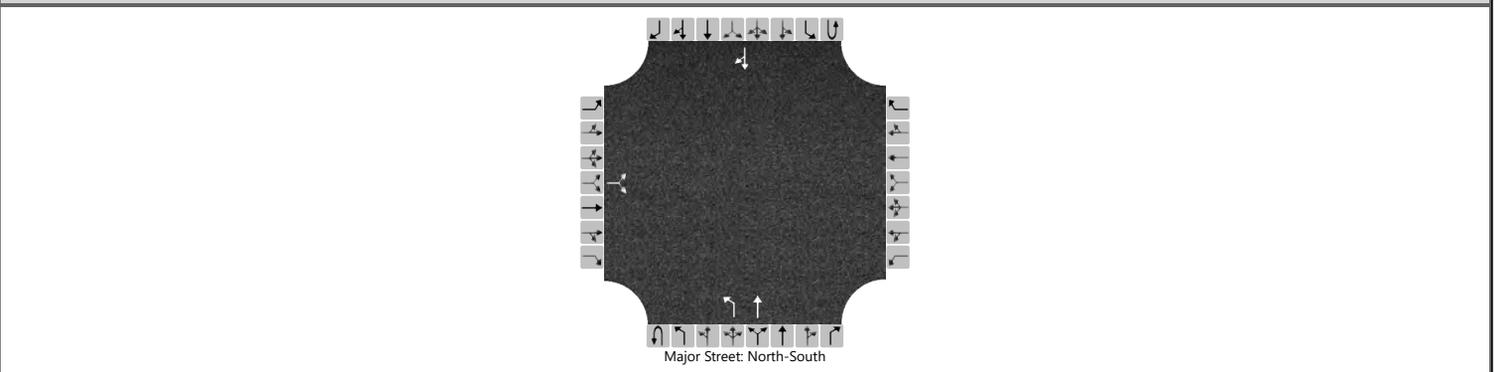
Flow Rate, v (veh/h)		50												20		29
Capacity, c (veh/h)		1299												381		784
v/c Ratio		0.04												0.05		0.04
95% Queue Length, Q ₉₅ (veh)		0.1												0.2		0.1
Control Delay (s/veh)		7.9												15.0		9.8
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)		1.0												11.8		
Approach LOS														B		

2024 BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2024	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0		1	1	0		0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		91		45						42	90				180	152
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

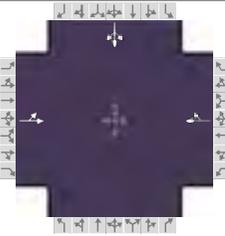
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

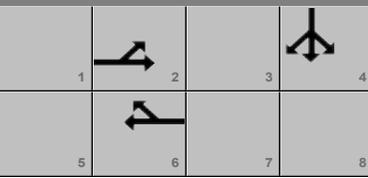
Flow Rate, v (veh/h)			148							46						
Capacity, c (veh/h)			590							1209						
v/c Ratio			0.25							0.04						
95% Queue Length, Q ₉₅ (veh)			1.0							0.1						
Control Delay (s/veh)			13.1							8.1						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)		13.1								2.6						
Approach LOS		B														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2024 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				197	6			7	279				112	0	58

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

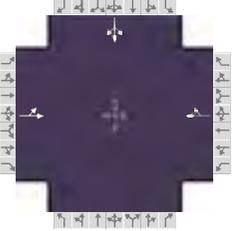
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				197	6			7	279				112	0	58
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						2		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	197	6			7	279				112	0	58

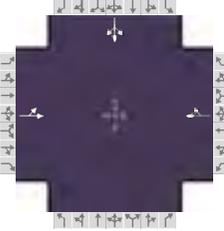
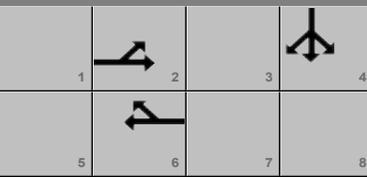
Signal Information				Phase Diagram								
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		60.0		60.0				30.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g_s), s		22.6		11.1				10.0
Green Extension Time (g_e), s		1.3		1.3				0.3
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	221			311						185		
Adjusted Saturation Flow Rate (s), veh/h/ln	895			1541						1709		
Queue Service Time (g_s), s	11.5			9.1						8.0		
Cycle Queue Clearance Time (g_c), s	20.6			9.1						8.0		
Green Ratio (g/C)	0.60			0.60						0.27		
Capacity (c), veh/h	616			924						456		
Volume-to-Capacity Ratio (X)	0.358			0.336						0.405		
Back of Queue (Q), ft/ln (95 th percentile)	114.6			118.7						145.3		
Back of Queue (Q), veh/ln (95 th percentile)	4.5			4.5						5.7		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	14.1			9.0						27.1		
Incremental Delay (d_2), s/veh	0.1			0.1						0.2		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	14.2			9.1						27.3		
Level of Service (LOS)	B			A						C		
Approach Delay, s/veh / LOS	14.2	B		9.1	A		0.0			27.3	C	
Intersection Delay, s/veh / LOS	15.4						B					

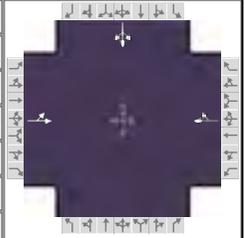
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.36	A	1.36	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.85	A	1.00	A			0.79	A

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other								
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR			PHF	0.92								
Urban Street	HILL RD	Analysis Year	2024 BUILD			Analysis Period	1 > 7:00								
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus												
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				197	6			7	279				112	0	58
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	54.0	24.0	0.0	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0					
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})				1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f_p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})				0.482	0.482		1.000	0.851					0.914	0.914	
Right-Turn Adjustment Factor (f_{RT})					0.000	0.482		0.000	0.851					0.000	0.000
Left-Turn Pedestrian Adjustment Factor (f_{LPB})				1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})						1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h				868	26	0	0	38	1503				1126	0	583
Proportion of Vehicles Arriving on Green (P)				0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)					0.04			0.04						0.04	
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t_L)					6.0		6.0							4.0	
Green Ratio (g/C)					0.60		0.60						0.27		
Permitted Saturation Flow Rate (s_p), veh/h/ln					1086		1432						0		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln					0		1811								
Permitted Effective Green Time (g_p), s					54.0		0.0						0.0		
Permitted Service Time (g_u), s					44.9		0.0						0.0		
Permitted Queue Service Time (g_{ps}), s					11.5										
Time to First Blockage (g_t), s					0.1		54.0						0.0		
Queue Service Time Before Blockage (g_{ts}), s					0.1										
Protected Right Saturation Flow (s_R), veh/h/ln															
Protected Right Effective Green Time (g_R), s															
Multimodal				EB			WB			NB			SB		
Pedestrian F_w / F_v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F_s / F_{delay}				0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M_{corner} / M_{cw}															
Bicycle c_b / d_b				1200.00	7.20	1200.00	7.20		50.14			52.27			
Bicycle F_w / F_v				-3.64	0.36	-3.64	0.51	-3.64			-3.64	0.30			

HCS7 Signalized Intersection Results Graphical Summary

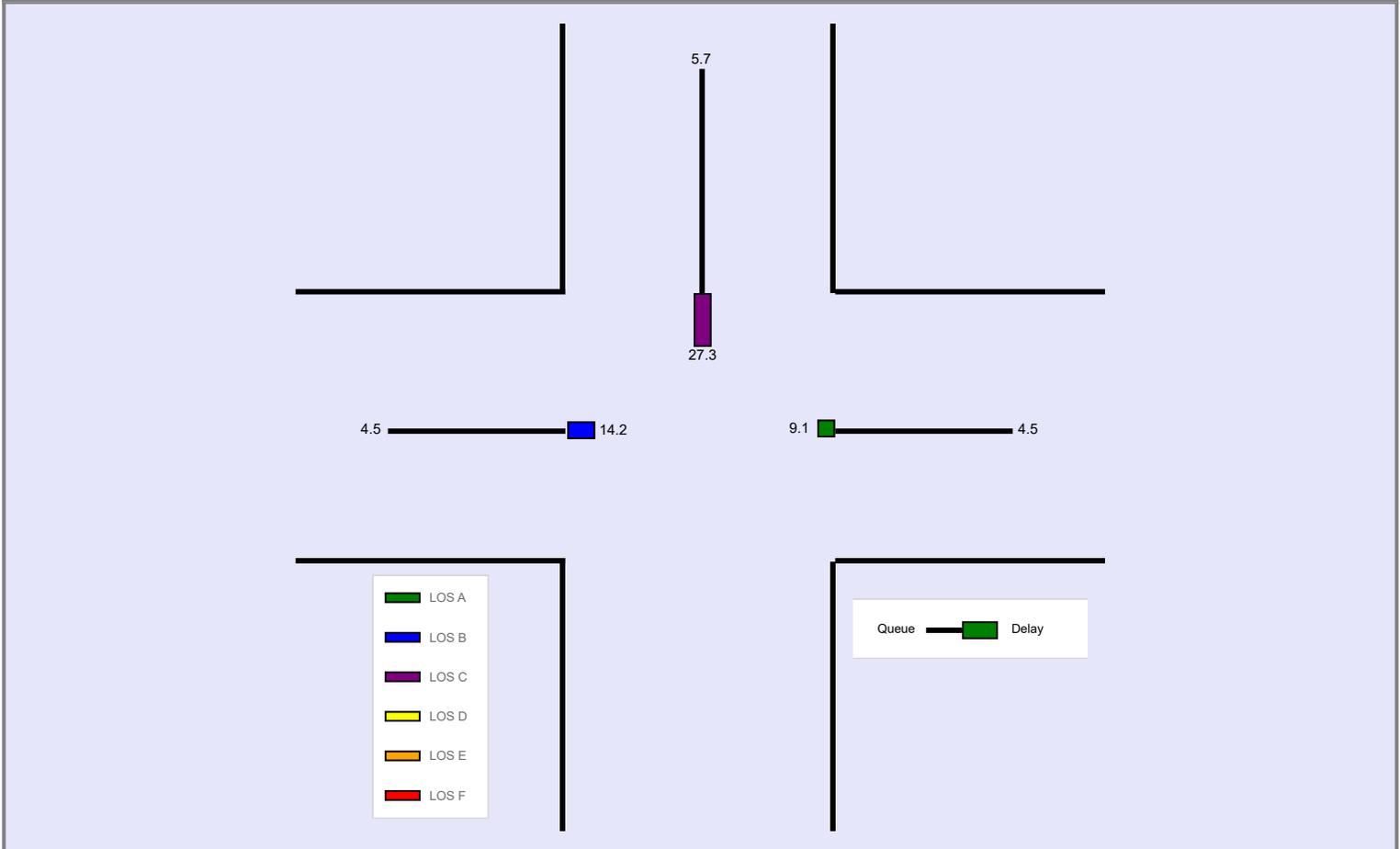
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	197	6			7	279				112	0	58

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

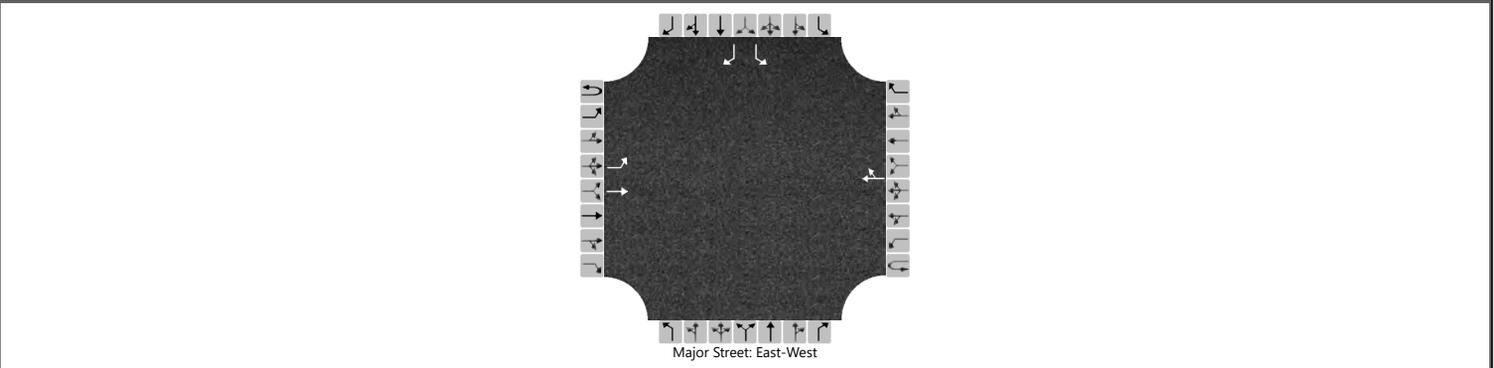
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		114.6			118.7							145.3
Back of Queue (Q), veh/ln (95 th percentile)		4.5			4.5							5.7
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00							0.00
Control Delay (d), s/veh		14.2			9.1							27.3
Level of Service (LOS)		B			A							C
Approach Delay, s/veh / LOS	14.2		B	9.1		A	0.0			27.3		C
Intersection Delay, s/veh / LOS	15.4						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2024	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		25	93				212	13						39		74
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)																0
Right Turn Channelized																No
Median Type Storage																Undivided

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

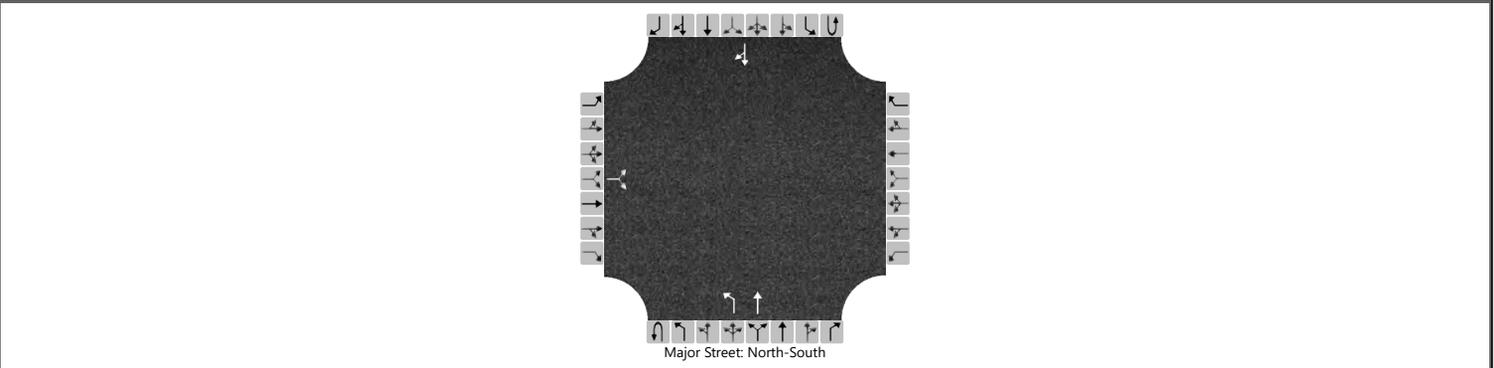
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		27												42		80	
Capacity, c (veh/h)		1333												603		806	
v/c Ratio		0.02												0.07		0.10	
95% Queue Length, Q ₉₅ (veh)		0.1												0.2		0.3	
Control Delay (s/veh)		7.8												11.4		10.0	
Level of Service (LOS)		A												B		A	
Approach Delay (s/veh)		1.6												10.5			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	BUSEY & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	BUSEY RD
Analysis Year	2024	North/South Street	HILL/BUSEY
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0		1	1	0		0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		98		66						83	289				215	68
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

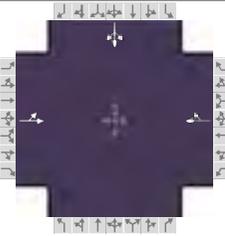
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

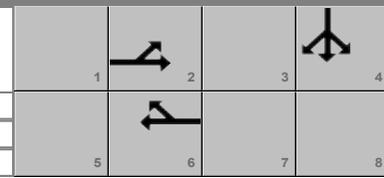
Flow Rate, v (veh/h)			178							90						
Capacity, c (veh/h)			440							1264						
v/c Ratio			0.41							0.07						
95% Queue Length, Q ₉₅ (veh)			1.9							0.2						
Control Delay (s/veh)			18.7							8.1						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		18.7								1.8						
Approach LOS		C														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2024 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				164	47			30	244				371	0	317

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	34.0	44.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

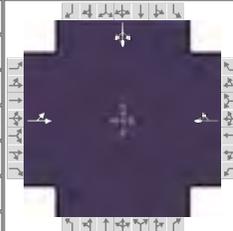
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				164	47			30	244				371	0	317
Initial Queue (Q _b), veh/h				0	0			0	0				0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900	1900	1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				0			0						1		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3	3	3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00	1.00	1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						0		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35	35	35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			34.0		34.0				44.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (I _t), s		2.0	2.0		2.0			2.0	2.0
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	2.0
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	164	47			30	244				371	0	317

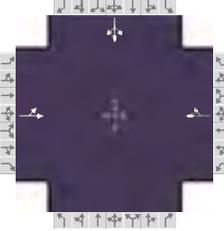
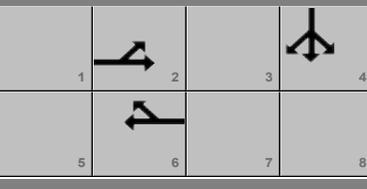
Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		8.0		8.0				12.0
Phase Duration, s		40.0		40.0				50.0
Change Period, ($Y+R_c$), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		3.4		3.4				3.2
Queue Clearance Time (g_s), s		29.3		14.4				38.2
Green Extension Time (g_e), s		0.6		1.2				1.2
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.50		0.00				0.37

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7	4	14
Adjusted Flow Rate (v), veh/h	229			298						748		
Adjusted Saturation Flow Rate (s), veh/h/ln	801			1638						1699		
Queue Service Time (g_s), s	14.9			12.4						36.2		
Cycle Queue Clearance Time (g_c), s	27.3			12.4						36.2		
Green Ratio (g/C)	0.38			0.38						0.49		
Capacity (c), veh/h	374			619						830		
Volume-to-Capacity Ratio (X)	0.614			0.481						0.901		
Back of Queue (Q), ft/ln (95 th percentile)	200.2			196.2						562.2		
Back of Queue (Q), veh/ln (95 th percentile)	8.0			7.8						22.3		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00						0.00		
Uniform Delay (d_1), s/veh	30.6			21.3						21.0		
Incremental Delay (d_2), s/veh	2.2			0.2						12.5		
Initial Queue Delay (d_3), s/veh	0.0			0.0						0.0		
Control Delay (d), s/veh	32.8			21.5						33.5		
Level of Service (LOS)	C			C						C		
Approach Delay, s/veh / LOS	32.8	C		21.5	C		0.0			33.5	C	
Intersection Delay, s/veh / LOS	30.6						C					

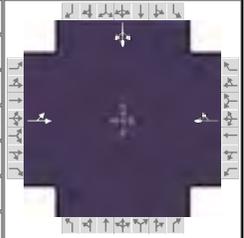
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.40	A	1.40	A	1.73	B	1.73	B
Bicycle LOS Score / LOS	0.87	A	0.98	A			1.72	B

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information										
Agency	CESO					Duration, h	0.250									
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other									
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR			PHF	0.92									
Urban Street	HILL RD	Analysis Year	2024 BUILD			Analysis Period	1 > 7:00									
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus													
Project Description	GREENGATE DEVELOPMENT TIS															
Demand Information				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				164	47			30	244				371	0	317	
Signal Information																
Cycle, s	90.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	Yes	Simult. Gap E/W	On													
Force Mode	Fixed	Simult. Gap N/S	On													
Green				34.0	44.0	0.0	0.0	0.0	0.0							
Yellow				4.0	4.0	0.0	0.0	0.0	0.0							
Red				2.0	2.0	0.0	0.0	0.0	0.0							
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R	
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000	
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000	
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Left-Turn Adjustment Factor (f _{LT})				0.421	0.421		1.000	0.862					0.901	0.901		
Right-Turn Adjustment Factor (f _{RT})					0.000	0.421		0.000	0.862					0.000	0.000	
Left-Turn Pedestrian Adjustment Factor (f _{Lpb})				1.000			1.000						1.000			
Right-Turn Ped-Bike Adjustment Factor (f _{Rpb})						1.000			1.000						1.000	
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000	
Movement Saturation Flow Rate (s), veh/h				622	178	0	0	179	1458				916	0	783	
Proportion of Vehicles Arriving on Green (P)				0.38	0.38	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.49	0.00	0.49	
Incremental Delay Factor (k)					0.14			0.04						0.41		
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R					
Lost Time (t _L)					6.0		6.0					4.0				
Green Ratio (g/C)					0.38		0.38					0.49				
Permitted Saturation Flow Rate (s _p), veh/h/ln					1099		1375					0				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1900									
Permitted Effective Green Time (g _p), s					34.0		0.0					0.0				
Permitted Service Time (g _u), s					21.6		0.0					0.0				
Permitted Queue Service Time (g _{ps}), s					14.9											
Time to First Blockage (g _t), s					0.6		34.0					0.0				
Queue Service Time Before Blockage (g _{ts}), s					0.6											
Protected Right Saturation Flow (s _R), veh/h/ln																
Protected Right Effective Green Time (g _R), s																
Multimodal				EB			WB			NB			SB			
Pedestrian F _w / F _v				0.681	0.000	0.681	0.000	0.972	0.000	0.972	0.000					
Pedestrian F _s / F _{delay}				0.000	0.115	0.000	0.115	0.000	0.157	0.000	0.157					
Pedestrian M _{corner} / M _{cw}																
Bicycle c _b / d _b				755.56	17.42	755.56	17.42			50.14			52.27			
Bicycle F _w / F _v				-3.64	0.38	-3.64	0.49	-3.64				-3.64	1.23			

HCS7 Signalized Intersection Results Graphical Summary

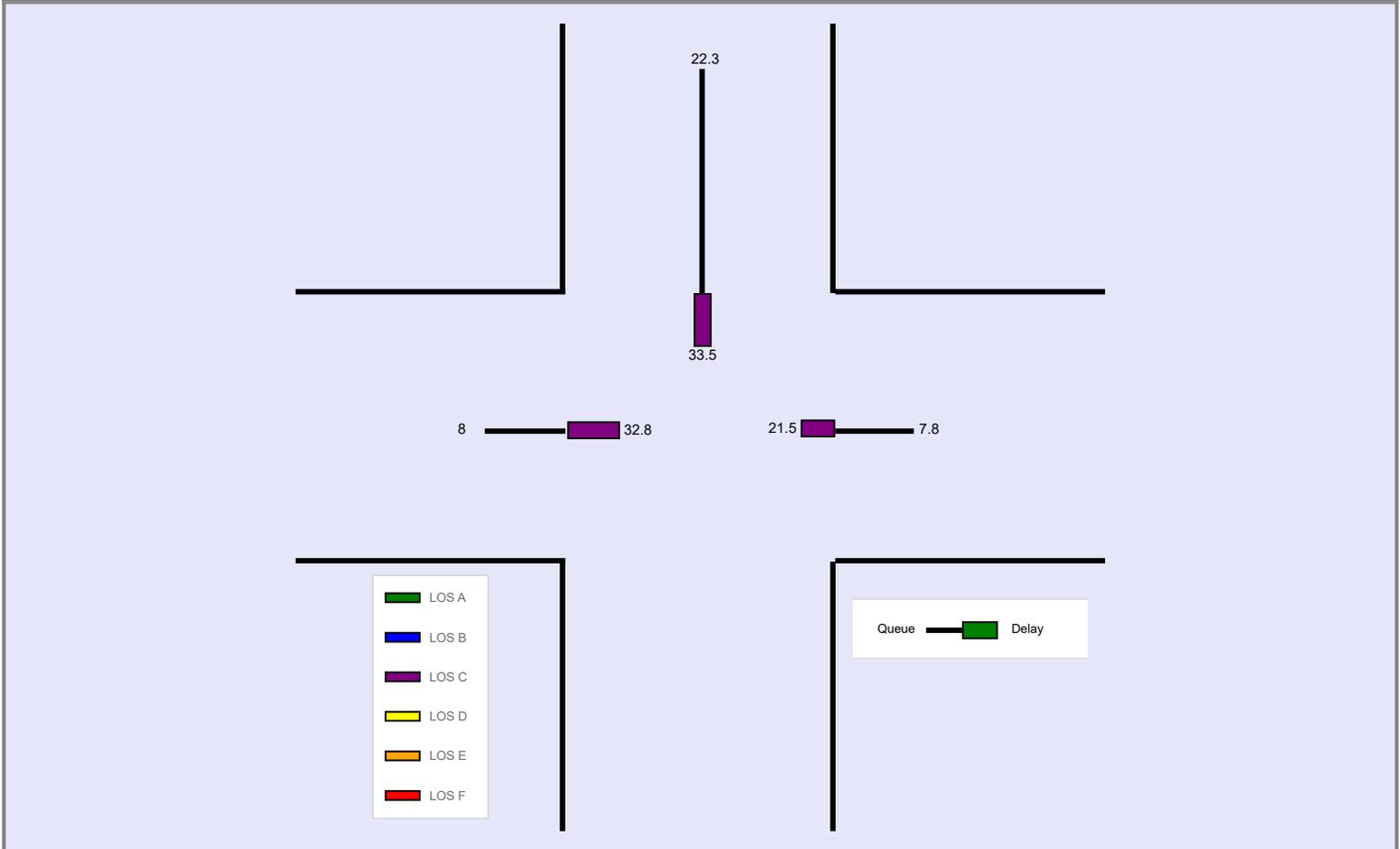
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	164	47			30	244				371	0	317

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	34.0	44.0	0.0	0.0	0.0	0.0				
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
		Red	2.0	2.0	0.0	0.0	0.0	0.0				

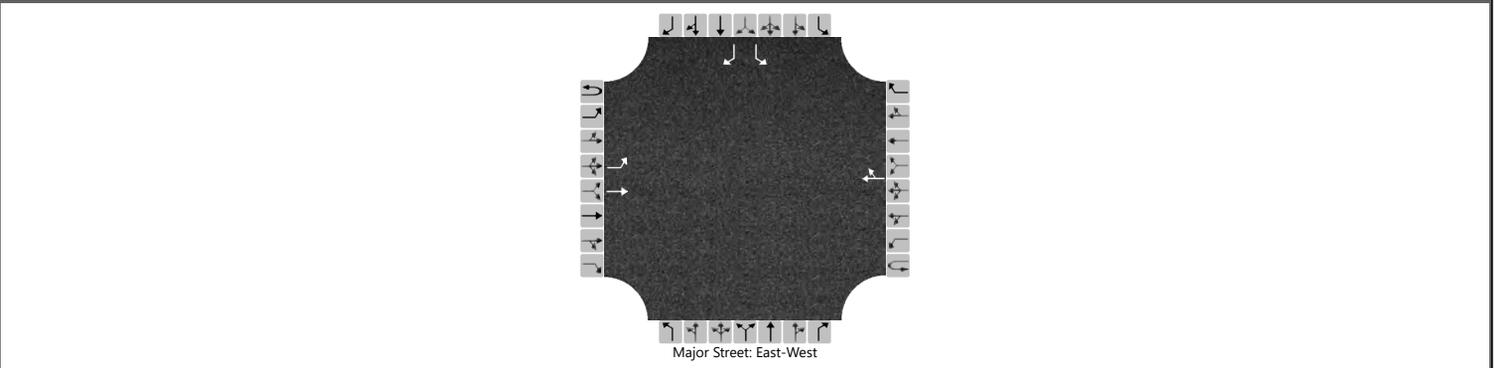
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		200.2			196.2						562.2	
Back of Queue (Q), veh/ln (95 th percentile)		8.0			7.8						22.3	
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.00	
Control Delay (d), s/veh		32.8			21.5						33.5	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	32.8		C	21.5		C	0.0			33.5		C
Intersection Delay, s/veh / LOS	30.6						C					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2024	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0	0	0	0	0	1	0	1	
Configuration		L	T					TR						L		R
Volume (veh/h)		75	343				230	51						29		44
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized														No		
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

Delay, Queue Length, and Level of Service

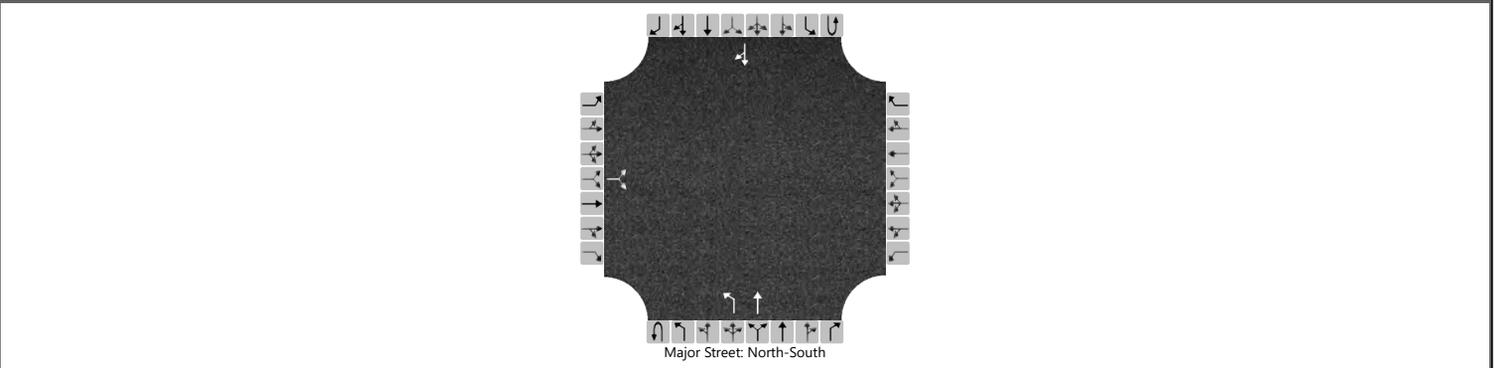
Flow Rate, v (veh/h)		82												32		48	
Capacity, c (veh/h)		1267												328		766	
v/c Ratio		0.06												0.10		0.06	
95% Queue Length, Q ₉₅ (veh)		0.2												0.3		0.2	
Control Delay (s/veh)		8.0												17.1		10.0	
Level of Service (LOS)		A												C		B	
Approach Delay (s/veh)		1.4												12.8			
Approach LOS														B			

2034 BUILD

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2034	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		122		48						23	116				241	199
Percent Heavy Vehicles (%)		4		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

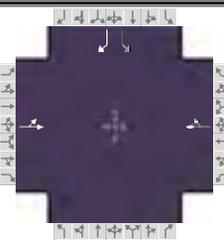
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.44		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.54		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			185							25						
Capacity, c (veh/h)			527							1095						
v/c Ratio			0.35							0.02						
95% Queue Length, Q ₉₅ (veh)			1.6							0.1						
Control Delay (s/veh)			15.5							8.4						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)		15.5								1.4						
Approach LOS		C														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	13			12	310				123		73

Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	13			12	310				123		73
Initial Queue (Q _b), veh/h				0	0			0	0				0		0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900		1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				3			6						0		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3		3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00		1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						250		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35		35

Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			54.0		54.0				24.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (l _t), s		2.0	2.0		2.0			2.0	
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	
Passage (P _T), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (P _C), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										

Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	13			12	310				123		73

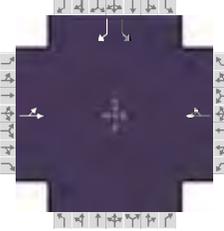
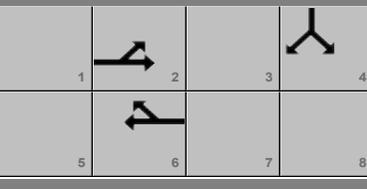
Signal Information														
Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

Timer Results		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase			2		6				4
Case Number			8.0		8.0				9.0
Phase Duration, s			60.0		60.0				30.0
Change Period, (Y+R _c), s			6.0		6.0				6.0
Max Allow Headway (MAH), s			3.5		3.5				3.2
Queue Clearance Time (g _s), s			30.5		12.6				7.3
Green Extension Time (g _e), s			1.6		1.7				0.4
Phase Call Probability			1.00		1.00				1.00
Max Out Probability			0.00		0.00				0.00

Movement Group Results		EB			WB			NB			SB		
Approach Movement		L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		5	2			6	16				7		14
Adjusted Flow Rate (v), veh/h		293			350						134		
Adjusted Saturation Flow Rate (s), veh/h/ln		844			1544						1810		
Queue Service Time (g _s), s		17.9			10.6						5.3		
Cycle Queue Clearance Time (g _c), s		28.5			10.6						5.3		
Green Ratio (g/C)		0.60			0.60						0.27		
Capacity (c), veh/h		585			926						483		
Volume-to-Capacity Ratio (X)		0.502			0.378						0.277		
Back of Queue (Q), ft/ln (95 th percentile)		175.1			138.2						99.5		
Back of Queue (Q), veh/ln (95 th percentile)		6.8			5.3						4.0		
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00						0.40		
Uniform Delay (d ₁), s/veh		16.5			9.3						26.1		
Incremental Delay (d ₂), s/veh		0.3			0.1						0.1		
Initial Queue Delay (d ₃), s/veh		0.0			0.0						0.0		
Control Delay (d), s/veh		16.8			9.4						26.2		
Level of Service (LOS)		B			A						C		
Approach Delay, s/veh / LOS		16.8		B	9.4		A	0.0			26.0		C
Intersection Delay, s/veh / LOS		16.1						B					

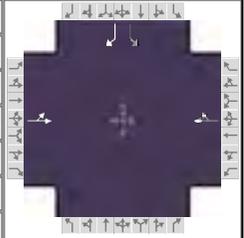
Multimodal Results		EB		WB		NB		SB	
Pedestrian LOS Score / LOS		0.68	A	1.65	B	1.73	B	1.73	B
Bicycle LOS Score / LOS		0.97	A	1.07	A				F

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other								
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92								
Urban Street	HILL RD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00								
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS AM.xus											
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				257	13			12	310				123		73
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.0	24.0	0.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
				Red	2.0	2.0	0.0	0.0	0.0	0.0					
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	0.977	1.000	1.000	0.953	1.000				1.000	0.984	1.000
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f _{LT})				0.455	0.455		1.000	0.852					0.952	0.000	
Right-Turn Adjustment Factor (f _{RT})					0.000	0.455		0.000	0.852					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f _{LPB})				1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})						1.000			1.000						1.000
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h				804	41	0	0	58	1486				1810	0	1610
Proportion of Vehicles Arriving on Green (P)				0.60	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.27	0.00	0.27
Incremental Delay Factor (k)					0.04			0.04					0.04		0.04
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t _L)					6.0		6.0								4.0
Green Ratio (g/C)					0.60		0.60							0.27	
Permitted Saturation Flow Rate (s _p), veh/h/ln					1047		1422							1810	
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1811								
Permitted Effective Green Time (g _p), s					54.0		0.0							0.0	
Permitted Service Time (g _u), s					43.4		0.0							0.0	
Permitted Queue Service Time (g _{ps}), s					17.9										
Time to First Blockage (g _t), s					0.1		54.0							0.0	
Queue Service Time Before Blockage (g _{ts}), s					0.1										
Protected Right Saturation Flow (s _R), veh/h/ln														0	
Protected Right Effective Green Time (g _R), s														0.0	
Multimodal				EB			WB			NB			SB		
Pedestrian F _w / F _v				0.000	0.000	0.972	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F _s / F _{delay}				0.000	0.079	0.000	0.079	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M _{corner} / M _{cw}															
Bicycle c _b / d _b				1200.00	7.20	1200.00	7.20			50.14			52.27		
Bicycle F _w / F _v				-3.64	0.48	-3.64	0.58	-3.64			-3.64				

HCS7 Signalized Intersection Results Graphical Summary

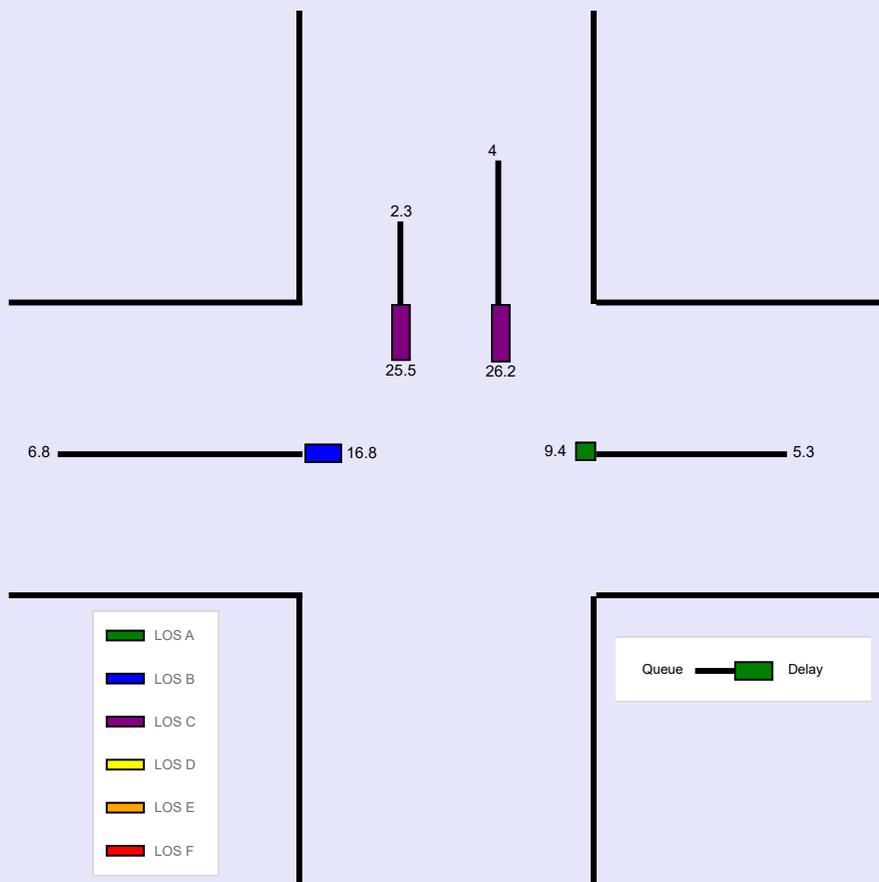
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	13			12	310				123		73

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

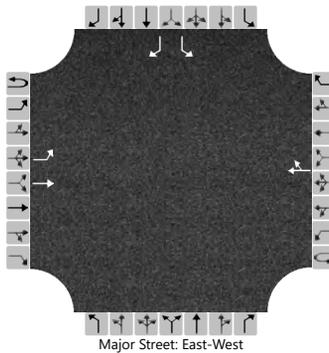
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		175.1			138.2					99.5		57.5
Back of Queue (Q), veh/ln (95 th percentile)		6.8			5.3					4.0		2.3
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00					0.40		0.00
Control Delay (d), s/veh		16.8			9.4					26.2		25.5
Level of Service (LOS)		B			A					C		C
Approach Delay, s/veh / LOS	16.8		B	9.4		A	0.0			26.0		C
Intersection Delay, s/veh / LOS	16.1						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	GREENGATE & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	HILL RD				
Analysis Year	2034	North/South Street	GREENGATE BLVD				
Time Analyzed	BUILD AM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		19	117				277	12						22		45
Percent Heavy Vehicles (%)		0												0		0
Proportion Time Blocked																
Percent Grade (%)																0
Right Turn Channelized																No
Median Type Storage																Undivided

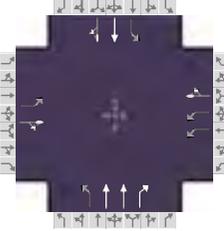
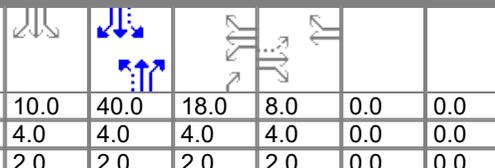
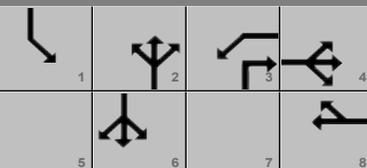
Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

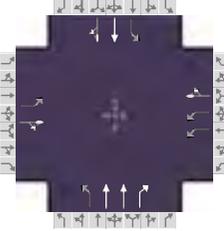
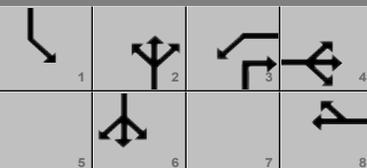
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		21												24		49
Capacity, c (veh/h)		1258												542		737
v/c Ratio		0.02												0.04		0.07
95% Queue Length, Q ₉₅ (veh)		0.1												0.1		0.2
Control Delay (s/veh)		7.9												11.9		10.2
Level of Service (LOS)		A												B		B
Approach Delay (s/veh)																10.8
Approach LOS																B

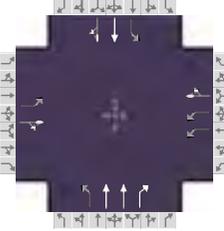
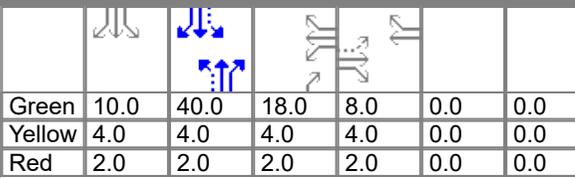
HCS7 Signalized Intersection Input Data

General Information						Intersection Information									
Agency		CESO				Duration, h		0.250							
Analyst		SKG		Analysis Date		3/4/2020		Area Type		Other					
Jurisdiction		CANAL WINCHESTER		Time Period		AM PEAK HOUR		PHF		0.92					
Urban Street		DILEY ROAD		Analysis Year		2034 BUILD		Analysis Period		1 > 7:00					
Intersection		DILEY & HOWE/GREE...		File Name		DILEY & HOWE AM.xus									
Project Description		GREENGATE DEVELOPMENT TIS													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				9	1	15	116	1	88	66	546	120	64	856	30
Signal Information															
Cycle, s		100.0						Reference Phase		2					
Offset, s		0						Reference Point		End					
Uncoordinated		No						Simult. Gap E/W		On					
Force Mode				Float	Simult. Gap N/S		On								
Green				10.0	40.0	18.0	8.0	0.0	0.0						
Yellow				4.0	4.0	4.0	4.0	0.0	0.0						
Red				2.0	2.0	2.0	2.0	0.0	0.0						
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				9	1	15	116	1	88	66	546	120	64	856	30
Initial Queue (Q _b), veh/h				0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N _m), man/h				None			None			None			None		
Heavy Vehicles (P _{HV}), %				29	9		0	0		4	5	0	0	2	
Ped / Bike / RTOR, /h				0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (AT)				3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W), ft				12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	
Turn Bay Length, ft				100	0		325	0		195	0	545	450	0	
Grade (P _g), %					0			0			0		0		
Speed Limit, mi/h				25	25	25	25	25	25	45	45	45	45	45	45
Phase Information				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Maximum Green (G _{max}) or Phase Split, s					14.0	24.0	38.0		46.0	16.0	62.0				
Yellow Change Interval (Y), s					4.0	4.0	4.0		4.0	4.0	4.0				
Red Clearance Interval (R _c), s					2.0	2.0	2.0		2.0	2.0	2.0				
Minimum Green (G _{min}), s					6	6	6		6	6	6				
Start-Up Lost Time (lt), s				2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0				
Extension of Effective Green (e), s				2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0				
Passage (PT), s					2.0	2.0	2.0		2.0	2.0	2.0				
Recall Mode					Off	Off	Off		Min	Off	Min				
Dual Entry					Yes	No	Yes		Yes	No	Yes				
Walk (Walk), s					0.0		0.0		0.0		0.0				
Pedestrian Clearance Time (PC), s					0.0		0.0		0.0		0.0				
Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft				9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking				No	0.50		No	0.50		No	0.50		No	0.50	

HCS7 Signalized Intersection Results Summary

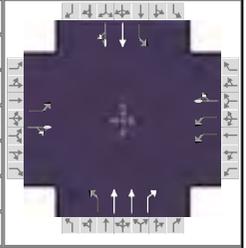
General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG		Analysis Date	3/4/2020		Area Type	Other								
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92								
Urban Street	DILEY ROAD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00								
Intersection	DILEY & HOWE/GREE...		File Name	DILEY & HOWE AM.xus											
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				9	1	15	116	1	88	66	546	120	64	856	30
Signal Information															
Cycle, s	100.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On	Green	10.0	40.0	18.0	8.0	0.0	0.0					
Force Mode	Float	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0					
				Red	2.0	2.0	2.0	2.0	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4	3	8		2	1	6				
Case Number					6.3	2.0	4.0		5.3	1.0	4.0				
Phase Duration, s					14.0	24.0	38.0		46.0	16.0	62.0				
Change Period, (Y+R _c), s					6.0	6.0	6.0		6.0	6.0	6.0				
Max Allow Headway (MAH), s					3.5	3.3	3.5		0.0	3.0	0.0				
Queue Clearance Time (g _s), s					3.1	5.1	6.3			3.9					
Green Extension Time (g _e), s					0.1	0.2	0.3		0.0	0.0	0.0				
Phase Call Probability					1.00	1.00	1.00			1.00					
Max Out Probability					0.23	0.00	0.00			0.01					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h				10	17		126	97		72	593	130	70	484	479
Adjusted Saturation Flow Rate (s), veh/h/ln				1021	1512		1757	1613		574	1738	1610	1810	1870	1848
Queue Service Time (g _s), s				0.9	1.1		3.1	4.3		8.6	12.4	3.7	1.9	15.4	15.4
Cycle Queue Clearance Time (g _c), s				0.9	1.1		3.1	4.3		8.6	12.4	3.7	1.9	15.4	15.4
Green Ratio (g/C)				0.08	0.08		0.18	0.32		0.40	0.40	0.58	0.52	0.56	0.56
Capacity (c), veh/h				154	121		633	516		302	1391	934	484	1047	1035
Volume-to-Capacity Ratio (X)				0.064	0.144		0.199	0.187		0.238	0.427	0.140	0.144	0.463	0.463
Back of Queue (Q), ft/ln (95 th percentile)				12.7	19.7		59.3	75.5		57.2	220.9	55.3	31.9	257.1	251.2
Back of Queue (Q), veh/ln (95 th percentile)				0.4	0.7		2.4	3.0		2.2	8.5	2.2	1.3	10.1	10.0
Queue Storage Ratio (RQ) (95 th percentile)				0.13	0.00		0.18	0.00		0.29	0.00	0.10	0.07	0.00	0.00
Uniform Delay (d ₁), s/veh				42.7	42.8		34.9	24.6		20.6	21.7	9.6	13.1	13.1	13.1
Incremental Delay (d ₂), s/veh				0.1	0.2		0.1	0.1		1.9	1.0	0.3	0.1	1.5	1.5
Initial Queue Delay (d ₃), s/veh				0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh				42.8	43.0		34.9	24.7		22.4	22.7	9.9	13.2	14.5	14.6
Level of Service (LOS)				D	D		C	C		C	C	A	B	B	B
Approach Delay, s/veh / LOS				42.9		D	30.5		C	20.6		C	14.4		B
Intersection Delay, s/veh / LOS				18.9						B					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				2.46		B	2.28		B	2.10		B	1.89		B
Bicycle LOS Score / LOS				0.53		A	0.86		A	1.14		A	1.34		A

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information											
Agency	CESO					Duration, h	0.250										
Analyst	SKG		Analysis Date	3/4/2020		Area Type	Other										
Jurisdiction	CANAL WINCHESTER		Time Period	AM PEAK HOUR		PHF	0.92										
Urban Street	DILEY ROAD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00										
Intersection	DILEY & HOWE/GREE...		File Name	DILEY & HOWE AM.xus													
Project Description	GREENGATE DEVELOPMENT TIS																
Demand Information				EB			WB			NB			SB				
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R		
Demand (v), veh/h				9	1	15	116	1	88	66	546	120	64	856	30		
Signal Information										1		2		3		4	
Cycle, s	100.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	On														
Force Mode	Float	Simult. Gap N/S	On														
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R		
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Heavy Vehicles and Grade Factor (f_{HVg})				0.774	0.930	1.000	1.000	1.000	1.000	0.969	0.961	1.000	1.000	0.984	1.000		
Parking Activity Adjustment Factor (f_p)				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Bus Blockage Adjustment Factor (f_{bb})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Lane Utilization Adjustment Factor (f_{LU})				1.000	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000	1.000	1.000	1.000	1.000	
Left-Turn Adjustment Factor (f_{LT})				0.537	0.000		0.952	0.000		0.302	0.000		0.952	0.000			
Right-Turn Adjustment Factor (f_{RT})					0.856	0.856		0.849	0.849		0.000	0.847		0.988	0.988		
Left-Turn Pedestrian Adjustment Factor (f_{LPB})				1.000			1.000			1.000			1.000				
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})						1.000			1.000			1.000			1.000		
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Movement Saturation Flow Rate (s), veh/h				1021	94	1417	3514	18	1595	574	3477	1610	1810	3592	126		
Proportion of Vehicles Arriving on Green (P)				0.08	0.08	0.08	0.18	0.32	0.32	0.40	0.40	0.40	0.10	0.56	0.56		
Incremental Delay Factor (k)				0.04	0.04		0.04	0.04		0.50	0.50	0.50	0.04	0.50	0.50		
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R						
Lost Time (t_L)					6.0	6.0	6.0		6.0	6.0	6.0	6.0					
Green Ratio (g/C)					0.08	0.18	0.32		0.40	0.52	0.56						
Permitted Saturation Flow Rate (s_p), veh/h/ln					1021	0	0		574	837	0						
Shared Saturation Flow Rate (s_{sh}), veh/h/ln																	
Permitted Effective Green Time (g_p), s					8.0	0.0	0.0		40.0	42.0	0.0						
Permitted Service Time (g_u), s					8.0	0.0	0.0		40.0	27.6	0.0						
Permitted Queue Service Time (g_{ps}), s					0.9				8.6	1.3							
Time to First Blockage (g_t), s					0.0	0.0	0.0		0.0	0.0	0.0						
Queue Service Time Before Blockage (g_{ts}), s																	
Protected Right Saturation Flow (s_R), veh/h/ln									1610								
Protected Right Effective Green Time (g_R), s									18.0								
Multimodal				EB			WB			NB			SB				
Pedestrian F_w / F_v				1.710	0.000	1.557	0.000	1.389	0.000	1.198	0.000						
Pedestrian F_s / F_{delay}				0.000	0.150	0.000	0.126	0.000	0.116	0.000	0.091						
Pedestrian M_{corner} / M_{cw}																	
Bicycle c_b / d_b				160.00	42.32	640.00	23.12	800.00	18.00	1120.00	9.68						
Bicycle F_w / F_v				-3.64	0.04	-3.64	0.37	-3.64	0.66	-3.64	0.85						

HCS7 Signalized Intersection Results Graphical Summary

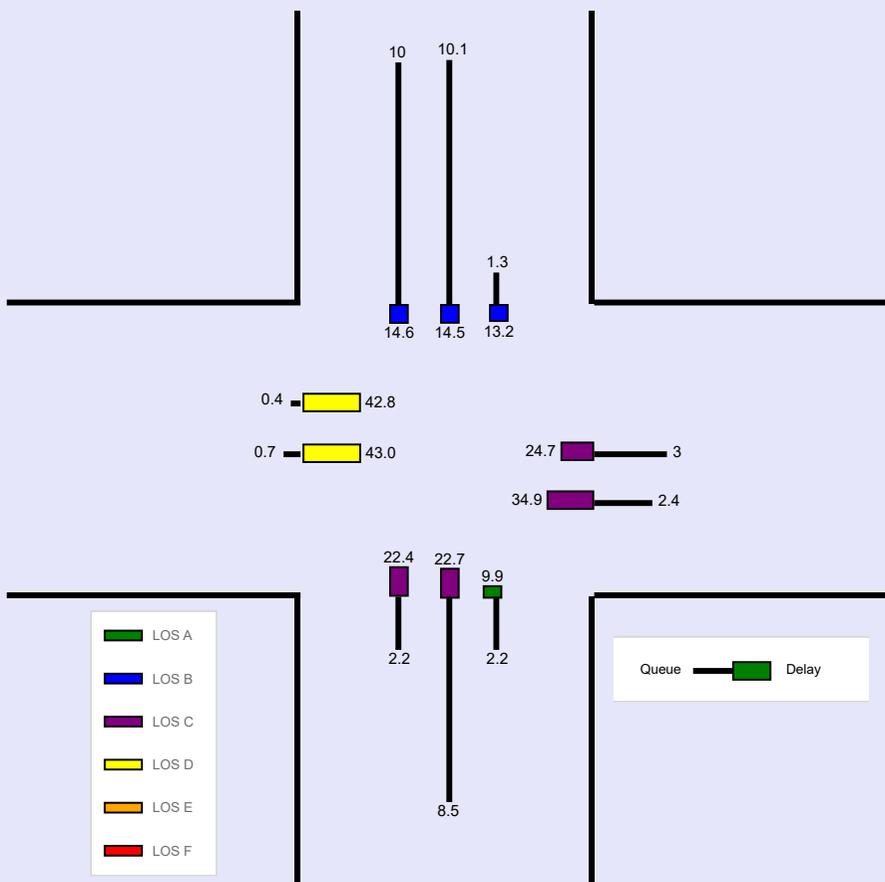
General Information				Intersection Information			
Agency	CESO			Duration, h	0.250		
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other		
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92		
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1 > 7:00		
Intersection	DILEY & HOWE/GREE...	File Name	DILEY & HOWE AM.xus				
Project Description	GREENGATE DEVELOPMENT TIS						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	9	1	15	116	1	88	66	546	120	64	856	30

Signal Information				EB				WB				NB				SB			
Cycle, s	100.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On	Green	10.0	40.0	18.0	8.0	0.0	0.0									
Force Mode	Float	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0									
				Red	2.0	2.0	2.0	2.0	0.0	0.0									

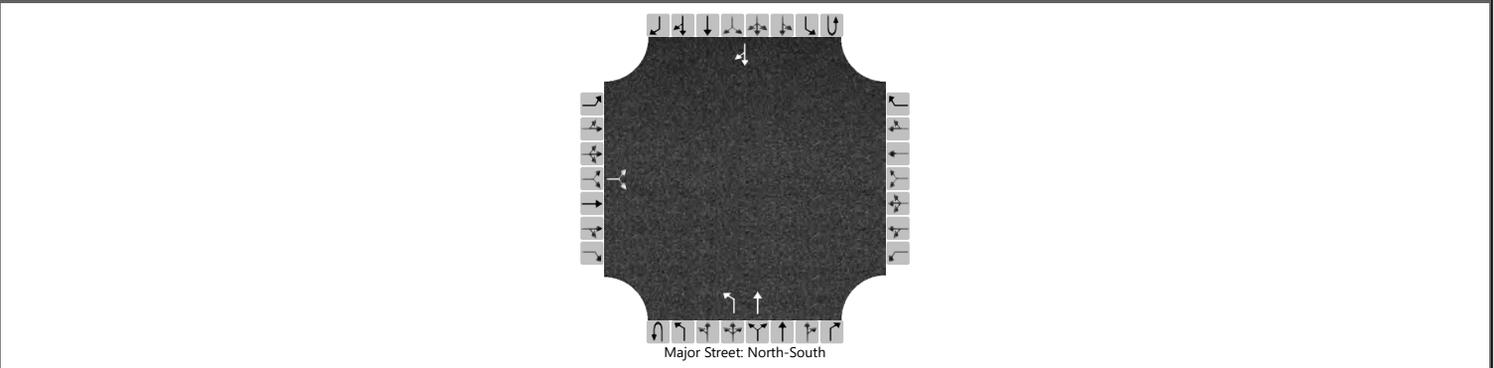
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Back of Queue (Q), ft/ln (95 th percentile)	12.7	19.7		59.3	75.5		57.2	220.9	55.3	31.9	257.1	251.2
Back of Queue (Q), veh/ln (95 th percentile)	0.4	0.7		2.4	3.0		2.2	8.5	2.2	1.3	10.1	10.0
Queue Storage Ratio (RQ) (95 th percentile)	0.13	0.00		0.18	0.00		0.29	0.00	0.10	0.07	0.00	0.00
Control Delay (d), s/veh	42.8	43.0		34.9	24.7		22.4	22.7	9.9	13.2	14.5	14.6
Level of Service (LOS)	D	D		C	C		C	C	A	B	B	B
Approach Delay, s/veh / LOS	42.9		D	30.5		C	20.6		C	14.4		B
Intersection Delay, s/veh / LOS	18.9						B					



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	SKG	Intersection	BUSEY & HILL				
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER				
Date Performed	1/15/2020	East/West Street	BUSEY RD				
Analysis Year	2034	North/South Street	HILL/BUSEY				
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	GREENGATE RESIDENTIAL DEV. TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume (veh/h)		131		43						83	385				297	89
Percent Heavy Vehicles (%)		5		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.45		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.55		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			189							90						
Capacity, c (veh/h)			302							1150						
v/c Ratio			0.63							0.08						
95% Queue Length, Q ₉₅ (veh)			3.9							0.3						
Control Delay (s/veh)			34.9							8.4						
Level of Service (LOS)			D							A						
Approach Delay (s/veh)		34.9								1.5						
Approach LOS		D														

HCS7 Signalized Intersection Input Data

General Information						Intersection Information					
Agency	CESO					Duration, h	0.250				
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other				
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92				
Urban Street	HILL RD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00				
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus							
Project Description	GREENGATE DEVELOPMENT TIS										

Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				241	82			60	286				416		400

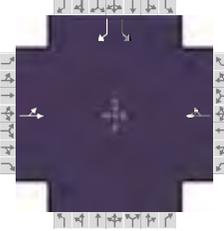
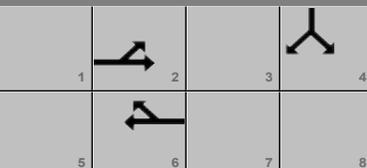
Signal Information				Signal Phases											
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
		Green		42.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow		4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Red		2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				241	82			60	286				416		400
Initial Queue (Q _b), veh/h				0	0			0	0				0		0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900			1900	1900				1900		1900
Parking (N _m), man/h				None			None						None		
Heavy Vehicles (P _{HV}), %				0			0						0		
Ped / Bike / RTOR, /h				0	0		0	0	0	0	0		0	0	
Buses (N _b), buses/h				0	0	0	0	0	0				0	0	0
Arrival Type (AT)				3	3			3	3				3		3
Upstream Filtering (I)				1.00	1.00			1.00	1.00				1.00		1.00
Lane Width (W), ft				12.0			12.0						12.0		
Turn Bay Length, ft				0			0						250		
Grade (P _g), %				0			0			0			0		
Speed Limit, mi/h				45	45			45	45				35		35

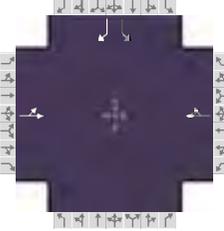
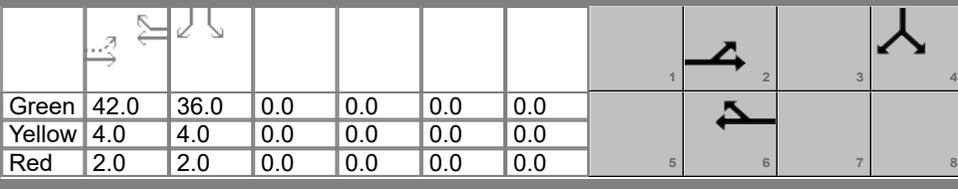
Phase Information		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G _{max}) or Phase Split, s			42.0		42.0				36.0
Yellow Change Interval (Y), s			4.0		4.0				4.0
Red Clearance Interval (R _c), s			2.0		2.0				2.0
Minimum Green (G _{min}), s			10		10				10
Start-Up Lost Time (I _t), s		2.0	2.0		2.0			2.0	
Extension of Effective Green (e), s		2.0	2.0		2.0			2.0	
Passage (PT), s			2.0		2.0				2.0
Recall Mode			Min		Min				Off
Dual Entry			Yes		Yes				Yes
Walk (Walk), s					0.0		0.0		0.0
Pedestrian Clearance Time (PC), s					0.0		0.0		0.0

Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius							0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft							9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0		No	0	0	No		0		0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0				12	5.0	2.0
Pedestrian Signal / Occupied Parking					0.50		No	0.50		No			No	0.50	

HCS7 Signalized Intersection Results Summary

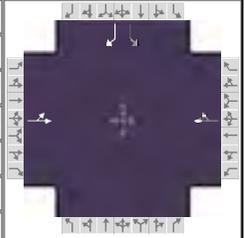
General Information						Intersection Information												
Agency	CESO					Duration, h	0.250											
Analyst	SKG		Analysis Date	Mar 4, 2020		Area Type	Other											
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92											
Urban Street	HILL RD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00											
Intersection	HILL RD & KINGS CRO...		File Name	HILL & KINGS PM.xus														
Project Description	GREENGATE DEVELOPMENT TIS																	
Demand Information						EB			WB			NB			SB			
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h						241	82			60	286				416		400	
Signal Information																		
Cycle, s	90.0	Reference Phase	2															
Offset, s	0	Reference Point	End															
Uncoordinated	Yes	Simult. Gap E/W	On			Green	42.0	36.0	0.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On			Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
						Red	2.0	2.0	0.0	0.0	0.0	0.0						
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase							2		6				4					
Case Number							8.0		8.0				9.0					
Phase Duration, s							48.0		48.0				42.0					
Change Period, (Y+R _c), s							6.0		6.0				6.0					
Max Allow Headway (MAH), s							3.4		3.4				3.2					
Queue Clearance Time (g _s), s							41.9		16.1				22.0					
Green Extension Time (g _e), s							0.0		1.8				1.8					
Phase Call Probability							1.00		1.00				1.00					
Max Out Probability							1.00		0.00				0.02					
Movement Group Results						EB			WB			NB			SB			
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement						5	2			6	16				7		14	
Adjusted Flow Rate (v), veh/h						351			376						452			
Adjusted Saturation Flow Rate (s), veh/h/ln						793			1654						1810			
Queue Service Time (g _s), s						25.7			14.1						18.0			
Cycle Queue Clearance Time (g _c), s						39.9			14.1						18.0			
Green Ratio (g/C)						0.47			0.47						0.40			
Capacity (c), veh/h						440			772						724			
Volume-to-Capacity Ratio (X)						0.798			0.487						0.625			
Back of Queue (Q), ft/ln (95 th percentile)						312.5			209.5						297			
Back of Queue (Q), veh/ln (95 th percentile)						12.5			8.4						11.9			
Queue Storage Ratio (RQ) (95 th percentile)						0.00			0.00						1.19			
Uniform Delay (d ₁), s/veh						29.5			16.6						21.6			
Incremental Delay (d ₂), s/veh						9.2			0.2						1.3			
Initial Queue Delay (d ₃), s/veh						0.0			0.0						0.0			
Control Delay (d), s/veh						38.7			16.7						22.9			
Level of Service (LOS)						D			B						C			
Approach Delay, s/veh / LOS						38.7	D	16.7	B	0.0		23.7	C					
Intersection Delay, s/veh / LOS						25.3						C						
Multimodal Results						EB			WB			NB			SB			
Pedestrian LOS Score / LOS						0.70	A	1.67	B	1.73	B	1.73	B					
Bicycle LOS Score / LOS						1.07	A	1.11	A				F					

HCS7 Signalized Intersection Intermediate Values

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG	Analysis Date	Mar 4, 2020			Area Type	Other								
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR			PHF	0.92								
Urban Street	HILL RD	Analysis Year	2034 BUILD			Analysis Period	1 > 7:00								
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus												
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				241	82			60	286				416		400
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
Green	42.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Saturation Flow / Delay				L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f _w)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f _{HVg})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	0.992	1.000
Parking Activity Adjustment Factor (f _p)				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f _{bb})				1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f _a)				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f _{LU})				1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f _{LT})				0.418	0.418		1.000	0.870					0.952	0.000	
Right-Turn Adjustment Factor (f _{RT})					0.000	0.418		0.000	0.870					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f _{LPB})				1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f _{RPB})						1.000			1.000						1.000
Work Zone Adjustment Factor (f _{wz})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f _{DDI})				1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h				592	201	0	0	287	1367				1810	0	1610
Proportion of Vehicles Arriving on Green (P)				0.47	0.47	0.00	0.00	0.47	0.47	0.00	0.00	0.00	0.40	0.00	0.40
Incremental Delay Factor (k)					0.31			0.04					0.15		0.20
Signal Timing / Movement Groups				EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R				
Lost Time (t _L)					6.0		6.0				4.0				
Green Ratio (g/C)					0.47		0.47				0.40				
Permitted Saturation Flow Rate (s _p), veh/h/ln					1023		1328				1810				
Shared Saturation Flow Rate (s _{sh}), veh/h/ln					0		1900								
Permitted Effective Green Time (g _p), s					42.0		0.0				0.0				
Permitted Service Time (g _u), s					27.9		0.0				0.0				
Permitted Queue Service Time (g _{ps}), s					25.7										
Time to First Blockage (g _t), s					0.5		42.0				0.0				
Queue Service Time Before Blockage (g _{ts}), s					0.5										
Protected Right Saturation Flow (s _R), veh/h/ln											0				
Protected Right Effective Green Time (g _R), s											0.0				
Multimodal				EB			WB			NB			SB		
Pedestrian F _w / F _v				0.000	0.000	0.972	0.000	0.972	0.000	0.972	0.000	0.972	0.000		
Pedestrian F _s / F _{delay}				0.000	0.102	0.000	0.102	0.000	0.157	0.000	0.157	0.000	0.159		
Pedestrian M _{corner} / M _{cw}															
Bicycle c _b / d _b				933.33	12.80	933.33	12.80		50.14			52.27			
Bicycle F _w / F _v				-3.64	0.58	-3.64	0.62	-3.64				-3.64			

HCS7 Signalized Intersection Results Graphical Summary

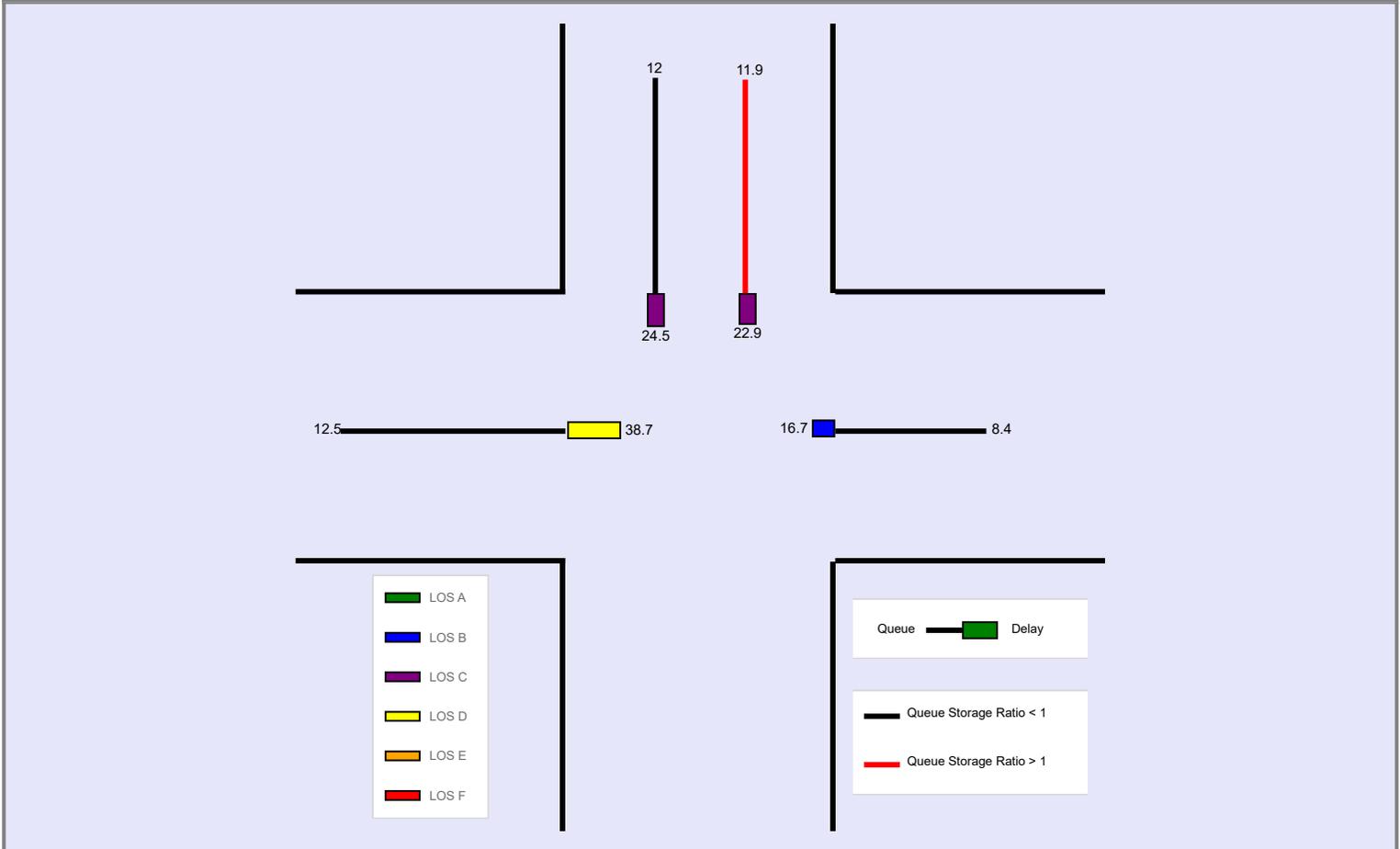
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1 > 7:00
Intersection	HILL RD & KINGS CRO...	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	241	82			60	286				416		400

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	42.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

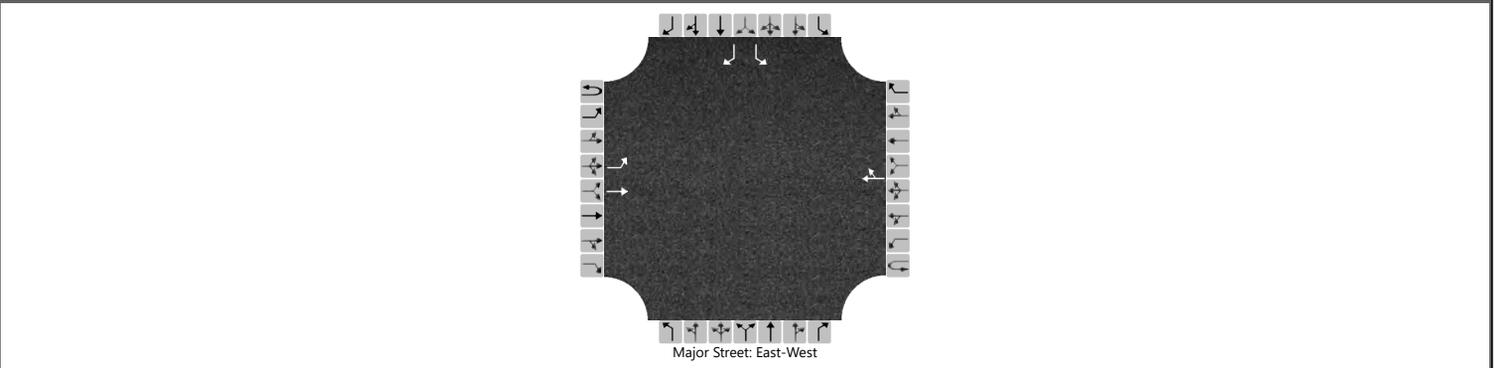
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (95 th percentile)		312.5			209.5					297		299.4
Back of Queue (Q), veh/ln (95 th percentile)		12.5			8.4					11.9		12.0
Queue Storage Ratio (RQ) (95 th percentile)		0.00			0.00					1.19		0.00
Control Delay (d), s/veh		38.7			16.7					22.9		24.5
Level of Service (LOS)		D			B					C		C
Approach Delay, s/veh / LOS	38.7		D	16.7		B	0.0			23.7		C
Intersection Delay, s/veh / LOS	25.3						C					



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SKG	Intersection	GREENGATE & HILL
Agency/Co.	CESO	Jurisdiction	CANAL WINCHESTER
Date Performed	1/15/2020	East/West Street	HILL RD
Analysis Year	2034	North/South Street	GREENGATE BLVD
Time Analyzed	BUILD PM PEAK HOUR	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	GREENGATE RESIDENTIAL DEV. TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	1	1	0	0	0	1	0	0	0	0		1	0	1	
Configuration		L	T					TR					L		R	
Volume (veh/h)		63	435				300	40					33		46	
Percent Heavy Vehicles (%)		0											0		0	
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized													No			
Median Type Storage	Undivided															

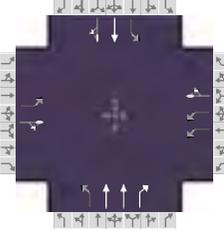
Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.10												6.40		6.20
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.30

Delay, Queue Length, and Level of Service

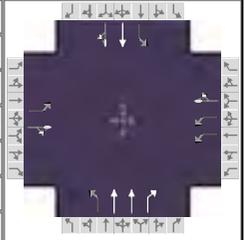
Flow Rate, v (veh/h)		68												36		50
Capacity, c (veh/h)		1200												272		700
v/c Ratio		0.06												0.13		0.07
95% Queue Length, Q ₉₅ (veh)		0.2												0.4		0.2
Control Delay (s/veh)		8.2												20.3		10.5
Level of Service (LOS)		A												C		B
Approach Delay (s/veh)	1.0												14.6			
Approach LOS													B			

HCS7 Signalized Intersection Input Data

General Information						Intersection Information									
Agency	CESO					Duration, h	0.250								
Analyst	SKG		Analysis Date	3/4/2020		Area Type	Other								
Jurisdiction	CANAL WINCHESTER		Time Period	PM PEAK HOUR		PHF	0.92								
Urban Street	DILEY ROAD		Analysis Year	2034 BUILD		Analysis Period	1 > 7:00								
Intersection	DILEY & HOWE/GREE...		File Name	DILEY & HOWE PM.xus											
Project Description	GREENGATE DEVELOPMENT TIS														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				20	1	54	362	1	290	11	1024	429	235	842	9
Signal Information															
Cycle, s	100.0	Reference Phase	2	Green	10.0	46.0	14.0	6.0	0.0	0.0	1	2	3	4	
Offset, s	0	Reference Point	End	Yellow	4.0	4.0	4.0	4.0	0.0	0.0	5	6	7	8	
Uncoordinated	No	Simult. Gap E/W	On	Red	2.0	2.0	2.0	2.0	0.0	0.0					
Force Mode	Float	Simult. Gap N/S	On												
Traffic Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				20	1	54	362	1	290	11	1024	429	235	842	9
Initial Queue (Q _b), veh/h				0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s ₀), veh/h				1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N _m), man/h				None			None			None			None		
Heavy Vehicles (P _{HV}), %				0	0		0	0		0	1	0	0	1	
Ped / Bike / RTOR, /h				0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), buses/h				0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (AT)				3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W), ft				12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	
Turn Bay Length, ft				100	0		325	0		195	0	545	450	0	
Grade (P _g), %					0			0			0			0	
Speed Limit, mi/h				25	25	25	25	25	25	45	45	45	45	45	45
Phase Information				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Maximum Green (G _{max}) or Phase Split, s					12.0	20.0	32.0		52.0	16.0	68.0				
Yellow Change Interval (Y), s					4.0	4.0	4.0		4.0	4.0	4.0				
Red Clearance Interval (R _c), s					2.0	2.0	2.0		2.0	2.0	2.0				
Minimum Green (G _{min}), s					6	6	6		6	6	6				
Start-Up Lost Time (lt), s				2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0				
Extension of Effective Green (e), s				2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0				
Passage (PT), s					2.0	2.0	2.0		2.0	2.0	2.0				
Recall Mode					Off	Off	Off		Min	Off	Min				
Dual Entry					Yes	No	Yes		Yes	No	Yes				
Walk (Walk), s					0.0		0.0		0.0		0.0				
Pedestrian Clearance Time (PC), s					0.0		0.0		0.0		0.0				
Multimodal Information				EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft				9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb				0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking				No	0.50		No	0.50		No	0.50		No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	CESO			Duration, h	0.250		
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other		
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92		
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1 > 7:00		
Intersection	DILEY & HOWE/GREE...	File Name	DILEY & HOWE PM.xus				
Project Description	GREENGATE DEVELOPMENT TIS						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	20	1	54	362	1	290	11	1024	429	235	842	9

Signal Information				Signal Phases											
Cycle, s	100.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	10.0	46.0	14.0	6.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0					
Force Mode	Float	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	0.0	0.0					

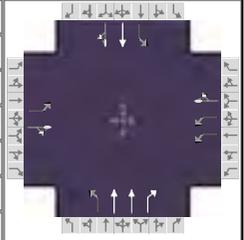
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8		2	1	6
Case Number		6.3	2.0	4.0		5.3	1.0	4.0
Phase Duration, s		12.0	20.0	32.0		52.0	16.0	68.0
Change Period, (Y+R _c), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Allow Headway (MAH), s		3.5	3.3	3.5		0.0	3.0	0.0
Queue Clearance Time (g _s), s		5.6	12.8	20.1			8.9	
Green Extension Time (g _e), s		0.1	0.2	0.6		0.0	0.1	0.0
Phase Call Probability		1.00	1.00	1.00			1.00	
Max Out Probability		1.00	1.00	0.25			1.00	

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	22	60		393	316		12	1113	466	255	463	462
Adjusted Saturation Flow Rate (s), veh/h/ln	1080	1615		1757	1611		614	1795	1610	1810	1885	1878
Queue Service Time (g _s), s	1.9	3.6		10.8	18.1		1.1	24.3	16.3	6.9	12.4	12.4
Cycle Queue Clearance Time (g _c), s	1.9	3.6		10.8	18.1		1.1	24.3	16.3	6.9	12.4	12.4
Green Ratio (g/C)	0.06	0.06		0.14	0.26		0.46	0.46	0.60	0.58	0.62	0.62
Capacity (c), veh/h	137	97		492	419		354	1651	966	365	1169	1164
Volume-to-Capacity Ratio (X)	0.159	0.617		0.800	0.755		0.034	0.674	0.483	0.700	0.396	0.396
Back of Queue (Q), ft/ln (95 th percentile)	23.8	75.7		226.1	310.7		7.1	373.9	230.6	130.4	205.5	203.3
Back of Queue (Q), veh/ln (95 th percentile)	1.0	3.0		9.0	12.4		0.3	14.8	9.2	5.2	8.2	8.1
Queue Storage Ratio (RQ) (95 th percentile)	0.24	0.00		0.70	0.00		0.04	0.00	0.42	0.29	0.00	0.00
Uniform Delay (d ₁), s/veh	45.1	45.9		41.6	34.1		14.9	21.1	11.3	17.0	9.6	9.6
Incremental Delay (d ₂), s/veh	0.2	8.4		8.4	6.9		0.2	2.2	1.7	5.0	1.0	1.0
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	45.3	54.3		50.1	40.9		15.0	23.4	13.0	22.0	10.6	10.6
Level of Service (LOS)	D	D		D	D		B	C	B	C	B	B
Approach Delay, s/veh / LOS	51.9		D	46.0		D	20.3		C	13.1		B
Intersection Delay, s/veh / LOS	23.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.46	B	2.29	B	2.10	B	1.88	B
Bicycle LOS Score / LOS	0.62	A	1.66	B	1.80	B	1.46	A

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information			
Agency	CESO			Duration, h	0.250		
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other		
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92		
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1 > 7:00		
Intersection	DILEY & HOWE/GREE...	File Name	DILEY & HOWE PM.xus				
Project Description	GREENGATE DEVELOPMENT TIS						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	20	1	54	362	1	290	11	1024	429	235	842	9

Signal Information														
Cycle, s	100.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	10.0	46.0	14.0	6.0	0.0	0.0				
Force Mode	Float	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
				Red	2.0	2.0	2.0	2.0	0.0	0.0				

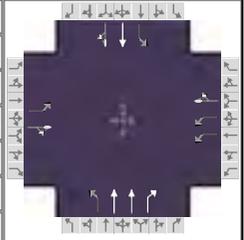
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.992	1.000	1.000	0.992	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.568	0.000		0.952	0.000		0.323	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.850	0.850		0.848	0.848		0.000	0.847		0.996	0.996
Left-Turn Pedestrian Adjustment Factor (f_{LPB})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{RPB})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1080	29	1585	3514	6	1605	614	3589	1610	1810	3723	40
Proportion of Vehicles Arriving on Green (P)	0.06	0.06	0.06	0.14	0.26	0.26	0.46	0.46	0.46	0.10	0.62	0.62
Incremental Delay Factor (k)	0.04	0.15		0.32	0.27		0.50	0.50	0.50	0.22	0.50	0.50

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0	6.0	6.0		6.0	6.0	6.0
Green Ratio (g/C)		0.06	0.14	0.26		0.46	0.58	0.62
Permitted Saturation Flow Rate (s_p), veh/h/ln		1080	0	0		614	514	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s		6.0	0.0	0.0		46.0	48.0	0.0
Permitted Service Time (g_u), s		6.0	0.0	0.0		46.0	21.7	0.0
Permitted Queue Service Time (g_{ps}), s		1.9				1.1	21.7	
Time to First Blockage (g_t), s		0.0	0.0	0.0		0.0	0.0	0.0
Queue Service Time Before Blockage (g_{ts}), s								
Protected Right Saturation Flow (s_R), veh/h/ln						1610		
Protected Right Effective Green Time (g_R), s						14.0		

Multimodal	EB			WB			NB			SB		
Pedestrian F_w / F_v	1.710	0.000		1.557	0.000		1.389	0.000		1.198	0.000	
Pedestrian F_s / F_{delay}	0.000	0.152		0.000	0.133		0.000	0.107		0.000	0.079	
Pedestrian M_{corner} / M_{cw}												
Bicycle c_b / d_b	120.00	44.18		520.00	27.38		920.00	14.58		1240.00	7.22	
Bicycle F_w / F_v	-3.64	0.13		-3.64	1.17		-3.64	1.31		-3.64	0.97	

HCS7 Signalized Intersection Results Graphical Summary

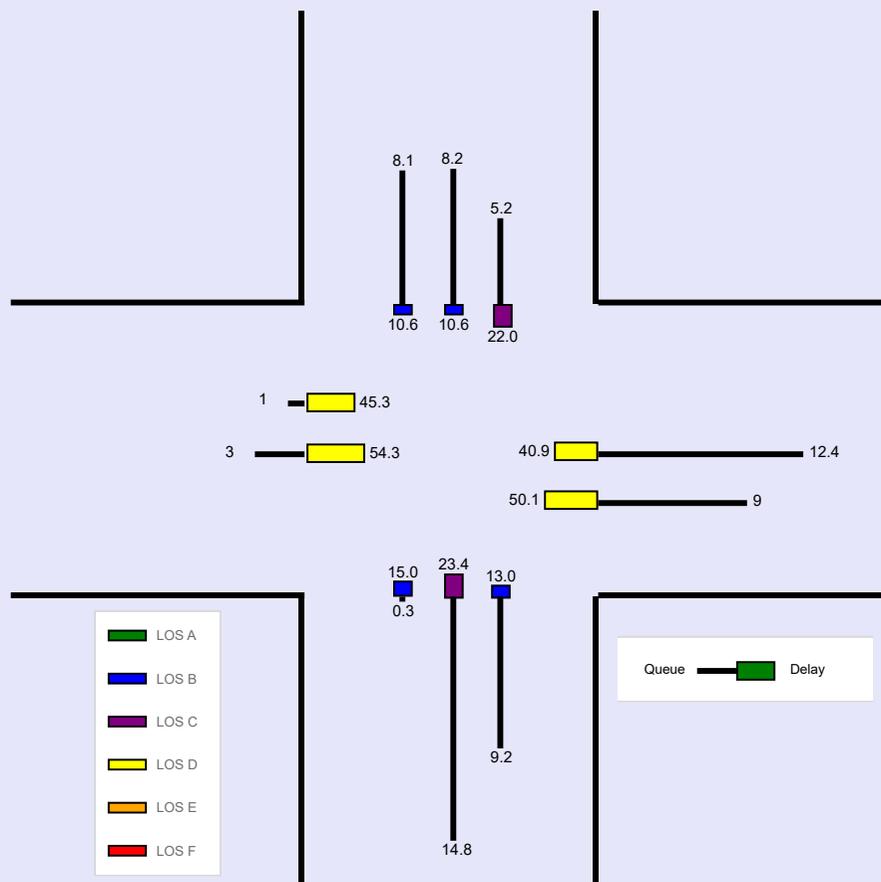
General Information				Intersection Information			
Agency	CESO			Duration, h	0.250		
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other		
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92		
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1 > 7:00		
Intersection	DILEY & HOWE/GREE...	File Name	DILEY & HOWE PM.xus				
Project Description	GREENGATE DEVELOPMENT TIS						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	20	1	54	362	1	290	11	1024	429	235	842	9

Signal Information				EB						WB				NB				SB					
Cycle, s	100.0	Reference Phase	2																				
Offset, s	0	Reference Point	End																				
Uncoordinated	No	Simult. Gap E/W	On	Green	10.0	46.0	14.0	6.0	0.0	0.0													
Force Mode	Float	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0													
				Red	2.0	2.0	2.0	2.0	0.0	0.0													

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Back of Queue (Q), ft/ln (95 th percentile)	23.8	75.7		226.1	310.7		7.1	373.9	230.6	130.4	205.5	203.3
Back of Queue (Q), veh/ln (95 th percentile)	1.0	3.0		9.0	12.4		0.3	14.8	9.2	5.2	8.2	8.1
Queue Storage Ratio (RQ) (95 th percentile)	0.24	0.00		0.70	0.00		0.04	0.00	0.42	0.29	0.00	0.00
Control Delay (d), s/veh	45.3	54.3		50.1	40.9		15.0	23.4	13.0	22.0	10.6	10.6
Level of Service (LOS)	D	D		D	D		B	C	B	C	B	B
Approach Delay, s/veh / LOS	51.9		D	46.0		D	20.3		C	13.1		B
Intersection Delay, s/veh / LOS	23.7						C					

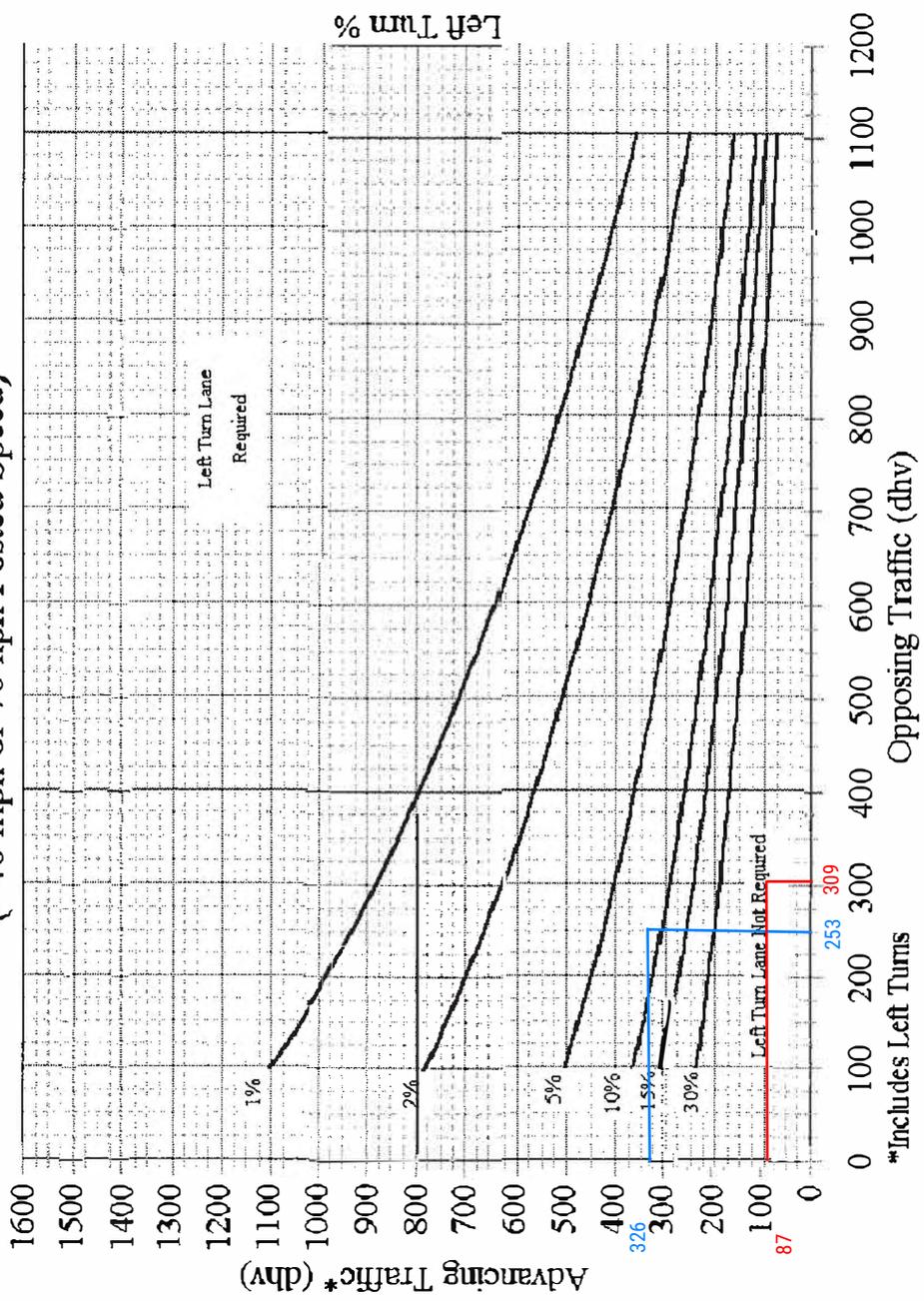


APPENDIX G
TURN LANE WARRANT FIGURES

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b
REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Left-turn lane is warranted in the PM Peak Hour.

AM - 15% LT
PM - 18% LT

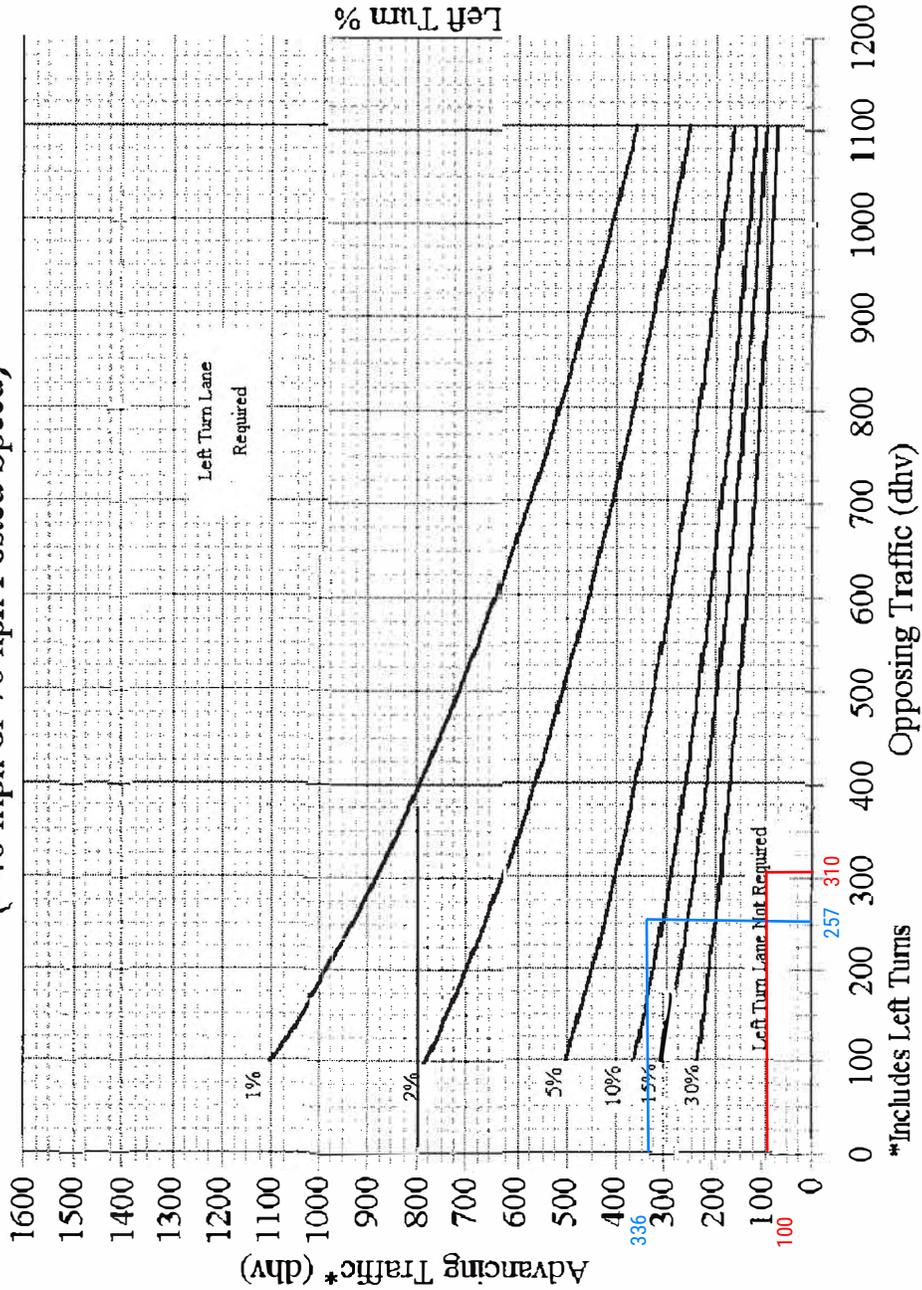
*Includes Left Turns

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

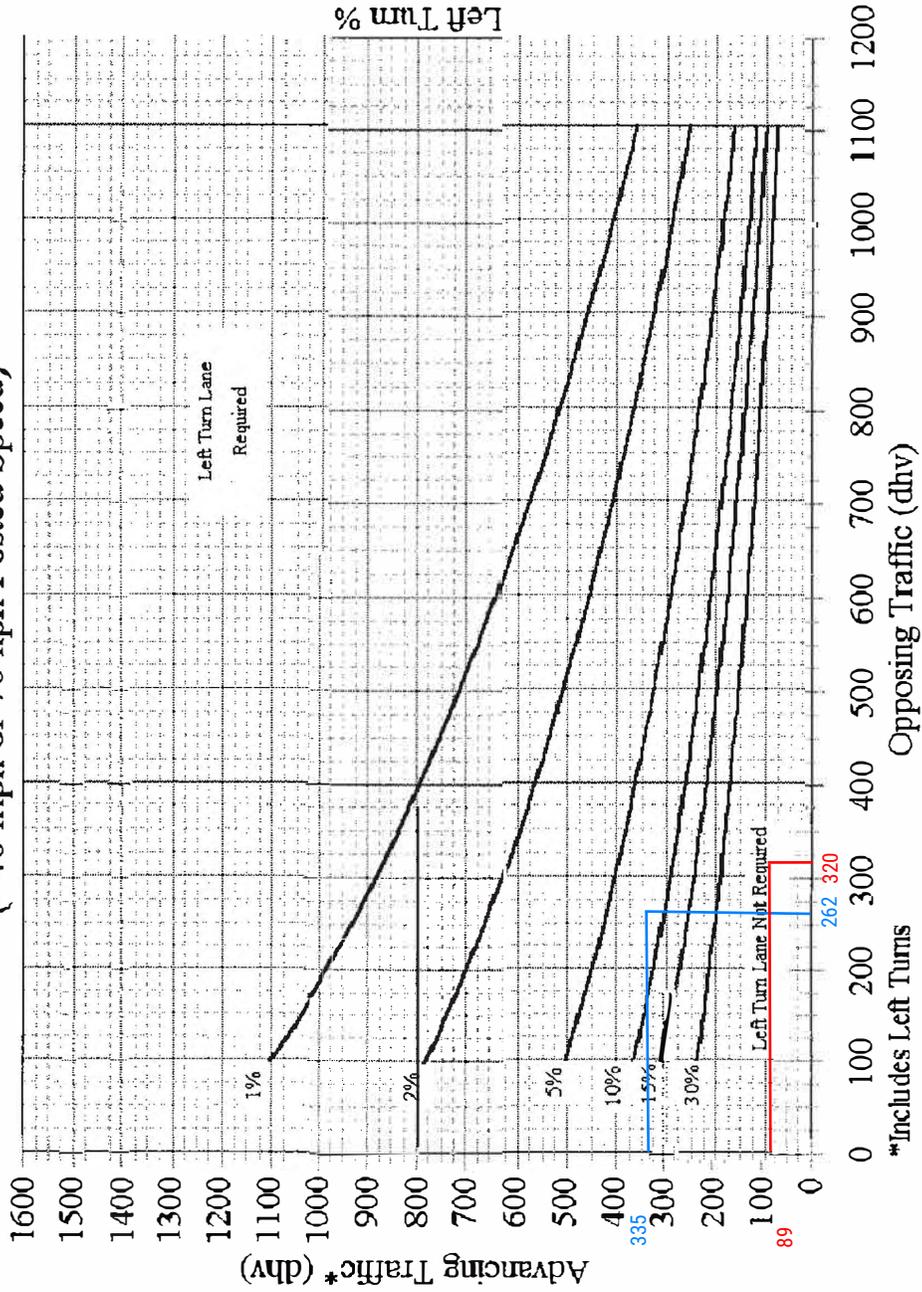
AM - 22% LT
PM - 20% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

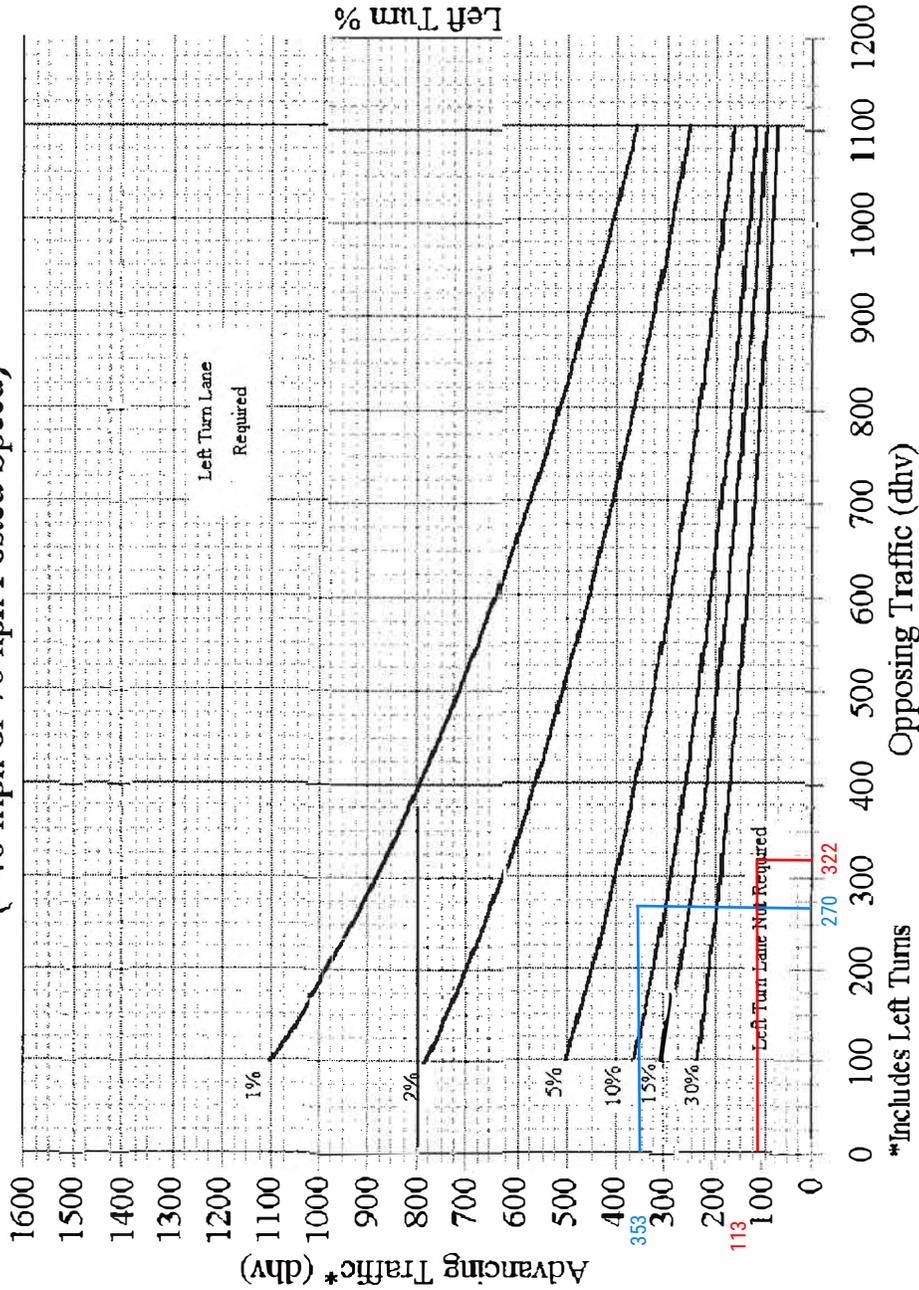
AM - 15% LT
PM - 18% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

AM - 27% LT
PM - 21% LT

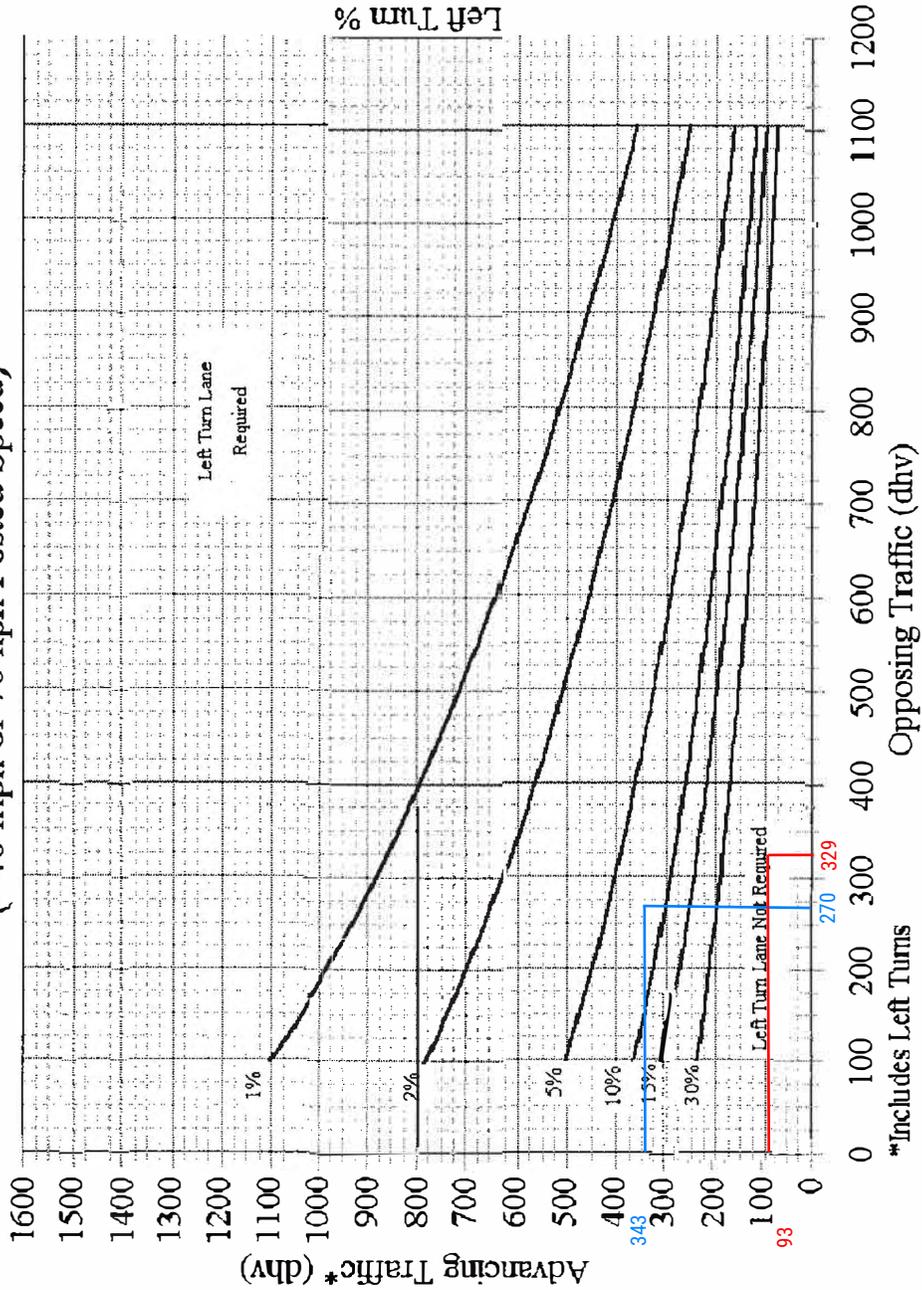
*Includes Left Turns

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

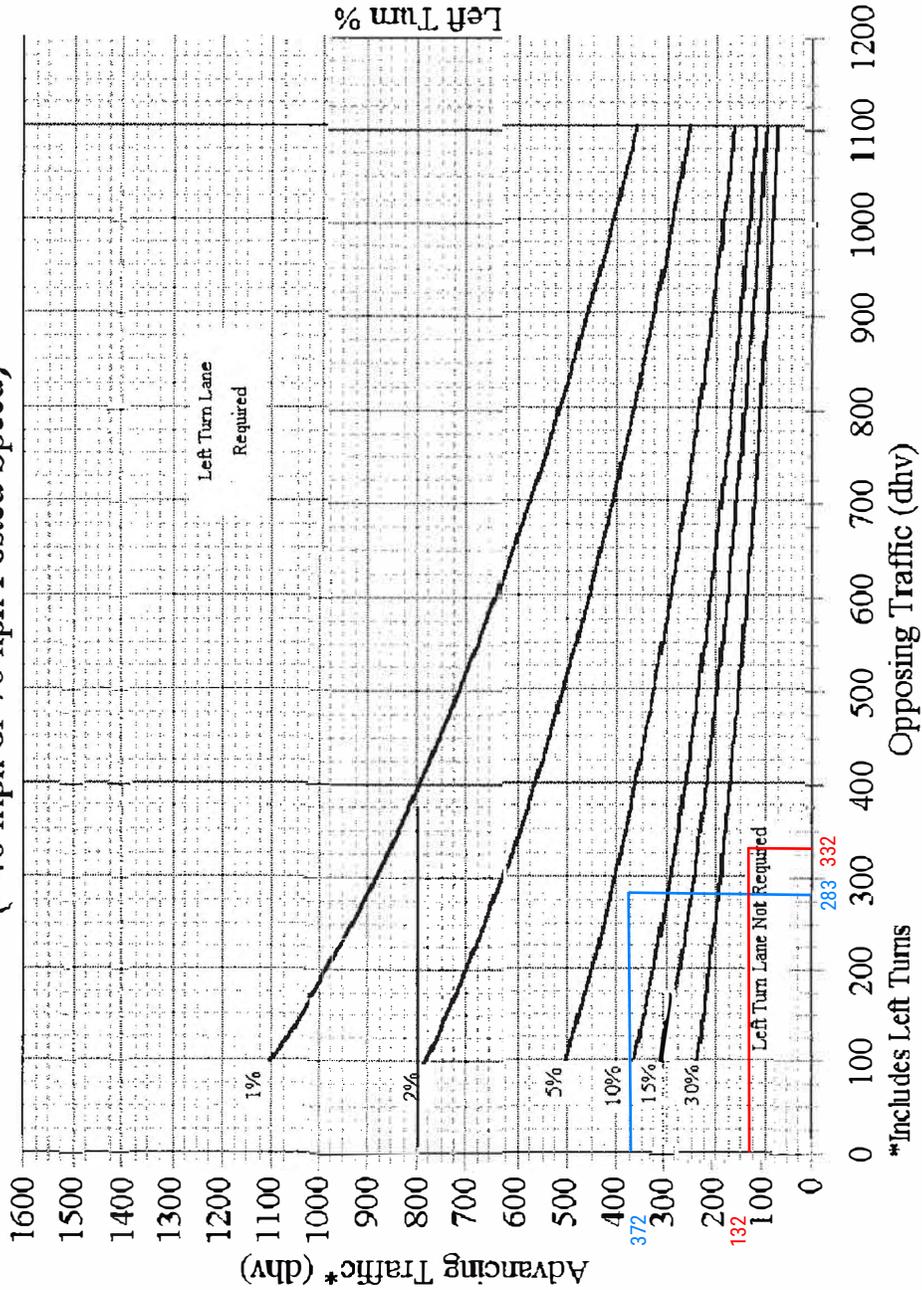
AM - 15% LT
PM - 18% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

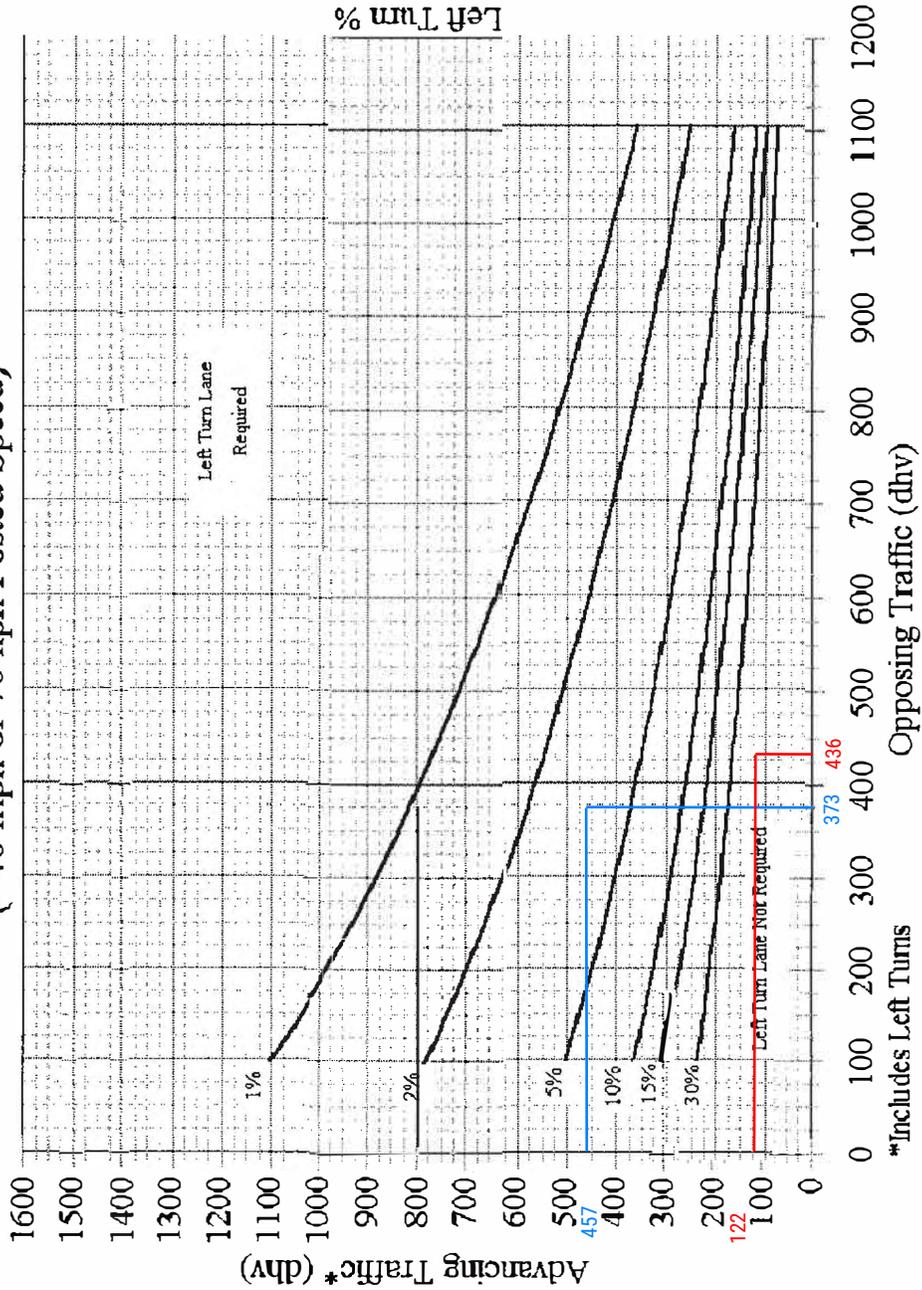
AM - 32% LT
PM - 22% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Left-turn lane is warranted in the PM Peak Hour.

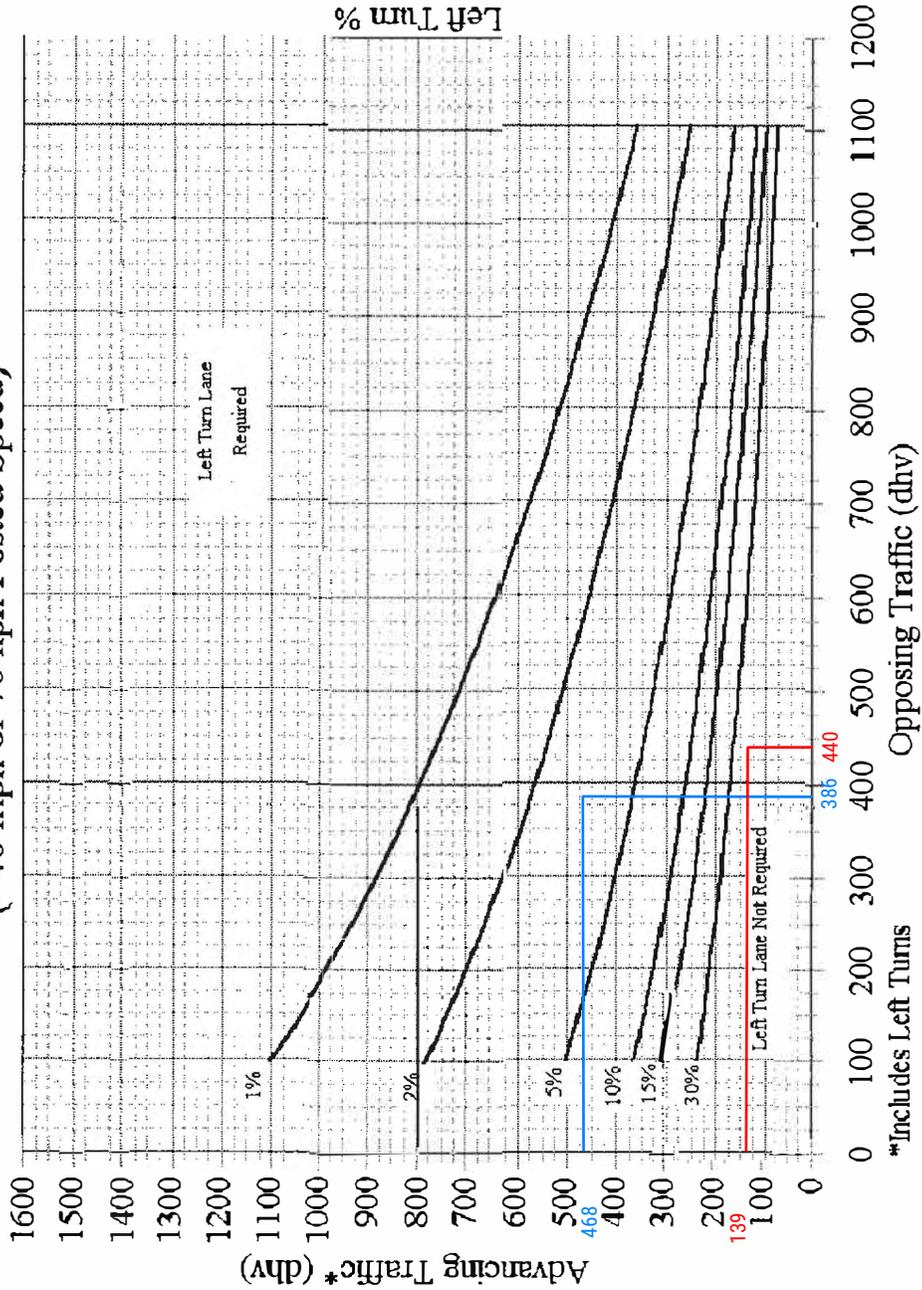
AM - 14% LT
PM - 17% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Left-turn lane is warranted in the PM Peak Hour.

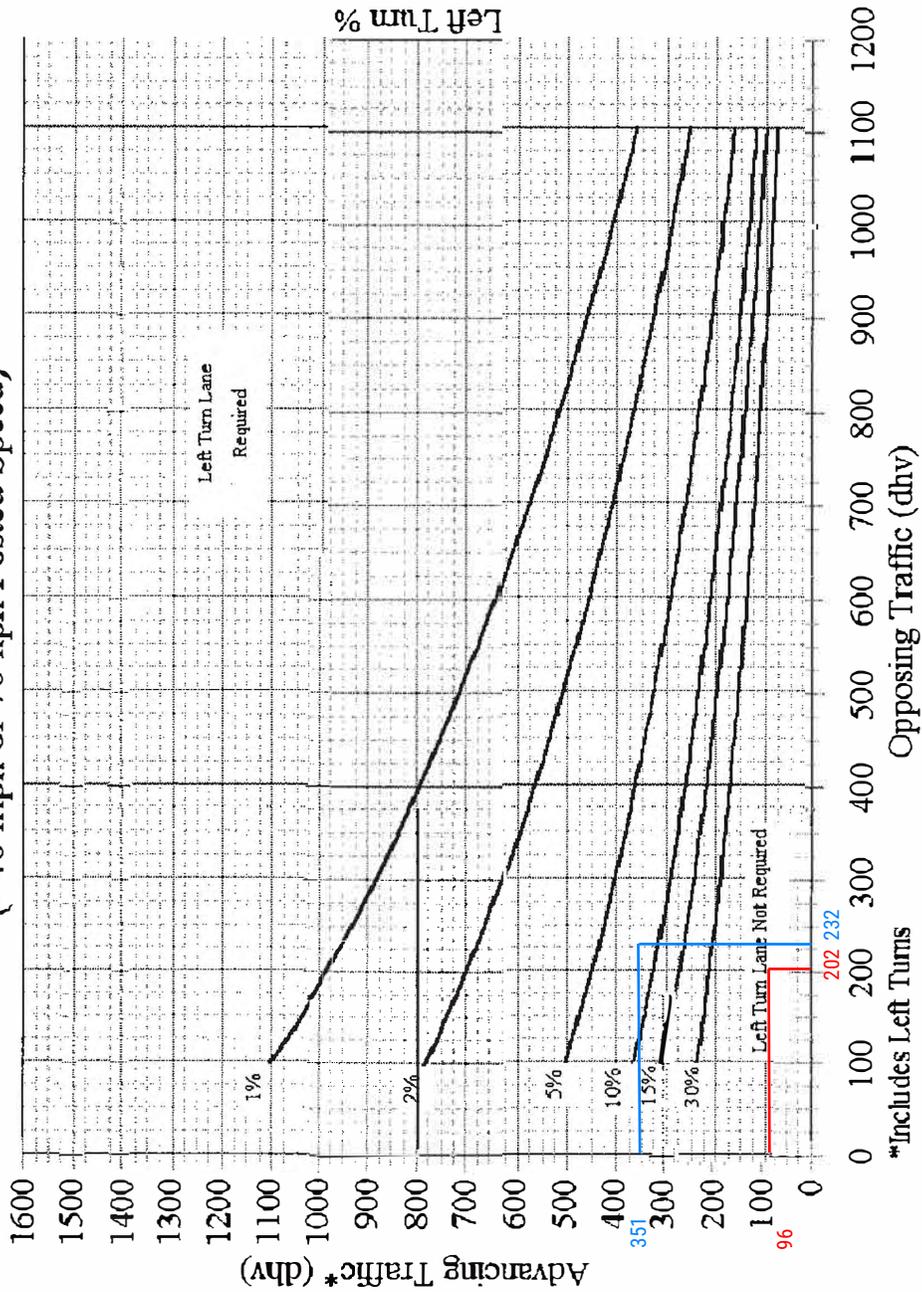
AM - 17% LT
PM - 18% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Left-turn lane is
not warranted.

AM - 9% LT
PM - 7% LT

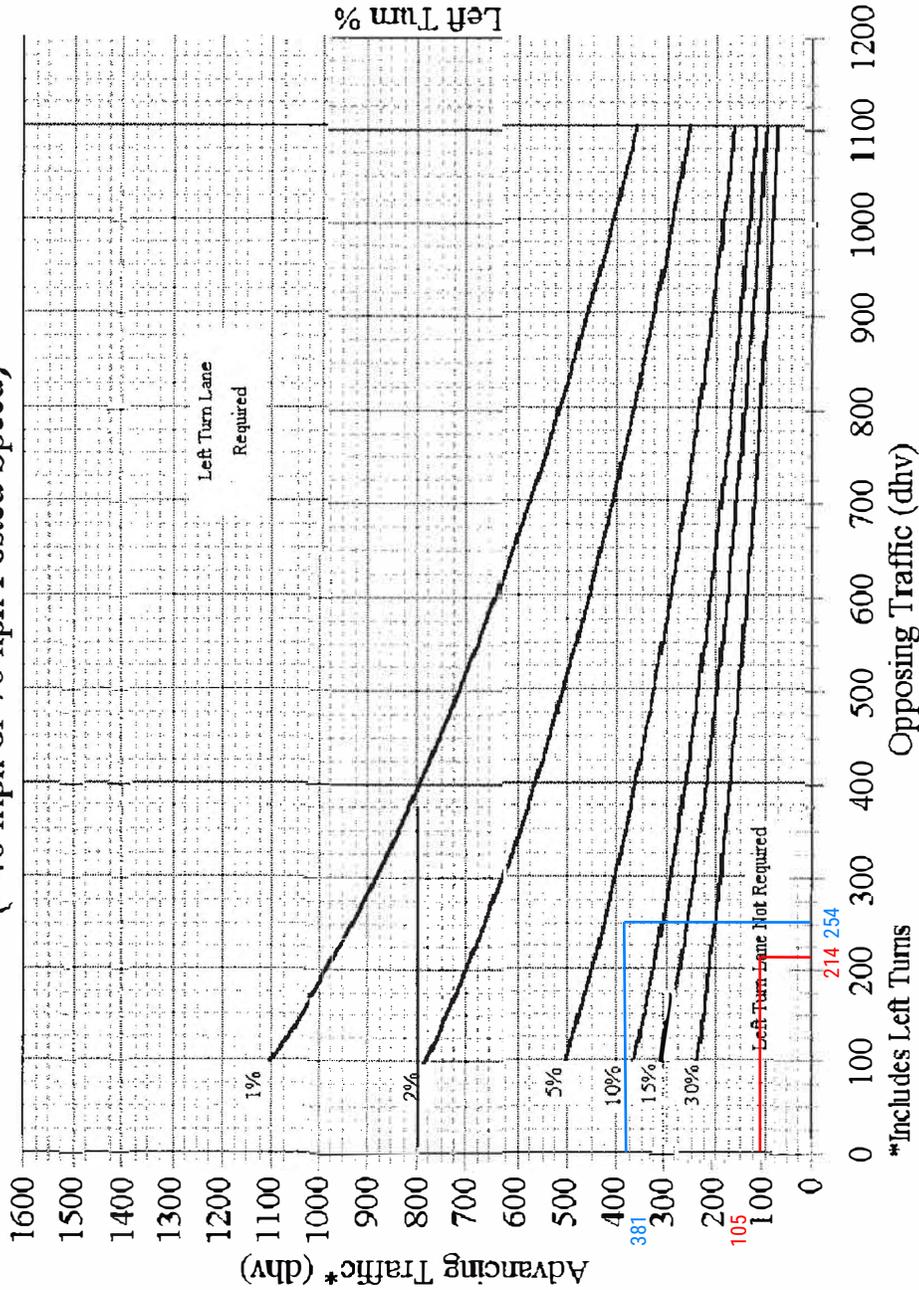
October 2004

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Left-turn lane is warranted in the PM Peak Hour.

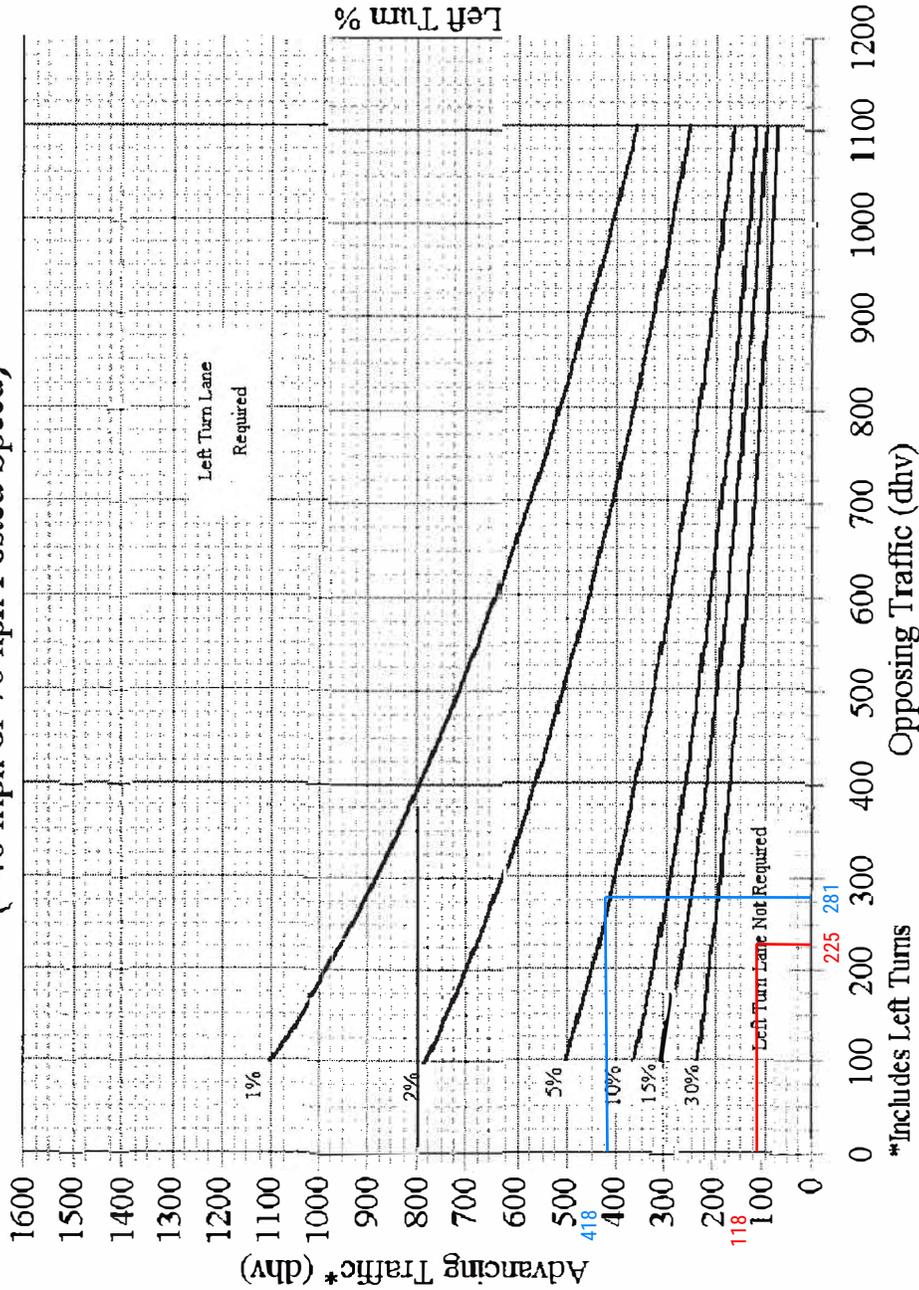
AM - 15% LT
PM - 12% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Left-turn lane is warranted in the PM Peak Hour.

AM - 21% LT
PM - 18% LT

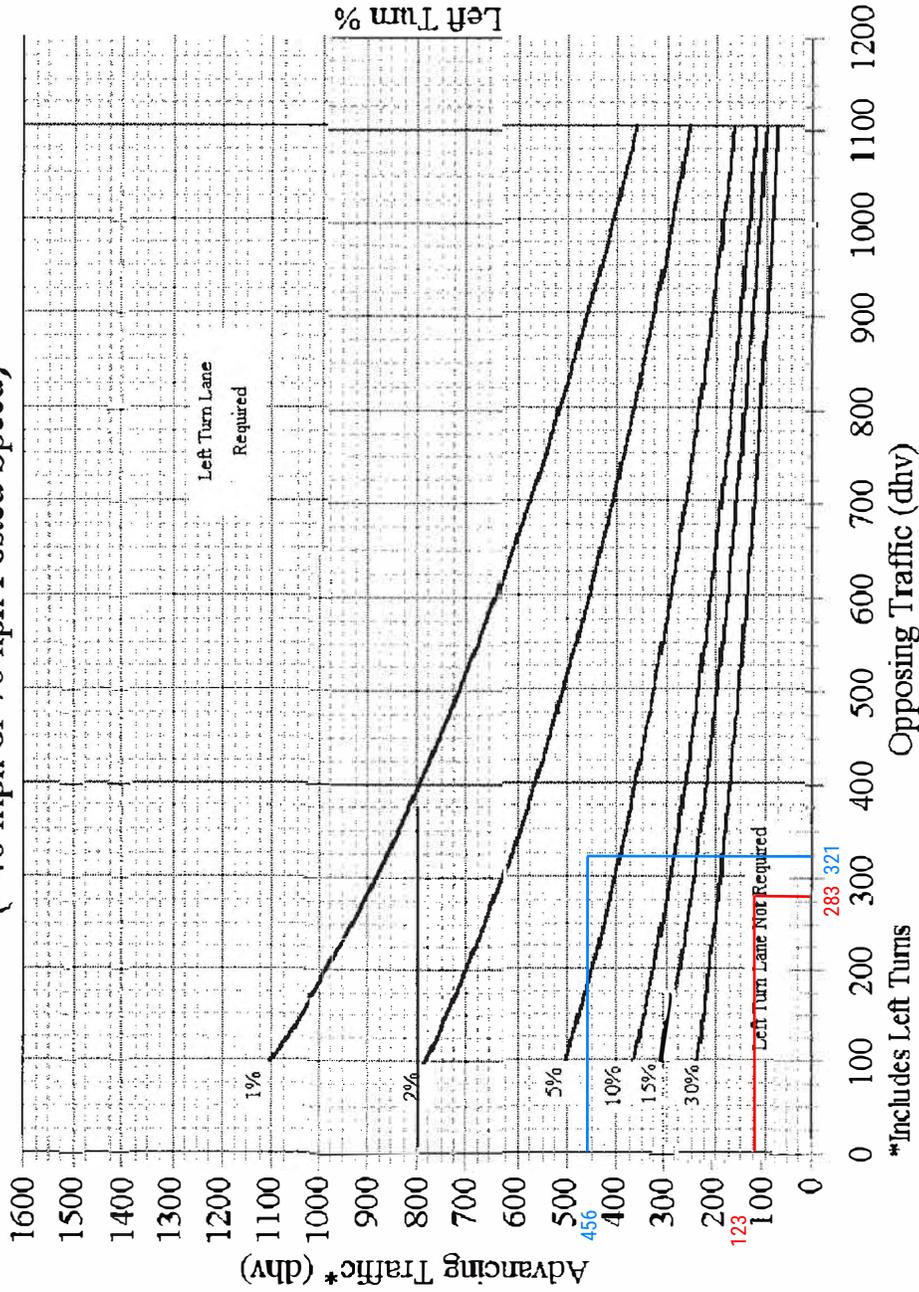
*Includes Left Turns

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

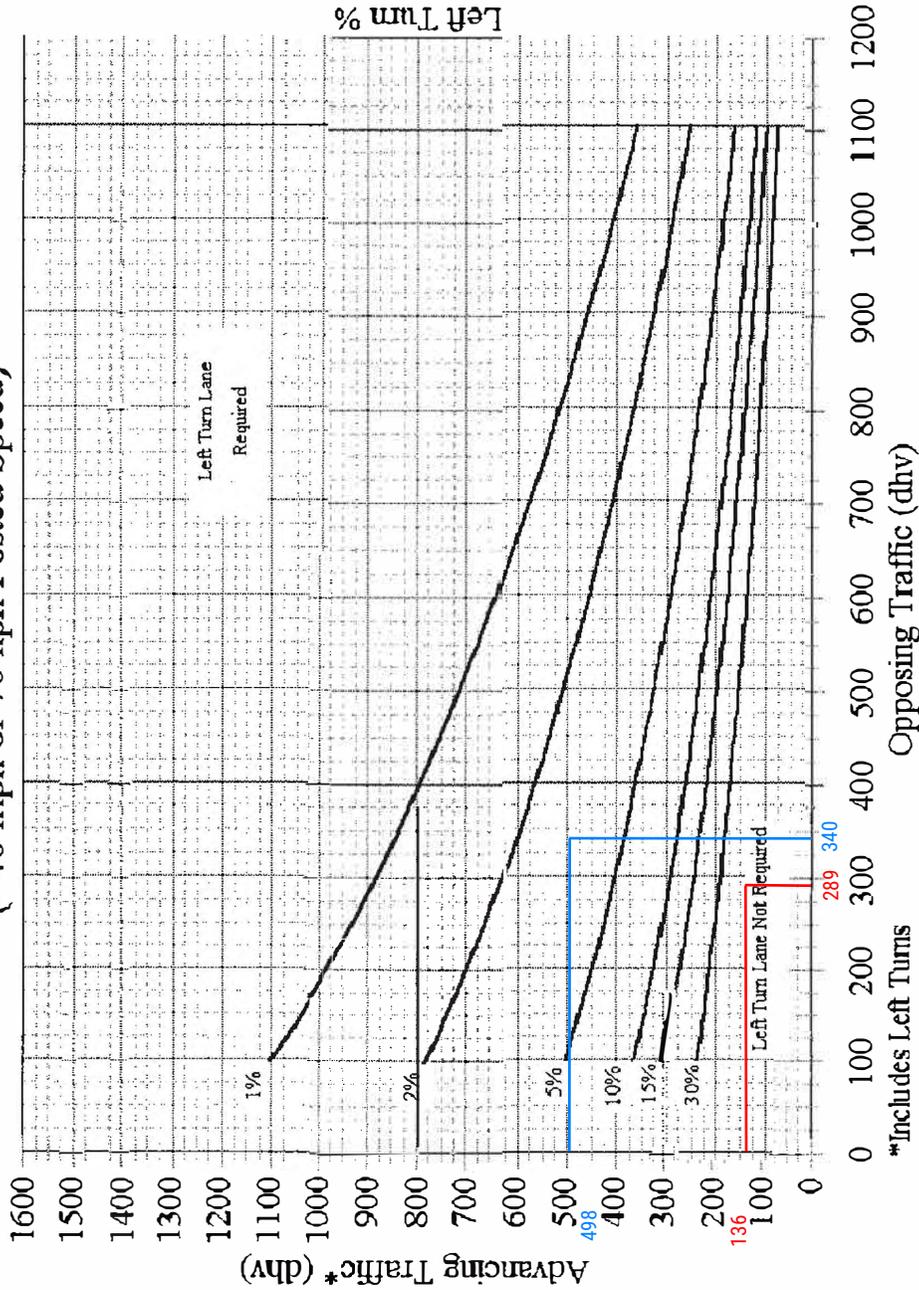
AM - 5% LT
PM - 5% LT

**2-LANE LEFT TURN LANE
WARRANT (HIGH SPEED)**

401-5b

REFERENCE SECTION
401.6.1

**2-Lane Highway Left Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)**



Left-turn lane is warranted in the PM Peak Hour.

AM - 14% LT
PM - 13% LT

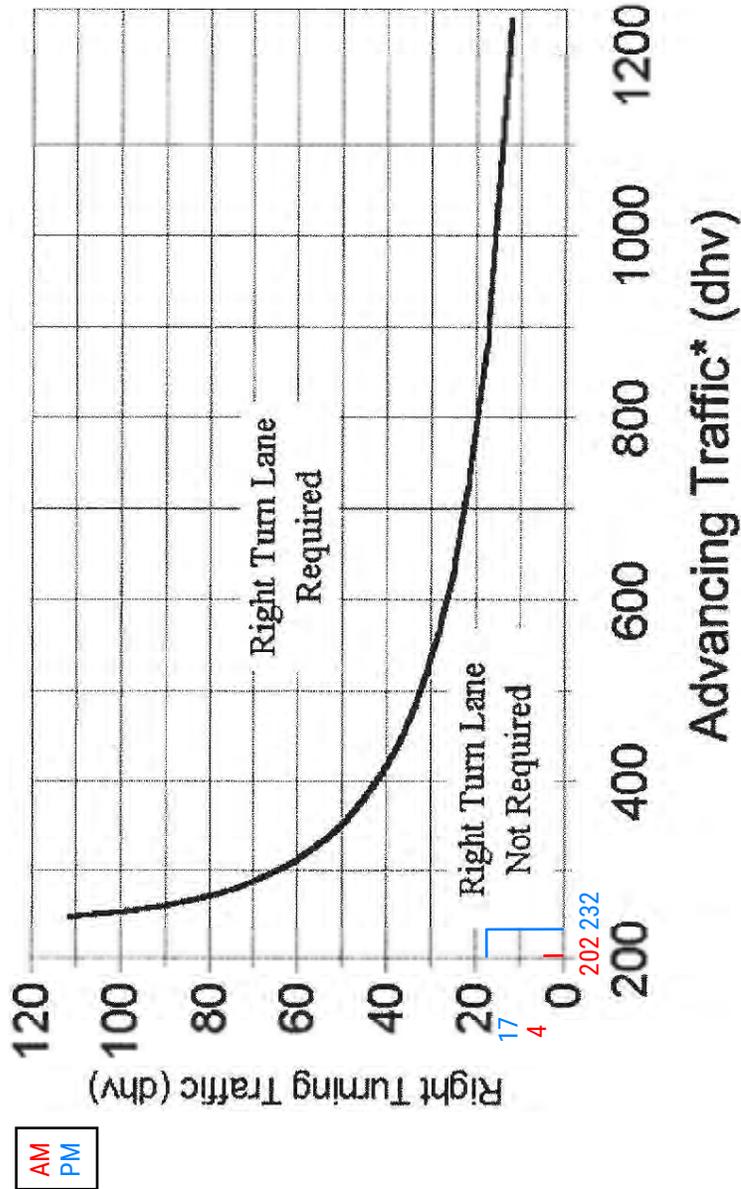
*Includes Left Turns

**2-LANE RIGHT TURN LANE
WARRANT (HIGH SPEED)**

401-6bE

REFERENCE SECTION
401.6.3

2-Lane Highway Right Turn Lane Warrant
> 40 mph or 70 kph Posted Speed



*Includes Right Turns

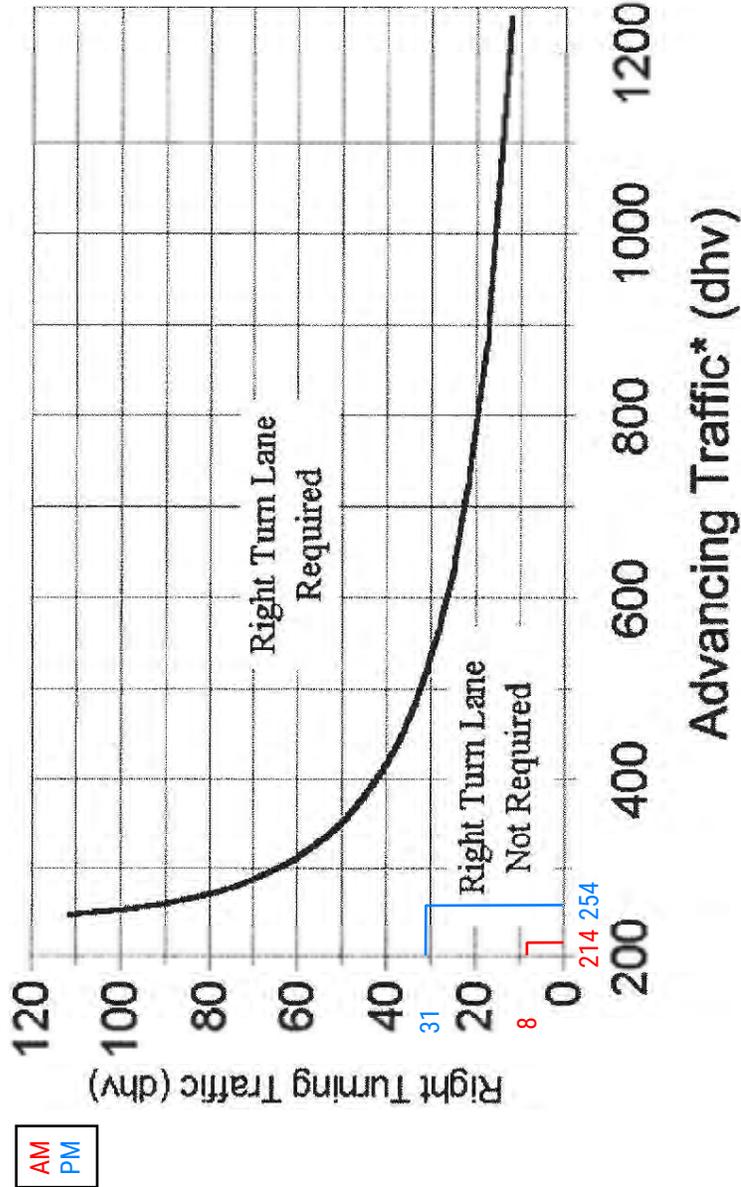
Right-turn lane is
not warranted.

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bE

REFERENCE SECTION
401.6.3

2-Lane Highway Right Turn Lane Warrant > 40 mph or 70 kph Posted Speed



*Includes Right Turns

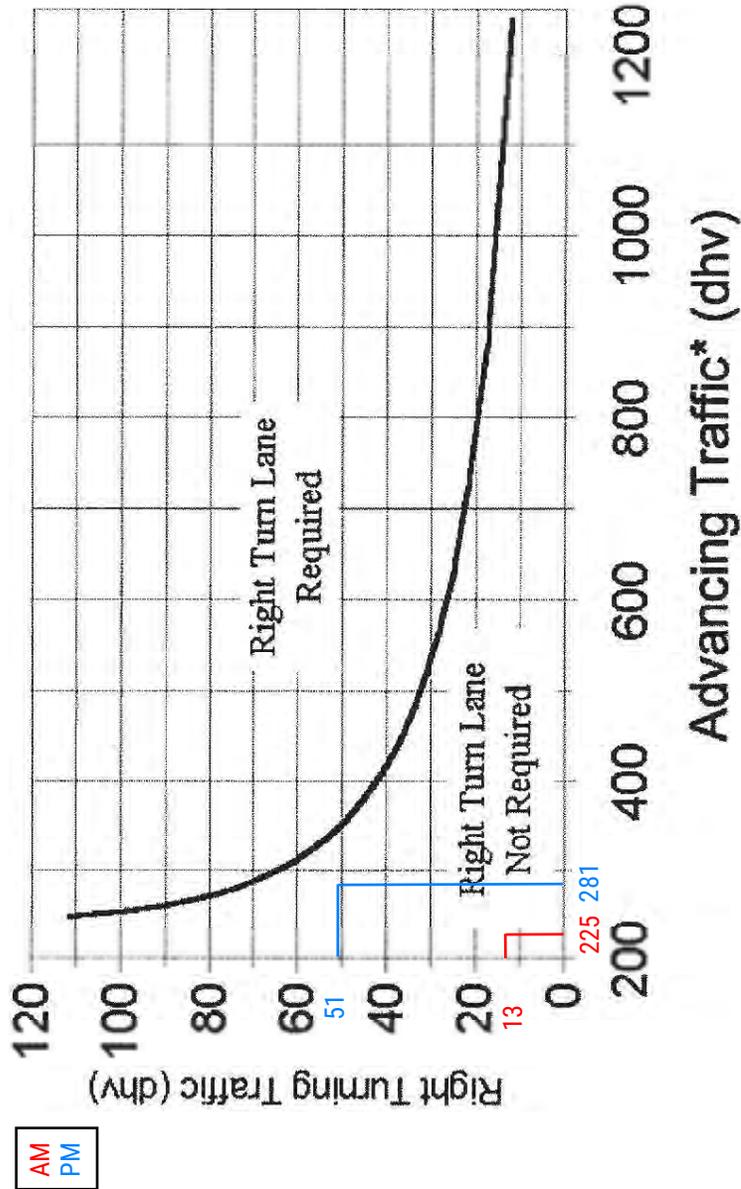
Right-turn lane is
not warranted.

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bE

REFERENCE SECTION
401.6.3

2-Lane Highway Right Turn Lane Warrant > 40 mph or 70 kph Posted Speed



*Includes Right Turns

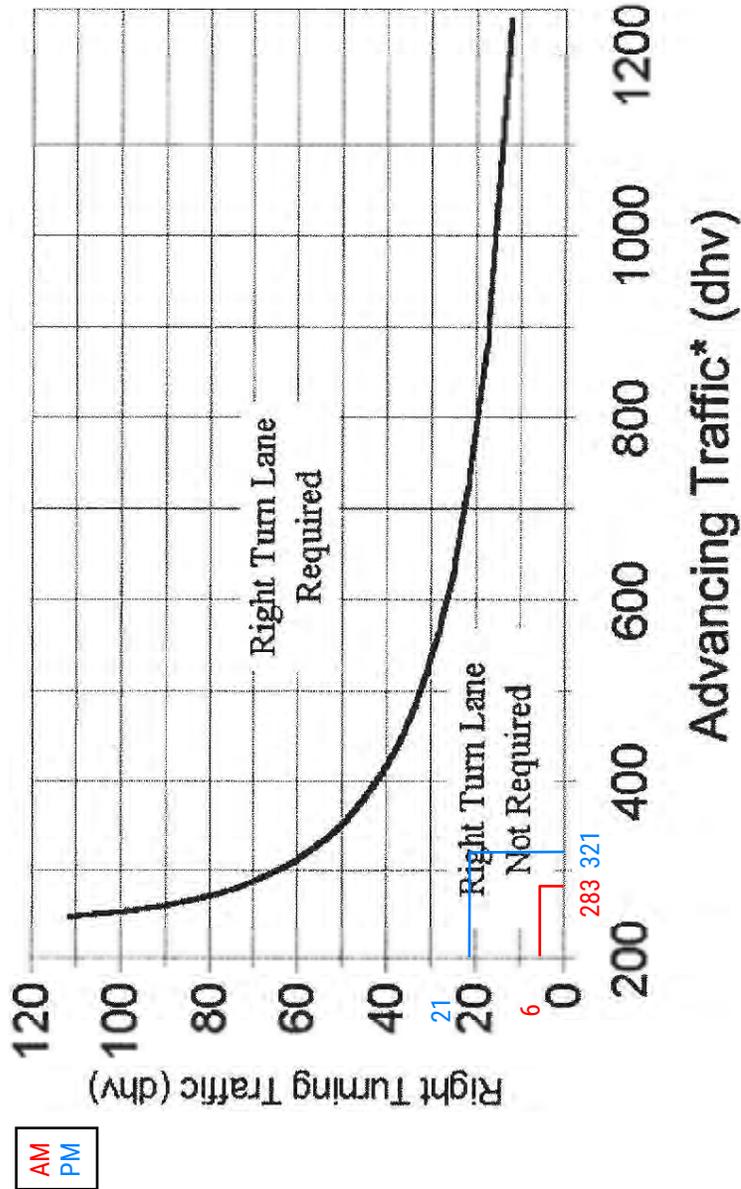
Right-turn lane is
not warranted.

**2-LANE RIGHT TURN LANE
WARRANT (HIGH SPEED)**

401-6bE

REFERENCE SECTION
401.6.3

2-Lane Highway Right Turn Lane Warrant
> 40 mph or 70 kph Posted Speed



*Includes Right Turns

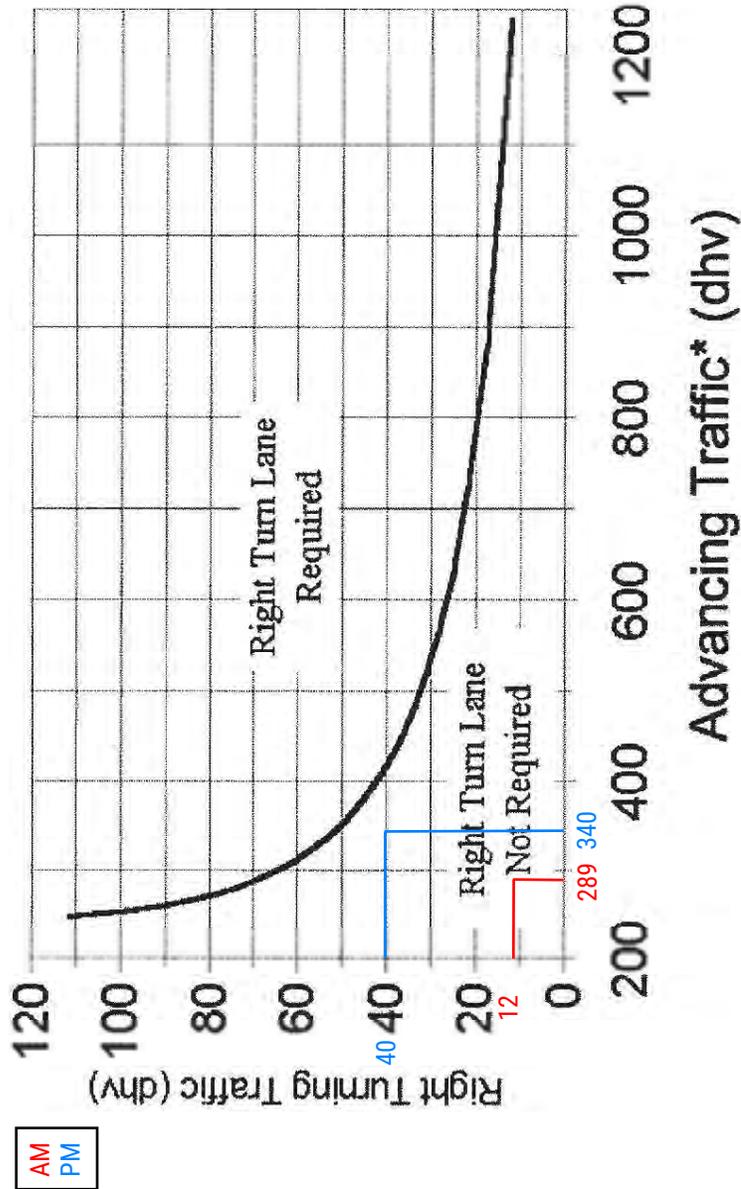
Right-turn lane is
not warranted.

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bE

REFERENCE SECTION
401.6.3

2-Lane Highway Right Turn Lane Warrant > 40 mph or 70 kph Posted Speed



*Includes Right Turns

Right-turn lane is
not warranted.

APPENDIX H
ODOT QUEUE LENGTH RESOURCES

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9
	REFERENCE SECTIONS 401.6.1, 401.6.3

Type of Traffic Control	Design Speed		
	30-35	40-65	
	Turn Demand Volume		
	All	Low*	High
Signalized	A	** B or C	** B or C
Unsignalized Stopped Crossroad	A	A	A
Unsignalized Through Road	A	B	** B or C

*Low is considered 10% or less of approach traffic volume

**Whichever is greater

CONDITION A	STORAGE ONLY
Length = 50' (diverging taper) + Storage Length (Figure 401-10)	

CONDITION B	HIGH SPEED DECELERATION ONLY
Design Speed	Length (including 50' Diverging Taper)
40	125
45	175
50	225
55	285
60	345
65	405

CONDITION C	MODERATE SPEED DECELERATION AND STORAGE
Design Speed	Length (including 50' Diverging Taper)
40	115 + Storage Length (Figure 401-10)
45	125 "
50	145 "
55	165 "
60	185 "
65	205 "

For explanation, see Turn Lane Design Example

<h1 style="margin: 0;">STORAGE LENGTH AT INTERSECTIONS</h1>	<h2 style="margin: 0;">401-10</h2>
	<small>REFERENCE SECTIONS 401.6.1, 401.6.3</small>

* AVERAGE NO. OF VEHICLES/CYCLE	REQUIRED LENGTH (FT.)	* AVERAGE NO. OF VEHICLES/CYCLE	REQUIRED LENGTH (FT.)
1	50	17	600
2	100	18	625
3	150	19	650
4	175	20	675
5	200	21	725
6	250	22	750
7	275	23	775
8	325	24	800
9	350	25	825
10	375	30	975
11	400	35	1125
12	450	40	1250
13	475	45	1400
14	500	50	1550
15	525	55	1700
16	550	60	1850

* AVERAGE VEHICLES PER CYCLE = $\frac{\text{DHV (TURNING LANE)}}{\text{CYCLES/HOUR}}$

IF CYCLES ARE UNKNOWN ASSUME:

- UNSIGNALIZED OR 2 PHASE = 60 CYCLES/HOUR
- 3 PHASE = 40 CYCLES/HOUR
- 4 PHASE = 30 CYCLES/HOUR

APPENDIX I
SIGNAL WARRANT ANALYSIS CALCULATIONS

HILL ROAD & KINGS CROSSING - EXISTING TRAFFIC COUNTS (YEAR 2019)

TIME BEGIN	HILL ROAD (EASTBOUND)			HILL ROAD (WESTBOUND)			N/A (NORTHBOUND)			KINGS CROSSING (SOUTHBOUND)					
	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	PEDS
6AM	178	3	0	0	0	0	189	0	0	0	0	59	0	23	0
7AM	190	4	0	0	0	1	190	0	0	0	0	72	0	50	0
8AM	117	2	0	0	0	6	163	0	0	0	0	79	0	39	0
9AM	99	3	0	0	0	5	133	0	0	0	0	76	0	64	0
10AM	70	9	0	0	0	11	124	0	0	0	0	73	0	56	0
11AM	75	8	0	0	0	5	121	0	0	0	0	81	0	58	0
12PM	82	11	0	0	0	9	130	0	0	0	0	102	0	90	0
1PM	81	7	0	0	0	5	129	0	0	0	0	90	0	98	0
2PM	72	13	0	0	0	6	108	0	0	0	0	121	0	96	0
3PM	111	12	0	0	0	15	167	0	0	0	0	157	0	176	0
4PM	115	16	0	0	0	21	179	0	0	0	0	227	0	228	0
5PM	139	35	0	0	0	22	172	0	0	0	0	263	0	276	0

EXISTING TRAFFIC VOLUMES - HILL ROAD							TOTAL Both Approaches
MAJOR							
EBL	EBT	EBR	WBL	WBT	WBR		
178	3	0	0	0	199		380
190	4	0	0	1	160		385
177	3	0	0	5	133		318
99	9	0	0	11	124		240
70	8	0	0	5	121		214
82	11	0	0	9	130		209
81	13	0	0	5	129		232
72	10	0	0	6	108		222
115	16	0	0	21	179		315
139	35	0	0	22	172		331
							388

2022 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR OF KINGS, 3.6%/YR S OF KINGS)							TOTAL Both Approaches
MAJOR							
EBL	EBT	EBR	WBL	WBT	WBR		
197	3	0	0	0	213		419
211	4	0	0	1	203		419
130	2	0	0	6	174		313
110	3	0	0	5	142		261
78	10	0	0	12	133		232
83	9	0	0	5	129		227
91	12	0	0	10	139		252
80	14	0	0	6	115		216
123	13	0	0	16	179		331
127	18	0	0	22	191		359
154	39	0	0	24	184		400

2023 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR OF KINGS, 3.6%/YR S OF KINGS)							TOTAL Both Approaches
MAJOR							
EBL	EBT	EBR	WBL	WBT	WBR		
204	3	0	0	0	217		424
217	5	0	0	1	207		431
134	2	0	0	7	178		321
113	3	0	0	6	145		267
86	10	0	0	12	132		233
94	13	0	0	10	142		258
93	8	0	0	5	141		247
82	15	0	0	7	118		222
127	14	0	0	16	182		339
132	18	0	0	23	195		368
159	40	0	0	24	188		411

2024 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR OF KINGS, 3.6%/YR S OF KINGS)							TOTAL Both Approaches
MAJOR							
EBL	EBT	EBR	WBL	WBT	WBR		
210	4	0	0	0	222		435
224	5	0	0	1	212		445
138	2	0	0	7	182		329
117	4	0	0	6	148		274
83	11	0	0	12	138		244
89	9	0	0	6	135		238
97	13	0	0	10	145		265
86	8	0	0	9	144		253
98	12	0	0	7	166		286
131	14	0	0	17	186		348
136	19	0	0	23	200		378
164	41	0	0	25	192		422

2024 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR OF KINGS, 3.6%/YR S OF KINGS)							TOTAL Both Approaches
MAJOR							
EBL	EBT	EBR	WBL	WBT	WBR		
274	5	0	0	0	268		546
293	6	0	0	1	256		556
180	3	0	0	8	219		411
152	5	0	0	7	179		343
108	14	0	0	15	167		303
128	17	0	0	12	175		330
125	11	0	0	7	174		316
111	20	0	0	8	200		344
171	18	0	0	20	225		434
177	25	0	0	28	241		471
214	54	0	0	30	231		529

EXISTING TRAFFIC VOLUMES - KINGS CROSSING							TOTAL Highest Vol. Approach
MINOR							
NBL	NBT	NBR	SBL	SBT	SBR		
			59	0	23		82
			72	0	50		122
			76	0	48		124
			84	0	64		148
			73	0	56		129
			81	0	58		139
			102	0	90		192
			90	0	98		188
			121	0	96		217
			178	0	178		356
			227	0	228		455
			263	0	276		539

2022 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR)							TOTAL Highest Vol. Approach
MINOR							
NBL	NBT	NBR	SBL	SBT	SBR		
			64	0	25		89
			78	0	55		133
			86	0	43		129
			83	0	70		153
			80	0	61		141
			88	0	63		152
			111	0	89		200
			132	0	105		237
			171	0	192		363
			247	0	249		496
			287	0	301		588

2023 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR)							TOTAL Highest Vol. Approach
MINOR							
NBL	NBT	NBR	SBL	SBT	SBR		
			66	0	26		92
			81	0	56		137
			88	0	44		132
			87	0	72		159
			91	0	62		154
			91	0	65		156
			114	0	101		215
			101	0	110		211
			136	0	108		243
			176	0	197		373
			254	0	255		509
			295	0	309		604

2024 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR)							TOTAL Highest Vol. Approach
MINOR							
NBL	NBT	NBR	SBL	SBT	SBR		
			68	0	28		96
			84	0	58		142
			91	0	45		136
			87	0	74		161
			84	0	64		148
			93	0	67		160
			117	0	104		221
			104	0	113		216
			181	0	186		367
			261	0	202		463
			302	0	317		620

2024 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR)							TOTAL Highest Vol. Approach
MINOR							
NBL	NBT	NBR	SBL	SBT	SBR		
			86	0	33		119
			104	0	73		177
			110	0	57		167
			110	0	93		203
			109	0	81		190
			148	0	131		278
			131	0	142		273
			175	0	139		315
			228	0	255		483
			329	0	331		660
			381	0	400		782

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2022 NO-BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	25	89	28%	213	20%	0%	20
7:00 AM	56	133	41%	204	40%	0%	33
8:00 AM	43	129	33%	161	20%	0%	34
9:00 AM	70	153	46%	148	40%	0%	42
10:00 AM	61	141	43%	144	40%	0%	37
11:00 AM	63	152	42%	135	40%	0%	38
12:00 PM	98	209	47%	149	40%	0%	59
1:00 PM	107	205	52%	143	40%	0%	64
2:00 PM	105	237	44%	122	40%	0%	63
3:00 PM	192	363	53%	195	40%	0%	115
4:00 PM	249	496	50%	214	40%	0%	149
5:00 PM	301	588	51%	207	40%	0%	181

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2023 NO-BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	26	92	28%	217	20%	0%	21
7:00 AM	56	137	41%	209	40%	0%	34
8:00 AM	44	132	33%	185	20%	0%	35
9:00 AM	72	157	46%	151	40%	0%	43
10:00 AM	63	144	43%	147	40%	0%	38
11:00 AM	65	156	42%	138	40%	0%	39
12:00 PM	101	215	47%	152	40%	0%	60
1:00 PM	110	211	52%	146	40%	0%	66
2:00 PM	108	243	44%	124	40%	0%	65
3:00 PM	197	373	53%	199	40%	0%	118
4:00 PM	255	510	50%	218	40%	0%	153
5:00 PM	309	604	51%	212	40%	0%	185

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2024 NO-BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	26	94	28%	222	20%	0%	21
7:00 AM	58	140	41%	213	40%	0%	35
8:00 AM	45	136	33%	188	20%	0%	36
9:00 AM	74	161	46%	154	40%	0%	44
10:00 AM	64	148	43%	151	40%	0%	39
11:00 AM	67	160	42%	140	40%	0%	40
12:00 PM	104	221	47%	155	40%	0%	62
1:00 PM	113	216	52%	149	40%	0%	68
2:00 PM	110	250	44%	127	40%	0%	66
3:00 PM	202	383	53%	203	40%	0%	121
4:00 PM	262	523	50%	223	40%	0%	157
5:00 PM	317	620	51%	216	40%	0%	190

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2034 NO-BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	33	119	28%	268	20%	0%	27
7:00 AM	73	177	41%	257	40%	0%	44
8:00 AM	57	171	33%	227	20%	0%	45
9:00 AM	93	203	46%	186	40%	0%	56
10:00 AM	81	187	43%	182	40%	0%	49
11:00 AM	84	202	42%	169	40%	0%	50
12:00 PM	131	278	47%	187	40%	0%	78
1:00 PM	142	273	52%	180	40%	0%	85
2:00 PM	139	315	44%	153	40%	0%	84
3:00 PM	255	483	53%	245	40%	0%	153
4:00 PM	331	660	50%	269	40%	0%	198
5:00 PM	400	782	51%	261	40%	0%	240

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - PHASE 1 & 2 (63 DWELLING UNITS)

	PRIMARY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS	
	Hourly Percentage Distribution	Inbound	Hourly Percentage Distribution	Inbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
6:00 AM	1.6%	5	0.0%	0	34.0	34.0	3.4	20	0	0
7:00 AM	3.2%	11	0.0%	0	35	46	11	35	0	0
8:00 AM	8.6%	29	0.0%	0	29	42	13	29	0	0
9:00 AM	3.2%	11	0.0%	0	18	29	11	18	0	0
10:00 AM	4.2%	14	0.0%	0	18	33	14	18	0	0
11:00 AM	5.4%	18	0.0%	0	17	36	18	17	0	0
12:00 PM	5.5%	19	0.0%	0	19	38	19	19	0	0
1:00 PM	6.0%	20	0.0%	0	20	40	20	20	0	0
2:00 PM	7.0%	24	0.0%	0	21	45	24	21	0	0
3:00 PM	8.5%	29	0.0%	0	29	49	29	29	0	0
4:00 PM	10.5%	36	0.0%	0	26	61	36	26	0	0
5:00 PM	10.3%	35	0.0%	0	25	60	35	25	0	0

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - PHASE 3 & 5 (63 DWELLING UNITS)

	PRIMARY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS	
	Hourly Percentage Distribution	Inbound	Hourly Percentage Distribution	Inbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
6:00 AM	1.6%	5	0.0%	0	29.0	29.0	2.9	17	0	0
7:00 AM	3.2%	9	0.0%	0	30	39	9	30	0	0
8:00 AM	3.7%	11	0.0%	0	25	36	11	25	0	0
9:00 AM	3.2%	9	0.0%	0	16	25	9	16	0	0
10:00 AM	4.2%	12	0.0%	0	16	28	12	16	0	0
11:00 AM	5.4%	16	0.0%	0	15	30	16	15	0	0
12:00 PM	5.5%	16	0.0%	0	16	32	16	16	0	0
1:00 PM	6.0%	17	0.0%	0	17	35	17	17	0	0
2:00 PM	7.0%	20	0.0%	0	18	38	20	18	0	0
3:00 PM	8.5%	25	0.0%	0	17	42	25	17	0	0
4:00 PM	10.5%	30	0.0%	0	22	52	30	22	0	0
5:00 PM	10.3%	30	0.0%	0	21	51	30	21	0	0

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - PHASE 4, 6, & 7 (75 DWELLING UNITS)

	PRIMARY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS	
	Hourly Percentage Distribution	Inbound	Hourly Percentage Distribution	Inbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
6:00 AM	1.6%	6	0.0%	0	39.9	39.9	3.99	24	0	0
7:00 AM	3.2%	13	0.0%	0	41	53	6	41	0	0
8:00 AM	8.6%	15	0.0%	0	34	49	15	34	0	0
9:00 AM	3.2%	13	0.0%	0	22	34	13	22	0	0
10:00 AM	4.2%	17	0.0%	0	22	38	17	22	0	0
11:00 AM	5.4%	22	0.0%	0	20	42	22	20	0	0
12:00 PM	5.5%	22	0.0%	0	22	44	22	22	0	0
1:00 PM	6.0%	24	0.0%	0	24	47	24	24	0	0
2:00 PM	7.0%	28	0.0%	0	25	53	28	25	0	0
3:00 PM	8.5%	34	0.0%	0	24	58	34	24	0	0
4:00 PM	10.5%	42	0.0%	0	30	72	42	30	0	0
5:00 PM	10.3%	41	0.0%	0	30	71	41	30	0	0

GREENGATE DEVELOPMENT TRIPS - ALL PHASES

	Total primary		Total pass-by	
	Inbound	Outbound	Inbound	Outbound
6:00 AM	16	61	0	0
7:00 AM	33	105	0	0
8:00 AM	38	88	0	0
9:00 AM	33	56	0	0
10:00 AM	43	56	0	0
11:00 AM	56	52	0	0
12:00 PM	57	58	0	0
1:00 PM	62	61	0	0
2:00 PM	72	64	0	0
3:00 PM	87	92	0	0
4:00 PM	108	77	0	0
5:00 PM	106	76	0	0

MULTIFAMILY HOUSING (LOW-RISE, ITE LUC 220) - 100 DWELLING UNITS

	PRIMARY		PASS-BY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS		
	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Inbound	outbound	Total	Inbound	outbound	Inbound	outbound	Inbound	outbound
6:00 AM	1.1%	5.8%	0.0%	0.0%	358	358	716	358	358	0	0	0	0
7:00 AM	2.6%	12.9%	0.0%	0.0%	4	21	25	4	21	0	0	0	0
8:00 AM	4.0%	9.1%	0.0%	0.0%	9	46	55	9	46	0	0	0	0
9:00 AM	3.9%	7.2%	0.0%	0.0%	14	33	47	14	33	0	0	0	0
10:00 AM	3.9%	4.7%	0.0%	0.0%	14	26	40	14	26	0	0	0	0
11:00 AM	4.9%	5.5%	0.0%	0.0%	18	17	31	14	17	0	0	0	0
12:00 PM	5.6%	5.4%	0.0%	0.0%	20	20	37	18	20	0	0	0	0
1:00 PM	4.8%	4.9%	0.0%	0.0%	17	19	39	20	19	0	0	0	0
2:00 PM	5.9%	6.0%	0.0%	0.0%	21	21	43	21	21	0	0	0	0
3:00 PM	8.3%	5.2%	0.0%	0.0%	30	19	48	30	19	0	0	0	0
4:00 PM	10.0%	5.1%	0.0%	0.0%	36	18	54	36	18	0	0	0	0
5:00 PM	11.4%	6.7%	0.0%	0.0%	41	24	65	41	24	0	0	0	0

SHOPPING CENTER (ITE LUC 820) - 309,240 SF

	PRIMARY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS		
	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Inbound	outbound	Total	Inbound	outbound	Inbound	outbound
6:00 AM	0.3%	0.2%	0.3%	0.2%	6416	6416	12832	4234	4234	2182	2182
7:00 AM	1.4%	0.9%	1.4%	0.9%	19	13	32	13	8	7	4
8:00 AM	2.6%	1.5%	2.6%	1.5%	90	58	148	59	38	31	20
9:00 AM	4.7%	2.5%	4.7%	2.5%	167	96	263	110	64	57	33
10:00 AM	7.1%	4.1%	7.1%	4.1%	302	160	462	199	106	103	55
11:00 AM	9.7%	6.8%	9.7%	6.8%	456	263	719	301	174	155	89
12:00 PM	10.6%	9.4%	10.6%	9.4%	622	436	1059	411	288	212	148
1:00 PM	9.2%	9.5%	9.2%	9.5%	680	603	1283	449	398	231	205
2:00 PM	8.9%	9.2%	8.9%	9.2%	590	610	1200	390	402	201	201
3:00 PM	8.5%	9.0%	8.5%	9.0%	571	590	1161	377	390	194	201
4:00 PM	8.9%	9.4%	8.9%	9.4%	545	577	1123	360	381	185	196
5:00 PM	9.2%	9.4%	9.2%	9.4%	571	603	1174	377	398	194	205

EXISTING RESIDENTIAL & PROPOSED COMMERCIAL DEVELOPMENT

	Total primary		Total pass-by	
	inbound	outbound	inbound	outbound
6:00 AM	17	29	7	4
7:00 AM	69	84	31	20
8:00 AM	124	96	57	33
9:00 AM	213	132	103	55
10:00 AM	315	190	155	89
11:00 AM	428	308	212	148
12:00 PM	469	417	231	205
1:00 PM	407	420	201	207
2:00 PM	398	411	194	201
3:00 PM	390	400	185	196
4:00 PM	413	416	194	205
5:00 PM	430	422	201	205

2022 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET									
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach			
6:00 AM	107	0	68	0	25	93			
7:00 AM	211	0	85	0	55	140			
8:00 AM	130	0	94	0	43	136			
9:00 AM	110	0	70	0	159	159			
10:00 AM	78	0	89	0	61	149			
11:00 AM	63	0	89	0	63	133			
12:00 PM	110	0	110	0	107	217			
1:00 PM	90	0	110	0	107	217			
2:00 PM	80	0	146	0	105	251			
3:00 PM	123	0	188	0	132	380			
4:00 PM	127	0	269	0	249	517			
5:00 PM	154	0	308	0	301	609			

2022 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET									
EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches			
6:00 AM	4	0	0	1	225	427			
7:00 AM	5	0	0	3	224	442			
8:00 AM	3	0	0	8	192	332			
9:00 AM	4	0	0	6	153	273			
10:00 AM	78	0	0	13	144	244			
11:00 AM	63	0	0	6	140	239			
12:00 PM	110	0	0	6	150	266			
1:00 PM	90	0	0	6	150	255			
2:00 PM	80	0	0	7	128	231			
3:00 PM	123	0	0	17	191	346			
4:00 PM	127	0	0	24	207	377			
5:00 PM	154	0	0	25	199	418			

2023 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET									
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach			
6:00 AM	204	0	72	0	26	88			
7:00 AM	217	0	93	0	56	149			
8:00 AM	134	0	102	0	44	148			
9:00 AM	110	0	86	0	72	168			
10:00 AM	80	0	98	0	63	169			
11:00 AM	86	0	111	0	65	176			
12:00 PM	94	0	133	0	101	234			
1:00 PM	93	0	122	0	110	231			
2:00 PM	62	0	160	0	108	267			
3:00 PM	127	0	205	0	197	402			
4:00 PM	126	0	330	0	252	658			
5:00 PM	156	0	330	0	309	639			

2023 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET									
EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches			
6:00 AM	4	0	0	2	240	448			
7:00 AM	6	0	0	4	246	473			
8:00 AM	3	0	0	9	211	357			
9:00 AM	4	0	0	14	156	261			
10:00 AM	80	0	0	7	151	255			
11:00 AM	86	0	0	12	161	281			
12:00 PM	94	0	0	7	161	271			
1:00 PM	93	0	0	9	139	247			
2:00 PM	62	0	0	18	203	365			
3:00 PM	127	0	0	26	213	442			
4:00 PM	126	0	0	26	213	442			
5:00 PM	156	0	0	28	213	442			

2024 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET									
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach			
6:00 AM	210	0	76	0	26	96			
7:00 AM	224	0	103	0	58	169			
8:00 AM	138	0	114	0	45	159			
9:00 AM	117	0	107	0	74	181			
10:00 AM	83	0	110	0	64	174			
11:00 AM	89	0	126	0	67	183			
12:00 PM	97	0	148	0	104	252			
1:00 PM	96	0	137	0	113	250			
2:00 PM	65	0	160	0	108	267			
3:00 PM	131	0	229	0	202	462			
4:00 PM	136	0	320	0	262	583			
5:00 PM	164	0	381	0	317	678			

2024 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET									
EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches			
6:00 AM	4	0	0	3	258	475			
7:00 AM	6	0	0	6	275	512			
8:00 AM	4	0	0	11	235	388			
9:00 AM	5	0	0	8	182	312			
10:00 AM	13	0	0	15	172	282			
11:00 AM	89	0	0	8	166	275			
12:00 PM	97	0	0	13	177	302			
1:00 PM	96	0	0	9	177	293			
2:00 PM	65	0	0	20	220	345			
3:00 PM	131	0	0	27	242	389			
4:00 PM	136	0	0	24	242	389			
5:00 PM	164	0	0	28	234	473			

2024 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - KINGS CROSSING MINOR STREET									
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach			
6:00 AM	119	0	86	0	33	119			
7:00 AM	171	0	104	0	73	171			
8:00 AM	171	0	115	0	57	171			
9:00 AM	203	0	110	0	93	203			
10:00 AM	197	0	109	0	81	197			
11:00 AM	203	0	126	0	131	203			
12:00 PM	278	0	148	0	131	278			
1:00 PM	273	0	131	0	142	273			
2:00 PM	315	0	175	0	138	315			
3:00 PM	483	0	228	0	255	483			
4:00 PM	660	0	329	0	331	660			
5:00 PM	782	0	381	0	400	782			

2024 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - HILL ROAD MAJOR STREET									
EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches			
6:00 AM	549	0	0	1	268	549			
7:00 AM	563	0	0	6	256	563			
8:00 AM	422	0	0	13	219	422			
9:00 AM	360	0	0	13	179	360			
10:00 AM	328	0	0	24	167	328			
11:00 AM	328	0	0	23	175	328			
12:00 PM	374	0	0	33	174	374			
1:00 PM	357	0	0	28	174	357			
2:00 PM	474	0	0	29	225	474			
3:00 PM	512	0	0	40	225	512			
4:00 PM	572	0	0	49	241	572			
5:00 PM	572	0	0	51	231	572			

2024 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET									
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach			
6:00 AM	124	0	90	0	33	124			
7:00 AM	187	0	114	0	73	187			
8:00 AM	187	0	120	0	63	187			
9:00 AM	213	0	119	0	93	213			
10:00 AM	200	0	120	0	81	200			
11:00 AM	218	0	134	0	84	218			
12:00 PM	284	0	164	0	131	284			
1:00 PM	290	0	148	0	142	290			
2:00 PM	355	0	199	0	159	355			
3:00 PM	483	0	255	0	174	483			
4:00 PM	660	0	329	0	331	660			
5:00 PM	811	0	411	0	400	811			

2024 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET									
EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches			
6:00 AM	274	0	0	4	266	571			
7:00 AM	283	0	0	11	287	571			
8:00 AM	180	0	0	16	196	381			
9:00 AM	152	0	0	27	183	350			
10:00 AM	108	0	0	25	178	355			
11:00 AM	116	0	0	36	191	386			
12:00 PM	126	0	0	32	191	386			
1:00 PM	125	0	0	32	163	349			
2:00 PM	111	0	0	45	174	330			
3:00 PM	177	0	0	53	262	443			
4:00 PM	177	0	0	54	253	443			
5:00 PM	214	0	0	54	253	602			

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2022 BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	25	93	27%	226	20%	0%	20
7:00 AM	55	140	39%	227	40%	0%	33
8:00 AM	43	136	31%	200	20%	0%	34
9:00 AM	70	159	44%	159	40%	0%	42
10:00 AM	61	149	41%	156	40%	0%	37
11:00 AM	53	143	37%	163	40%	0%	36
12:00 PM	88	221	44%	181	40%	0%	56
1:00 PM	107	217	49%	156	40%	0%	64
2:00 PM	105	251	42%	136	40%	0%	63
3:00 PM	182	380	50%	208	40%	0%	115
4:00 PM	249	517	48%	230	40%	0%	149
5:00 PM	301	609	49%	224	40%	0%	181

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2023 BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	26	98	26%	241	20%	0%	21
7:00 AM	56	149	38%	250	40%	0%	34
8:00 AM	44	146	30%	220	20%	0%	35
9:00 AM	72	169	42%	173	40%	0%	43
10:00 AM	65	160	37%	178	40%	0%	38
11:00 AM	57	170	33%	159	40%	0%	30
12:00 PM	101	234	43%	173	40%	0%	60
1:00 PM	110	231	47%	169	40%	0%	66
2:00 PM	108	267	40%	148	40%	0%	65
3:00 PM	197	402	49%	221	40%	0%	118
4:00 PM	255	546	47%	247	40%	0%	153
5:00 PM	309	639	48%	240	40%	0%	185

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2024 BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	26	104	25%	261	20%	0%	21
7:00 AM	58	160	36%	281	40%	0%	35
8:00 AM	45	159	28%	246	20%	0%	36
9:00 AM	74	181	41%	190	40%	0%	44
10:00 AM	64	174	37%	197	40%	0%	39
11:00 AM	56	185	30%	170	40%	0%	35
12:00 PM	104	265	41%	190	40%	0%	62
1:00 PM	113	250	45%	186	40%	0%	68
2:00 PM	110	289	38%	165	40%	0%	66
3:00 PM	202	431	47%	240	40%	0%	121
4:00 PM	262	583	45%	269	40%	0%	157
5:00 PM	317	678	47%	262	40%	0%	190

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2034 NO-BUILD (WITH FUTURE DEVELOPMENT)							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	33	119	28%	269	20%	0%	27
7:00 AM	73	177	41%	281	40%	0%	44
8:00 AM	57	171	33%	232	20%	0%	45
9:00 AM	93	203	46%	192	40%	0%	56
10:00 AM	81	187	43%	191	40%	0%	49
11:00 AM	70	197	35%	165	40%	0%	46
12:00 PM	131	278	47%	208	40%	0%	70
1:00 PM	142	273	52%	201	40%	0%	85
2:00 PM	139	315	44%	174	40%	0%	84
3:00 PM	255	483	53%	285	40%	0%	153
4:00 PM	331	660	50%	290	40%	0%	198
5:00 PM	400	782	51%	282	40%	0%	240

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2034 BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	33	124	27%	290	20%	0%	27
7:00 AM	73	187	39%	288	40%	0%	44
8:00 AM	57	183	31%	263	20%	0%	45
9:00 AM	93	213	44%	212	40%	0%	56
10:00 AM	81	200	41%	211	40%	0%	49
11:00 AM	70	211	33%	203	40%	0%	46
12:00 PM	131	294	44%	227	40%	0%	78
1:00 PM	142	290	49%	221	40%	0%	85
2:00 PM	139	335	42%	195	40%	0%	84
3:00 PM	255	507	50%	285	40%	0%	153
4:00 PM	331	690	48%	315	40%	0%	198
5:00 PM	400	811	49%	307	40%	0%	240

DILEY ROAD & HOWE INDUSTRIAL PARKWAY - EXISTING TRAFFIC COUNTS (YEAR 2020)																
TIME BEGIN	HOWE INDUSTRIAL PKWY (EASTBOUND)				N/A (WESTBOUND)				DILEY ROAD (NORTHBOUND)				DILEY ROAD (SOUTHBOUND)			
	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS
6AM	3	0	0	0	0	0	0	0	19	383	0	0	0	510	13	0
7AM	7	0	7	0	0	0	0	0	43	450	0	0	0	668	21	0
8AM	6	0	21	0	0	0	0	0	33	383	0	0	0	619	22	0
9AM	1	0	9	0	0	0	0	0	13	321	0	0	0	476	4	0
10AM	10	0	10	0	0	0	0	0	5	358	0	0	0	409	5	0
11AM	9	0	26	0	0	0	0	0	16	402	0	0	0	441	12	0
12PM	11	0	24	0	0	0	0	0	28	478	0	0	0	501	17	0
1PM	14	0	14	0	0	0	0	0	16	397	0	0	0	498	19	0
2PM	14	0	18	0	0	0	0	0	19	540	0	0	0	505	8	0
3PM	8	0	27	0	0	0	0	0	13	676	0	0	0	604	6	0
4PM	18	0	34	0	0	0	0	0	10	750	0	0	0	702	5	0
5PM	15	0	41	0	0	0	0	0	8	879	0	0	0	694	7	0

EXISTING TRAFFIC VOLUMES - DILEY ROAD										EXISTING TRAFFIC VOLUMES - HOWE INDUSTRIAL PKWY											
MAJOR					MINOR					MAJOR					MINOR						
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Both Approaches	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approach	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approach	
6:00 AM	19	383	0	0	13	925	3	0	4	7	7	7	7	3	0	7	0	0	0	0	14
7:00 AM	43	450	0	688	21	1182	7	0	7	21	21	21	21	6	0	21	0	0	0	0	27
8:00 AM	33	383	0	619	22	1057	6	0	21	21	21	21	21	1	0	21	0	0	0	0	10
9:00 AM	13	321	0	476	4	814	1	0	9	9	9	9	9	10	0	10	0	0	0	0	20
10:00 AM	5	358	0	409	5	777	9	0	26	26	26	26	26	9	0	26	0	0	0	0	35
11:00 AM	16	402	0	441	12	871	11	0	24	24	24	24	24	11	0	24	0	0	0	0	28
12:00 PM	28	478	0	501	17	1024	14	0	14	14	14	14	14	14	0	14	0	0	0	0	32
1:00 PM	16	397	0	486	19	930	14	0	18	18	18	18	18	14	0	18	0	0	0	0	35
2:00 PM	19	540	0	505	8	1072	14	0	27	27	27	27	27	8	0	27	0	0	0	0	32
3:00 PM	13	676	0	604	6	1289	18	0	34	34	34	34	34	8	0	34	0	0	0	0	52
4:00 PM	10	750	0	702	5	1467	15	0	41	41	41	41	41	15	0	41	0	0	0	0	56
5:00 PM	8	879	0	894	7	1588															

2034 NO-BUILD TRAFFIC VOLUMES - DILEY ROAD (2.3%/YR)										2034 NO-BUILD TRAFFIC VOLUMES - HOWE INDUSTRIAL PKWY (2.3%/YR)											
MAJOR					MINOR					MAJOR					MINOR						
NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Both Approaches	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approach	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approach	
6:00 AM	25	656	0	674	17	1423	4	0	5	5	5	5	5	4	0	5	0	0	0	0	9
7:00 AM	57	696	0	863	26	1643	8	0	9	9	9	9	9	8	0	9	0	0	0	0	16
8:00 AM	44	596	0	818	29	1397	6	0	28	28	28	28	28	6	0	28	0	0	0	0	36
9:00 AM	17	424	0	629	7	1076	1	0	12	12	12	12	12	1	0	12	0	0	0	0	13
10:00 AM	7	473	0	541	7	1027	13	0	13	13	13	13	13	13	0	13	0	0	0	0	26
11:00 AM	21	531	0	583	16	1151	12	0	34	34	34	34	34	12	0	34	0	0	0	0	46
12:00 PM	37	632	0	662	22	1354	15	0	32	32	32	32	32	15	0	32	0	0	0	0	46
1:00 PM	21	525	0	658	25	1229	19	0	19	19	19	19	19	19	0	19	0	0	0	0	37
2:00 PM	25	714	0	668	11	1417	19	0	24	24	24	24	24	19	0	24	0	0	0	0	42
3:00 PM	17	894	0	798	8	1717	11	0	36	36	36	36	36	11	0	36	0	0	0	0	46
4:00 PM	13	962	0	928	7	1939	24	0	45	45	45	45	45	24	0	45	0	0	0	0	69
5:00 PM	11	1162	0	917	9	2099	20	0	54	54	54	54	54	20	0	54	0	0	0	0	74

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - ALL PHASES (191 DWELLING UNITS)

	PRIMARY		PASS-BY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS	
	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Inbound	outbound	Total	Inbound	outbound	Inbound	outbound	
6:00 AM	1.6%	0.0%	0.0%	0.0%	16	61	2056	1023	1023	0	0	
7:00 AM	3.2%	0.0%	0.0%	0.0%	33	105	138	33	105	0	0	
8:00 AM	3.7%	0.0%	0.0%	0.0%	38	88	177	38	88	0	0	
9:00 AM	3.2%	0.0%	0.0%	0.0%	33	56	88	33	56	0	0	
10:00 AM	4.2%	0.0%	0.0%	0.0%	43	56	99	43	56	0	0	
11:00 AM	5.4%	0.0%	0.0%	0.0%	57	58	108	56	52	0	0	
12:00 PM	5.5%	0.0%	0.0%	0.0%	57	61	122	61	57	0	0	
1:00 PM	6.0%	0.0%	0.0%	0.0%	62	64	136	72	64	0	0	
2:00 PM	8.5%	0.0%	0.0%	0.0%	87	62	149	87	62	0	0	
3:00 PM	10.5%	0.0%	0.0%	0.0%	108	77	182	108	77	0	0	
4:00 PM	10.3%	0.0%	0.0%	0.0%	106	76	182	106	76	0	0	
5:00 PM												

MULTIFAMILY HOUSING (LOW-RISE, ITE LUC 220) - 100 DWELLING UNITS

	PRIMARY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS	
	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Inbound	outbound	Total	Inbound	outbound	
6:00 AM	1.1%	0.0%	0.0%	0.0%	4	21	716	358	358	0
7:00 AM	2.6%	0.0%	0.0%	0.0%	9	46	25	9	46	0
8:00 AM	4.0%	0.0%	0.0%	0.0%	14	33	57	14	33	0
9:00 AM	3.9%	0.0%	0.0%	0.0%	14	26	40	14	26	0
10:00 AM	3.9%	0.0%	0.0%	0.0%	14	17	31	14	17	0
11:00 AM	4.9%	0.0%	0.0%	0.0%	18	20	37	18	20	0
12:00 PM	5.6%	0.0%	0.0%	0.0%	20	19	39	20	19	0
1:00 PM	4.6%	0.0%	0.0%	0.0%	17	16	35	17	16	0
2:00 PM	5.9%	0.0%	0.0%	0.0%	21	21	43	21	21	0
3:00 PM	8.3%	0.0%	0.0%	0.0%	30	19	48	30	19	0
4:00 PM	10.0%	0.0%	0.0%	0.0%	36	18	54	36	18	0
5:00 PM	11.4%	0.0%	0.0%	0.0%	41	24	65	41	24	0

SHOPPING CENTER (ITE LUC 820) - 309,240 SF

	PRIMARY		PASS-BY		TOTAL TRIPS		PRIMARY TRIPS		PASS BY TRIPS	
	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Hourly Percentage Distribution Inbound	Hourly Percentage Distribution Outbound	Inbound	outbound	Total	Inbound	outbound	
6:00 AM	0.3%	0.2%	0.3%	0.2%	19	13	12832	6416	4234	2182
7:00 AM	0.9%	1.4%	0.9%	1.4%	90	59	32	32	8	4
8:00 AM	2.6%	1.5%	2.6%	1.5%	167	96	148	90	31	20
9:00 AM	4.7%	2.5%	4.7%	2.5%	302	160	263	160	64	33
10:00 AM	7.1%	4.1%	7.1%	4.1%	456	263	462	302	103	55
11:00 AM	6.8%	9.7%	6.8%	9.7%	622	438	719	301	174	89
12:00 PM	10.6%	10.6%	9.4%	9.4%	680	603	1059	449	268	148
1:00 PM	9.2%	9.2%	9.2%	9.2%	590	610	1263	390	388	205
2:00 PM	8.9%	9.2%	8.9%	9.2%	571	590	1161	377	380	201
3:00 PM	8.5%	9.0%	8.5%	9.0%	545	577	1123	360	361	196
4:00 PM	8.9%	9.4%	8.9%	9.4%	571	603	1174	377	388	205
5:00 PM	9.2%	9.4%	9.2%	9.4%	590	603	1193	380	388	201

EXISTING RESIDENTIAL & PROPOSED COMMERCIAL DEVELOPMENT

	Total primary		Total pass-by	
	Inbound	outbound	Inbound	outbound
6:00 AM	17	29	7	4
7:00 AM	69	84	31	20
8:00 AM	124	96	57	33
9:00 AM	132	103	103	55
10:00 AM	155	100	155	89
11:00 AM	148	308	212	148
12:00 PM	231	417	231	205
1:00 PM	201	420	201	207
2:00 PM	185	411	185	201
3:00 PM	194	400	185	196
4:00 PM	194	416	194	205
5:00 PM	201	422	201	205

GREENGATE DEVELOPMENT TRIPS - ALL PHASES

	Total primary		Total pass-by	
	Inbound	outbound	Inbound	outbound
6:00 AM	16	61	0	0
7:00 AM	33	105	0	0
8:00 AM	38	88	0	0
9:00 AM	33	56	0	0
10:00 AM	43	56	0	0
11:00 AM	57	52	0	0
12:00 PM	57	56	0	0
1:00 PM	61	61	0	0
2:00 PM	72	64	0	0
3:00 PM	87	62	0	0
4:00 PM	108	77	0	0
5:00 PM	106	76	0	0

2034 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - DILEY ROAD							TOTAL Both Approaches
MAJOR STREET						MINOR STREET	
NBL	NBT	NBR	SBL	SBT	SBR		
25	502	14	7	672	17		1238
6:00 AM	575	61	31	872	28		1624
7:00 AM	469	112	57	798	29		1509
8:00 AM	358	194	100	593	5		1268
9:00 AM	373	289	149	486	7		1310
10:00 AM	384	395	203	509	16		1537
11:00 AM	482	432	222	581	22		1776
12:00 PM	384	375	192	566	25		1596
1:00 PM	386	375	192	566	25		1596
2:00 PM	375	365	182	550	11		1503
3:00 PM	375	365	182	550	11		1503
4:00 PM	865	374	192	860	8		2311
5:00 PM	1032	389	199	847	9		2487

2034 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - HOWE INDUSTRIAL PKWY/GREENGATE BLVD							TOTAL Highest Vol. Approach
MINOR STREET						MINOR STREET	
EBL	EBT	EBR	WBL	WBT	WBR		
4	0	5	19	0	12		31
6:00 AM	9	0	57	0	38		95
7:00 AM	8	0	69	0	50		119
8:00 AM	1	0	12	0	75		173
9:00 AM	13	0	98	0	115		261
10:00 AM	12	0	146	0	189		425
11:00 AM	15	0	236	0	259		581
12:00 PM	19	0	322	0	281		685
1:00 PM	19	0	324	0	281		685
2:00 PM	19	0	324	0	281		685
3:00 PM	19	0	324	0	281		685
4:00 PM	24	0	366	0	344		734
5:00 PM	20	0	322	0	289		629
			325		280		605

2034 BUILD TRAFFIC VOLUMES - DILEY ROAD							TOTAL Both Approaches
MAJOR STREET						MINOR STREET	
NBL	NBT	NBR	SBL	SBT	SBR		
25	502	19	11	672	17		1246
6:00 AM	575	71	38	872	28		1641
7:00 AM	469	123	65	798	29		1528
8:00 AM	358	204	106	593	5		1284
9:00 AM	373	302	157	486	7		1332
10:00 AM	384	411	214	509	16		1565
11:00 AM	482	447	238	581	22		1805
12:00 PM	384	391	208	588	25		1628
1:00 PM	384	384	205	600	11		1813
2:00 PM	384	384	205	600	11		1813
3:00 PM	773	378	204	734	8		2113
4:00 PM	865	403	219	860	7		2367
5:00 PM	1032	417	226	847	9		2542

2034 BUILD TRAFFIC VOLUMES - HOWE INDUSTRIAL PKWY/GREENGATE BLVD							TOTAL Highest Vol. Approach
MINOR STREET						MINOR STREET	
EBL	EBT	EBR	WBL	WBT	WBR		
4	0	5	37	0	24		61
6:00 AM	9	0	89	0	59		148
7:00 AM	8	0	96	0	68		163
8:00 AM	1	0	115	0	86		201
9:00 AM	13	0	162	0	126		289
10:00 AM	12	0	252	0	199		451
11:00 AM	15	0	338	0	273		611
12:00 PM	19	0	341	0	276		617
1:00 PM	19	0	341	0	276		617
2:00 PM	19	0	341	0	276		617
3:00 PM	11	0	325	0	283		588
4:00 PM	24	0	342	0	277		620
5:00 PM	20	0	346	0	279		624

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2034 NO-BUILD (WITH FUTURE DEVELOPMENT)							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	12	31	38%	258	60%	0%	5
7:00 AM	38	95	40%	318	60%	0%	15
8:00 AM	50	119	42%	290	60%	0%	20
9:00 AM	75	173	43%	276	60%	0%	30
10:00 AM	115	261	44%	331	60%	0%	46
11:00 AM	189	425	44%	394	60%	0%	75
12:00 PM	259	581	45%	457	60%	5%	116
1:00 PM	261	585	45%	384	60%	0%	104
2:00 PM	254	571	44%	476	60%	5%	114
3:00 PM	248	556	45%	564	60%	10%	124
4:00 PM	258	580	45%	620	60%	15%	142
5:00 PM	260	585	44%	710	60%	20%	156

MINOR STREET RIGHT-TURN REDUCTION CALCULATIONS - 2034 BUILD							
	Right Turns	Approach	% RT out of Approach	Mainline Volume per lane	Base Right Turn Reduction	Mainline Congestion Factor	Adjusted Right Turns
6:00 AM	24	61	39%	261	60%	0%	9
7:00 AM	59	148	40%	323	60%	0%	24
8:00 AM	68	163	41%	296	60%	0%	27
9:00 AM	86	201	43%	281	60%	0%	34
10:00 AM	126	289	44%	337	60%	0%	51
11:00 AM	199	451	44%	403	60%	5%	90
12:00 PM	273	611	45%	464	60%	5%	123
1:00 PM	276	617	45%	393	60%	0%	110
2:00 PM	270	604	45%	486	60%	5%	121
3:00 PM	263	588	45%	576	60%	10%	131
4:00 PM	277	620	45%	634	60%	15%	153
5:00 PM	279	624	45%	724	60%	20%	167

CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 1,609

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,052

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 2,360

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Not Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied

Required volumes reached for 3 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Not Satisfied

Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied

Required 1A volumes reached for 6 hours, 8 are needed

Required 1B volumes reached for 0 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Not Satisfied

Number of hours (3) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (9) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
06:45 - 07:45	212	+	207	=	419	0	105	Yes
16:45 - 17:45	181	+	207	=	388	0	450	Yes
15:45 - 16:45	142	+	210	=	352	0	367	Yes
06:30 - 07:30	208	+	209	=	417	0	98	No
06:15 - 07:15	204	+	211	=	415	0	91	No
06:00 - 07:00	200	+	213	=	413	0	84	No
15:30 - 16:30	140	+	205	=	345	0	340	No
07:45 - 08:45	149	+	189	=	338	0	117	No
15:15 - 16:15	138	+	200	=	338	0	313	No
15:00 - 16:00	136	+	195	=	331	0	286	No
08:00 - 09:00	132	+	180	=	312	0	120	No
05:45 - 06:45	150	+	159	=	309	0	63	No
08:15 - 09:15	129	+	171	=	300	0	121	No
14:45 - 15:45	124	+	175	=	299	0	264	No
08:30 - 09:30	126	+	162	=	288	0	122	No
08:45 - 09:45	123	+	153	=	276	0	123	No
14:30 - 15:30	114	+	157	=	271	0	241	No
09:00 - 10:00	113	+	147	=	260	0	125	No
09:15 - 10:15	106	+	146	=	252	0	123	No
12:00 - 13:00	103	+	149	=	252	0	170	No
12:15 - 13:15	101	+	147	=	248	0	167	No
11:45 - 12:45	101	+	146	=	247	0	159	No
09:30 - 10:30	99	+	145	=	244	0	121	No
12:30 - 13:30	99	+	145	=	244	0	164	No
14:15 - 15:15	104		139		243	0	218	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
07:00 - 08:00	215	+	204	=	419	0	111	No
06:45 - 07:45	212	+	207	=	419	0	105	No
06:30 - 07:30	208	+	209	=	417	0	98	No
06:15 - 07:15	204	+	211	=	415	0	91	No
06:00 - 07:00	200	+	213	=	413	0	84	No
17:00 - 18:00	193	+	208	=	401	0	468	No
07:15 - 08:15	193	+	199	=	392	0	113	No
16:45 - 17:45	181	+	207	=	388	0	450	No
16:30 - 17:30	169	+	209	=	378	0	432	No
16:15 - 17:15	157	+	211	=	368	0	414	No
07:30 - 08:30	171	+	194	=	365	0	115	No
16:00 - 17:00	145	+	213	=	358	0	396	No
15:45 - 16:45	142	+	210	=	352	0	367	No
15:30 - 16:30	140	+	205	=	345	0	340	No
07:45 - 08:45	149	+	189	=	338	0	117	No
15:15 - 16:15	138	+	200	=	338	0	313	No
15:00 - 16:00	136	+	195	=	331	0	286	No
08:00 - 09:00	132	+	180	=	312	0	120	No
05:45 - 06:45	150	+	159	=	309	0	63	No
17:15 - 18:15	145	+	156	=	301	0	351	No
08:15 - 09:15	129	+	171	=	300	0	121	No
14:45 - 15:45	124	+	175	=	299	0	264	No
08:30 - 09:30	126	+	162	=	288	0	122	No
08:45 - 09:45	123	+	153	=	276	0	123	No
14:30 - 15:30	114		157		271	0	241	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 6 hours meet 1A minimums.
 Only 0 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
07:00 - 08:00	215	+	204	=	419	0	111	Yes
06:00 - 07:00	200	+	213	=	413	0	84	Yes
16:45 - 17:45	181	+	207	=	388	0	450	Yes
15:45 - 16:45	142	+	210	=	352	0	367	Yes
08:00 - 09:00	132	+	180	=	312	0	120	Yes
14:45 - 15:45	124	+	175	=	299	0	264	Yes
05:45 - 06:45	150	+	159	=	309	0	63	No
14:30 - 15:30	114	+	157	=	271	0	241	No
09:00 - 10:00	113	+	147	=	260	0	125	No
09:15 - 10:15	106	+	146	=	252	0	123	No
12:00 - 13:00	103	+	149	=	252	0	170	No
12:15 - 13:15	101	+	147	=	248	0	167	No

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
06:45 - 07:45	212	+	207	=	419	0	105	No
07:00 - 08:00	215	+	204	=	419	0	111	No
06:30 - 07:30	208	+	209	=	417	0	98	No
06:15 - 07:15	204	+	211	=	415	0	91	No
06:00 - 07:00	200	+	213	=	413	0	84	No
17:00 - 18:00	193	+	208	=	401	0	468	No
07:15 - 08:15	193	+	199	=	392	0	113	No
16:45 - 17:45	181	+	207	=	388	0	450	No
16:30 - 17:30	169	+	209	=	378	0	432	No
16:15 - 17:15	157	+	211	=	368	0	414	No
07:30 - 08:30	171	+	194	=	365	0	115	No
16:00 - 17:00	145	+	213	=	358	0	396	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

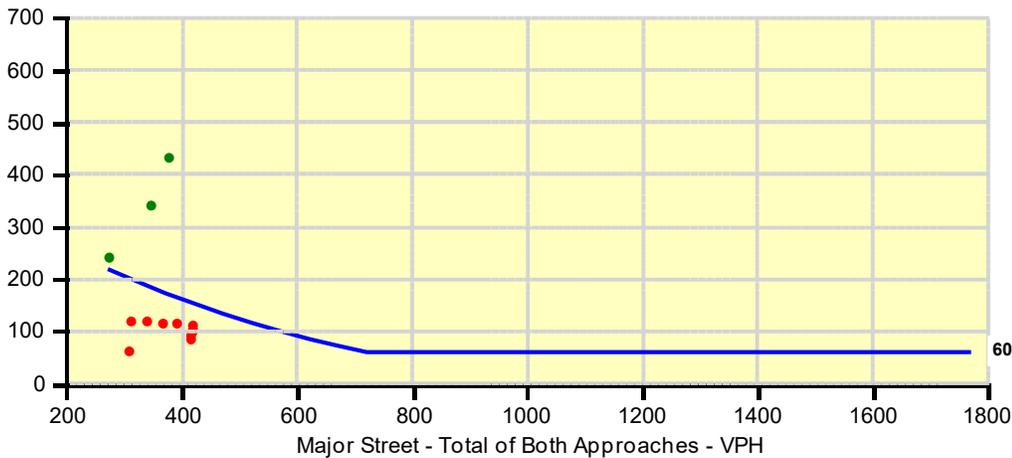
Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Minor Road		Met?	
	Major EB	+	Major WB	=	Total	Minor NB		Minor SB
16:30 - 17:30	169	+	209	=	378	0	432	Yes
15:30 - 16:30	140	+	205	=	345	0	340	Yes
14:30 - 15:30	114	+	157	=	271	0	241	Yes
07:00 - 08:00	215	+	204	=	419	0	111	No
06:45 - 07:45	212	+	207	=	419	0	105	No
06:30 - 07:30	208	+	209	=	417	0	98	No
06:15 - 07:15	204	+	211	=	415	0	91	No
06:00 - 07:00	200	+	213	=	413	0	84	No
07:15 - 08:15	193	+	199	=	392	0	113	No
07:30 - 08:30	171	+	194	=	365	0	115	No
07:45 - 08:45	149	+	189	=	338	0	117	No
						0	120	No



CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Time	Major Road			Minor Road			Warrant Met?		
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB		Delay SB	Met?
17:00 - 18:00	869	Yes	0	-	---	468	-	Yes	Yes
16:45 - 17:45	838	Yes	0	-	---	450	-	Yes	Yes
16:30 - 17:30	810	Yes	0	-	---	432	-	Yes	Yes
16:15 - 17:15	782	Yes	0	-	---	414	-	Yes	Yes
16:00 - 17:00	754	Yes	0	-	---	396	-	Yes	Yes
15:45 - 16:45	719	Yes	0	-	---	367	-	Yes	Yes
15:30 - 16:30	685	Yes	0	-	---	340	-	Yes	Yes
17:15 - 18:15	652	Yes	0	-	---	351	-	Yes	Yes
15:15 - 16:15	651	Yes	0	-	---	313	-	Yes	Yes
15:00 - 16:00	617	No	0	-	---	286	-	Yes	No
14:45 - 15:45	563	No	0	-	---	264	-	Yes	No
07:00 - 08:00	530	No	0	-	---	111	-	Yes	No
06:45 - 07:45	524	No	0	-	---	105	-	Yes	No
06:30 - 07:30	515	No	0	-	---	98	-	No	No
14:30 - 15:30	512	No	0	-	---	241	-	Yes	No
06:15 - 07:15	506	No	0	-	---	91	-	No	No
07:15 - 08:15	505	No	0	-	---	113	-	Yes	No
06:00 - 07:00	497	No	0	-	---	84	-	No	No
07:30 - 08:30	480	No	0	-	---	115	-	Yes	No
14:15 - 15:15	461	No	0	-	---	218	-	Yes	No
07:45 - 08:45	455	No	0	-	---	117	-	Yes	No
17:30 - 18:30	435	No	0	-	---	234	-	Yes	No
08:00 - 09:00	432	No	0	-	---	120	-	Yes	No
12:00 - 13:00	422	No	0	-	---	170	-	Yes	No
08:15 - 09:15	421	No	0	-	---	121	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 NO-BUILD

Study Name: GREENGATE DEV - 2022 NO-BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	193	+	208	=	401	0	468	Yes
16:45 - 17:45	181	+	207	=	388	0	450	Yes
16:30 - 17:30	169	+	209	=	378	0	432	Yes
16:15 - 17:15	157	+	211	=	368	0	414	Yes
16:00 - 17:00	145	+	213	=	358	0	396	Yes
15:45 - 16:45	142	+	210	=	352	0	367	Yes
15:30 - 16:30	140	+	205	=	345	0	340	Yes
15:15 - 16:15	138	+	200	=	338	0	313	Yes
17:15 - 18:15	145	+	156	=	301	0	351	Yes
07:00 - 08:00	215	+	204	=	419	0	111	No
06:45 - 07:45	212	+	207	=	419	0	105	No
							98	No



CESO, Inc.
GREENGATE DEVELOPMENT
2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 1,625

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,230

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 2,501

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Not Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied

Required volumes reached for 4 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Not Satisfied

Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied

Required 1A volumes reached for 6 hours, 8 are needed

Required 1B volumes reached for 2 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Not Satisfied

Number of hours (3) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (9) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 4 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
06:45 - 07:45	213	+	229	=	442	0	109	Yes
16:15 - 17:15	158	+	229	=	387	0	436	Yes
07:45 - 08:45	153	+	206	=	359	0	127	Yes
15:15 - 16:15	140	+	214	=	354	0	331	Yes
06:30 - 07:30	209	+	228	=	437	0	102	No
06:15 - 07:15	205	+	227	=	432	0	95	No
06:00 - 07:00	201	+	226	=	427	0	88	No
15:00 - 16:00	138	+	208	=	346	0	303	No
05:45 - 06:45	150	+	168	=	318	0	66	No
14:45 - 15:45	129	+	189	=	318	0	281	No
17:15 - 18:15	147	+	168	=	315	0	367	No
08:45 - 09:45	121	+	170	=	291	0	128	No
14:30 - 15:30	118	+	171	=	289	0	257	No
09:00 - 10:00	114	+	159	=	273	0	131	No
09:15 - 10:15	108	+	158	=	266	0	130	No
12:00 - 13:00	104	+	161	=	265	0	181	No
12:15 - 13:15	102	+	160	=	262	0	180	No
14:15 - 15:15	107	+	153	=	260	0	233	No
11:45 - 12:45	102	+	158	=	260	0	167	No
09:30 - 10:30	102	+	157	=	259	0	129	No
12:30 - 13:30	100	+	159	=	259	0	179	No
12:45 - 13:45	98	+	158	=	256	0	178	No
13:00 - 14:00	99	+	156	=	255	0	174	No
11:30 - 12:30	99	+	154	=	253	0	157	No
09:45 - 10:45	96		156		252	0	128	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
07:00 - 08:00	216	+	227	=	443	0	118	No
06:45 - 07:45	213	+	229	=	442	0	109	No
06:30 - 07:30	209	+	228	=	437	0	102	No
06:15 - 07:15	205	+	227	=	432	0	95	No
06:00 - 07:00	201	+	226	=	427	0	88	No
17:00 - 18:00	195	+	224	=	419	0	489	No
07:15 - 08:15	195	+	220	=	415	0	121	No
16:45 - 17:45	180	+	225	=	405	0	472	No
16:30 - 17:30	169	+	227	=	396	0	454	No
07:30 - 08:30	174	+	213	=	387	0	124	No
16:15 - 17:15	158	+	229	=	387	0	436	No
16:00 - 17:00	147	+	231	=	378	0	418	No
15:45 - 16:45	144	+	226	=	370	0	387	No
15:30 - 16:30	142	+	220	=	362	0	359	No
07:45 - 08:45	153	+	206	=	359	0	127	No
15:15 - 16:15	140	+	214	=	354	0	331	No
15:00 - 16:00	138	+	208	=	346	0	303	No
08:00 - 09:00	133	+	200	=	333	0	128	No
08:15 - 09:15	129	+	190	=	319	0	128	No
05:45 - 06:45	150	+	168	=	318	0	66	No
14:45 - 15:45	129	+	189	=	318	0	281	No
17:15 - 18:15	147	+	168	=	315	0	367	No
08:30 - 09:30	125	+	180	=	305	0	128	No
08:45 - 09:45	121	+	170	=	291	0	128	No
14:30 - 15:30	118		171		289	0	257	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 6 hours meet 1A minimums.
 Only 2 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

 Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
07:00 - 08:00	216	+	227	=	443	0	118	Yes
06:00 - 07:00	201	+	226	=	427	0	88	Yes
16:30 - 17:30	169	+	227	=	396	0	454	Yes
15:30 - 16:30	142	+	220	=	362	0	359	Yes
08:00 - 09:00	133	+	200	=	333	0	128	Yes
14:30 - 15:30	118	+	171	=	289	0	257	Yes
05:45 - 06:45	150	+	168	=	318	0	66	No
09:00 - 10:00	114	+	159	=	273	0	131	No
09:15 - 10:15	108	+	158	=	266	0	130	No
12:00 - 13:00	104	+	161	=	265	0	181	No
12:15 - 13:15	102	+	160	=	262	0	180	No
14:15 - 15:15	107	+	153	=	260	0	233	No

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
07:00 - 08:00	216	+	227	=	443	0	118	Yes
06:00 - 07:00	201	+	226	=	427	0	88	Yes
17:00 - 18:00	195	+	224	=	419	0	489	No
16:45 - 17:45	180	+	225	=	405	0	472	No
16:30 - 17:30	169	+	227	=	396	0	454	No
16:15 - 17:15	158	+	229	=	387	0	436	No
16:00 - 17:00	147	+	231	=	378	0	418	No
15:45 - 16:45	144	+	226	=	370	0	387	No
15:30 - 16:30	142	+	220	=	362	0	359	No
15:15 - 16:15	140	+	214	=	354	0	331	No
15:00 - 16:00	138	+	208	=	346	0	303	No
08:00 - 09:00	133	+	200	=	333	0	128	No

CESO, Inc.
GREENGATE DEVELOPMENT
2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

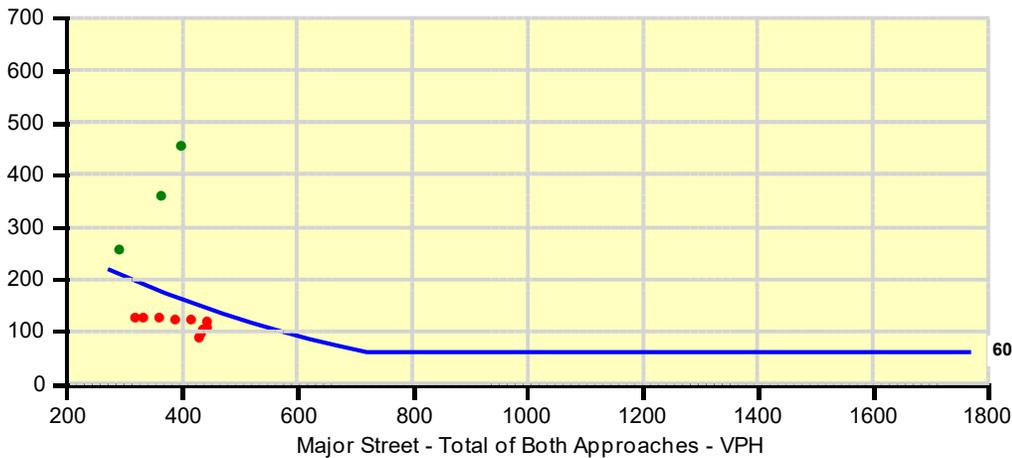
Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				=	Total	Minor Road		Met?
	Major EB	+	Major WB				Minor NB	Minor SB	
16:30 - 17:30	169	+	227	=	396	0	454	Yes	
15:30 - 16:30	142	+	220	=	362	0	359	Yes	
14:30 - 15:30	118	+	171	=	289	0	257	Yes	
07:00 - 08:00	216	+	227	=	443	0	118	No	
06:45 - 07:45	213	+	229	=	442	0	109	No	
06:30 - 07:30	209	+	228	=	437	0	102	No	
06:15 - 07:15	205	+	227	=	432	0	95	No	
06:00 - 07:00	201	+	226	=	427	0	88	No	
07:15 - 08:15	195	+	220	=	415	0	121	No	
07:30 - 08:30	174	+	213	=	387	0	124	No	
07:45 - 08:45	153	+	206	=	359	0	127	No	
						0	128	No	



CESO, Inc.
GREENGATE DEVELOPMENT
 2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

9 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
 Veh/Hr Minor = **100**
 Total Delay (Veh-Hrs) = **4**

Time	Major Road			Minor Road			Warrant Met?		
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB		Delay SB	Met?
17:00 - 18:00	908	Yes	0	-	---	489	-	Yes	Yes
16:45 - 17:45	877	Yes	0	-	---	472	-	Yes	Yes
16:30 - 17:30	850	Yes	0	-	---	454	-	Yes	Yes
16:15 - 17:15	823	Yes	0	-	---	436	-	Yes	Yes
16:00 - 17:00	796	Yes	0	-	---	418	-	Yes	Yes
15:45 - 16:45	757	Yes	0	-	---	387	-	Yes	Yes
15:30 - 16:30	721	Yes	0	-	---	359	-	Yes	Yes
15:15 - 16:15	685	Yes	0	-	---	331	-	Yes	Yes
17:15 - 18:15	682	Yes	0	-	---	367	-	Yes	Yes
15:00 - 16:00	649	No	0	-	---	303	-	Yes	No
14:45 - 15:45	599	No	0	-	---	281	-	Yes	No
07:00 - 08:00	561	No	0	-	---	118	-	Yes	No
06:45 - 07:45	551	No	0	-	---	109	-	Yes	No
14:30 - 15:30	546	No	0	-	---	257	-	Yes	No
06:30 - 07:30	539	No	0	-	---	102	-	Yes	No
07:15 - 08:15	536	No	0	-	---	121	-	Yes	No
06:15 - 07:15	527	No	0	-	---	95	-	No	No
06:00 - 07:00	515	No	0	-	---	88	-	No	No
07:30 - 08:30	511	No	0	-	---	124	-	Yes	No
14:15 - 15:15	493	No	0	-	---	233	-	Yes	No
07:45 - 08:45	486	No	0	-	---	127	-	Yes	No
08:00 - 09:00	461	No	0	-	---	128	-	Yes	No
17:30 - 18:30	456	No	0	-	---	245	-	Yes	No
08:15 - 09:15	447	No	0	-	---	128	-	Yes	No
12:00 - 13:00	446	No	0	-	---	181	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
 2022 BUILD

Study Name: GREENGATE DEV - 2022 BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

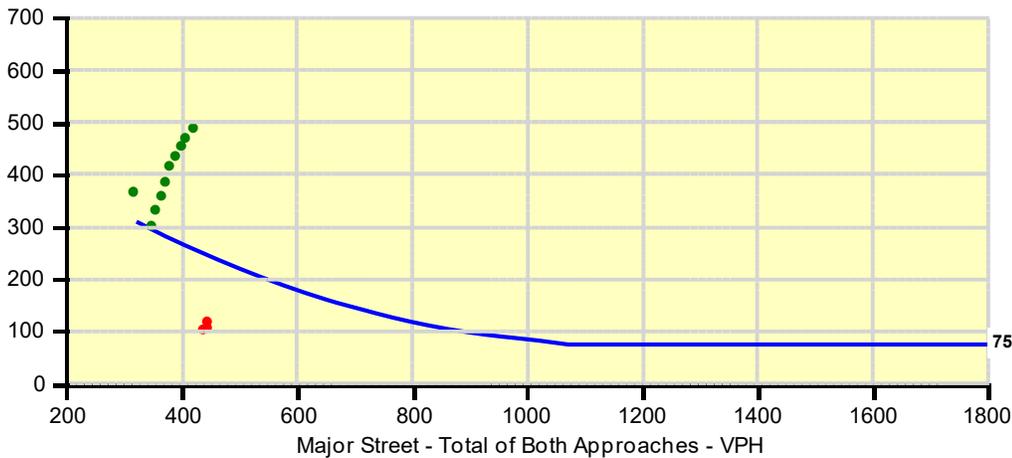
Summary

10 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	195	+	224	=	419	0	489	Yes
16:45 - 17:45	180	+	225	=	405	0	472	Yes
16:30 - 17:30	169	+	227	=	396	0	454	Yes
16:15 - 17:15	158	+	229	=	387	0	436	Yes
16:00 - 17:00	147	+	231	=	378	0	418	Yes
15:45 - 16:45	144	+	226	=	370	0	387	Yes
15:30 - 16:30	142	+	220	=	362	0	359	Yes
15:15 - 16:15	140	+	214	=	354	0	331	Yes
15:00 - 16:00	138	+	208	=	346	0	303	Yes
17:15 - 18:15	147	+	168	=	315	0	367	Yes
07:00 - 08:00	216	+	227	=	443	0	118	No
							109	No



CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 1,661

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,095

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 2,426

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Not Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied

Required volumes reached for 3 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Not Satisfied

Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied

Required 1A volumes reached for 6 hours, 8 are needed

Required 1B volumes reached for 2 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Not Satisfied

Number of hours (3) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (9) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
	HILL ROAD							
06:45 - 07:45	216	+	211	=	427	0	108	Yes
16:30 - 17:30	176	+	214	=	390	0	443	Yes
15:30 - 16:30	143	+	208	=	351	0	350	Yes
06:30 - 07:30	213	+	213	=	426	0	101	No
06:15 - 07:15	210	+	215	=	425	0	94	No
06:00 - 07:00	207	+	217	=	424	0	87	No
07:45 - 08:45	159	+	190	=	349	0	124	No
15:15 - 16:15	142	+	203	=	345	0	322	No
15:00 - 16:00	141	+	198	=	339	0	294	No
08:00 - 09:00	136	+	185	=	321	0	123	No
05:45 - 06:45	156	+	162	=	318	0	63	No
14:45 - 15:45	133	+	179	=	312	0	273	No
08:15 - 09:15	131	+	176	=	307	0	124	No
08:30 - 09:30	126	+	167	=	293	0	125	No
14:30 - 15:30	121	+	161	=	282	0	249	No
08:45 - 09:45	121	+	158	=	279	0	126	No
09:00 - 10:00	116	+	150	=	266	0	128	No
09:15 - 10:15	109	+	150	=	259	0	126	No
12:00 - 13:00	107	+	152	=	259	0	174	No
12:15 - 13:15	105	+	150	=	255	0	172	No
11:45 - 12:45	104	+	149	=	253	0	160	No
14:15 - 15:15	109	+	143	=	252	0	225	No
09:30 - 10:30	102	+	150	=	252	0	124	No
12:30 - 13:30	103	+	148	=	251	0	170	No
12:45 - 13:45	101		146		247	0	168	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
	HILL ROAD							
07:00 - 08:00	222	+	208	=	430	0	115	No
06:45 - 07:45	216	+	211	=	427	0	108	No
06:30 - 07:30	213	+	213	=	426	0	101	No
06:15 - 07:15	210	+	215	=	425	0	94	No
06:00 - 07:00	207	+	217	=	424	0	87	No
17:00 - 18:00	199	+	212	=	411	0	480	No
07:15 - 08:15	201	+	202	=	403	0	118	No
16:45 - 17:45	189	+	212	=	401	0	461	No
16:30 - 17:30	176	+	214	=	390	0	443	No
16:15 - 17:15	163	+	216	=	379	0	425	No
07:30 - 08:30	180	+	196	=	376	0	121	No
16:00 - 17:00	150	+	218	=	368	0	407	No
15:45 - 16:45	144	+	213	=	357	0	378	No
15:30 - 16:30	143	+	208	=	351	0	350	No
07:45 - 08:45	159	+	190	=	349	0	124	No
15:15 - 16:15	142	+	203	=	345	0	322	No
15:00 - 16:00	141	+	198	=	339	0	294	No
08:00 - 09:00	136	+	185	=	321	0	123	No
05:45 - 06:45	156	+	162	=	318	0	63	No
14:45 - 15:45	133	+	179	=	312	0	273	No
17:15 - 18:15	149	+	159	=	308	0	360	No
08:15 - 09:15	131	+	176	=	307	0	124	No
08:30 - 09:30	126	+	167	=	293	0	125	No
14:30 - 15:30	121	+	161	=	282	0	249	No
08:45 - 09:45	121		158		279	0	126	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 6 hours meet 1A minimums.
 Only 2 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
07:00 - 08:00	222	+	208	=	430	0	115	Yes
06:00 - 07:00	207	+	217	=	424	0	87	Yes
16:30 - 17:30	176	+	214	=	390	0	443	Yes
15:30 - 16:30	143	+	208	=	351	0	350	Yes
08:00 - 09:00	136	+	185	=	321	0	123	Yes
14:30 - 15:30	121	+	161	=	282	0	249	Yes
05:45 - 06:45	156	+	162	=	318	0	63	No
09:00 - 10:00	116	+	150	=	266	0	128	No
09:15 - 10:15	109	+	150	=	259	0	126	No
12:00 - 13:00	107	+	152	=	259	0	174	No
12:15 - 13:15	105	+	150	=	255	0	172	No
11:45 - 12:45	104	+	149	=	253	0	160	No

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
07:00 - 08:00	222	+	208	=	430	0	115	Yes
06:00 - 07:00	207	+	217	=	424	0	87	Yes
17:00 - 18:00	199	+	212	=	411	0	480	No
16:45 - 17:45	189	+	212	=	401	0	461	No
16:30 - 17:30	176	+	214	=	390	0	443	No
16:15 - 17:15	163	+	216	=	379	0	425	No
16:00 - 17:00	150	+	218	=	368	0	407	No
15:45 - 16:45	144	+	213	=	357	0	378	No
15:30 - 16:30	143	+	208	=	351	0	350	No
15:15 - 16:15	142	+	203	=	345	0	322	No
15:00 - 16:00	141	+	198	=	339	0	294	No
08:00 - 09:00	136	+	185	=	321	0	123	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

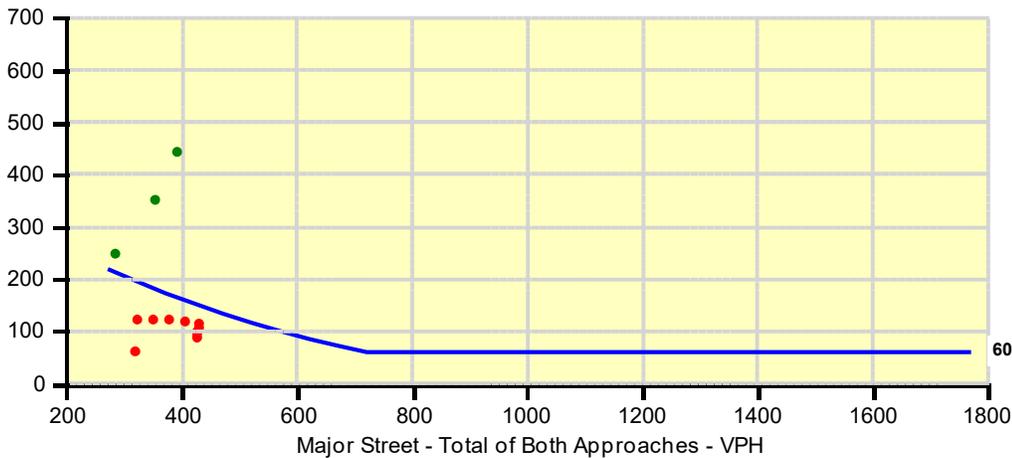
Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
16:30 - 17:30	176	+	214	=	390	0	443	Yes
15:30 - 16:30	143	+	208	=	351	0	350	Yes
14:30 - 15:30	121	+	161	=	282	0	249	Yes
07:00 - 08:00	222	+	208	=	430	0	115	No
06:45 - 07:45	216	+	211	=	427	0	108	No
06:30 - 07:30	213	+	213	=	426	0	101	No
06:15 - 07:15	210	+	215	=	425	0	94	No
06:00 - 07:00	207	+	217	=	424	0	87	No
07:15 - 08:15	201	+	202	=	403	0	118	No
07:30 - 08:30	180	+	196	=	376	0	121	No
07:45 - 08:45	159	+	190	=	349	0	124	No
						0	123	No



CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Time	Major Road		Minor Road			Minor Road		Met?	Warrant Met?
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB		
17:00 - 18:00	891	Yes	0	-	---	480	-	Yes	Yes
16:45 - 17:45	862	Yes	0	-	---	461	-	Yes	Yes
16:30 - 17:30	833	Yes	0	-	---	443	-	Yes	Yes
16:15 - 17:15	804	Yes	0	-	---	425	-	Yes	Yes
16:00 - 17:00	775	Yes	0	-	---	407	-	Yes	Yes
15:45 - 16:45	735	Yes	0	-	---	378	-	Yes	Yes
15:30 - 16:30	701	Yes	0	-	---	350	-	Yes	Yes
17:15 - 18:15	668	Yes	0	-	---	360	-	Yes	Yes
15:15 - 16:15	667	Yes	0	-	---	322	-	Yes	Yes
15:00 - 16:00	633	No	0	-	---	294	-	Yes	No
14:45 - 15:45	585	No	0	-	---	273	-	Yes	No
07:00 - 08:00	545	No	0	-	---	115	-	Yes	No
06:45 - 07:45	535	No	0	-	---	108	-	Yes	No
14:30 - 15:30	531	No	0	-	---	249	-	Yes	No
06:30 - 07:30	527	No	0	-	---	101	-	Yes	No
07:15 - 08:15	521	No	0	-	---	118	-	Yes	No
06:15 - 07:15	519	No	0	-	---	94	-	No	No
06:00 - 07:00	511	No	0	-	---	87	-	No	No
07:30 - 08:30	497	No	0	-	---	121	-	Yes	No
14:15 - 15:15	477	No	0	-	---	225	-	Yes	No
07:45 - 08:45	473	No	0	-	---	124	-	Yes	No
17:30 - 18:30	445	No	0	-	---	240	-	Yes	No
08:00 - 09:00	444	No	0	-	---	123	-	Yes	No
12:00 - 13:00	433	No	0	-	---	174	-	Yes	No
08:15 - 09:15	431	No	0	-	---	124	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 NO-BUILD

Study Name: GREENGATE DEV - 2023 NO-BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

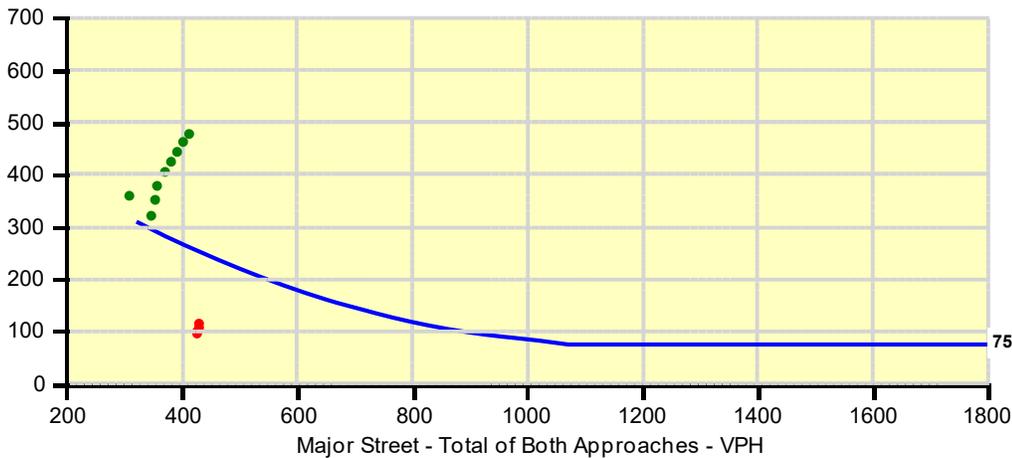
Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				=	Total	Minor Road		Met?
	Major EB	+	Major WB				Minor NB	Minor SB	
17:00 - 18:00	199	+	212	=	411	0	480	Yes	
16:45 - 17:45	189	+	212	=	401	0	461	Yes	
16:30 - 17:30	176	+	214	=	390	0	443	Yes	
16:15 - 17:15	163	+	216	=	379	0	425	Yes	
16:00 - 17:00	150	+	218	=	368	0	407	Yes	
15:45 - 16:45	144	+	213	=	357	0	378	Yes	
15:30 - 16:30	143	+	208	=	351	0	350	Yes	
15:15 - 16:15	142	+	203	=	345	0	322	Yes	
17:15 - 18:15	149	+	159	=	308	0	360	Yes	
07:00 - 08:00	222	+	208	=	430	0	115	No	
06:45 - 07:45	216	+	211	=	427	0	108	No	
							101	No	



CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 1,683

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,408

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 2,671

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Not Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied

Required volumes reached for 5 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Not Satisfied

Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied

Required 1A volumes reached for 8 hours, 8 are needed

Required 1B volumes reached for 3 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Satisfied

Number of hours (4) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (10) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 5 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
	HILL ROAD							
06:30 - 07:30	216	+	248	=	464	0	109	Yes
17:00 - 18:00	202	+	239	=	441	0	515	Yes
07:30 - 08:30	181	+	234	=	415	0	135	Yes
16:00 - 17:00	154	+	246	=	400	0	444	Yes
15:00 - 16:00	143	+	221	=	364	0	323	Yes
06:15 - 07:15	212	+	245	=	457	0	101	No
06:00 - 07:00	208	+	242	=	450	0	93	No
14:45 - 15:45	135	+	202	=	337	0	300	No
05:45 - 06:45	156	+	180	=	336	0	69	No
08:30 - 09:30	125	+	198	=	323	0	137	No
14:30 - 15:30	123	+	184	=	307	0	275	No
08:45 - 09:45	119	+	187	=	306	0	137	No
09:00 - 10:00	117	+	173	=	290	0	140	No
09:15 - 10:15	111	+	172	=	283	0	139	No
12:00 - 13:00	108	+	173	=	281	0	193	No
14:15 - 15:15	111	+	166	=	277	0	250	No
12:15 - 13:15	105	+	172	=	277	0	191	No
09:30 - 10:30	105	+	171	=	276	0	138	No
11:45 - 12:45	106	+	167	=	273	0	180	No
12:30 - 13:30	102	+	171	=	273	0	189	No
13:00 - 14:00	103	+	168	=	271	0	188	No
09:45 - 10:45	99	+	170	=	269	0	137	No
12:45 - 13:45	99	+	170	=	269	0	187	No
11:30 - 12:30	103	+	164	=	267	0	170	No
13:15 - 14:15	102		163		265	0	198	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
	HILL ROAD							
07:00 - 08:00	223	+	250	=	473	0	127	No
06:45 - 07:45	220	+	251	=	471	0	117	No
06:30 - 07:30	216	+	248	=	464	0	109	No
06:15 - 07:15	212	+	245	=	457	0	101	No
06:00 - 07:00	208	+	242	=	450	0	93	No
07:15 - 08:15	202	+	242	=	444	0	131	No
17:00 - 18:00	202	+	239	=	441	0	515	No
16:45 - 17:45	190	+	240	=	430	0	495	No
16:30 - 17:30	178	+	242	=	420	0	478	No
07:30 - 08:30	181	+	234	=	415	0	135	No
16:15 - 17:15	166	+	244	=	410	0	461	No
16:00 - 17:00	154	+	246	=	400	0	444	No
15:45 - 16:45	152	+	239	=	391	0	413	No
07:45 - 08:45	160	+	226	=	386	0	139	No
15:30 - 16:30	149	+	233	=	382	0	383	No
15:15 - 16:15	146	+	227	=	373	0	353	No
15:00 - 16:00	143	+	221	=	364	0	323	No
08:00 - 09:00	137	+	220	=	357	0	137	No
08:15 - 09:15	131	+	209	=	340	0	137	No
14:45 - 15:45	135	+	202	=	337	0	300	No
05:45 - 06:45	156	+	180	=	336	0	69	No
17:15 - 18:15	151	+	180	=	331	0	387	No
08:30 - 09:30	125	+	198	=	323	0	137	No
14:30 - 15:30	123	+	184	=	307	0	275	No
08:45 - 09:45	119		187		306	0	137	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

8 hours meet 1A minimums.
 Only 3 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
07:00 - 08:00	223	+	250	=	473	0	127	Yes
06:00 - 07:00	208	+	242	=	450	0	93	Yes
16:30 - 17:30	178	+	242	=	420	0	478	Yes
15:30 - 16:30	149	+	233	=	382	0	383	Yes
08:00 - 09:00	137	+	220	=	357	0	137	Yes
14:30 - 15:30	123	+	184	=	307	0	275	Yes
09:00 - 10:00	117	+	173	=	290	0	140	Yes
12:00 - 13:00	108	+	173	=	281	0	193	Yes
05:45 - 06:45	156	+	180	=	336	0	69	No
14:15 - 15:15	111	+	166	=	277	0	250	No
11:45 - 12:45	106	+	167	=	273	0	180	No
13:00 - 14:00	103	+	168	=	271	0	188	No

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
07:00 - 08:00	223	+	250	=	473	0	127	Yes
06:00 - 07:00	208	+	242	=	450	0	93	Yes
16:30 - 17:30	178	+	242	=	420	0	478	Yes
16:15 - 17:15	166	+	244	=	410	0	461	No
16:00 - 17:00	154	+	246	=	400	0	444	No
15:45 - 16:45	152	+	239	=	391	0	413	No
15:30 - 16:30	149	+	233	=	382	0	383	No
15:15 - 16:15	146	+	227	=	373	0	353	No
15:00 - 16:00	143	+	221	=	364	0	323	No
08:00 - 09:00	137	+	220	=	357	0	137	No
08:15 - 09:15	131	+	209	=	340	0	137	No
14:45 - 15:45	135	+	202	=	337	0	300	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

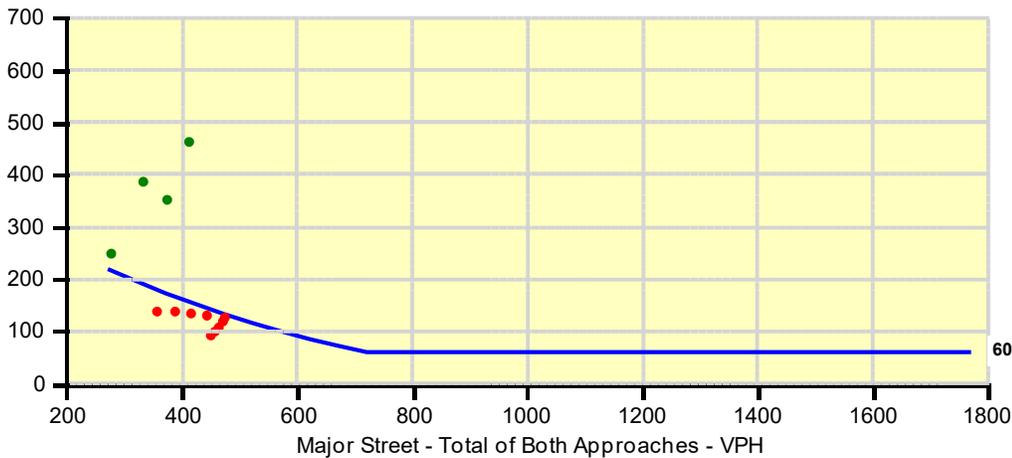
Summary

4 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
16:15 - 17:15	166	+	244	=	410	0	461	Yes
15:15 - 16:15	146	+	227	=	373	0	353	Yes
17:15 - 18:15	151	+	180	=	331	0	387	Yes
14:15 - 15:15	111	+	166	=	277	0	250	Yes
07:00 - 08:00	223	+	250	=	473	0	127	No
06:45 - 07:45	220	+	251	=	471	0	117	No
06:30 - 07:30	216	+	248	=	464	0	109	No
06:15 - 07:15	212	+	245	=	457	0	101	No
06:00 - 07:00	208	+	242	=	450	0	93	No
07:15 - 08:15	202	+	242	=	444	0	131	No
07:30 - 08:30	181	+	234	=	415	0	135	No
							139	No



CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

10 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Time	Major Road			Minor Road			Warrant Met?		
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB		Delay SB	Met?
17:00 - 18:00	956	Yes	0	-	---	515	-	Yes	Yes
16:45 - 17:45	925	Yes	0	-	---	495	-	Yes	Yes
16:30 - 17:30	898	Yes	0	-	---	478	-	Yes	Yes
16:15 - 17:15	871	Yes	0	-	---	461	-	Yes	Yes
16:00 - 17:00	844	Yes	0	-	---	444	-	Yes	Yes
15:45 - 16:45	804	Yes	0	-	---	413	-	Yes	Yes
15:30 - 16:30	765	Yes	0	-	---	383	-	Yes	Yes
15:15 - 16:15	726	Yes	0	-	---	353	-	Yes	Yes
17:15 - 18:15	718	Yes	0	-	---	387	-	Yes	Yes
15:00 - 16:00	687	Yes	0	-	---	323	-	Yes	Yes
14:45 - 15:45	637	No	0	-	---	300	-	Yes	No
07:00 - 08:00	600	No	0	-	---	127	-	Yes	No
06:45 - 07:45	588	No	0	-	---	117	-	Yes	No
14:30 - 15:30	582	No	0	-	---	275	-	Yes	No
07:15 - 08:15	575	No	0	-	---	131	-	Yes	No
06:30 - 07:30	573	No	0	-	---	109	-	Yes	No
06:15 - 07:15	558	No	0	-	---	101	-	Yes	No
07:30 - 08:30	550	No	0	-	---	135	-	Yes	No
06:00 - 07:00	543	No	0	-	---	93	-	No	No
14:15 - 15:15	527	No	0	-	---	250	-	Yes	No
07:45 - 08:45	525	No	0	-	---	139	-	Yes	No
08:00 - 09:00	494	No	0	-	---	137	-	Yes	No
17:30 - 18:30	480	No	0	-	---	259	-	Yes	No
08:15 - 09:15	477	No	0	-	---	137	-	Yes	No
12:00 - 13:00	474	No	0	-	---	193	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
2023 BUILD

Study Name: GREENGATE DEV - 2023 BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

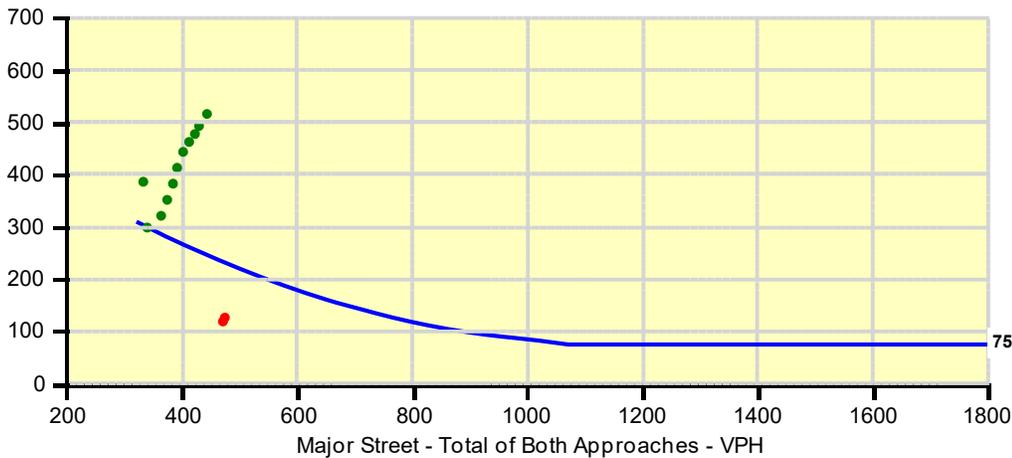
Summary

11 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	202	+	239	=	441	0	515	Yes
16:45 - 17:45	190	+	240	=	430	0	495	Yes
16:30 - 17:30	178	+	242	=	420	0	478	Yes
16:15 - 17:15	166	+	244	=	410	0	461	Yes
16:00 - 17:00	154	+	246	=	400	0	444	Yes
15:45 - 16:45	152	+	239	=	391	0	413	Yes
15:30 - 16:30	149	+	233	=	382	0	383	Yes
15:15 - 16:15	146	+	227	=	373	0	353	Yes
15:00 - 16:00	143	+	221	=	364	0	323	Yes
14:45 - 15:45	135	+	202	=	337	0	300	Yes
17:15 - 18:15	151	+	180	=	331	0	387	Yes
							127	No



CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 1,715

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,144

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 2,489

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Not Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied

Required volumes reached for 4 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Not Satisfied

Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied

Required 1A volumes reached for 6 hours, 8 are needed

Required 1B volumes reached for 3 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Not Satisfied

Number of hours (3) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (10) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 4 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
06:30 - 07:30	222	+	216	=	438	0	105	Yes
16:15 - 17:15	167	+	221	=	388	0	438	Yes
07:30 - 08:30	183	+	203	=	386	0	122	Yes
15:15 - 16:15	147	+	209	=	356	0	331	Yes
06:15 - 07:15	218	+	219	=	437	0	97	No
06:00 - 07:00	214	+	222	=	436	0	89	No
15:00 - 16:00	145	+	203	=	348	0	302	No
05:45 - 06:45	159	+	168	=	327	0	66	No
17:15 - 18:15	154	+	163	=	317	0	368	No
14:45 - 15:45	136	+	181	=	317	0	277	No
08:30 - 09:30	132	+	171	=	303	0	129	No
08:45 - 09:45	128	+	162	=	290	0	130	No
14:30 - 15:30	124	+	163	=	287	0	253	No
09:00 - 10:00	121	+	154	=	275	0	131	No
09:15 - 10:15	115	+	152	=	267	0	129	No
12:00 - 13:00	110	+	155	=	265	0	179	No
12:15 - 13:15	109	+	155	=	264	0	177	No
12:30 - 13:30	108	+	155	=	263	0	175	No
12:45 - 13:45	107	+	155	=	262	0	173	No
09:30 - 10:30	109	+	150	=	259	0	127	No
14:15 - 15:15	112	+	145	=	257	0	229	No
11:45 - 12:45	107	+	147	=	254	0	169	No
13:00 - 14:00	104	+	150	=	254	0	172	No
09:45 - 10:45	103	+	148	=	251	0	125	No
11:30 - 12:30	104		145		249	0	157	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
07:00 - 08:00	229	+	213	=	442	0	118	No
06:45 - 07:45	226	+	213	=	439	0	113	No
06:30 - 07:30	222	+	216	=	438	0	105	No
06:15 - 07:15	218	+	219	=	437	0	97	No
06:00 - 07:00	214	+	222	=	436	0	89	No
17:00 - 18:00	205	+	217	=	422	0	492	No
07:15 - 08:15	206	+	208	=	414	0	120	No
16:45 - 17:45	191	+	217	=	408	0	478	No
16:30 - 17:30	179	+	219	=	398	0	458	No
16:15 - 17:15	167	+	221	=	388	0	438	No
07:30 - 08:30	183	+	203	=	386	0	122	No
16:00 - 17:00	155	+	223	=	378	0	418	No
15:45 - 16:45	151	+	221	=	372	0	389	No
15:30 - 16:30	149	+	215	=	364	0	360	No
07:45 - 08:45	160	+	198	=	358	0	124	No
15:15 - 16:15	147	+	209	=	356	0	331	No
15:00 - 16:00	145	+	203	=	348	0	302	No
08:00 - 09:00	140	+	189	=	329	0	127	No
05:45 - 06:45	159	+	168	=	327	0	66	No
17:15 - 18:15	154	+	163	=	317	0	368	No
14:45 - 15:45	136	+	181	=	317	0	277	No
08:15 - 09:15	136	+	180	=	316	0	128	No
08:30 - 09:30	132	+	171	=	303	0	129	No
08:45 - 09:45	128	+	162	=	290	0	130	No
14:30 - 15:30	124		163		287	0	253	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 6 hours meet 1A minimums.
 Only 3 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
07:00 - 08:00	229	+	213	=	442	0	118	Yes
06:00 - 07:00	214	+	222	=	436	0	89	Yes
16:30 - 17:30	179	+	219	=	398	0	458	Yes
15:30 - 16:30	149	+	215	=	364	0	360	Yes
08:00 - 09:00	140	+	189	=	329	0	127	Yes
14:30 - 15:30	124	+	163	=	287	0	253	Yes
05:45 - 06:45	159	+	168	=	327	0	66	No
09:00 - 10:00	121	+	154	=	275	0	131	No
09:15 - 10:15	115	+	152	=	267	0	129	No
12:00 - 13:00	110	+	155	=	265	0	179	No
12:15 - 13:15	109	+	155	=	264	0	177	No
12:30 - 13:30	108	+	155	=	263	0	175	No

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
07:00 - 08:00	229	+	213	=	442	0	118	Yes
06:00 - 07:00	214	+	222	=	436	0	89	Yes
17:00 - 18:00	205	+	217	=	422	0	492	Yes
16:45 - 17:45	191	+	217	=	408	0	478	No
16:30 - 17:30	179	+	219	=	398	0	458	No
16:15 - 17:15	167	+	221	=	388	0	438	No
16:00 - 17:00	155	+	223	=	378	0	418	No
15:45 - 16:45	151	+	221	=	372	0	389	No
15:30 - 16:30	149	+	215	=	364	0	360	No
15:15 - 16:15	147	+	209	=	356	0	331	No
15:00 - 16:00	145	+	203	=	348	0	302	No
08:00 - 09:00	140	+	189	=	329	0	127	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

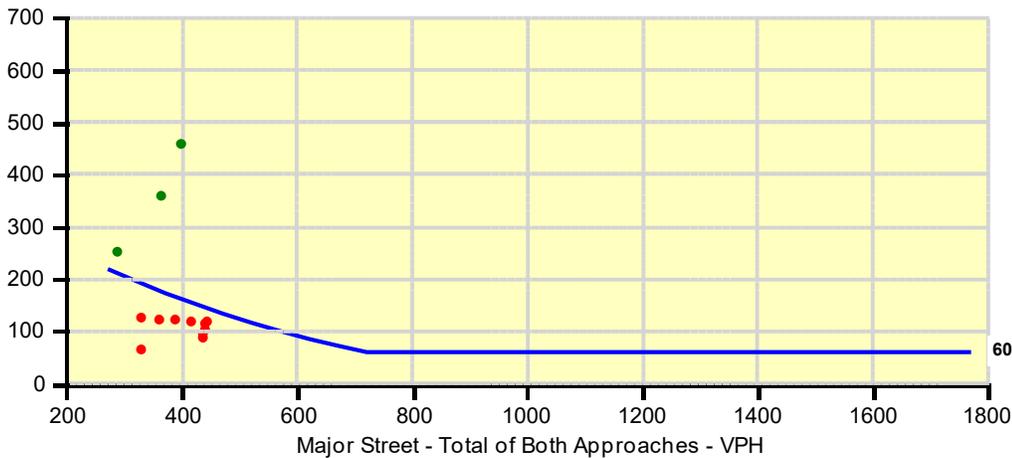
Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				=	Total	Minor Road		Met?
	Major EB	+	Major WB				Minor NB	Minor SB	
16:30 - 17:30	179	+	219	=	398	0	458	Yes	
15:30 - 16:30	149	+	215	=	364	0	360	Yes	
14:30 - 15:30	124	+	163	=	287	0	253	Yes	
07:00 - 08:00	229	+	213	=	442	0	118	No	
06:45 - 07:45	226	+	213	=	439	0	113	No	
06:30 - 07:30	222	+	216	=	438	0	105	No	
06:15 - 07:15	218	+	219	=	437	0	97	No	
06:00 - 07:00	214	+	222	=	436	0	89	No	
07:15 - 08:15	206	+	208	=	414	0	120	No	
07:30 - 08:30	183	+	203	=	386	0	122	No	
07:45 - 08:45	160	+	198	=	358	0	124	No	
						0	127	No	



CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

10 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Time	Major Road		Minor Road			Minor Road		Met?	Warrant Met?
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB		
17:00 - 18:00	914	Yes	0	-	---	492	-	Yes	Yes
16:45 - 17:45	886	Yes	0	-	---	478	-	Yes	Yes
16:30 - 17:30	856	Yes	0	-	---	458	-	Yes	Yes
16:15 - 17:15	826	Yes	0	-	---	438	-	Yes	Yes
16:00 - 17:00	796	Yes	0	-	---	418	-	Yes	Yes
15:45 - 16:45	761	Yes	0	-	---	389	-	Yes	Yes
15:30 - 16:30	724	Yes	0	-	---	360	-	Yes	Yes
15:15 - 16:15	687	Yes	0	-	---	331	-	Yes	Yes
17:15 - 18:15	685	Yes	0	-	---	368	-	Yes	Yes
15:00 - 16:00	650	Yes	0	-	---	302	-	Yes	Yes
14:45 - 15:45	594	No	0	-	---	277	-	Yes	No
07:00 - 08:00	560	No	0	-	---	118	-	Yes	No
06:45 - 07:45	552	No	0	-	---	113	-	Yes	No
06:30 - 07:30	543	No	0	-	---	105	-	Yes	No
14:30 - 15:30	540	No	0	-	---	253	-	Yes	No
07:15 - 08:15	534	No	0	-	---	120	-	Yes	No
06:15 - 07:15	534	No	0	-	---	97	-	No	No
06:00 - 07:00	525	No	0	-	---	89	-	No	No
07:30 - 08:30	508	No	0	-	---	122	-	Yes	No
14:15 - 15:15	486	No	0	-	---	229	-	Yes	No
07:45 - 08:45	482	No	0	-	---	124	-	Yes	No
08:00 - 09:00	456	No	0	-	---	127	-	Yes	No
17:30 - 18:30	456	No	0	-	---	244	-	Yes	No
08:15 - 09:15	444	No	0	-	---	128	-	Yes	No
12:00 - 13:00	444	No	0	-	---	179	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 NO-BUILD

Study Name: GREENGATE DEV - 2024 NO-BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

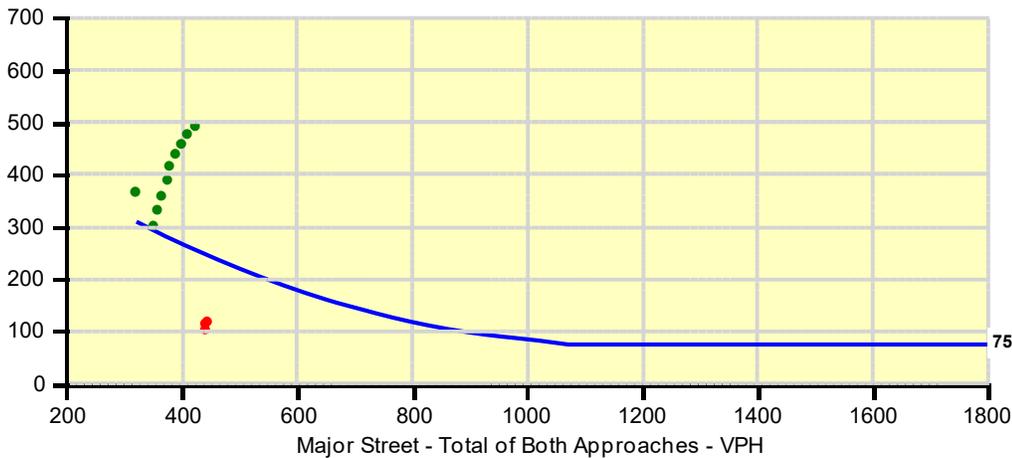
Summary

10 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	205	+	217	=	422	0	492	Yes
16:45 - 17:45	191	+	217	=	408	0	478	Yes
16:30 - 17:30	179	+	219	=	398	0	458	Yes
16:15 - 17:15	167	+	221	=	388	0	438	Yes
16:00 - 17:00	155	+	223	=	378	0	418	Yes
15:45 - 16:45	151	+	221	=	372	0	389	Yes
15:30 - 16:30	149	+	215	=	364	0	360	Yes
15:15 - 16:15	147	+	209	=	356	0	331	Yes
15:00 - 16:00	145	+	203	=	348	0	302	Yes
17:15 - 18:15	154	+	163	=	317	0	368	Yes
07:00 - 08:00	229	+	213	=	442	0	118	No
							113	No



CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 1,750

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,652

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 2,904

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Not Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied

Required volumes reached for 6 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Not Satisfied

Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied

Required 1A volumes reached for 12 hours, 8 are needed

Required 1B volumes reached for 4 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Satisfied

Number of hours (7) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (11) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 6 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
	HILL ROAD							
06:15 - 07:15	219	+	267	=	486	0	109	Yes
07:15 - 08:15	207	+	272	=	479	0	140	Yes
16:45 - 17:45	199	+	263	=	462	0	534	Yes
15:45 - 16:45	156	+	261	=	417	0	446	Yes
08:15 - 09:15	137	+	232	=	369	0	151	Yes
14:45 - 15:45	140	+	223	=	363	0	323	Yes
06:00 - 07:00	214	+	261	=	475	0	99	No
05:45 - 06:45	159	+	195	=	354	0	75	No
14:30 - 15:30	128	+	204	=	332	0	297	No
09:15 - 10:15	116	+	189	=	305	0	151	No
12:00 - 13:00	113	+	190	=	303	0	210	No
14:15 - 15:15	116	+	185	=	301	0	271	No
12:15 - 13:15	112	+	189	=	301	0	208	No
12:30 - 13:30	111	+	188	=	299	0	206	No
09:30 - 10:30	110	+	188	=	298	0	151	No
12:45 - 13:45	110	+	187	=	297	0	204	No
11:45 - 12:45	110	+	183	=	293	0	203	No
13:00 - 14:00	107	+	186	=	293	0	205	No
09:45 - 10:45	104	+	187	=	291	0	151	No
11:30 - 12:30	107	+	180	=	287	0	195	No
13:15 - 14:15	106	+	181	=	287	0	215	No
10:00 - 11:00	96	+	187	=	283	0	149	No
13:30 - 14:30	105	+	176	=	281	0	225	No
11:15 - 12:15	104	+	177	=	281	0	187	No
10:15 - 11:15	97		184		281	0	156	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
07:00 - 08:00	230	+	281	=	511	0	138	No
06:45 - 07:45	229	+	279	=	508	0	129	No
06:30 - 07:30	224	+	273	=	497	0	119	No
06:15 - 07:15	219	+	267	=	486	0	109	No
07:15 - 08:15	207	+	272	=	479	0	140	No
06:00 - 07:00	214	+	261	=	475	0	99	No
17:00 - 18:00	211	+	262	=	473	0	551	No
16:45 - 17:45	199	+	263	=	462	0	534	No
16:30 - 17:30	186	+	265	=	451	0	515	No
07:30 - 08:30	184	+	263	=	447	0	142	No
16:15 - 17:15	173	+	267	=	440	0	496	No
16:00 - 17:00	160	+	269	=	429	0	477	No
15:45 - 16:45	156	+	261	=	417	0	446	No
07:45 - 08:45	161	+	254	=	415	0	144	No
15:30 - 16:30	154	+	254	=	408	0	414	No
15:15 - 16:15	152	+	247	=	399	0	382	No
15:00 - 16:00	150	+	240	=	390	0	350	No
08:00 - 09:00	142	+	246	=	388	0	150	No
08:15 - 09:15	137	+	232	=	369	0	151	No
14:45 - 15:45	140	+	223	=	363	0	323	No
17:15 - 18:15	158	+	197	=	355	0	413	No
05:45 - 06:45	159	+	195	=	354	0	75	No
08:30 - 09:30	132	+	218	=	350	0	152	No
14:30 - 15:30	128	+	204	=	332	0	297	No
08:45 - 09:45	127		204		331	0	153	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

12 hours meet 1A minimums.
 Only 4 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

 Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
07:00 - 08:00	230	+	281	=	511	0	138	Yes
06:00 - 07:00	214	+	261	=	475	0	99	Yes
16:15 - 17:15	173	+	267	=	440	0	496	Yes
15:15 - 16:15	152	+	247	=	399	0	382	Yes
08:00 - 09:00	142	+	246	=	388	0	150	Yes
17:15 - 18:15	158	+	197	=	355	0	413	Yes
09:00 - 10:00	122	+	190	=	312	0	151	Yes
14:15 - 15:15	116	+	185	=	301	0	271	Yes
12:15 - 13:15	112	+	189	=	301	0	208	Yes
13:15 - 14:15	106	+	181	=	287	0	215	Yes
10:00 - 11:00	96	+	187	=	283	0	149	Yes
11:15 - 12:15	104	+	177	=	281	0	187	Yes

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
07:00 - 08:00	230	+	281	=	511	0	138	Yes
06:00 - 07:00	214	+	261	=	475	0	99	Yes
17:00 - 18:00	211	+	262	=	473	0	551	Yes
16:00 - 17:00	160	+	269	=	429	0	477	Yes
15:45 - 16:45	156	+	261	=	417	0	446	No
15:30 - 16:30	154	+	254	=	408	0	414	No
15:15 - 16:15	152	+	247	=	399	0	382	No
15:00 - 16:00	150	+	240	=	390	0	350	No
08:00 - 09:00	142	+	246	=	388	0	150	No
08:15 - 09:15	137	+	232	=	369	0	151	No
14:45 - 15:45	140	+	223	=	363	0	323	No
05:45 - 06:45	159	+	195	=	354	0	75	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

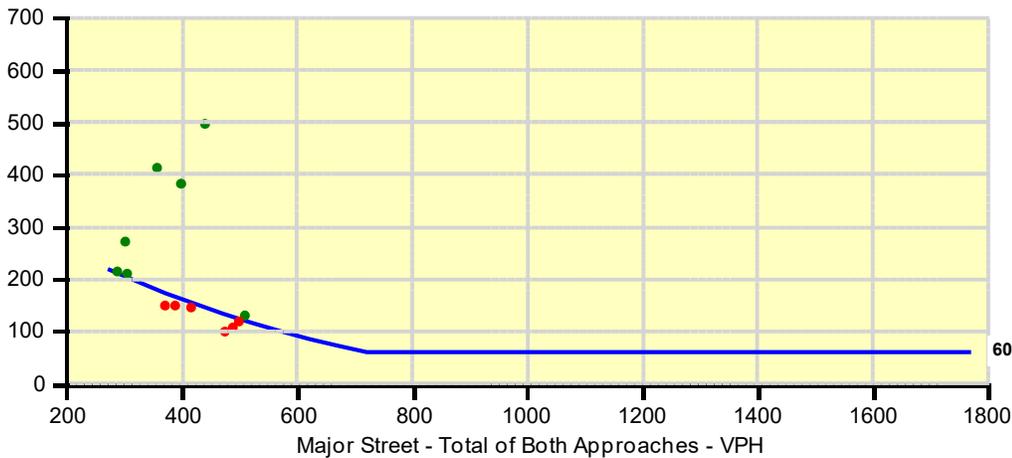
Summary

7 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
06:45 - 07:45	229	+	279	=	508	0	129	Yes
16:15 - 17:15	173	+	267	=	440	0	496	Yes
15:15 - 16:15	152	+	247	=	399	0	382	Yes
17:15 - 18:15	158	+	197	=	355	0	413	Yes
12:00 - 13:00	113	+	190	=	303	0	210	Yes
14:15 - 15:15	116	+	185	=	301	0	271	Yes
13:15 - 14:15	106	+	181	=	287	0	215	Yes
06:30 - 07:30	224	+	273	=	497	0	119	No
06:15 - 07:15	219	+	267	=	486	0	109	No
06:00 - 07:00	214	+	261	=	475	0	99	No
07:45 - 08:45	161	+	254	=	415	0	144	No
							150	No



CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

11 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Time	Major Road			Minor Road			Warrant Met?		
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB		Delay SB	Met?
17:00 - 18:00	1024	Yes	0	-	---	551	-	Yes	Yes
16:45 - 17:45	996	Yes	0	-	---	534	-	Yes	Yes
16:30 - 17:30	966	Yes	0	-	---	515	-	Yes	Yes
16:15 - 17:15	936	Yes	0	-	---	496	-	Yes	Yes
16:00 - 17:00	906	Yes	0	-	---	477	-	Yes	Yes
15:45 - 16:45	863	Yes	0	-	---	446	-	Yes	Yes
15:30 - 16:30	822	Yes	0	-	---	414	-	Yes	Yes
15:15 - 16:15	781	Yes	0	-	---	382	-	Yes	Yes
17:15 - 18:15	768	Yes	0	-	---	413	-	Yes	Yes
15:00 - 16:00	740	Yes	0	-	---	350	-	Yes	Yes
14:45 - 15:45	686	Yes	0	-	---	323	-	Yes	Yes
07:00 - 08:00	649	No	0	-	---	138	-	Yes	No
06:45 - 07:45	637	No	0	-	---	129	-	Yes	No
14:30 - 15:30	629	No	0	-	---	297	-	Yes	No
07:15 - 08:15	619	No	0	-	---	140	-	Yes	No
06:30 - 07:30	616	No	0	-	---	119	-	Yes	No
06:15 - 07:15	595	No	0	-	---	109	-	Yes	No
07:30 - 08:30	589	No	0	-	---	142	-	Yes	No
06:00 - 07:00	574	No	0	-	---	99	-	No	No
14:15 - 15:15	572	No	0	-	---	271	-	Yes	No
07:45 - 08:45	559	No	0	-	---	144	-	Yes	No
08:00 - 09:00	538	No	0	-	---	150	-	Yes	No
08:15 - 09:15	520	No	0	-	---	151	-	Yes	No
14:00 - 15:00	515	No	0	-	---	245	-	Yes	No
12:00 - 13:00	513	No	0	-	---	210	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
2024 BUILD

Study Name: GREENGATE DEV - 2024 BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

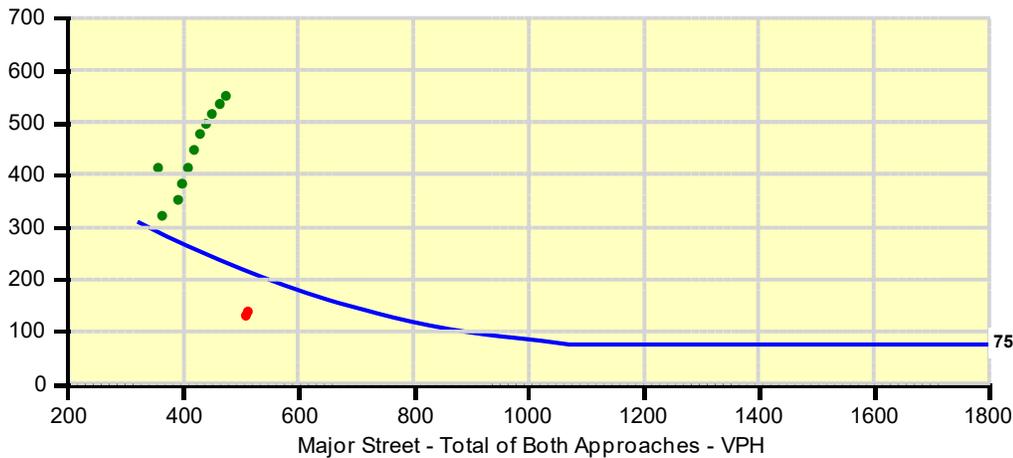
Summary

11 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	211	+	262	=	473	0	551	Yes
16:45 - 17:45	199	+	263	=	462	0	534	Yes
16:30 - 17:30	186	+	265	=	451	0	515	Yes
16:15 - 17:15	173	+	267	=	440	0	496	Yes
16:00 - 17:00	160	+	269	=	429	0	477	Yes
15:45 - 16:45	156	+	261	=	417	0	446	Yes
15:30 - 16:30	154	+	254	=	408	0	414	Yes
15:15 - 16:15	152	+	247	=	399	0	382	Yes
15:00 - 16:00	150	+	240	=	390	0	350	Yes
14:45 - 15:45	140	+	223	=	363	0	323	Yes
17:15 - 18:15	158	+	197	=	355	0	413	Yes
							138	No



CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,419

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,752

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 3,139

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes	Satisfied
Warrant 1A - Minimum Vehicular Volume	Satisfied
Required volumes reached for 10 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic	Not Satisfied
Required volumes reached for 3 hours, 8 are needed	
Warrant 1C - Combination of Warrants	Not Satisfied
Required 1A volumes reached for 12 hours, 8 are needed	
Required 1B volumes reached for 6 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Satisfied
Number of hours (10) volumes exceed minimum >= minimum required (4).	
Warrant 3 - Peak Hour	Satisfied
Warrant 3A - Peak Hour Delay	Satisfied
Number of one hour periods (19) volumes exceed minimum >= required (1). Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes	Satisfied
Volumes exceed minimums for at least one hour period.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Evaluated
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

10 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

Time	Major Road				Minor Road		Met?	
	Major EB	+	Major WB	=	Total	Minor NB		Minor SB
07:00 - 08:00	303	+	262	=	565	0	148	Yes
06:00 - 07:00	279	+	269	=	548	0	113	Yes
16:15 - 17:15	240	+	289	=	529	0	550	Yes
15:15 - 16:15	211	+	271	=	482	0	418	Yes
17:15 - 18:15	216	+	211	=	427	0	466	Yes
08:00 - 09:00	189	+	232	=	421	0	160	Yes
12:30 - 13:30	160	+	206	=	366	0	220	Yes
14:15 - 15:15	166	+	197	=	363	0	289	Yes
09:00 - 10:00	167	+	192	=	359	0	166	Yes
11:30 - 12:30	160	+	195	=	355	0	199	Yes
05:45 - 06:45	207	+	201	=	408	0	87	No
11:15 - 12:15	155	+	190	=	345	0	183	No
13:30 - 14:30	154	+	186	=	340	0	238	No
11:00 - 12:00	150	+	185	=	335	0	167	No
10:45 - 11:45	144	+	188	=	332	0	164	No
13:45 - 14:45	153	+	178	=	331	0	249	No
10:30 - 11:30	142	+	189	=	331	0	161	No
10:15 - 11:15	140	+	190	=	330	0	158	No
10:00 - 11:00	138	+	191	=	329	0	155	No
14:00 - 15:00	151	+	174	=	325	0	259	No
05:30 - 06:30	138	+	134	=	272	0	58	No
05:15 - 06:15	69	+	67	=	136	0	29	No
00:00 - 01:00	0	+	0	=	0	0	0	No
00:15 - 01:15	0	+	0	=	0	0	0	No
00:30 - 01:30	0		0		0	0	0	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 3 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
07:00 - 08:00	303	+	262	=	565	0	148	Yes
06:00 - 07:00	279	+	269	=	548	0	113	Yes
16:15 - 17:15	240	+	289	=	529	0	550	Yes
16:00 - 17:00	222	+	290	=	512	0	527	No
15:45 - 16:45	215	+	283	=	498	0	492	No
15:30 - 16:30	213	+	277	=	490	0	455	No
15:15 - 16:15	211	+	271	=	482	0	418	No
15:00 - 16:00	209	+	265	=	474	0	381	No
14:45 - 15:45	196	+	243	=	439	0	349	No
17:15 - 18:15	216	+	211	=	427	0	466	No
08:00 - 09:00	189	+	232	=	421	0	160	No
05:45 - 06:45	207	+	201	=	408	0	87	No
08:15 - 09:15	184	+	222	=	406	0	162	No
14:30 - 15:30	181	+	220	=	401	0	319	No
08:30 - 09:30	179	+	212	=	391	0	164	No
08:45 - 09:45	174	+	202	=	376	0	166	No
12:00 - 13:00	166	+	208	=	374	0	226	No
12:15 - 13:15	163	+	207	=	370	0	223	No
12:30 - 13:30	160	+	206	=	366	0	220	No
11:45 - 12:45	165	+	200	=	365	0	215	No
14:15 - 15:15	166	+	197	=	363	0	289	No
12:45 - 13:45	157	+	205	=	362	0	217	No
09:00 - 10:00	167	+	192	=	359	0	166	No
13:00 - 14:00	156	+	202	=	358	0	216	No
11:30 - 12:30	160		195		355	0	199	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

12 hours meet 1A minimums.
 Only 6 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

 Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
16:45 - 17:45	276	+	287	=	563	0	596	Yes
06:45 - 07:45	297	+	266	=	563	0	137	Yes
15:45 - 16:45	215	+	283	=	498	0	492	Yes
07:45 - 08:45	219	+	238	=	457	0	157	Yes
14:45 - 15:45	196	+	243	=	439	0	349	Yes
05:45 - 06:45	207	+	201	=	408	0	87	Yes
08:45 - 09:45	174	+	202	=	376	0	166	Yes
11:45 - 12:45	165	+	200	=	365	0	215	Yes
12:45 - 13:45	157	+	205	=	362	0	217	Yes
09:45 - 10:45	146	+	192	=	338	0	154	Yes
10:45 - 11:45	144	+	188	=	332	0	164	Yes
13:45 - 14:45	153	+	178	=	331	0	249	Yes

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
07:00 - 08:00	303	+	262	=	565	0	148	Yes
16:45 - 17:45	276	+	287	=	563	0	596	Yes
06:00 - 07:00	279	+	269	=	548	0	113	Yes
15:45 - 16:45	215	+	283	=	498	0	492	Yes
14:45 - 15:45	196	+	243	=	439	0	349	Yes
08:00 - 09:00	189	+	232	=	421	0	160	Yes
05:45 - 06:45	207	+	201	=	408	0	87	No
14:30 - 15:30	181	+	220	=	401	0	319	No
12:00 - 13:00	166	+	208	=	374	0	226	No
12:15 - 13:15	163	+	207	=	370	0	223	No
12:30 - 13:30	160	+	206	=	366	0	220	No
11:45 - 12:45	165	+	200	=	365	0	215	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

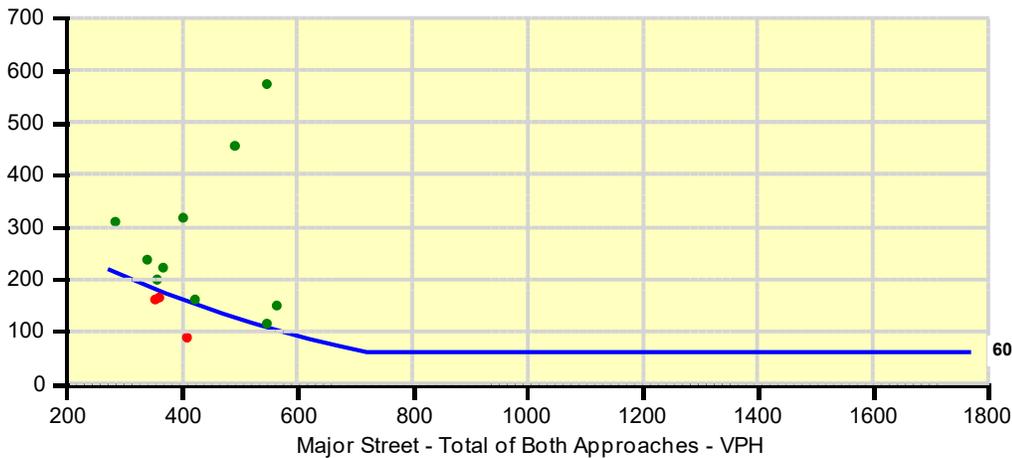
Summary

10 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Minor Road		Met?	
	Major EB	+	Major WB	=	Total	Minor NB		Minor SB
07:00 - 08:00	303	+	262	=	565	0	148	Yes
06:00 - 07:00	279	+	269	=	548	0	113	Yes
16:30 - 17:30	258	+	288	=	546	0	573	Yes
15:30 - 16:30	213	+	277	=	490	0	455	Yes
08:00 - 09:00	189	+	232	=	421	0	160	Yes
14:30 - 15:30	181	+	220	=	401	0	319	Yes
12:30 - 13:30	160	+	206	=	366	0	220	Yes
11:30 - 12:30	160	+	195	=	355	0	199	Yes
13:30 - 14:30	154	+	186	=	340	0	238	Yes
17:30 - 18:30	143	+	140	=	283	0	311	Yes
05:45 - 06:45	207	+	201	=	408	0	87	No
							166	No



CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

19 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Time	Major Road		Minor Road			Minor Road		Met?	Warrant Met?
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB		
17:00 - 18:00	1192	Yes	0	-	---	621	-	Yes	Yes
16:45 - 17:45	1159	Yes	0	-	---	596	-	Yes	Yes
16:30 - 17:30	1119	Yes	0	-	---	573	-	Yes	Yes
16:15 - 17:15	1079	Yes	0	-	---	550	-	Yes	Yes
16:00 - 17:00	1039	Yes	0	-	---	527	-	Yes	Yes
15:45 - 16:45	990	Yes	0	-	---	492	-	Yes	Yes
15:30 - 16:30	945	Yes	0	-	---	455	-	Yes	Yes
15:15 - 16:15	900	Yes	0	-	---	418	-	Yes	Yes
17:15 - 18:15	893	Yes	0	-	---	466	-	Yes	Yes
15:00 - 16:00	855	Yes	0	-	---	381	-	Yes	Yes
14:45 - 15:45	788	Yes	0	-	---	349	-	Yes	Yes
14:30 - 15:30	720	Yes	0	-	---	319	-	Yes	Yes
07:00 - 08:00	713	Yes	0	-	---	148	-	Yes	Yes
06:45 - 07:45	700	Yes	0	-	---	137	-	Yes	Yes
06:30 - 07:30	687	Yes	0	-	---	129	-	Yes	Yes
07:15 - 08:15	680	Yes	0	-	---	151	-	Yes	Yes
06:15 - 07:15	674	Yes	0	-	---	121	-	Yes	Yes
06:00 - 07:00	661	Yes	0	-	---	113	-	Yes	Yes
14:15 - 15:15	652	Yes	0	-	---	289	-	Yes	Yes
07:30 - 08:30	647	No	0	-	---	154	-	Yes	No
07:45 - 08:45	614	No	0	-	---	157	-	Yes	No
12:00 - 13:00	600	No	0	-	---	226	-	Yes	No
17:30 - 18:30	594	No	0	-	---	311	-	Yes	No
12:15 - 13:15	593	No	0	-	---	223	-	Yes	No
12:30 - 13:30	586	No	0	-	---	220	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: GREENGATE DEV - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

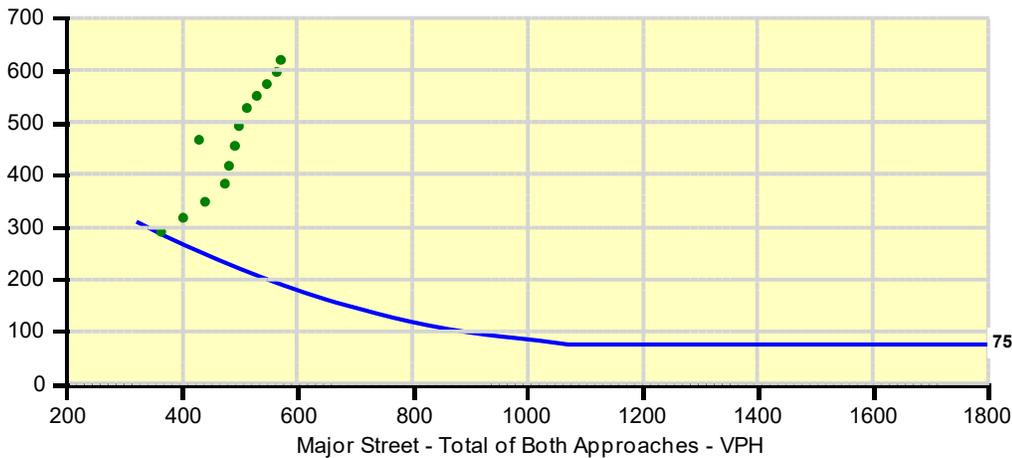
Summary

13 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	289	+	282	=	571	0	621	Yes
16:45 - 17:45	276	+	287	=	563	0	596	Yes
16:30 - 17:30	258	+	288	=	546	0	573	Yes
16:15 - 17:15	240	+	289	=	529	0	550	Yes
16:00 - 17:00	222	+	290	=	512	0	527	Yes
15:45 - 16:45	215	+	283	=	498	0	492	Yes
15:30 - 16:30	213	+	277	=	490	0	455	Yes
15:15 - 16:15	211	+	271	=	482	0	418	Yes
15:00 - 16:00	209	+	265	=	474	0	381	Yes
14:45 - 15:45	196	+	243	=	439	0	349	Yes
17:15 - 18:15	216	+	211	=	427	0	466	Yes
							319	Yes



CESO, Inc.
GREENGATE DEVELOPMENT
2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Eastbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 2,456

Westbound: HILL ROAD

Number of Lanes : 1

Total Approach Volume: 3,027

Minor Street Approaches

Southbound: KINGS CROSSING

Number of Lanes : 1

Total Approach Volume: 3,342

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes	Satisfied
Warrant 1A - Minimum Vehicular Volume	Satisfied
Required volumes reached for 12 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic	Not Satisfied
Required volumes reached for 4 hours, 8 are needed	
Warrant 1C - Combination of Warrants	Not Satisfied
Required 1A volumes reached for 12 hours, 8 are needed	
Required 1B volumes reached for 6 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Satisfied
Number of hours (11) volumes exceed minimum >= minimum required (4).	
Warrant 3 - Peak Hour	Satisfied
Warrant 3A - Peak Hour Delay	Satisfied
Number of one hour periods (21) volumes exceed minimum >= required (1). Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes	Satisfied
Volumes exceed minimums for at least one hour period.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Evaluated
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

12 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
 Veh/Hr Major = **350**
 Veh/Hr Minor = **105**

Time	Major Road				Minor Road			Met?
	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	
07:00 - 08:00	304	+	298	=	602	0	158	Yes
17:00 - 18:00	295	+	307	=	602	0	651	Yes
06:00 - 07:00	280	+	290	=	570	0	117	Yes
16:00 - 17:00	228	+	315	=	543	0	557	Yes
15:00 - 16:00	213	+	285	=	498	0	405	Yes
08:00 - 09:00	191	+	263	=	454	0	171	Yes
12:00 - 13:00	169	+	227	=	396	0	242	Yes
09:00 - 10:00	169	+	212	=	381	0	176	Yes
13:00 - 14:00	159	+	222	=	381	0	233	Yes
11:00 - 12:00	153	+	203	=	356	0	184	Yes
14:00 - 15:00	155	+	195	=	350	0	280	Yes
10:00 - 11:00	140	+	210	=	350	0	168	Yes
05:45 - 06:45	210	+	219	=	429	0	87	No
05:30 - 06:30	140	+	146	=	286	0	58	No
05:15 - 06:15	70	+	73	=	143	0	29	No
00:00 - 01:00	0	+	0	=	0	0	0	No
00:15 - 01:15	0	+	0	=	0	0	0	No
00:30 - 01:30	0	+	0	=	0	0	0	No
00:45 - 01:45	0	+	0	=	0	0	0	No
01:00 - 02:00	0	+	0	=	0	0	0	No
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0		0		0	0	0	No

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 4 one hour periods meet minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
 Veh/Hr Major = **525**

 Veh/Hr Minor = **52**

Time	Major Road				Minor Road		Met?	
	Major EB	+	Major WB	=	Total	Minor NB		Minor SB
07:00 - 08:00	304	+	298	=	602	0	158	Yes
16:45 - 17:45	279	+	309	=	588	0	626	Yes
06:00 - 07:00	280	+	290	=	570	0	117	Yes
15:45 - 16:45	225	+	309	=	534	0	522	Yes
15:30 - 16:30	221	+	301	=	522	0	483	No
15:15 - 16:15	217	+	293	=	510	0	444	No
15:00 - 16:00	213	+	285	=	498	0	405	No
14:45 - 15:45	197	+	261	=	458	0	373	No
08:00 - 09:00	191	+	263	=	454	0	171	No
08:15 - 09:15	185	+	250	=	435	0	172	No
05:45 - 06:45	210	+	219	=	429	0	87	No
14:30 - 15:30	183	+	239	=	422	0	342	No
08:30 - 09:30	179	+	237	=	416	0	173	No
08:45 - 09:45	173	+	224	=	397	0	174	No
12:00 - 13:00	169	+	227	=	396	0	242	No
11:45 - 12:45	168	+	224	=	392	0	229	No
12:15 - 13:15	165	+	226	=	391	0	239	No
14:15 - 15:15	169	+	217	=	386	0	311	No
12:30 - 13:30	161	+	225	=	386	0	236	No
09:00 - 10:00	169	+	212	=	381	0	176	No
13:00 - 14:00	159	+	222	=	381	0	233	No
12:45 - 13:45	157	+	224	=	381	0	233	No
11:30 - 12:30	163	+	217	=	380	0	214	No
09:15 - 10:15	162	+	212	=	374	0	174	No
13:15 - 14:15	159		215		374	0	245	No

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

12 hours meet 1A minimums.
 Only 6 hours meet 1B minimums.
 Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **280 420**

Veh/Hr Minor = **84 42**

Major Road
HILL ROAD

Minor Road

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1A?
06:45 - 07:45	298	+	296	=	594	0	147	Yes
16:45 - 17:45	279	+	309	=	588	0	626	Yes
15:45 - 16:45	225	+	309	=	534	0	522	Yes
07:45 - 08:45	220	+	271	=	491	0	170	Yes
14:45 - 15:45	197	+	261	=	458	0	373	Yes
05:45 - 06:45	210	+	219	=	429	0	87	Yes
08:45 - 09:45	173	+	224	=	397	0	174	Yes
11:45 - 12:45	168	+	224	=	392	0	229	Yes
12:45 - 13:45	157	+	224	=	381	0	233	Yes
09:45 - 10:45	148	+	212	=	360	0	170	Yes
13:45 - 14:45	159	+	201	=	360	0	269	Yes
10:45 - 11:45	149	+	201	=	350	0	180	Yes

Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met1B?
06:45 - 07:45	298	+	296	=	594	0	147	Yes
16:30 - 17:30	262	+	311	=	573	0	603	Yes
15:30 - 16:30	221	+	301	=	522	0	483	Yes
07:45 - 08:45	220	+	271	=	491	0	170	Yes
05:45 - 06:45	210	+	219	=	429	0	87	Yes
14:30 - 15:30	183	+	239	=	422	0	342	Yes
08:45 - 09:45	173	+	224	=	397	0	174	No
12:00 - 13:00	169	+	227	=	396	0	242	No
11:45 - 12:45	168	+	224	=	392	0	229	No
12:15 - 13:15	165	+	226	=	391	0	239	No
12:30 - 13:30	161	+	225	=	386	0	236	No
14:15 - 15:15	169	+	217	=	386	0	311	No

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

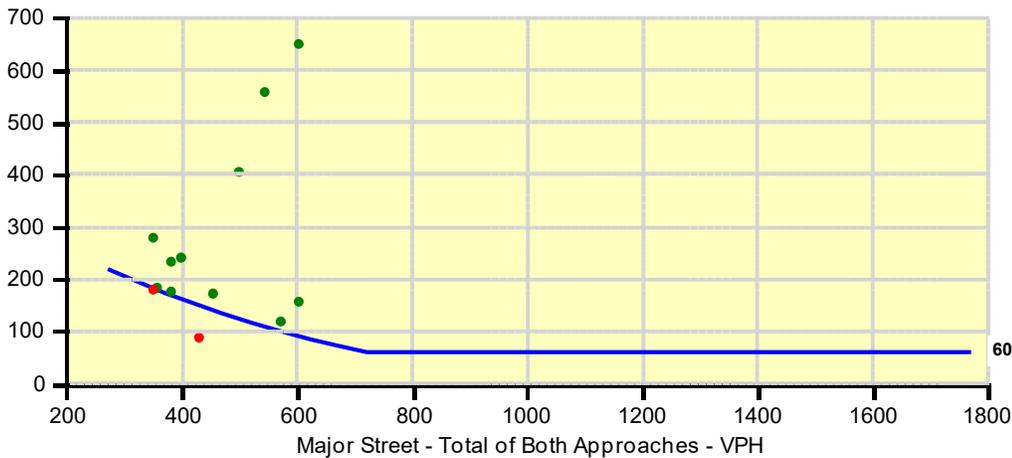
Summary

11 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Minor Road		Met?	
	Major EB	+	Major WB	=	Total	Minor NB		Minor SB
07:00 - 08:00	304	+	298	=	602	0	158	Yes
17:00 - 18:00	295	+	307	=	602	0	651	Yes
06:00 - 07:00	280	+	290	=	570	0	117	Yes
16:00 - 17:00	228	+	315	=	543	0	557	Yes
15:00 - 16:00	213	+	285	=	498	0	405	Yes
08:00 - 09:00	191	+	263	=	454	0	171	Yes
12:00 - 13:00	169	+	227	=	396	0	242	Yes
09:00 - 10:00	169	+	212	=	381	0	176	Yes
13:00 - 14:00	159	+	222	=	381	0	233	Yes
11:00 - 12:00	153	+	203	=	356	0	184	Yes
14:00 - 15:00	155	+	195	=	350	0	280	Yes
							87	No



CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

21 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Number of Minor Lanes =1

Volume and Delay Requirements

Veh/Hr All Approaches = **650**
 Veh/Hr Minor = **100**
 Total Delay (Veh-Hrs) = **4**

Time	Major Road		Minor Road			Minor Road		Met?	Warrant Met?
	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB		
17:00 - 18:00	1253	Yes	0	-	---	651	-	Yes	Yes
16:45 - 17:45	1214	Yes	0	-	---	626	-	Yes	Yes
16:30 - 17:30	1176	Yes	0	-	---	603	-	Yes	Yes
16:15 - 17:15	1138	Yes	0	-	---	580	-	Yes	Yes
16:00 - 17:00	1100	Yes	0	-	---	557	-	Yes	Yes
15:45 - 16:45	1056	Yes	0	-	---	522	-	Yes	Yes
15:30 - 16:30	1005	Yes	0	-	---	483	-	Yes	Yes
15:15 - 16:15	954	Yes	0	-	---	444	-	Yes	Yes
17:15 - 18:15	939	Yes	0	-	---	488	-	Yes	Yes
15:00 - 16:00	903	Yes	0	-	---	405	-	Yes	Yes
14:45 - 15:45	831	Yes	0	-	---	373	-	Yes	Yes
14:30 - 15:30	764	Yes	0	-	---	342	-	Yes	Yes
07:00 - 08:00	760	Yes	0	-	---	158	-	Yes	Yes
06:45 - 07:45	741	Yes	0	-	---	147	-	Yes	Yes
07:15 - 08:15	727	Yes	0	-	---	162	-	Yes	Yes
06:30 - 07:30	723	Yes	0	-	---	137	-	Yes	Yes
06:15 - 07:15	705	Yes	0	-	---	127	-	Yes	Yes
14:15 - 15:15	697	Yes	0	-	---	311	-	Yes	Yes
07:30 - 08:30	694	Yes	0	-	---	166	-	Yes	Yes
06:00 - 07:00	687	Yes	0	-	---	117	-	Yes	Yes
07:45 - 08:45	661	Yes	0	-	---	170	-	Yes	Yes
12:00 - 13:00	638	No	0	-	---	242	-	Yes	No
14:00 - 15:00	630	No	0	-	---	280	-	Yes	No
12:15 - 13:15	630	No	0	-	---	239	-	Yes	No
13:45 - 14:45	629	No	0	-	---	269	-	Yes	No

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: GREENGATE DEV - 2034 BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

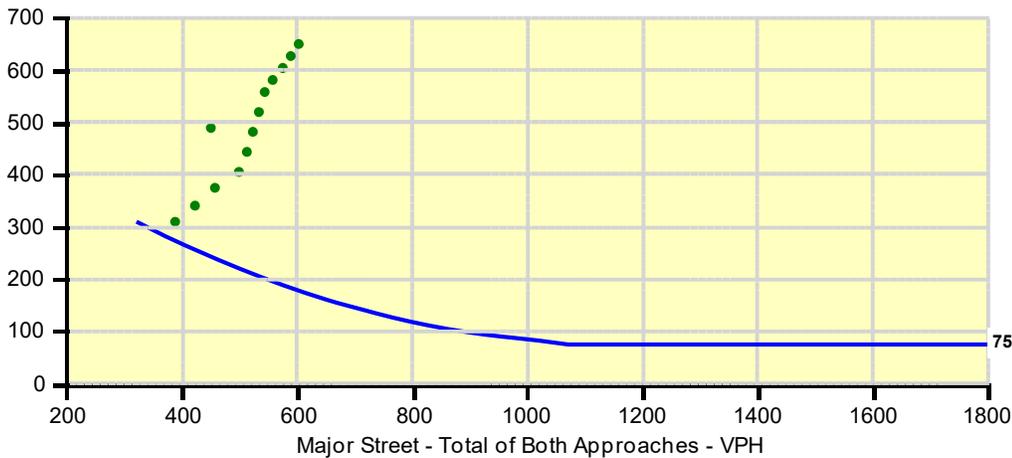
Summary

14 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **1**
 Number of Minor Lanes = **1**

Time	Major Road HILL ROAD				Total	Minor Road		Met?
	Major EB	+	Major WB	=		Minor NB	Minor SB	
17:00 - 18:00	295	+	307	=	602	0	651	Yes
16:45 - 17:45	279	+	309	=	588	0	626	Yes
16:30 - 17:30	262	+	311	=	573	0	603	Yes
16:15 - 17:15	245	+	313	=	558	0	580	Yes
16:00 - 17:00	228	+	315	=	543	0	557	Yes
15:45 - 16:45	225	+	309	=	534	0	522	Yes
15:30 - 16:30	221	+	301	=	522	0	483	Yes
15:15 - 16:15	217	+	293	=	510	0	444	Yes
15:00 - 16:00	213	+	285	=	498	0	405	Yes
14:45 - 15:45	197	+	261	=	458	0	373	Yes
17:15 - 18:15	221	+	230	=	451	0	488	Yes
							342	Yes



CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Northbound: DILEY ROAD

Number of Lanes : 2+

Total Approach Volume: 10,454

Southbound: DILEY ROAD

Number of Lanes :2+

Total Approach Volume: 10,045

Minor Street Approaches

Eastbound: HOWE INDUSTRIAL PKWY

Number of Lanes :1

Total Approach Volume: 466

Westbound: GREENGATE BLVD

Number of Lanes :2+

Total Approach Volume: 3,491

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes	Satisfied
Warrant 1A - Minimum Vehicular Volume	Satisfied
Required volumes reached for 9 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic	Satisfied
Required volumes reached for 11 hours, 8 are needed	
Warrant 1C - Combination of Warrants	Satisfied
Required 1A volumes reached for 10 hours, 8 are needed	
Required 1B volumes reached for 12 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Satisfied
Number of hours (11) volumes exceed minimum >= minimum required (4).	
Warrant 3 - Peak Hour	Satisfied
Warrant 3A - Peak Hour Delay	Satisfied
Number of one hour periods (33) volumes exceed minimum >= required (1). Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes	Satisfied
Volumes exceed minimums for at least one hour period.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Evaluated
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **420**

Veh/Hr Minor = **105 140**

Time	Major Road				Minor Road			Met?
	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	
	DILEY ROAD				HOWE INDUSTRIAL PKWY			
16:15 - 17:15	1297	+	1058	=	2355	71	468	Yes
15:15 - 16:15	1172	+	957	=	2129	52	441	Yes
17:15 - 18:15	1074	+	791	=	1865	55	361	Yes
14:15 - 15:15	1019	+	830	=	1849	44	432	Yes
12:15 - 13:15	911	+	819	=	1730	45	436	Yes
13:15 - 14:15	837	+	804	=	1641	39	428	Yes
11:15 - 12:15	845	+	753	=	1598	47	342	Yes
10:15 - 11:15	704	+	663	=	1367	31	222	Yes
09:15 - 10:15	594	+	685	=	1279	16	144	Yes
07:00 - 08:00	693	+	931	=	1624	18	72	No
07:15 - 08:15	676	+	919	=	1595	23	76	No
07:30 - 08:30	659	+	907	=	1566	28	80	No
07:45 - 08:45	642	+	895	=	1537	33	84	No
06:45 - 07:45	652	+	873	=	1525	15	60	No
08:00 - 09:00	625	+	884	=	1509	36	89	No
08:15 - 09:15	611	+	837	=	1448	30	99	No
06:30 - 07:30	615	+	814	=	1429	13	48	No
08:30 - 09:30	597	+	790	=	1387	24	109	No
06:15 - 07:15	578	+	755	=	1333	11	36	No
08:45 - 09:45	583	+	743	=	1326	18	119	No
09:00 - 10:00	569	+	698	=	1267	13	128	No
06:00 - 07:00	541	+	696	=	1237	9	24	No
05:45 - 06:45	408	+	522	=	930	6	18	No
05:30 - 06:30	272	+	348	=	620	4	12	No
05:15 - 06:15	136		174		310	2	6	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

11 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **630**

Veh/Hr Minor = **52 70**

Time	Major Road				Minor Road			Met?
	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	
	DILEY ROAD				HOWE INDUSTRIAL PKWY			
17:00 - 18:00	1432	+	1055	=	2487	74	481	Yes
16:00 - 17:00	1252	+	1059	=	2311	69	464	Yes
15:00 - 16:00	1144	+	924	=	2068	47	433	Yes
14:00 - 15:00	978	+	798	=	1776	43	431	Yes
12:00 - 13:00	951	+	825	=	1776	47	438	Yes
07:00 - 08:00	693	+	931	=	1624	18	72	Yes
13:00 - 14:00	790	+	805	=	1595	38	428	Yes
11:00 - 12:00	810	+	728	=	1538	46	311	Yes
08:00 - 09:00	625	+	884	=	1509	36	89	Yes
10:00 - 11:00	669	+	642	=	1311	26	192	Yes
09:00 - 10:00	569	+	698	=	1267	13	128	Yes
06:45 - 07:45	652	+	873	=	1525	15	60	No
06:30 - 07:30	615	+	814	=	1429	13	48	No
06:15 - 07:15	578	+	755	=	1333	11	36	No
06:00 - 07:00	541	+	696	=	1237	9	24	No
05:45 - 06:45	408	+	522	=	930	6	18	No
05:30 - 06:30	272	+	348	=	620	4	12	No
05:15 - 06:15	136	+	174	=	310	2	6	No
04:30 - 05:30	0	+	0	=	0	0	0	No
04:00 - 05:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0	+	0	=	0	0	0	No
03:00 - 04:00	0		0		0	0	0	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

10 hours meet 1A minimums.
 12 hours meet 1B minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **2 or more**
 Number of Minor Lanes = **Mixed**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **336 504**
 Veh/Hr Minor EB = **84 42**
 Veh/Hr Minor WB = **112 56**

Major Road
DILEY ROAD

Minor Road
HOWE INDUSTRIAL PKWY

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
16:45 - 17:45	1387	+	1056	=	2443	75	476	Yes
15:45 - 16:45	1228	+	1023	=	2251	62	457	Yes
14:45 - 15:45	1101	+	894	=	1995	46	434	Yes
13:45 - 14:45	931	+	802	=	1733	41	428	Yes
11:45 - 12:45	915	+	803	=	1718	49	404	Yes
12:45 - 13:45	831	+	807	=	1638	41	432	Yes
10:45 - 11:45	774	+	705	=	1479	41	282	Yes
08:45 - 09:45	583	+	743	=	1326	18	119	Yes
09:45 - 10:45	644	+	659	=	1303	22	176	Yes
17:45 - 18:45	358	+	263	=	621	17	121	Yes
07:00 - 08:00	693	+	931	=	1624	18	72	No
07:15 - 08:15	676	+	919	=	1595	23	76	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:45 - 17:45	1387	+	1056	=	2443	75	476	Yes
15:45 - 16:45	1228	+	1023	=	2251	62	457	Yes
14:45 - 15:45	1101	+	894	=	1995	46	434	Yes
13:45 - 14:45	931	+	802	=	1733	41	428	Yes
11:45 - 12:45	915	+	803	=	1718	49	404	Yes
12:45 - 13:45	831	+	807	=	1638	41	432	Yes
07:45 - 08:45	642	+	895	=	1537	33	84	Yes
06:45 - 07:45	652	+	873	=	1525	15	60	Yes
10:45 - 11:45	774	+	705	=	1479	41	282	Yes
08:45 - 09:45	583	+	743	=	1326	18	119	Yes
09:45 - 10:45	644	+	659	=	1303	22	176	Yes
17:45 - 18:45	358	+	263	=	621	17	121	Yes

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

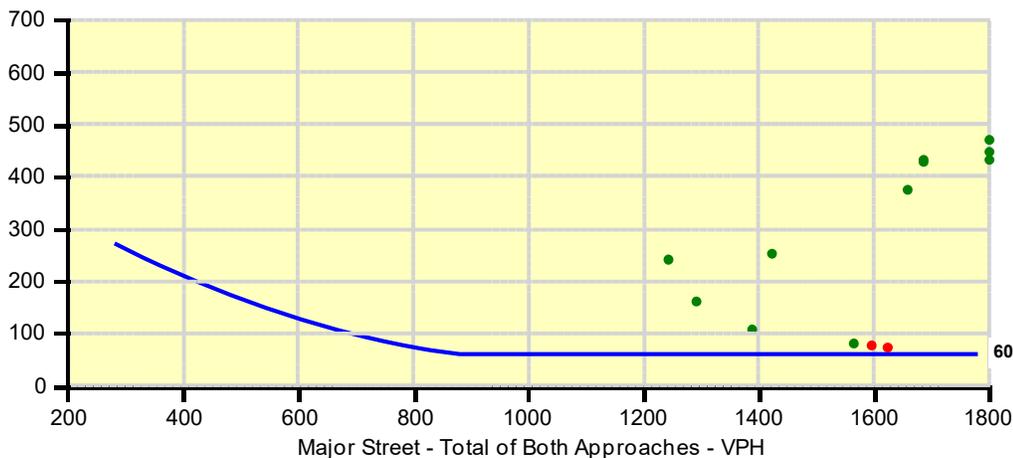
Summary

11 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **Mixed**

Time	Major Road DILEY ROAD				Total	Minor Road HOWE INDUSTRIAL PKWY		Met?
	Major NB	+	Major SB	=		Minor EB	Minor WB	
16:30 - 17:30	1342	+	1057	=	2399	73	472	Yes
15:30 - 16:30	1200	+	990	=	2190	57	449	Yes
14:30 - 15:30	1060	+	862	=	1922	45	433	Yes
13:30 - 14:30	884	+	803	=	1687	40	428	Yes
12:30 - 13:30	871	+	813	=	1684	43	434	Yes
11:30 - 12:30	880	+	778	=	1658	48	373	Yes
07:30 - 08:30	659	+	907	=	1566	28	80	Yes
10:30 - 11:30	739	+	684	=	1423	36	252	Yes
08:30 - 09:30	597	+	790	=	1387	24	109	Yes
09:30 - 10:30	619	+	672	=	1291	19	160	Yes
17:30 - 18:30	716	+	527	=	1243	36	241	Yes
							72	No



CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

48 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes = **2 or more**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **150**
Total Delay (Veh-Hrs) = **5**

Time	Major Road			Minor Road			Warrant Met?		
	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB		Delay WB	Met?
17:00 - 18:00	3042	Yes	74	-	---	481	-	Yes	Yes
16:45 - 17:45	2994	Yes	75	-	---	476	-	Yes	Yes
16:30 - 17:30	2944	Yes	73	-	---	472	-	Yes	Yes
16:15 - 17:15	2894	Yes	71	-	---	468	-	Yes	Yes
16:00 - 17:00	2844	Yes	69	-	---	464	-	Yes	Yes
15:45 - 16:45	2770	Yes	62	-	---	457	-	Yes	Yes
15:30 - 16:30	2696	Yes	57	-	---	449	-	Yes	Yes
15:15 - 16:15	2622	Yes	52	-	---	441	-	Yes	Yes
15:00 - 16:00	2548	Yes	47	-	---	433	-	Yes	Yes
14:45 - 15:45	2475	Yes	46	-	---	434	-	Yes	Yes
14:30 - 15:30	2400	Yes	45	-	---	433	-	Yes	Yes
14:15 - 15:15	2325	Yes	44	-	---	432	-	Yes	Yes
17:15 - 18:15	2281	Yes	55	-	---	361	-	Yes	Yes
12:00 - 13:00	2261	Yes	47	-	---	438	-	Yes	Yes
14:00 - 15:00	2250	Yes	43	-	---	431	-	Yes	Yes
12:15 - 13:15	2211	Yes	45	-	---	436	-	Yes	Yes
13:45 - 14:45	2202	Yes	41	-	---	428	-	Yes	Yes
11:45 - 12:45	2171	Yes	49	-	---	404	-	Yes	Yes
12:30 - 13:30	2161	Yes	43	-	---	434	-	Yes	Yes
13:30 - 14:30	2155	Yes	40	-	---	428	-	Yes	Yes
12:45 - 13:45	2111	Yes	41	-	---	432	-	Yes	Yes
13:15 - 14:15	2108	Yes	39	-	---	428	-	Yes	Yes
11:30 - 12:30	2079	Yes	48	-	---	373	-	Yes	Yes
13:00 - 14:00	2061	Yes	38	-	---	428	-	Yes	Yes
11:15 - 12:15	1987	Yes	47	-	---	342	-	Yes	Yes

CESO, Inc.
GREENGATE DEVELOPMENT
2034 NO-BUILD

Study Name: DILEY & HOWE - 2034 NO-BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

Summary

37 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **Mixed**

Time	Major Road DILEY ROAD				Total	Minor Road HOWE INDUSTRIAL PKWY		Met?
	Major NB	+	Major SB	=		Minor EB	Minor WB	
17:00 - 18:00	1432	+	1055	=	2487	74	481	Yes
16:45 - 17:45	1387	+	1056	=	2443	75	476	Yes
16:30 - 17:30	1342	+	1057	=	2399	73	472	Yes
16:15 - 17:15	1297	+	1058	=	2355	71	468	Yes
16:00 - 17:00	1252	+	1059	=	2311	69	464	Yes
15:45 - 16:45	1228	+	1023	=	2251	62	457	Yes
15:30 - 16:30	1200	+	990	=	2190	57	449	Yes
15:15 - 16:15	1172	+	957	=	2129	52	441	Yes
15:00 - 16:00	1144	+	924	=	2068	47	433	Yes
14:45 - 15:45	1101	+	894	=	1995	46	434	Yes
14:30 - 15:30	1060	+	862	=	1922	45	433	Yes
							361	Yes



CESO, Inc.
GREENGATE DEVELOPMENT
2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Signal Warrants - Summary

Major Street Approaches

Northbound: DILEY ROAD

Number of Lanes : 2+

Total Approach Volume: 10,650

Southbound: DILEY ROAD

Number of Lanes :2+

Total Approach Volume: 10,213

Minor Street Approaches

Eastbound: HOWE INDUSTRIAL PKWY

Number of Lanes :1

Total Approach Volume: 466

Westbound: GREENGATE BLVD

Number of Lanes :2+

Total Approach Volume: 3,817

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Satisfied

Warrant 1A - Minimum Vehicular Volume.....Satisfied

Required volumes reached for 9 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Satisfied

Required volumes reached for 12 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Satisfied

Required 1A volumes reached for 11 hours, 8 are needed

Required 1B volumes reached for 12 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Satisfied

Number of hours (12) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied

Number of one hour periods (34) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....Satisfied

Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....Not Evaluated

Warrant 5 - School Crossing.....Not Evaluated

Warrant 6 - Coordinated Signal System.....Not Evaluated

Warrant 7 - Crash Experience.....Not Evaluated

Warrant 8 - Roadway Network.....Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing.....Not Evaluated

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

9 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **2 or more**
 Number of Minor Lanes = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
 Veh/Hr Major = **420**

Veh/Hr Minor = **105 140**

Time	Major Road				Total	Minor Road		Met?
	Major NB	+	Major SB	=		Minor EB	Minor WB	
	DILEY ROAD					HOWE INDUSTRIAL PKWY		
16:45 - 17:45	1416	+	1080	=	2496	75	507	Yes
15:45 - 16:45	1255	+	1051	=	2306	62	486	Yes
14:45 - 15:45	1123	+	915	=	2038	46	455	Yes
13:45 - 14:45	950	+	818	=	1768	41	454	Yes
11:45 - 12:45	931	+	814	=	1745	49	432	Yes
12:45 - 13:45	846	+	824	=	1670	41	455	Yes
10:45 - 11:45	787	+	716	=	1503	41	309	Yes
08:45 - 09:45	594	+	748	=	1342	18	141	Yes
09:45 - 10:45	657	+	668	=	1325	22	197	Yes
07:00 - 08:00	703	+	938	=	1641	18	113	No
07:15 - 08:15	686	+	926	=	1612	23	116	No
07:30 - 08:30	669	+	914	=	1583	28	119	No
07:45 - 08:45	652	+	902	=	1554	33	122	No
06:45 - 07:45	663	+	880	=	1543	15	97	No
08:00 - 09:00	636	+	892	=	1528	36	123	No
08:15 - 09:15	622	+	844	=	1466	30	129	No
06:30 - 07:30	624	+	820	=	1444	13	80	No
08:30 - 09:30	608	+	796	=	1404	24	135	No
06:15 - 07:15	585	+	760	=	1345	11	63	No
06:00 - 07:00	546	+	700	=	1246	9	46	No
05:45 - 06:45	411	+	525	=	936	6	33	No
17:45 - 18:45	365	+	272	=	637	17	129	No
05:30 - 06:30	274	+	350	=	624	4	22	No
05:15 - 06:15	137	+	175	=	312	2	11	No
00:00 - 01:00	0		0		0	0	0	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

12 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **630**

Veh/Hr Minor = **52 70**

Time	Major Road				Minor Road			Met?
	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	
	DILEY ROAD				HOWE INDUSTRIAL PKWY			
16:30 - 17:30	1371	+	1082	=	2453	73	503	Yes
15:30 - 16:30	1226	+	1016	=	2242	57	476	Yes
14:30 - 15:30	1081	+	882	=	1963	45	455	Yes
13:30 - 14:30	902	+	819	=	1721	40	453	Yes
12:30 - 13:30	886	+	829	=	1715	43	457	Yes
11:30 - 12:30	896	+	789	=	1685	48	402	Yes
07:30 - 08:30	669	+	914	=	1583	28	119	Yes
10:30 - 11:30	752	+	694	=	1446	36	277	Yes
06:30 - 07:30	624	+	820	=	1444	13	80	Yes
08:30 - 09:30	608	+	796	=	1404	24	135	Yes
09:30 - 10:30	631	+	680	=	1311	19	181	Yes
17:30 - 18:30	730	+	542	=	1272	36	257	Yes
06:15 - 07:15	585	+	760	=	1345	11	63	No
06:00 - 07:00	546	+	700	=	1246	9	46	No
05:45 - 06:45	411	+	525	=	936	6	33	No
05:30 - 06:30	274	+	350	=	624	4	22	No
05:15 - 06:15	137	+	175	=	312	2	11	No
05:00 - 06:00	0	+	0	=	0	0	0	No
04:45 - 05:45	0	+	0	=	0	0	0	No
04:30 - 05:30	0	+	0	=	0	0	0	No
04:00 - 05:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0		0		0	0	0	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

11 hours meet 1A minimums.
 12 hours meet 1B minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **2 or more**
 Number of Minor Lanes = **Mixed**

Volume Requirements

Rural Factor of 70% applied
 Warrant 1A 1B
 Veh/Hr Major = **336 504**
 Veh/Hr Minor EB = **84 42**
 Veh/Hr Minor WB = **112 56**

Major Road
DILEY ROAD

Minor Road
HOWE INDUSTRIAL PKWY

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
17:00 - 18:00	1460	+	1082	=	2542	74	513	Yes
16:00 - 17:00	1281	+	1086	=	2367	69	495	Yes
15:00 - 16:00	1168	+	946	=	2114	47	456	Yes
14:00 - 15:00	997	+	816	=	1813	43	455	Yes
12:00 - 13:00	966	+	839	=	1805	47	461	Yes
07:00 - 08:00	703	+	938	=	1641	18	113	Yes
13:00 - 14:00	806	+	821	=	1627	38	451	Yes
11:00 - 12:00	826	+	739	=	1565	46	342	Yes
08:00 - 09:00	636	+	892	=	1528	36	123	Yes
10:00 - 11:00	682	+	650	=	1332	26	213	Yes
09:00 - 10:00	579	+	704	=	1283	13	149	Yes
06:45 - 07:45	663		880		1543	15	97	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:15 - 17:15	1326	+	1084	=	2410	71	499	Yes
15:15 - 16:15	1197	+	981	=	2178	52	466	Yes
17:15 - 18:15	1095	+	812	=	1907	55	385	Yes
14:15 - 15:15	1039	+	849	=	1888	44	455	Yes
12:15 - 13:15	926	+	834	=	1760	45	459	Yes
13:15 - 14:15	854	+	820	=	1674	39	452	Yes
11:15 - 12:15	861	+	764	=	1625	47	372	Yes
07:15 - 08:15	686	+	926	=	1612	23	116	Yes
08:15 - 09:15	622	+	844	=	1466	30	129	Yes
10:15 - 11:15	717	+	672	=	1389	31	245	Yes
06:15 - 07:15	585	+	760	=	1345	11	63	Yes
09:15 - 10:15	605		692		1297	16	165	Yes

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

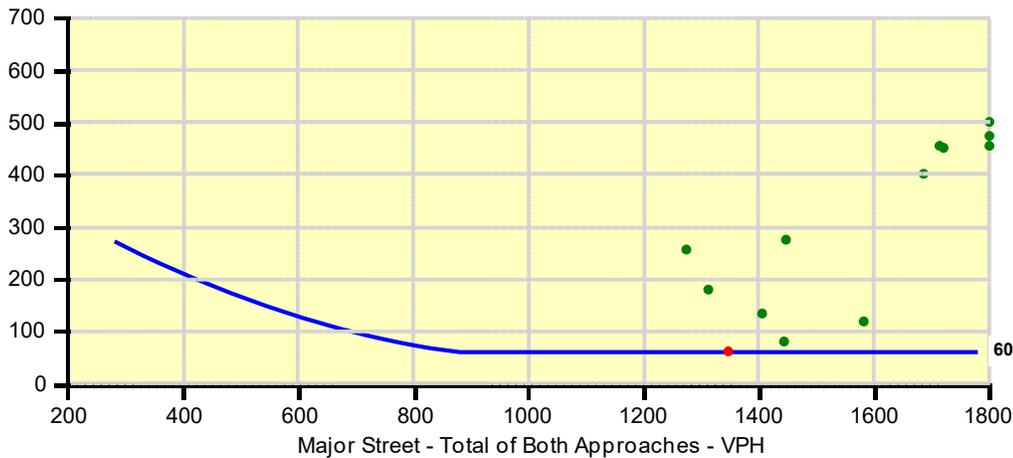
Summary

12 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **2 or more**
 Number of Minor Lanes = **Mixed**

Time	Major Road DILEY ROAD				Total	Minor Road HOWE INDUSTRIAL PKWY		Met?
	Major NB	+	Major SB	=		Minor EB	Minor WB	
16:30 - 17:30	1371	+	1082	=	2453	73	503	Yes
15:30 - 16:30	1226	+	1016	=	2242	57	476	Yes
14:30 - 15:30	1081	+	882	=	1963	45	455	Yes
13:30 - 14:30	902	+	819	=	1721	40	453	Yes
12:30 - 13:30	886	+	829	=	1715	43	457	Yes
11:30 - 12:30	896	+	789	=	1685	48	402	Yes
07:30 - 08:30	669	+	914	=	1583	28	119	Yes
10:30 - 11:30	752	+	694	=	1446	36	277	Yes
06:30 - 07:30	624	+	820	=	1444	13	80	Yes
08:30 - 09:30	608	+	796	=	1404	24	135	Yes
09:30 - 10:30	631	+	680	=	1311	19	181	Yes
							257	Yes



CESO, Inc.
GREENGATE DEVELOPMENT
2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

48 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes = **2 or more**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **150**
Total Delay (Veh-Hrs) = **5**

Time	Major Road			Minor Road			Warrant Met?		
	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB		Delay WB	Met?
17:00 - 18:00	3129	Yes	74	-	---	513	-	Yes	Yes
16:45 - 17:45	3078	Yes	75	-	---	507	-	Yes	Yes
16:30 - 17:30	3029	Yes	73	-	---	503	-	Yes	Yes
16:15 - 17:15	2980	Yes	71	-	---	499	-	Yes	Yes
16:00 - 17:00	2931	Yes	69	-	---	495	-	Yes	Yes
15:45 - 16:45	2854	Yes	62	-	---	486	-	Yes	Yes
15:30 - 16:30	2775	Yes	57	-	---	476	-	Yes	Yes
15:15 - 16:15	2696	Yes	52	-	---	466	-	Yes	Yes
15:00 - 16:00	2617	Yes	47	-	---	456	-	Yes	Yes
14:45 - 15:45	2539	Yes	46	-	---	455	-	Yes	Yes
14:30 - 15:30	2463	Yes	45	-	---	455	-	Yes	Yes
14:15 - 15:15	2387	Yes	44	-	---	455	-	Yes	Yes
17:15 - 18:15	2347	Yes	55	-	---	385	-	Yes	Yes
12:00 - 13:00	2313	Yes	47	-	---	461	-	Yes	Yes
14:00 - 15:00	2311	Yes	43	-	---	455	-	Yes	Yes
12:15 - 13:15	2264	Yes	45	-	---	459	-	Yes	Yes
13:45 - 14:45	2263	Yes	41	-	---	454	-	Yes	Yes
11:45 - 12:45	2226	Yes	49	-	---	432	-	Yes	Yes
12:30 - 13:30	2215	Yes	43	-	---	457	-	Yes	Yes
13:30 - 14:30	2214	Yes	40	-	---	453	-	Yes	Yes
12:45 - 13:45	2166	Yes	41	-	---	455	-	Yes	Yes
13:15 - 14:15	2165	Yes	39	-	---	452	-	Yes	Yes
11:30 - 12:30	2135	Yes	48	-	---	402	-	Yes	Yes
13:00 - 14:00	2116	Yes	38	-	---	451	-	Yes	Yes
11:15 - 12:15	2044	Yes	47	-	---	372	-	Yes	Yes

CESO, Inc.
GREENGATE DEVELOPMENT
 2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

Summary

43 one hour periods meet minimums.
 Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
 Number of Major Lanes = **2 or more**
 Number of Minor Lanes = **Mixed**

Time	Major Road DILEY ROAD				Total	Minor Road HOWE INDUSTRIAL PKWY		Met?
	Major NB	+	Major SB	=		Minor EB	Minor WB	
17:00 - 18:00	1460	+	1082	=	2542	74	513	Yes
16:45 - 17:45	1416	+	1080	=	2496	75	507	Yes
16:30 - 17:30	1371	+	1082	=	2453	73	503	Yes
16:15 - 17:15	1326	+	1084	=	2410	71	499	Yes
16:00 - 17:00	1281	+	1086	=	2367	69	495	Yes
15:45 - 16:45	1255	+	1051	=	2306	62	486	Yes
15:30 - 16:30	1226	+	1016	=	2242	57	476	Yes
15:15 - 16:15	1197	+	981	=	2178	52	466	Yes
15:00 - 16:00	1168	+	946	=	2114	47	456	Yes
14:45 - 15:45	1123	+	915	=	2038	46	455	Yes
14:30 - 15:30	1081	+	882	=	1963	45	455	Yes
							385	Yes

