Canal Winchester

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

Meeting Agenda

Monday, June 8, 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

May 11, 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.

Public Hearings

FS-20-001

Property Owner: Grand Communities, LLC
Applicant: Keith Smith – Civil & Environmental Consultants, Inc.
Location: PID 184-003289
Request: Final Subdivision Plat for Villages at Westchester Section 9, Phase 1.

*Motion By:*_____ *2nd By:*_____
Vote: _____
Conditions: _____

FS-20-002

Property Owner: Grand Communities, LLC
Applicant: Keith Smith – Civil & Environmental Consultants, Inc.
Location: PID 184-003289
Request: Final Subdivision Plat for Villages at Westchester Section 9, Phase 2.

*Motion By:*_____ *2nd By:*_____
Vote: _____
Conditions: _____

VA-20-003

Property Owner: Crossroads Christian Church
Applicant: DaNite Sign Co.
Location: 6600 Bigerton Bend
Request: Variance to section 1189.06(a) to allow for an off premises freestanding sign.

*Motion to close Public Hearing By:*_____
*2nd By:*_____ *Vote:*_____

*Motion By:*_____ *2nd By:*_____
Vote: _____
Conditions: _____

VA-20-004

Property Owner: Crossroads Christian Church
Applicant: DaNite Sign Co.
Location: 6600 Bigerton Bend
Request: Variance to section 1189.08(b)(1) & (3) to allow for a freestanding sign to be larger and taller than the setback requirement.

*Motion to close Public Hearing By:*_____
*2nd By:*_____ *Vote:*_____

*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

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22 South Trine Street
Canal Winchester, OH 43110

Meeting Minutes

Monday, May 11, 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: 7:02pm

Declaring A Quorum (Roll Call)

A motion was made by Joe Donahue, seconded by Kevin Serna that Mark Caulk be excused.

The motion carried by the following vote:

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

Excused: **1** – Caulk

Approval of Minutes

April 13, 2020 Planning and Zoning Commission Meeting Minutes

A motion was made Brad Richey, seconded by Kevin Serna, that the April 13, 2020 Minutes be approved.

The motion carried by the following vote:

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

Abstain: **1** - Donahue

Public Comment

Public Oath

Appeals

Property owner: Courtney & James Elliott
Applicant: Courtney & James Elliott
Location: 392 Sarwil Drive South
Request: Appealing a Notice of Violation issued by the Planning and Zoning Administrator regarding a pig (aka swine) being housed on the subject property.

Mr. Moore presented the appeal for Courtney and James Elliott for property located at 392 Sarwil Drive South. The property owner is appealing a Notice of Violation issued by the Planning and Zoning Administrator regarding a pig being housed on the subject property. Staff is recommending that due to the applicant not being present at the meeting that this appeal be tabled to the June 8 meeting so that they have the opportunity to present their appeal to the commission.

Jesse Shamp representing the law director commented that he does see a benefit in tabling the application so that the applicants have another opportunity to be here to discuss the appeal, however it also incentives them to wait this out and delay due process.

Mr. Richey stated that his opinion is that they vote the pig be removed from the property but give the property owners an additional sixty days to get it removed.

Mr. Shamp noted that if the P&Z Commission denied the appeal, upholding the violation notice then the property owner would have the opportunity to appeal the P&Z decision to City Council.

Mr. Wildenthaler asked Mr. Shamp if they choose to table the application could they skip the P&Z process and go directly to Council. Mr. Shamp indicated that they could not.

Mr. Donahue stated he is comfortable with tabling the application for another 30 days and if the applicant does not show up again then vote. Wildenthaler affirmed.

Mr. Christensen opened up the discussion for public comment.

Adjacent property owner Katherine Santore spoke to the commission in regards to her concerns with the pig. Mrs. Santore lives right next door to this pig and since the last communication with the city the pig has now urinated on her and her dog through the fence. Feces and other waste is along the fence line and just sits there and when they finally go clean up the yard it is stored in an open trashcan next to her property line.

Mrs. Santore discussed her concern with knowing if the pig is property vaccinated and the health risks associated with this type of animal on a small residential lot. The is a smell that is starting to occur with this animal present on the property to the point where windows can not be opened on her home.

Mr. Donahue asked staff to confirm the violation notice was sent on March 9. Staff affirmed.

Mr. Shamp discussed that if the commission wants to vote this evening he feels confident that they can do so given the residents testimony. They had knowledge of the meeting and the ability to represent their application.

Mr. Serna asked staff if the resident drafted the response to keep the pig after the violation notice was sent. Staff affirmed that they gave the property owner 30 days to remove the pig from the property. About day 25 they came in to drop off a doctor note stating that the animal is an Emotional Support Animal prescribed by the doctor. Staff indicated to the property owner at the time that they can not just approve of the pig with the doctors note and if she wanted to keep the animal she would need to appeal the violation notice and provide

factual information that she does not have an agricultural animal on the property. Staff also noted that within the criminal code enforceable by the Sherriff's it states that pigs are not permitted unless done in conformance with agricultural uses.

Mr. Richey commented that when he was looking up information on Emotional Support Animals for this meeting that typically an ESA is trained to perform that job with a certification or something similar. The applicant did not provide in the appeal any information showing that this pig is certified or trained in any way. Mr. Shamp added that there have been no court cases were those certifications have been followed or have been requirements. That makes the certifications a misleading statement. Any animal can be an ESA and the law says there needs to be reasonable accommodation to someone with a disability, unless it puts an undue burden on the City.

Mr. Wildenthaler commented that the doctor that wrote the support note for the pig appears to be her primary care physician. Mr. Shamp affirmed. Wildenthaler added that through what he researched an ESA note needs to come from a certified mental health professional. Mr. Shamp noted that information can be used in the decision P&Z makes on the appeal application.

Mr. Richey commented that his opinion is that they still vote on this matter and if the applicant wants to appeal the decision to Council they have the ability to do so.

A motion was made by Brad Richey, seconded by Kevin Serna that this Public Hearing be closed.

The motion carried by the following vote:

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

A motion was made by Joe Wildenthaler, seconded by Joe Donahue that the Notice of Violation issued by the Planning and Zoning Administrator regarding a pig, aka "swine" being housed on the subject property be dismissed.

The motion failed by the following vote:

No: 6 – Christensen, Richey, Vasko, Serna, Donahue & Wildenthaler

Public Hearings

VA-20-002

Property Owner: Crossroads Christian Church
Applicant: DaNite Sign Co.
Location: 6600 Bigerton Bend
Request: Variance to section 1189.06(c) to allow for internally illuminated wall signs on a residentially zoned property.

Mr. Moore presented the application for Crossroads Christian Church for property located at 6600 Bigerton Bend. The applicant is requesting approval for a variance from Section 1189.06(c) of the sign code to allow for internally illuminated wall signs on the residentially zoned property.

Staff discussed that the subject property consists of approximately 23 acres and is currently under construction for a 58,000 sq. ft. 1,200 seat church facility. A 4.7 acre commercial outparcel along Gender Road is also owned by the church and is for sale for future development. Staff discussed that churches are conditional uses in residential zoning districts and are not permitted within a general commercial or limited manufacturing zone so that is why the church was permitted to be constructed on this site.

The sign code states in the general requirements that signs within residential districts shall only be externally illuminated by reflected light and shall not be internally illuminated. This section of the code was to prevent residential homes with home occupations from having cabinet box style signage.

The subject property is a large 23 acre site that is being developed for a large church. This type of facility is very commercial in design and function compared to the other scale of churches within Canal Winchester, not to mention its location just south of the shopping centers along Gender Road. The building sits in excess of 590' to the nearest single-family residence and with the scale of the site and setbacks the difference between internally and external illumination for the signage would be negligible.

The plans for the building has wall signage on three locations. Signage on the north to be seen from Bigerton Bend. Signage on the west to be seen from Gender Road and the main parking lot. And signage on the east to be seen from the secondary entry and parking lot.

Staff discusses that the literal interpretation of the code would not deprive the application of rights enjoyed by other properties because the other religious facilities on Canal Winchester feature illuminated wall signage. However, consideration that the site conditions and context to the surroundings are unique when neighboring properties are shopping centers and industrial sites where internal illumination is permitted. The plans for this site's landscaping along Bigerton Bend will also provide long term screening solutions.

Based on the unique site context and building being constructed staff recommends that Variance Application VA-20-002 be approved as presented.

Mr. Donahue commented that he knows this will be covered in the next application but where is the requested monument sign being located. Staff indicated the monument sign variance it is being requested at the intersection of Gender Road and Bigerton Bend. Donahue asked if there are any additional freestanding signs. Staff indicated there are plans for one directly north of the

building about centered the length of Bigerton Bend. The design of that sign does not require any variances.

Mr. Christensen asked if the monument signs are internally illuminated. Staff affirmed.

Lead Pastor Tim Moore spoke about the signage design for the facility. The wall sign has been designed to have a minimal light emission. The stroke of the letters has been designed to be very simple and thin freestanding letters. Additionally, the sign will appear black during the day but the face has small perforation pinholes that allow for a diffused soft white light to be emitted during the evening hours when the sign kicks on.

The Pastor discussed that on the east side of the site there is a large woodland that was retained to help screen the facility from the neighborhood. Additional trees are to be planted in the greenspace between the street and the parking lot for further screening. The distance from the house at the end of Bigerton Bend to the sign was around 700 feet. The Pastor noted that while this site is zoned residential the rest of the building construction is held to commercial standards so should the signage.

Mr. Christensen opened up the application for the Public Hearing.

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

The motion carried by the following vote:

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

Mr. Donahue asked staff if there were any other comments from adjacent resident's asides from the two that were shared with the commission today. Staff indicated that the two emails were the only comments they received on the variance. Mr. Donahue asked staff when did the adjacent residents receive the letter about the variance hearing. Staff indicated 7-10 days prior to the meeting.

Mr. Wildenthaler asked staff how long it will take to complete the site landscaping. Staff indicated that they are probably around three months out to finishing the building and sitework and the landscaping typically is finished around the same timeframe for a Final Occupancy Certificate.

Mr. Donahue asked staff if the site will have five signs total, three on the building and two monument signs. Staff affirmed that is the plan so far.

Mr. Donahue asked staff how many acres is the total property. Staff indicated the church sits on 23 acres and the commercial outparcel is 4.7 acres.

Mr. Donahue asked staff how close the monument sign from Gender Road will be to the building. Staff indicated around 900 feet.

Mr. Wildenthaler asked staff how the signage relates to their neighbor across the tracks BrewDog. Staff indicated that they received a signage variance for the total square footage of the signage on the building and one for a large message board sign. They do not have the same restrictions on internal illumination as their property is zoned Limited Manufacturing.

A motion was made by Joe Donahue, seconded by Kevin Serna that Variance Application #VA-20-002 be approved as presented.

The motion carried by the following vote:

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

No: **1 -** Donahue

VA-20-003

Property Owner: Crossroads Christian Church
Applicant: DaNite Sign Co.
Location: 6600 Bigerton Bend
Request: Variance to section 1189.06(a) to allow for an off premises freestanding sign.

Mr. Moore presented the application for Crossroads Christian Church for property located at 6600 Bigerton Bend. The applicant is requesting approval for a variance from Section 1189.06(a) of the sign code to allow for an off-premises identification sign. The requested sign variance is for both the church and future outparcel development. The proposed sign will be 2/3 identification for the church and there are two tenant panel slots available on the bottom 1/3rd for the commercial outparcel.

Staff discussed that the subject property consists of approximately 23 acres and is currently under construction for a 58,000 sq. ft. 1,200 seat church facility. A 4.7 acre commercial outparcel along Gender Road is also owned by the church and is for sale for future development. The requested monument sign is proposed to be on Parcel 184-002666 which is owned by the City of Canal Winchester.

The parcel where they are looking to place the sign is located at the corner og Gender Road and Bigerton Bend. This property contains the detention basin for the Waterloo Shopping Center and an easement for the use as a basin was retained by the landowner of the plaza. Staff explained that with the rezoning of the parcel the church is on to Multi-Family, when the Final Development Plan of the site was approved all associated floodway with the site would get dedicated to the city, including this basin. When the city gained ownership of the parcel all future maintenance of the landscaping was assumed by the city. The proposal

for the sign variance allows the city trade a signage easement with the church for the long-term ground maintenance.

Staff shared with the commission the signage plans. The plans note that the sign will be approximately 15 feet from the Gender Road right-of-way and 6 feet from Bigerton Bend right-of-way. However, these setbacks are not exact and are based off scaling a GIS aerial data and not actual survey data. Staff further discussed concern that there are a lot of underground utilities in this area that need to be avoided. This information is not shown in the plans.

While staff does not have an issue with the proposed location of the sign in question on their parcel, the applicant needs to get more information on where the sign is going to ensure nothing is going to be obstructed. Staff recommends that Variance Application #VA-20-003 be tabled at this time.

Pastor Tim Moore indicated that they are having issues with the signage company who is doing the installation. They are the ones who are supposed to be gathering this information for the city but have yet to do so. The Pastor indicated he has no issues with tabling the application to get the additional information.

Pastor Tim did mention that this sign will be a key component to them selling the commercial outparcel. The Bigerton and Gender Road intersection is the full access for that site and with the existing ditch and tree line that site is hard to visualize prior to passing it on Gender Road heading over the railroad tracks, resulting in people having to turn around.

Pastor Tim did acknowledge that the agreement with the City for the signage easement is to take over maintenance of the ground.

Mr. Christensen opened up the application for the Public Hearing.

A motion was made by Brad Richey, seconded by Joe Wildenthaler that this Public Hearing be closed.

The motion carried by the following vote:

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

A motion was made by Joe Donahue, seconded by Mike Vasko that Variance Application #VA-20-003 be tabled to the June 8, 2020 Agenda.

The motion carried by the following vote:

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

VA-20-004

Property Owner: Crossroads Christian Church
Applicant: DaNite Sign Co.
Location: 6600 Bigerton Bend
Request: Variance to section 1189.08(b)(1) & (3) to allow for a freestanding sign to be larger and taller than the setback requirement.

Mr. Moore presented the application for Crossroads Christian Church for property located at 6600 Bigerton Bend. The applicant is requesting approval for a variance from Section 1189.08(b)(1) & (3) to allow for a freestanding sign to be larger and taller than the setback requirement.

Staff indicated that this application has the same issues as the previous where there is not enough information submitted showing the signage location and what impacts it may have on existing utilities. Staff is recommending that this application also be tabled at this time.

A motion was made by Mike Vasko, seconded by Brad Richey that this Public Hearing be closed.

The motion carried by the following vote:

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

A motion was made by Brad Richey, seconded by Kevin Serna that Variance Application #VA-20-004 be tabled to the June 8, 2020 Agenda.

The motion carried by the following vote:

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

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 indicated that the applicants for Final Development Plan #FDP-20-002 have indicated that they are requesting the application be tabled to the June 8, 2020 agenda as they are still working on the final bits of information updating the traffic study and providing plans for the Hill Road turn lane improvements.

A motion was made by Kevin Serna, seconded by Brad Richey that Final Development Plan #FDP-20-002 be tabled to the June 8, 2020 Agenda.

The motion carried by the following vote:

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

Old Business

New Business

Adjournment

Time Out: 7:56 pm

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

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

_____

Date

_____

Bill Christensen - Chairman

_____

Joe Donahue - Secretary

Final Subdivision #FS-20-001
Villages at Westchester, Section 9 Part 1

Owner: Grand Communities, Ltd.

Applicant: Grand Communities, Ltd.

Location: PID 184-003289 (Connor Court Extension)

Existing Zoning: PUD (Planned Unit District)

Request: Final Subdivision for Villages at Westchester, Section 9 Part 1

Location and Surrounding Land Uses
The subject property consists of 4.032 acres to the north of the existing Connor Court stub. The applicant is requesting to Plat Section 9 Part 1, which will account for a total of 7 buildable lots and 1 reserve lot. To the north is Section 9 Parts 2 of the subdivision. To the west is Section 10 Part II of the subdivision. To the south is the existing Section 10 Part 2 of the Villages at Westchester subdivision. To the east is undeveloped ground zoned R-3 (low density residential).

Zoning
The subject parcel is zoned PUD (Planned Unit District). It is currently subject to the Villages at Westchester development text and conditions adopted by Ordinance 59-90, 81-91, 17-01, and 40-02. Sections 1 through 13 of the Villages at Westchester have been developed, with 57 lots remaining for homes to be constructed, out of the 771 single family platted lots.

VAW Section('s)	Available Lots
VAW Section 12	19
VAW Section 10	1
VAW Section 13	37

The approved development standards as part of the Villages at Westchester planned unit district are as follows.

- Building heights regarding the residential and non-residential structures as well as the off-street parking and loading standards shall comply with the requirements set forth by the Village of Canal Winchester Zoning Ordinance (as adopted by Ordinance 48-90). These standards include:
- 60 feet of frontage on an approved public right-of-way, with 40 feet of frontage on a curve with a 60 feet lot width at the building line.
- 30 feet front setback
- 30 feet rear setback
- 20 feet total side yard with a minimum of 8 feet on any side
- A minimum finished floor area of 1,700 square feet for a 2 story home, 1,500 square feet for a one-and-a-half story and 1,300 square feet for a one story or split-level home.
- The minimum lot size for any single family detached house shall be 8,000 square feet with an average lot size of not less than 9,000 square feet, except that a total of one hundred

and eight (108) lots in Sections 8 and 9 (as identified on the Phasing Plan, dated April 20, 1990) may have a minimum lot size of 7,200 square feet. Any lot in Section 8 or Section 10 which abuts an existing single family lot shall contain a minimum of 8,400 square feet and shall be a minimum of seventy (70) feet at the building line. No final development plan shall be filed for less than an entire section as shown on the Phasing Plan dated April 20, 1990.

Zoning Analysis

The Planning and Zoning Commission approved the final development plan #FDP-16-002 for Phase 9, 10 and 11.2 in October 2016. This approved plan called for 117 single family lots that are within the three sections. Section 9 will be broken up into two construction parts containing a total of 24 new lots. Section 9.1 will contain 7 single family lots.

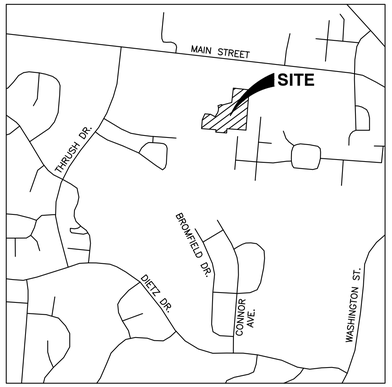
With Section 9 Part 1 the applicant extended Connor Court for 7 additional lots. These lots conform to the Final Development Plan for the section. This section will also include a 2.081 acre reserve area behind lots 749-751. This reserve will have public access between lots 749 and the ditch via a 10' reserve access easement.

Staff Recommendation

Staff recommends the applicant's request for the Final Subdivision Plat #FS-20-001 be approved as presented and recommended to City Council for adoption.

THE VILLAGES AT WESTCHESTER
SECTION 9, PART 1

STATE OF OHIO, COUNTY OF FRANKLIN, CITY OF CANAL WINCHESTER,
SECTION 30, TOWNSHIP 15, RANGE 20, CONGRESS LANDS EAST OF THE SCIOTO RIVER



VICINITY MAP
SCALE:1"=1,000'

SITUATED IN THE STATE OF OHIO, COUNTY OF FRANKLIN, CITY OF CANAL WINCHESTER, AND LOCATED IN SECTION 30, TOWNSHIP 15, RANGE 20, CONGRESS LANDS EAST OF THE SCIOTO RIVER, CONTAINING 4.032 ACRES OF LAND, MORE OR LESS, SAID 4.032 ACRES BEING OUT OF THAT 25.455 ACRE TRACT OF LAND DESCRIBED IN DEED TO GRAND COMMUNITIES, LTD OF RECORD IN INSTRUMENT NO. 201706280088119, RECORDER'S OFFICE, FRANKLIN COUNTY, OHIO.

THE UNDERSIGNED, GRAND COMMUNITIES, LLC., A KENTUCKY LIMITED LIABILITY COMPANY, BY TODD E. HUSS, PRESIDENT, OWNER OF THE LANDS PLATTED HEREIN, DULY AUTHORIZED IN THE PREMISES, DOES HEREBY CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS ITS **"THE VILLAGES AT WESTCHESTER, SECTION 9, PART 1"**, A SUBDIVISION CONTAINING LOTS NUMBERED 746–752 INCLUSIVE, AND RESERVE "B" AND DOES HEREBY ACCEPT THIS PLAT OF SAME AND DEDICATES TO PUBLIC USE, AS SUCH, ALL OR PARTS OF CONNOR COURT, SHOWN HEREON AND NOT HERETOFORE DEDICATED.

EASEMENTS ARE HEREBY RESERVED IN, OVER AND UNDER AREAS DESIGNATED ON THIS PLAT AS "EASEMENT", "ACCESS EASEMENT" OR "DRAINAGE EASEMENT". EACH OF THE AFOREMENTIONED DESIGNATED EASEMENTS PERMIT THE CONSTRUCTION, OPERATION AND MAINTENANCE OF ALL PUBLIC AND QUASI–PUBLIC UTILITIES ABOVE, BENEATH AND ON THE SURFACE OF THE GROUND AND, WHERE NECESSARY, FOR THE CONSTRUCTION, OPERATION AND MAINTENANCE OF SERVICE CONNECTIONS TO ALL ADJACENT LOTS AND LANDS AND FOR STORM WATER DRAINAGE. WITHIN THOSE AREAS DESIGNATED "DRAINAGE EASEMENT" ON THIS PLAT, AN ADDITIONAL EASEMENT IS HEREBY RESERVED FOR THE PURPOSE OF CONSTRUCTING, OPERATING AND MAINTAINING MAJOR STORM WATER DRAINAGE SWALES AND/OR OTHER STORM WATER DRAINAGE FACILITIES. NO ABOVE GRADE STRUCTURES, DAMS OR OTHER OBSTRUCTIONS TO THE FLOW OF STORM WATER RUNOFF ARE PERMITTED WITHIN DRAINAGE EASEMENT AREAS AS DELINEATED ON THIS PLAT. THOSE AREAS DESIGNATED AS ACCESS EASEMENT ARE RESERVED FOR THE PURPOSE TO PROVIDE INGRESS/EGRESS FROM THE PUBLIC ROADWAY TO THE REAR ACREAGE OF THE PLATTED RESERVE TO THAT ENTITY RESPONSIBLE FOR THE MAINTAINING SAID RESERVE.

THE EASEMENTS SHOWN HEREON OUTSIDE OF THE PLATTED AREA WITHIN SAID 25.455 ACRE TRACT OF LAND OWNED BY GRAND COMMUNITIES, LLC, AND ARE RESERVED FOR THE PURPOSES STATED IN THE FOREGOING "EASEMENT" PARAGRAPH.

IN WITNESS WHEREOF, GRAND COMMUNITIES, LLC, A KENTUCKY LIMITED LIABILITY COMPANY BY, TODD E. HUSS, PRESIDENT, HAS CAUSED THIS PLAT TO BE EXECUTED BY THIS DULY AUTHORIZED OFFICE.

THIS ____ DAY OF _____, 2020.

SIGNED AND ACKNOWLEDGED
IN THE PRESENCE OF:

GRAND COMMUNITIES, LLC
A KENTUCKY LIMITED LIABILITY COMPANY
BY: FISCHER DEVELOPMENT COMPANY

BY: _____

_____
TODD E. HUSS
PRESIDENT

_____

COMMONWEALTH OF KENTUCKY
COUNTY OF BOONE:

THIS IS AN ACKNOWLEDGMENT CLAUSE; NO OATH OR AFFIRMATION WAS ADMINISTERED TO THE SIGNER. THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS _____ DAY OF _____, 2020, BY TODD E. HUSS, PRESIDENT OF GRAND COMMUNITIES, LLC, A KENTUCKY LIMITED LIABILITY COMPANY, ON BEHALF OF THE COMPANY.

MY COMMISSION EXPIRES _____, _____

APPROVED THIS _____ DAY OF _____ , 2020 _____,
PLANNING & ZONING ADMINISTRATOR,
CITY OF CANAL WINCHESTER

APPROVED THIS _____ DAY OF _____ , 2020 _____,
CHAIRMAN,
PLANNING & ZONING ADMINISTRATOR,
CITY OF CANAL WINCHESTER

APPROVED THIS _____ DAY OF _____ , 2020 _____,
CITY ENGINEER,
CITY OF CANAL WINCHESTER

THIS _____ DAY OF _____, 2020, BY ORDINANCE NO. _____ RIGHTS–OF–WAY FOR CONNOR COURT, HEREIN DEDICATED TO THE PUBLIC USE ARE HEREBY ACCEPTED AND APPROVED AS SUCH BY THE CITY OF CANAL WINCHESTER, OHIO.

_____,
MAYOR, CITY OF CANAL WINCHESTER

_____,
CLERK OF COUNCIL,
CITY OF CANAL WINCHESTER

THIS PLAT SHALL NOT BE TRANSFERRED OR RECORDED UNTIL ALL ABOVE REQUIRED SIGNATURES ARE PLACED ON THIS PLAT.

TRANSFERRED THIS ____ DAY OF _____, 2020 _____,
AUDITOR, FRANKLIN COUNTY, OHIO

_____,
DEPUTY AUDITOR, FRANKLIN COUNTY, OHIO

FILED FOR RECORD THIS _____ DAY OF _____, 2020 _____,
RECORDER, FRANKLIN COUNTY, OHIO

AT _____M.

FEE $_____

FILE NO. _____,

RECORDED THIS _____, DAY OF _____, 2020 _____,
DEPUTY RECORDER, FRANKLIN COUNTY, OHIO

PLAT BOOK _____, PAGES _____

ZONING:
AT THE TIME OF PLATTING, THE PROPERTY BEING PLATTED HEREON IS ZONED:
"PLANNED UNIT DISTRICT (PUD)"
"LOW DENSITY RESIDENTIAL (R–3)"

SETBACKS:
FRONT YARD SETBACK: 30'
REAR YARD SETBACK: 30'
SIDE YARD SETBACK: 20' TOTAL SIDE YARD SETBACK

BASIS OF BEARINGS:
THE BEARINGS FOR THIS SURVEY ARE BASED ON THE EASTERLY LINE OF 13.689 ACRE TRACT AS SHOWN IN INSTRUMENT NUMBER 201612160173734 AS BEING SOUTH 04°28'49" WEST.

SOURCE OF DATA:
THE SOURCES OF RECORDED SURVEY DATA REFERENCED IN THE PLAN AND TEXT OF THIS PLAT ARE RECORDS OF THE RECORDER'S OFFICE, FRANKLIN COUNTY, OHIO.

IRON PINS:
WHERE INDICATED HEREON, UNLESS OTHERWISE NOTED, ARE TO BE SET AND ARE 5/8" SOLID REBAR, THIRTY INCHES IN LENGTH WITH A YELLOW PLASTIC CAP BEARING THE INITIALS "CEC INC".

PERMANENT MARKERS:
WHERE INDICATED HEREON UNLESS OTHERWISE NOTED ARE TO BE SET AND ARE SOLID IRON PINS, 1" IN DIAMETER, 30" IN LENGTH WITH A 2" DIAMETER ALUMINUM CAP BEARING THE STAMP "PERMANENT MARKER CEC".

CERTIFICATION:
WE DO HEREBY CERTIFY THAT WE HAVE SURVEYED THE ATTACHED PREMISES, PREPARED THE ATTACHED PLAT, AND THAT SAID PLAT IS CORRECT. ALL DIMENSIONS ARE SHOWN IN FEET AND DECIMAL PARTS THEREOF.

DRAFT

_____ _____
MARK ALAN SMITH DATE
PROFESSIONAL LAND SURVEYOR NO. S–8232

DEVELOPER:
GRAND COMMUNITIES, LLC
3940 OLYMPIC BOULEVARD, SUITE 400
ERLANGER, KENTUCKY 41018
PHONE: (859) 341–4709

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
250 Old Wilson Bridge Road · Suite 250 · Worthington, OH 43085
614-540-6633 · 888-598-6808
www.cecinc.com

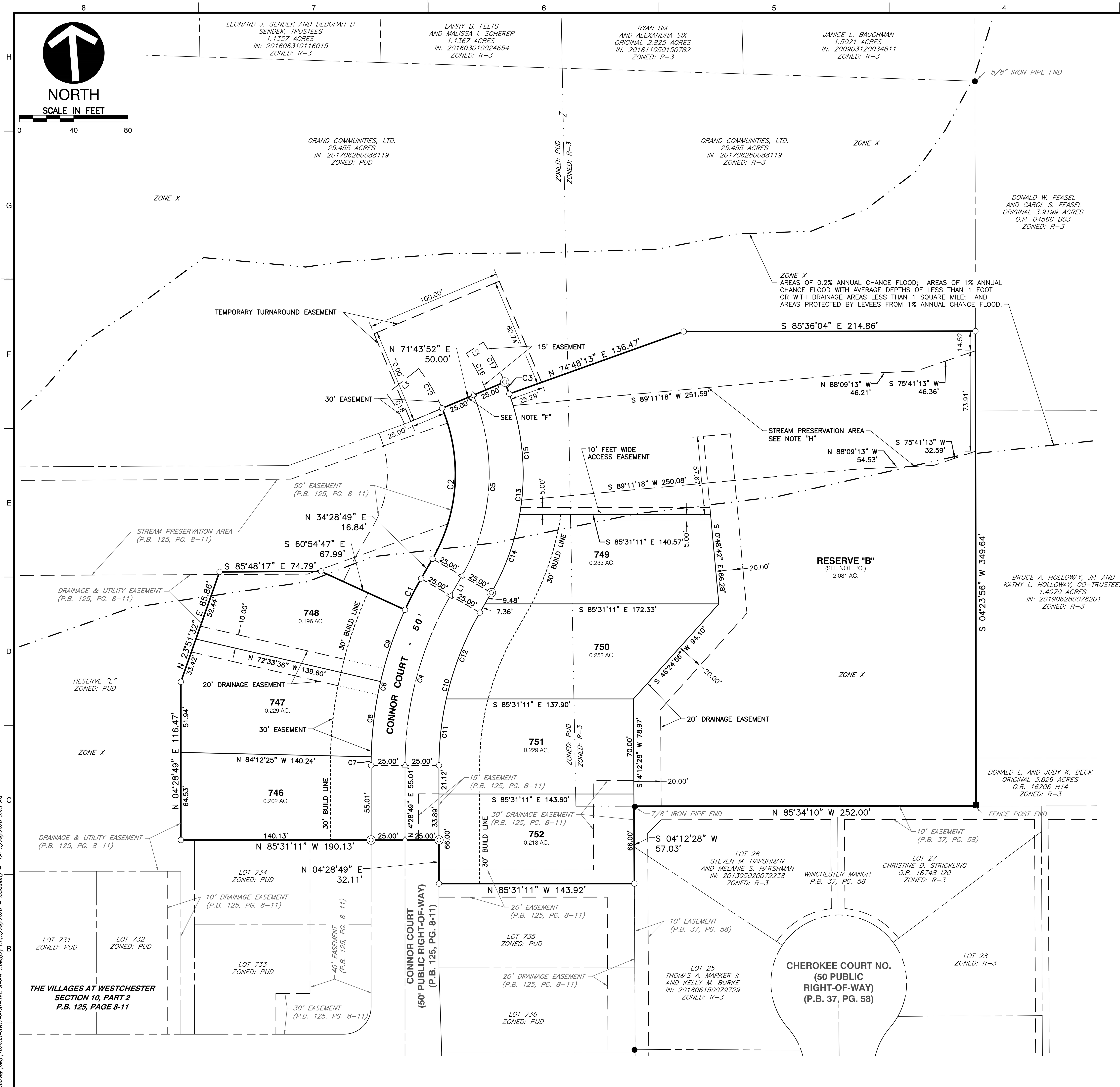
THE VILLAGES AT WESTCHESTER
CITY OF CANAL WINCHESTER
FRANKLIN COUNTY, OHIO

THE VILLAGES AT WESTCHESTER
SECTION 9, PART 1

DATE:	MAY 2020	DRAWN BY:	KAS
DWG SCALE:	N/A	CHECKED BY:	MAS
PROJECT NO:			162-435
APPROVED BY:			

DRAWING NO.:
PLAT
SHEET 1 OF 2

P:\2016\162-435\-Survey\Dwg\162435-3101-PLAT-SEC 9-PH 1.dwg\1 LS:(5/29/2020 - dbischoff) - LP: 5/29/2020 2:44 PM



NOTE "A": AT THE TIME OF PLATTING, BY GRAPHIC PLOTTING ONLY, "THE VILLAGES AT WESTCHESTER SECTION 9, PART 1", ARE IN: ZONE "X" (AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN).
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).
AS DESIGNATED AND DELINEATED ON THE FEMA FLOOD INSURANCE RATE MAP FOR FRANKLIN COUNTY, OHIO, AND INCORPORATED AREAS, MAP NUMBER 39049C0454K WITH EFFECTIVE DATE OF JUNE 17, 2008.

NOTE "B": ACREAGE BREAKDOWN

TOTAL ACREAGE:	4.032 ACRES
ACREAGE IN LOTS 746–752 INCLUSIVE:	1.560 ACRES
ACREAGE IN RESERVE "B":	2.081 ACRES
ACREAGE IN RIGHT–OF–WAY:	0.391 ACRES
ACREAGE OUT OF PID: 184–001350:	2.360 ACRES
ACREAGE OUT OF PID: 184–003289:	1.672 ACRES

NOTE "C": AT THE TIME OF PLATTING, ELECTRIC, CABLE AND TELEPHONE SERVICE PROVIDERS HAVE NOT ISSUED INFORMATION REQUIRED SO THAT EASEMENT AREAS, IN ADDITION TO THOSE SHOWN ON THIS PLAT AS DEEMED NECESSARY BY THESE PROVIDERS FOR INSTALLATION AND MAINTENANCE OF ALL OF THEIR MAIN LINE FACILITIES, COULD CONVENIENTLY BE SHOWN ON THIS PLAT. EXISTING RECORDED EASEMENT INFORMATION ABOUT "THE VILLAGES AT WESTCHESTER SECTION 9, PART 1" OR ANY PART THEREOF CAN BE ACQUIRED BY A COMPETENT EXAMINATION OF THE THEN CURRENT PUBLIC RECORDS, INCLUDING THOSE IN THE RECORDER'S OFFICE, FRANKLIN COUNTY, OHIO.

NOTE "D": THE PURPOSE OF THIS PLAT IS TO SHOW CERTAIN PROPERTY, RIGHT OF WAY, AND EASEMENT BOUNDARIES, AS OF THE TIME OF PLATTING. AT THE REQUEST OF ZONING AND PLANNING AUTHORITIES AT THE TIME OF PLATTING, THIS PLAT SHOWS SOME OF THE LIMITATIONS AND REQUIREMENTS OF THE ZONING CODE IN EFFECT ON THE DATE OF FILING THIS PLAT FOR REFERENCE ONLY, THE LIMITATIONS AND REQUIREMENTS MAY CHANGE FROM TIME TO TIME AND SHOULD BE REVIEWED TO DETERMINE THE THEN CURRENT APPLICABLE USE AND DEVELOPMENT LIMITATIONS OF THE ZONING CODE AS ADOPTED BY THE GOVERNMENT AUTHORITY HAVING JURISDICTION. THE THEN APPLICABLE ZONING CODE SHALL HAVE CONTROL OVER CONFLICTING LIMITATIONS AND REQUIREMENTS THAT MAY BE SHOWN ON THIS PLAT. THIS NOTE SHOULD NOT BE CONSTRUED AS CREATING PLAT OR SUBDIVISION RESTRICTIONS, PRIVATE USE RESTRICTIONS, COVENANTS RUNNING WITH THE LAND OR TITLE ENCUMBRANCES OF ANY NATURE, EXCEPT TO THE EXTENT SPECIFICALLY IDENTIFIED AS SUCH.

NOTE "E": A PORTLAND CEMENT CONCRETE SIDEWALK, FOUR FEET IN WIDTH, SHALL BE CONSTRUCTED/INSTALLED BY THE BUILDER OF THE HOUSE ALONG THE STREET FRONTAGE OF EACH LOT IN "THE VILLAGES AT WESTCHESTER SECTION 9, PART 1". THE SIDEWALK SHALL BE LOCATED IN THE STREET RIGHT–OF–WAY.

NOTE "F": NO VEHICULAR ACCESS TO BE IN EFFECT UNTIL SUCH TIME AS THE PUBLIC STREET IS EXTENDED BY PLAT OR DEED.

NOTE "G": RESERVE "B" AS DESIGNATED AND DELINEATED HEREON SHALL BE OWNED AND MAINTAINED BY THE VILLAGES AT WESTCHESTER HOMEOWNERS ASSOCIATION FOR OPEN SPACE. AN EASEMENT FOR DRAINAGE AND UTILITY PURPOSES SHALL BE GRANTED TO THE CITY OF CANAL WINCHESTER FOR THE PURPOSE OF THE MAINTENANCE OF DRAINAGE FEATURES AS SHOWN ON THE IMPROVEMENT PLANS FOR THIS DEVELOPMENT.

NOTE "H": THE STREAM PRESERVATION AREA SHALL FOREVER BE RESTRICTED FROM DEVELOPMENT WITH BUILDINGS, STRUCTURES, AND USES AND THE NATURAL STATE OF SAID AREA SHALL REMAIN UNDISTURBED. IT IS ALSO THE INTENT AND PURPOSE OF THE STREAM AND/OR WETLAND PRESERVATION AREA TO RESTRICT AND FORBID ANY ACTIVITY OR USE WHICH WOULD AS A NATURAL CONSEQUENCE OF SUCH, IMPEDE OR MAKE MORE DIFFICULT THE ACCOMPLISHMENT OF THE PURPOSE OF WHICH THE SAID AREA WAS CREATED.

ADDITIONAL RESTRICTIONS INCLUDE:

1. NO DUMPING OR BURNING REFUSE.
2. NO HUNTING OR TRAPPING.
3. NATURAL RESOURCES OF THE AREA SHALL REMAIN UNDISTURBED AND NO TOPSOIL, SAND GRAVEL, OR ROCK SHALL BE EXCAVATED, REMOVED OR GRADED.
4. NOTHING SHALL BE PERMITTED OR OCCUR ON THE PREMISES WHICH WOULD CONTRIBUTE TO THE EROSION OF THE LAND AND NO TREES SHALL BE CUT OR REMOVED, EXCEPT FOR THE REMOVAL OF SUCH DEAD, DISEASED, NOXIOUS, OR DECAYED TREES OR VEGETATION WHICH MAY BE REQUIRED FOR CONSERVATION OR SCENIC PURPOSES, OR FOR REASONS OF PUBLIC SAFETY.
5. NO PRIVATE ENCROACHMENTS SHALL BE PERMITTED, SUCH AS, BUT NOT LIMITED TO, PLANTING OF FLOWERS, SHRUBS, GARDEN MATERIAL, ETC. DUMPING OF TRASH OR DEBRIS, OR THE INSTALLATION OF ANY TYPE OF RECREATION OR OTHER FACILITY OR CONVENIENCE.

NO ROADWAY OR ANY FACILITY OF ANY PUBLIC UTILITY OTHER THAN EXISTING ROADWAYS AND PUBLIC UTILITY FACILITIES OR THOSE OUTLINED IN THE ORIGINAL PLAN SHALL BE PERMITTED TO BE CONSTRUCTED OR INSTALLED IN THE PREMISES.

NOTICE IS HEREBY GIVEN TO THE OWNERS OF ALL OF THE LOTS IN THE THE VILLAGES AT WESTCHESTER SUBDIVISION THAT THE CITY OF CANAL WINCHESTER, OHIO, SHALL BE HELD HARMLESS FOR ANY ISSUES AND/OR IMPACTS ARISING FROM THE AREA DELINEATED AND SHOWN HEREON AS STREAM PRESERVATION AREA" INCLUDING, BUT NOT LIMITED TO STORM WATER DRAINAGE, INSECT CONTROL OR WET SOIL CONDITIONS.

NOTE "I": THE PROPERTY SHOWN AND PLATTED HEREON IS SUBJECT TO THE DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS AND RESERVATION OF EASEMENTS FOR THE VILLAGES AT WESTCHESTER SECTION 9, PART 1 RECORDED IN INSTRUMENT NUMBER ________________ IN FRANKLIN COUNTY, OHIO AS MAY BE AMENDED OR SUPPLEMENTED.

LINE TABLE

LINE #	DIRECTION	LENGTH
L1	N 34°28'49" E	16.84'
L2	N 60°47'37" E	15.00'
L3	N 56°08'54" E	30.00'

CURVE TABLE

CURVE #	RADIUS	DELTA	LENGTH	CHL	CHB
C1	275.00'	5°23'36"	25.89'	25.88'	N 31°47'01" E
C2	125.00'	52°44'58"	115.08'	111.06'	N 08°06'21" E
C3	175.00'	3°04'21"	9.38'	9.38'	S 16°43'58" E
C4	250.00'	30°00'00"	130.90'	129.41'	N 19°28'49" E
C5	150.00'	52°44'58"	138.10'	133.27'	N 08°06'21" E
C6	275.00'	24°36'24"	118.10'	117.20'	N 16°47'01" E
C7	275.00'	1°18'45"	6.30'	6.30'	S 05°08'12" W
C8	275.00'	11°38'49"	55.90'	55.81'	S 11°36'59" W
C9	275.00'	11°38'49"	55.90'	55.81'	S 23°15'49" W
C10	225.00'	30°00'00"	117.81'	116.47'	S 19°28'49" W
C11	225.00'	12°32'48"	49.27'	49.17'	N 10°45'14" E
C12	225.00'	17°27'12"	68.54'	68.27'	N 25°45'14" E
C13	175.00'	49°40'37"	151.73'	147.02'	S 09°38'31" W
C14	175.00'	20°13'35"	61.78'	61.46'	N 24°22'02" E
C15	175.00'	29°27'02"	89.95'	88.96'	N 00°28'16" W
C16	160.00'	10°56'15"	30.54'	30.50'	N 23°44'16" W
C17	175.00'	10°56'15"	33.41'	33.36'	S 23°44'16" E
C18	95.00'	15°34'57"	25.84'	25.76'	N 26°03'37" W
C19	125.00'	15°34'57"	34.00'	33.89'	S 26°03'37" E

- ● I.P. FOUND
- ▲ MAG NAIL FOUND
- ○ I.P. SET
- ◎ PERMANENT MARKER SET
- △ MAG NAIL SET

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
250 Old Wilson Bridge Road · Suite 250 · Worthington, OH 43085
614-540-6633 · 888-598-6808
www.cecinc.com

THE VILLAGES AT WESTCHESTER CITY OF CANAL WINCHESTER FRANKLIN COUNTY, OHIO

THE VILLAGES AT WESTCHESTER SECTION 9, PART 1

DATE:	MAY 2020	DRAWN BY:	KAS
DWG SCALE:	1"=40'	CHECKED BY:	MAS
PROJECT NO:	162-435		
APPROVED BY:			

DRAWING NO.: PLAT

SHEET 2 OF 2

Final Subdivision #FS-20-002
Villages at Westchester, Section 9 Part 2

Owner: Grand Communities, Ltd.

Applicant: Grand Communities, Ltd.

Location: PID 184-003289 (Connor Court Extension)

Existing Zoning: PUD (Planned Unit District)

Request: Final Subdivision for Villages at Westchester, Section 9 Part 2

Location and Surrounding Land Uses
The subject property consists of 4.213 acres to the north of the existing Connor Court stub. The applicant is requesting to Plat Section 9 Part 2, which will account for a total of 17 buildable lots and 1 reserve lot. To the north are single family homes along Groveport Road zoned R-3 (low density residential). To the west is a 48 unit condominium development being constructed by Rockford Homes. To the south is the Section 9.1 and 10 Part 2 of the Villages at Westchester subdivision. To the east is undeveloped ground zoned R-3 (low density residential).

Zoning
The subject parcel is zoned PUD (Planned Unit District). It is currently subject to the Villages at Westchester development text and conditions adopted by Ordinance 59-90, 81-91, 17-01, and 40-02. Sections 1 through 13 of the Villages at Westchester have been developed, with 57 lots remaining for homes to be constructed, out of the 771 single family platted lots.

VAW Section('s)	Available Lots
VAW Section 12	19
VAW Section 10	1
VAW Section 13	37

The approved development standards as part of the Villages at Westchester planned unit district are as follows.

- Building heights regarding the residential and non-residential structures as well as the off-street parking and loading standards shall comply with the requirements set forth by the Village of Canal Winchester Zoning Ordinance (as adopted by Ordinance 48-90). These standards include:
- 60 feet of frontage on an approved public right-of-way, with 40 feet of frontage on a curve with a 60 feet lot width at the building line.
- 30 feet front setback
- 30 feet rear setback
- 20 feet total side yard with a minimum of 8 feet on any side
- A minimum finished floor area of 1,700 square feet for a 2 story home, 1,500 square feet for a one-and-a-half story and 1,300 square feet for a one story or split-level home.
- The minimum lot size for any single family detached house shall be 8,000 square feet with an average lot size of not less than 9,000 square feet, except that a total of one hundred

and eight (108) lots in Sections 8 and 9 (as identified on the Phasing Plan, dated April 20, 1990) may have a minimum lot size of 7,200 square feet. Any lot in Section 8 or Section 10 which abuts an existing single family lot shall contain a minimum of 8,400 square feet and shall be a minimum of seventy (70) feet at the building line. No final development plan shall be filed for less than an entire section as shown on the Phasing Plan dated April 20, 1990.

Zoning Analysis

The Planning and Zoning Commission approved the final development plan #FDP-16-002 for Phase 9, 10 and 11.2 in October 2016. This approved plan called for 117 single family lots that are within the three sections. Section 9 will be broken up into two construction parts containing a total of 24 new lots. Section 9.2 will contain 17 single family lots.

With Section 9 Part 2 the applicant extended Connor Court for 17 additional lots. These lots conform to the Final Development Plan for the section. This section will also include a .912 acre reserve area behind lots 820-821 for a detention basin that serves this cul-de-sac. This reserve will have public access between lots 821 and the ditch via a 10' reserve access easement.

Staff Recommendation

Staff recommends the applicant's request for the Final Subdivision Plat #FS-20-002 be approved as presented and recommended to City Council for adoption.

THE VILLAGES AT WESTCHESTER
SECTION 9, PART 2

STATE OF OHIO, COUNTY OF FRANKLIN, CITY OF CANAL WINCHESTER,
SECTION 25, TOWNSHIP 11, RANGE 21,
SECTION 30, TOWNSHIP 15, RANGE 20,
CONGRESS LANDS EAST OF THE SCIOTO RIVER

SITUATED IN THE STATE OF OHIO, COUNTY OF FRANKLIN, CITY OF CANAL WINCHESTER, LOCATED IN SECTION 25, TOWNSHIP 11, RANGE 21, AND BEING IN SECTION 30, TOWNSHIP 15, RANGE 20, CONGRESS LANDS EAST OF THE SCIOTO RIVER, CONTAINING 5.755 ACRES OF LAND, MORE OR LESS, SAID 5.755 ACRES BEING OUT OF THAT 25.455 ACRE TRACT OF LAND DESCRIBED IN DEED TO GRAND COMMUNITIES, LTD. OF RECORD IN INSTRUMENT NO. 201706280088119, RECORDER'S OFFICE, FRANKLIN COUNTY, OHIO.

THE UNDERSIGNED, GRAND COMMUNITIES, LLC, A KENTUCKY LIMITED LIABILITY COMPANY, BY TODD E. HUSS, PRESIDENT, OWNER OF THE LANDS PLATTED HEREIN, DULY AUTHORIZED IN THE PREMISES, DOES HEREBY CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS ITS "**THE VILLAGES AT WESTCHESTER, SECTION 9, PART 2**", A SUBDIVISION CONTAINING LOTS NUMBERED 805–821 INCLUSIVE AND RESERVE "H", AND DOES HEREBY ACCEPT THIS PLAT OF SAME AND DEDICATES TO PUBLIC USE, AS SUCH, ALL OR PARTS OF CONNOR COURT, SHOWN HEREON AND NOT HERETOFORE DEDICATED.

EASEMENTS ARE HEREBY RESERVED IN, OVER AND UNDER AREAS DESIGNATED ON THIS PLAT AS "UTILITY EASEMENT", "SANITARY EASEMENT", " ACCESS EASEMENT" OR "DRAINAGE EASEMENT". EACH OF THE AFOREMENTIONED DESIGNATED EASEMENTS PERMIT THE CONSTRUCTION, OPERATION AND MAINTENANCE OF ALL PUBLIC AND QUASI–PUBLIC UTILITIES ABOVE, BENEATH AND ON THE SURFACE OF THE GROUND AND, WHERE NECESSARY, FOR THE CONSTRUCTION, OPERATION AND MAINTENANCE OF SERVICE CONNECTIONS TO ALL ADJACENT LOTS AND LANDS AND FOR STORM WATER DRAINAGE. WITHIN THOSE AREAS DESIGNATED "DRAINAGE EASEMENT" ON THIS PLAT, AN ADDITIONAL EASEMENT IS HEREBY RESERVED FOR THE PURPOSE OF CONSTRUCTING, OPERATING AND MAINTAINING MAJOR STORM WATER DRAINAGE SWALES AND/OR OTHER STORM WATER DRAINAGE FACILITIES. NO ABOVE GRADE STRUCTURES, DAMS OR OTHER OBSTRUCTIONS TO THE FLOW OF STORM WATER RUNOFF ARE PERMITTED WITHIN DRAINAGE EASEMENT AREAS AS DELINEATED ON THIS PLAT. THOSE AREAS DESIGNATED AS ACCESS EASEMENT ARE RESERVED FOR THE PURPOSE TO PROVIDE INGRESS/EGRESS FROM THE PUBLIC ROADWAY TO THE REAR ACREAGE OF THE PLATTED RESERVE TO THAT ENTITY RESPONSIBLE FOR THE MAINTAINING SAID RESERVE.

THE EASEMENTS SHOWN HEREON OUTSIDE OF THE PLATTED AREA WITHIN SAID 25.455 ACRE TRACT OF LAND OWNED BY GRAND COMMUNITIES, LLC, AND ARE RESERVED FOR THE PURPOSES STATED IN THE FOREGOING "EASEMENT" PARAGRAPH.

IN WITNESS WHEREOF, GRAND COMMUNITIES, LLC, A KENTUCKY LIMITED LIABILITY COMPANY BY, TODD E. HUSS, PRESIDENT, HAS CAUSED THIS PLAT TO BE EXECUTED BY THIS DULY AUTHORIZED OFFICE.

THIS _____ DAY OF _____, 2020.

SIGNED AND ACKNOWLEDGED
IN THE PRESENCE OF:

GRAND COMMUNITIES, LLC
A KENTUCKY LIMITED LIABILITY COMPANY

BY: _____

_____
TODD E. HUSS
PRESIDENT

_____

COMMONWEALTH OF KENTUCKY
COUNTY OF BOONE:

THIS IS AN ACKNOWLEDGMENT CLAUSE; NO OATH OR AFFIRMATION WAS ADMINISTERED TO THE SIGNER. THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS _____ DAY OF _____, 2020, BY TODD E. HUSS, PRESIDENT OF GRAND COMMUNITIES, LLC, A KENTUCKY LIMITED LIABILITY COMPANY, ON BEHALF OF THE COMPANY.

MY COMMISSION EXPIRES _____, _____

CERTIFICATION:
WE DO HEREBY CERTIFY THAT WE HAVE SURVEYED THE ATTACHED PREMISES, PREPARED THE ATTACHED PLAT, AND THAT SAID PLAT IS CORRECT. ALL DIMENSIONS ARE SHOWN IN FEET AND DECIMAL PARTS THEREOF.

DRAFT

_____ _____
MARK ALAN SMITH DATE
PROFESSIONAL LAND SURVEYOR NO. S–8232

APPROVED THIS _____ DAY OF _____ , 2020 _____,
PLANNING & ZONING ADMINISTRATOR,
CITY OF CANAL WINCHESTER

APPROVED THIS _____ DAY OF _____ , 2020 _____,
CHAIRMAN,
PLANNING & ZONING ADMINISTRATOR,
CITY OF CANAL WINCHESTER

APPROVED THIS _____ DAY OF _____ , 2020 _____,
CITY ENGINEER,
CITY OF CANAL WINCHESTER

THIS _____ DAY OF _____, 2020, BY ORDINANCE NO. _____ RIGHTS–OF–WAY FOR CONNOR COURT, HEREIN DEDICATED TO THE PUBLIC USE ARE HEREBY ACCEPTED AND APPROVED AS SUCH BY THE CITY OF CANAL WINCHESTER, OHIO.

_____,
MAYOR, CITY OF CANAL WINCHESTER

_____,
CLERK OF COUNCIL,
CITY OF CANAL WINCHESTER

THIS PLAT SHALL NOT BE TRANSFERRED OR RECORDED UNTIL ALL ABOVE REQUIRED SIGNATURES ARE PLACED ON THIS PLAT.

TRANSFERRED THIS ____ DAY OF _____, 2020 _____,
AUDITOR, FRANKLIN COUNTY, OHIO

_____,
DEPUTY AUDITOR, FRANKLIN COUNTY, OHIO

FILED FOR RECORD THIS _____ DAY OF _____, 2020 _____,
RECORDER, FRANKLIN COUNTY, OHIO

AT _____M.

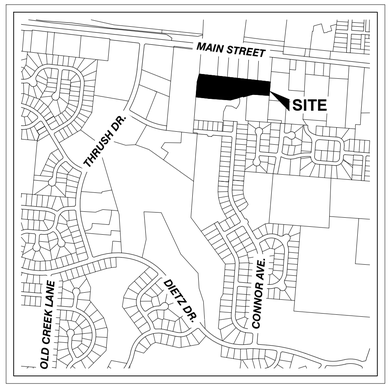
FEE $_____

FILE NO. _____,

RECORDED THIS _____, DAY OF _____, 2020 _____,
DEPUTY RECORDER, FRANKLIN COUNTY, OHIO

PLAT BOOK _____, PAGES _____

NORTH



VICINITY MAP
SCALE: 1" = 2000'

ZONING:
AT THE TIME OF PLATTING, THE PROPERTY BEING PLATTED HEREON IS ZONED:
"PLANNED UNIT DISTRICT (PUD)"
"LOW DENSITY RESIDENTIAL (R–3)"

SETBACKS:
FRONT YARD SETBACK: 30' MINIMUM
REAR YARD SETBACK: 30'
SIDE YARD SETBACK: 20' TOTAL SIDE YARD SETBACK WITH A MINIMUM OF 8'

BASIS OF BEARINGS:
THE BEARINGS FOR THIS SURVEY ARE BASED ON THE EASTERLY LINE OF 13.689 ACRE TRACT AS SHOWN IN INSTRUMENT NUMBER 201612160173734 AS BEING SOUTH 04°28'49" WEST.

SOURCE OF DATA:
THE SOURCES OF RECORDED SURVEY DATA REFERENCED IN THE PLAN AND TEXT OF THIS PLAT ARE RECORDS OF THE RECORDER'S OFFICE, FRANKLIN COUNTY, OHIO.

IRON PINS:
WHERE INDICATED HEREON, UNLESS OTHERWISE NOTED, ARE TO BE SET AND ARE 5/8" SOLID REBAR, THIRTY INCHES IN LENGTH WITH A YELLOW PLASTIC CAP BEARING THE INITIALS "CEC INC".

PERMANENT MARKERS:
WHERE INDICATED HEREON UNLESS OTHERWISE NOTED ARE TO BE SET AND ARE SOLID IRON PINS, 1" IN DIAMETER, 30" IN LENGTH WITH A 2" DIAMETER ALUMINUM CAP BEARING THE STAMP "PERMANENT MARKER CEC".

DEVELOPER:
GRAND COMMUNITIES, LLC
3940 OLYMPIC BOULEVARD, SUITE 400
ERLANGER, KENTUCKY 41018
PHONE: (859) 341–4709

REVISION RECORD

NO	DATE	DESCRIPTION

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250 Old Wilson Bridge Road · Suite 250 · Worthington, OH 43085
614-540-6633 · 888-598-6808
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THE VILLAGES AT WESTCHESTER
CITY OF CANAL WINCHESTER
FRANKLIN COUNTY, OHIO

THE VILLAGES AT WESTCHESTER
SECTION 9, PART 2

DATE:	MAY 2020	DRAWN BY:	KAS
DWG SCALE:	N/A	CHECKED BY:	DBP
PROJECT NO:	162-435		
APPROVED BY:			

DRAWING NO.:
PLAT
SHEET 1 OF 2

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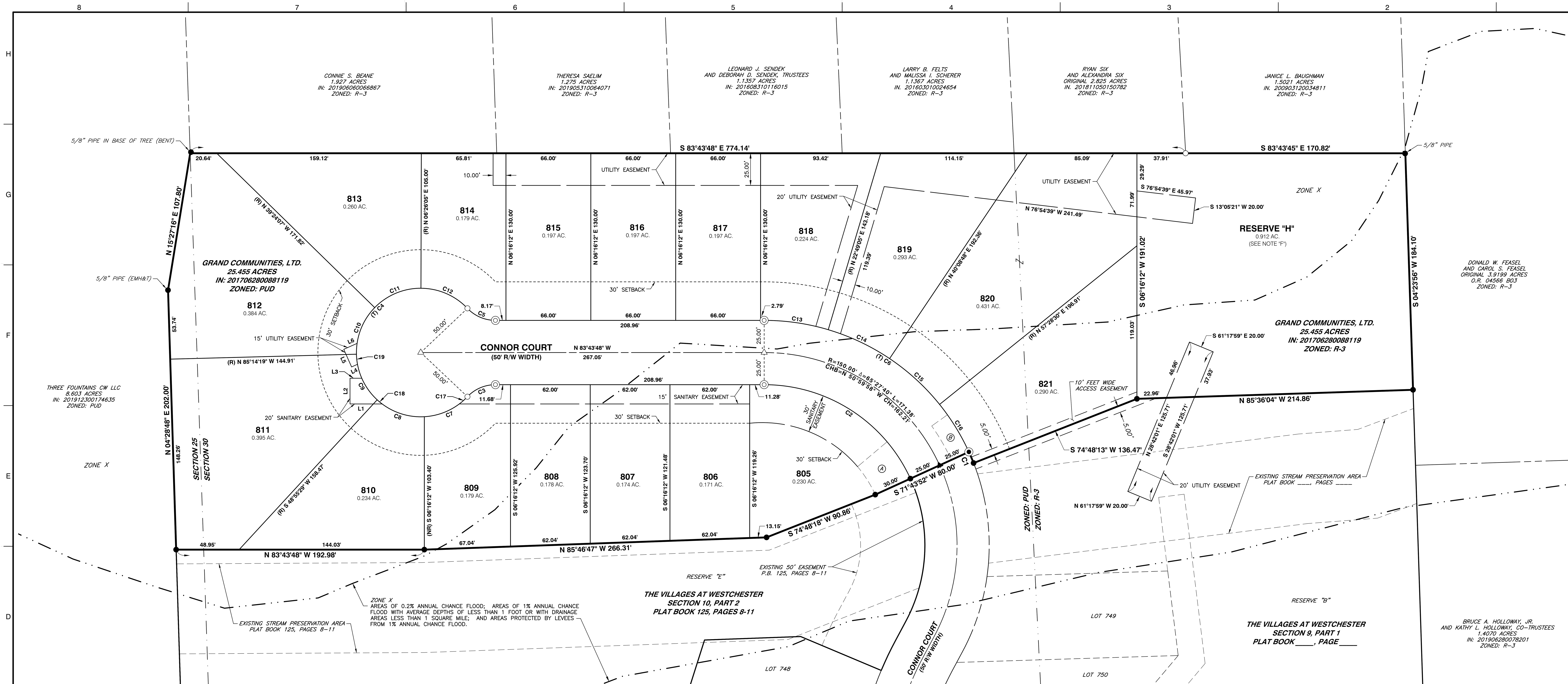

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ZONE "X" (AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN).
ZONE "X" (AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD).
AS DESIGNATED AND DELINEATED ON THE FEMA FLOOD INSURANCE RATE MAP FOR FRANKLIN COUNTY, OHIO, AND INCORPORATED AREAS:
MAP NUMBER 39049C0452K WITH EFFECTIVE DATE OF JUNE 17, 2008 AND
MAP NUMBER 39049C0454K WITH EFFECTIVE DATE OF JUNE 17, 2008.

NOTE "B": ACREAGE BREAKDOWN

ACREAGE IN LOTS 805–821 INCLUSIVE:	4.213 ACRES
ACREAGE IN RESERVE "H":	0.912 ACRES
ACREAGE IN RIGHT-OF-WAY:	0.630 ACRES
TOTAL ACREAGE:	5.755 ACRES
ACREAGE OUT OF PID: 184-001350:	1.343 ACRES
ACREAGE OUT OF PID: 184-003289:	4.412 ACRES

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NOTE "F": RESERVE "H" AS DESIGNATED AND DELINEATED HEREON SHALL BE OWNED AND MAINTAINED BY THE VILLAGES AT WESTCHESTER HOMEOWNERS ASSOCIATION FOR OPEN SPACE. AN EASEMENT FOR DRAINAGE AND UTILITY PURPOSES SHALL BE GRANTED TO THE CITY OF CANAL WINCHESTER FOR THE PURPOSE OF THE MAINTENANCE OF DRAINAGE FEATURES AS SHOWN ON THE IMPROVEMENT PLANS FOR THIS DEVELOPMENT.

NOTE "G": THE STREAM PRESERVATION AREA SHALL FOREVER BE RESTRICTED FROM DEVELOPMENT WITH BUILDINGS, STRUCTURES, AND USES AND THE NATURAL STATE OF SAID AREA SHALL REMAIN UNDISTURBED. IT IS ALSO THE INTENT AND PURPOSE OF THE STREAM AND/OR WETLAND PRESERVATION AREA TO RESTRICT AND FORBID ANY ACTIVITY OR USE WHICH WOULD AS A NATURAL CONSEQUENCE OF SUCH, IMPEDE OR MAKE MORE DIFFICULT THE ACCOMPLISHMENT OF THE PURPOSE OF WHICH THE SAID AREA WAS CREATED.

ADDITIONAL RESTRICTIONS INCLUDE:

1. NO DUMPING OR BURNING REFUSE.
2. NO HUNTING OR TRAPPING.
3. NATURAL RESOURCES OF THE AREA SHALL REMAIN UNDISTURBED AND NO TOPSOIL, SAND GRAVEL, OR ROCK SHALL BE EXCAVATED, REMOVED OR GRADED.
4. NOTHING SHALL BE PERMITTED OR OCCUR ON THE PREMISES WHICH WOULD CONTRIBUTE TO THE EROSION OF THE LAND AND NO TREES SHALL BE CUT OR REMOVED, EXCEPT FOR THE REMOVAL OF SUCH DEAD, DISEASED, NOXIOUS, OR DECAYED TREES OR VEGETATION WHICH MAY BE REQUIRED FOR CONSERVATION OR SCENIC PURPOSES, OR FOR REASONS OF PUBLIC SAFETY.
5. NO PRIVATE ENCROACHMENTS SHALL BE PERMITTED, SUCH AS, BUT NOT LIMITED TO, PLANTING OF FLOWERS, SHRUBS, GARDEN MATERIAL, ETC. DUMPING OF TRASH OR DEBRIS, OR THE INSTALLATION OF ANY TYPE OF RECREATION OR OTHER FACILITY OR CONVENIENCE.

NO ROADWAY OR ANY FACILITY OF ANY PUBLIC UTILITY OTHER THAN EXISTING ROADWAYS AND PUBLIC UTILITY FACILITIES OR THOSE OUTLINED IN THE ORIGINAL PLAN SHALL BE PERMITTED TO BE CONSTRUCTED OR INSTALLED IN THE PREMISES.

NOTICE IS HEREBY GIVEN TO THE OWNERS OF ALL OF THE LOTS IN THE THE VILLAGES AT WESTCHESTER SUBDIVISION THAT THE CITY OF CANAL WINCHESTER, OHIO, SHALL BE HELD HARMLESS FOR ANY ISSUES AND/OR IMPACTS ARISING FROM THE AREA DELINEATED AND SHOWN HEREON AS STREAM PRESERVATION AREA" INCLUDING, BUT NOT LIMITED TO STORM WATER DRAINAGE, INSECT CONTROL OR WET SOIL CONDITIONS.

NOTE "H": THE PROPERTY SHOWN AND PLATTED HEREON IS SUBJECT TO THE DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS AND RESERVATION OF EASEMENTS FOR THE VILLAGES AT WESTCHESTER SECTION 9, PART 2 RECORDED IN INSTRUMENT NUMBER ____________ IN FRANKLIN COUNTY, OHIO AS MAY BE AMENDED OR SUPPLEMENTED.

LEGEND

- ▲ MAG NAIL FOUND
- △ MAG NAIL SET
- ● 5/8" REBAR FD. "CEC INC" (UNLESS OTHERWISE STATED)
- ○ REBAR SET & CAP (SEE IRON PINS NOTE)
- ◉ PERMANENT MARKER (1" REBAR FOUND)
- ◎ PERMANENT MARKER (1" REBAR SET)
- (T) TOTAL DISTANCE
- (R) RADIAL
- (NR) NON-RADIAL

CURVE TABLE

CURVE #	RADIUS	DELTA	LENGTH	CHB	CHL
(T) C4	50.00'	273°08'06"	238.36'	N 06°16'12" E	68.75'
(T) C6	175.00'	65°27'40"	199.94'	S 50°59'58" E	189.24'
C1	175.00'	3°04'21"	9.38'	N 16°43'58" W	9.38'
C2	125.00'	65°27'40"	142.81'	S 50°59'58" E	135.17'
C3	30.00'	46°34'03"	24.38'	N 72°59'11" E	23.72'
C5	30.00'	46°34'03"	24.38'	N 60°26'46" W	23.72'
C7	50.00'	43°23'04"	37.86'	N 71°23'41" E	36.96'
C8	50.00'	45°50'13"	40.00'	S 63°59'40" E	38.94'
C9	50.00'	45°50'15"	40.00'	S 18°09'26" E	38.94'
C10	50.00'	45°50'15"	40.00'	S 27°40'49" W	38.94'
C11	50.00'	45°50'13"	40.00'	S 73°31'03" W	38.94'
C12	50.00'	46°24'06"	40.49'	N 60°21'48" W	39.40'
C13	175.00'	16°32'53"	50.54'	N 75°27'21" W	50.37'
C14	175.00'	17°19'43"	52.93'	N 58°31'04" W	52.73'
C15	175.00'	17°19'43"	52.93'	N 41°11'21" W	52.73'
C16	175.00'	14°15'21"	43.54'	N 25°23'49" W	43.43'
C17	50.00'	9°41'51"	8.46'	S 54°33'05" W	8.45'
C18	50.00'	5°47'03"	5.05'	S 43°58'05" E	5.05'
C19	50.00'	9°02'41"	7.89'	S 00°14'21" W	7.88'

Ⓐ EXISTING 30' EASEMENT P.B. ___, PAGES ____

Ⓑ EXISTING 15' EASEMENT P.B. ___, PAGES ____

LINE TABLE

LINE #	DIRECTION	LENGTH
L1	N 83°43'48" W	25.00'
L2	N 06°16'12" E	20.00'
L3	S 83°43'48" E	9.17'
L4	S 72°15'41" W	5.07'
L5	N 17°44'19" W	15.00'
L6	N 72°15'41" E	11.38'

NORTH

SCALE IN FEET
0 40 80

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
250 Old Wilson Bridge Road · Suite 250 · Worthington, OH 43085
614-540-6633 · 888-598-6808
www.cecinc.com

THE VILLAGES AT WESTCHESTER
CITY OF CANAL WINCHESTER
FRANKLIN COUNTY, OHIO

THE VILLAGES AT WESTCHESTER
SECTION 9, PART 2

DATE:	MAY 2020	DRAWN BY:	KAS
DWG SCALE:	1"=40'	CHECKED BY:	DBP
PROJECT NO:	162-435		
APPROVED BY:			

DRAWING NO.:
PLAT
SHEET 2 OF 2

P:\2016\162-435\-Survey\Dwg\162435-SV01-Sub 9-2.dwg{SHEET 2} LS:(5/29/2020 - dbischoff) - LP: 5/29/2020 2:34 PM

Variance #VA-20-003
Crossroads Church

Owner: Crossroads Christian Church

Applicant: DaNite Sign Co.

Location: 6600 Bigerton Bend

Existing Zoning: AR-1 (Multi-Family Residential)

Request: Variance to Chapter 1189.06(a) to allow for an off premises sign.

Location and Surrounding Land Uses
The subject property, approximately 23 acres, is on the southeast corner of Bigerton Bend and Gender Rd and is zoned for AR-1 (Multi Family). The property to the south consists of 40+ acres for BrewDog and is zoned LM (Limited Manufacturing). Property to the east is zoned PRD (Planned Residential District) and is a single-family development for Cherry Landing, consisting of approximately 180 lots. Properties to the north are zoned GC (General Commercial) and consist of the Waterloo Crossing Shopping center. Properties to the west are zoned GC and consist of a few out parcels containing The Goddard School, a car wash, Valvoline Oil, and Bremen Bank.

Analysis
The subject building is a 58,488 sq. ft., 1,200 seat church facility that is currently finishing construction on the site. The applicant is requesting approval to install a freestanding multi-tenant sign off-site in an adjacent parcel.

Chapter 1189.06(a) of the Zoning Code, which regulates General Requirements for signage, states: "Signs shall only be utilized for the promotion of a business, product or service available on the premises where the sign is located."

The applicant is requesting to install the signage on a piece of property that was acquired by the City of Canal Winchester with the approval of the Site Development Plan approval for the Crossroads Church.

- *Condition #2 with ORD 27-00, which rezoned the subject site to Multi-Family Residential, required the retention basin at the corner of Canal Street and Gender Road to be donated to the City of Canal Winchester when a Final Development Plan for the site was approved.*

This parcel consists of a 1.2 acre triangle shaped tract of ground that houses the detention basin for the Waterloo Crossing Shopping center to the north. When the City acquired the parcel, it was noted that the maintenance of the detention basin remain the responsibility of the shopping center while the maintenance of the ground be done by the City.

Crossroads Church is requesting to get a signage easement from the city for the church facility and future commercial outparcel identification. In return for the signage easement, the church will do maintenance of the property on behalf of the city. Staff has no issues with the requested easement with trade for site maintenance; however, the application that was submitted by the signage company is incomplete. There is no clear information showing where the signage is being requested to be located. With the various utilities

running through the site, the city wants to ensure that the signage will be placed in a suitable location prior to recommending approval of the variance request and granting the easement for the signage location.

Criteria For Approval

(a) That special circumstances or conditions exist which are not applicable to other lands or structures in the same zoning district.

(b) That a literal interpretation of the provisions of this Zoning Code would deprive the applicant of rights commonly enjoyed by other properties in the same zoning district under the provisions of this Zoning Code.

(c) That the special conditions and circumstances do not result from the actions of the applicant.

(d) That the granting of the variance will not confer on the applicant any undue privilege that is denied by this Zoning Code to other lands or structures in the same zoning district.

(e) That the granting of the variance will in no other manner adversely affect the public health, safety, convenience, comfort, prosperity, and general welfare.

(f) That the granting of the variance is not solely based upon the showing that the property could be put to better economic use than presently permitted by zoning regulations.

(g) That the granting of the variance will not permit a use that is otherwise not permitted within the respective zoning district.

Staff Recommendation

Staff recommends variance application #VA-20-003 be tabled at this time so a more complete application can be submitted for review.

City of Canal Winchester

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

VARIANCE APPLICATION

rev. 09/24/2013

PROPERTY OWNER

Name CROSSROADS CHRISTIAN CHURCH

Address 11573 LITHOPOLIS RD NW LITHOPOLIS OH 43136

Daytime Phone 614.829.5800 Email pastortim@thex.church

APPLICANT

Name DANITE SIGN COMPANY

Address 1640 HARMON AVE COLUMBUS OH 43223

Daytime Phone 614.444.3333 Email LHAWKINS@DANITESIGN.COM

Address of Subject Property INTERSECTION OF GENDER RD & BIGGERTON

Current Zoning GC Variance Request to Section 1189.06(a)

Requested Variance To allow a complex ID sign off premises of 000865

Attach a legal description and current survey (within 2 years) of the subject property and all supporting materials as required by Section 1147.02(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.

Property Owner's or Authorize Agent' Signature **Date** 3.31.20

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: VA - _____

VARIANCE TEXT
X CHURCH

(1)
Current Zoning: General Commercial
Proposed Zoning: General Commercial
PID: 184-002666
Property Address: Gender Rd.
Owner: City of Canal Winchester
36 S High St
Canal Winchester OH 43110
Applicant: Crossroads Christian Life Center Inc
11573 Lithopolis Rd NW
Lithopolis OH 43136
Represented by,
DaNite Sign Company
Lisa Hawkins / Pam Meeks
1640 Harmon Ave
Columbus OH 43223
614.444.3333 (O)

Date of Text: 2.1.20

(2)
Legal Description: See Exhibit A

(3)
Nature of Variance: This variance is being requested, as the current code
1189.06 GENERAL REQUIREMENTS.
All signs shall be subject to the following general requirements along with other applicable requirements of this Zoning Code:
(a) Signs shall only be utilized for the promotion of a business, product or service available on the premises where the sign is located.

The client is requesting a variance for an off premises complex identification sign to be located on PID184-002666 for promotion of business on PID 184-000865. (See Exhibits B & C)

(4)
1147.03 Criteria:
a. The special circumstances or conditions which are not applicable to other lands or structures in the same zoning districts is that the structure on PID 184-000865 is located 860' from Gender Rd, thus inhibiting clear visibility of the building structure to drivers while heading North or South on Gender Rd.

b. The literal interpretation of the provisions of the Zoning Code would deprive the church of promoting their business commonly enjoyed by other properties in the same zoning district under provisions of this Zoning Code.

c. The special conditions and circumstances do not result from the actions of the applicant, as the pond already existing on the property.

d. The granting of the variance will not confer on the church any undue privilege that is denied by this Zoning Code, as the church would benefit from being able to promote their business the same as neighboring land or structures in the same zoning district.

e. The granting of the variance will not adversely affect the public health, safety, convenience, comfort, prosperity and general welfare.

f. The granting of this variance is not solely based upon the showing that the property could be put to better use. There is a retention pond on this particular property with no other structure or service.
(See Exhibit D)

g. The granting of this variance will not permit the use that is otherwise not permitted as complex on premises signs are permitted on commercial properties.

(5)
List of Property Owners: See Exhibit E

(6)
Plot Plan: See Exhibit D

EXHIBIT A

DO NOT DETACH

Instrument Number: 201905230061002
Recorded Date: 05/23/2019 2:49:43 PM

Daniel J. O'Connor Jr.
Franklin County Recorder
373 South High Street, 18th Floor
Columbus, OH 43215
(614) 525-3930
http://Recorder.FranklinCountyOhio.gov
Recorder@FranklinCountyOhio.gov

Return To (Mail Envelope):
FROST BROWN TODD

Mail Envelope

Transaction Number: T20190029382
Document Type: DEED
Document Page Count: 24

Submitted By (Walk-In):
FROST BROWN TODD

Walk-In

First Grantor:
WATERLOO CROSSING OP LLC

First Grantee:
CANAL WINCHESTER CITY OF

Fees:	
Document Recording Fee:	$28.00
Additional Pages Fee:	$176.00
Total Fees:	$204.00
Amount Paid:	$204.00
Amount Due:	$0.00

Instrument Number: 201905230061002
Recorded Date: 05/23/2019 2:49:43 PM

OFFICIAL RECORDING COVER PAGE

DO NOT DETACH

THIS PAGE IS NOW PART OF THIS RECORDED DOCUMENT
NOTE: If the document data differs from this cover sheet, please first check the document on our website to ensure it has been corrected. The document data always supersedes the cover page.
If an error on the cover page appears on our website after review please let our office know.
COVER PAGE DOES NOT INCLUDE ALL DATA, PLEASE SEE INDEX AND DOCUMENT FOR ANY ADDITIONAL INFORMATION.

24
45

CONVEYANCE TAX
EXEMPT
A DB
MICHAEL STINZIANO
FRANKLIN COUNTY AUDITOR
90004700

TRANSFERRED

MAY 23 2019

MICHAEL STINZIANO
AUDITOR
FRANKLIN COUNTY, OHIO

STATE OF OHIO

COUNTY OF FRANKLIN

LIMITED WARRANTY DEED

THIS INDENTURE is made as of May 17, 2019, between **WATERLOO CROSSING OP, LLC**, an Ohio limited liability company, c/o Casto, 250 Civic Center Drive, Suite 500, Columbus, Ohio 43215 (herein called "Grantor"), and **CITY OF CANAL WINCHESTER**, an Ohio municipal corporation, 36 South High Street, Canal Winchester, Ohio 43110 (herein called "Grantee").

WITNESSETH: That Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, in hand paid at and before the sealing and delivery of these presents, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, alienated, conveyed and confirmed and by these presents does grant, bargain, sell, alienate, convey and confirm unto Grantee all of the following tracts or parcels of land:

Parcel One: Being a 0.875 acre parcel of land, as described with more particularity in the legal description attached hereto as Exhibit A-1 and incorporated herein by reference.

Parcel Two: Being a 1.200 acre parcel of land, as described with more particularity in the legal description attached hereto as Exhibit A-2 and incorporated herein by reference.

PARCEL NUMBERS: FRANKLIN COUNTY NO. 184-002989, 184-002666

INSTRUMENT REFERENCE: PRIOR INSTRUMENT NUMBER 201510140145469
RECORDER'S OFFICE; FRANKLIN COUNTY, OHIO

TO HAVE AND TO HOLD the said bargained premises, together with all and singular the rights, members and appurtenances thereof, to the same being, belonging or in any wise appertaining, to the only proper use, benefit and behoof of Grantee, forever, **IN FEE SIMPLE**, reserving, however, in

favor of Grantor, its successors and assigns, easements more particularly described on Exhibit "B" attached hereto and made a part hereof, for the benefit of those certain parcels described on Exhibit "D-1" attached hereto and made a part hereof.

This deed and the warranty of title contained herein are made expressly subject to the rights of tenants under unrecorded leases; the lien of all ad valorem real estate taxes and assessments not yet due and payable; local, state and federal laws, ordinances or governmental regulations, including but not limited to building and zoning laws, ordinances and regulations; all matters of record encumbering the property, including but not limited to those items set forth on Exhibit "C" attached hereto and made a part hereof; and the deed restrictions set forth on Exhibit "D" attached hereto and made a part hereof.

Grantor will warrant and forever defend the right and title to the above described property unto Grantee against the lawful claims of all persons owning, holding or claiming by, through or under Grantor, but not otherwise.

(The words "Grantor" and "Grantee" include all genders, plural and singular, and their respective heirs, successors and assigns where the context requires or permits.)

WATERLOO CROSSING OP, LLC, an Ohio limited liability company

By: CRI Holdings, Inc., an Ohio corporation,
Its Managing Member

By: _____

Name: William J. Rist

Title: Vice President

State of Ohio
County of Franklin

The foregoing was acknowledged before me, a Notary Public, in and for said county, by WILLIAM J. RIST, who is personally known to me and who is the VICE PRESIDENT of CRI Holdings, Inc., an Ohio corporation, Managing Member of WATERLOO CROSSING OP, LLC, an Ohio limited liability company, on behalf of the limited liability company, this 17th day of MAY, 2019.

_____
Notary Public

NOTARIAL SEAL
STATE OF OHIO

HELENA BRUS
Notary Public, State of Ohio
My Commission Expires 09-14-2021

Instrument prepared by:

Louis Visco, Esq.
Casto
250 Civic Center Drive, Suite 500
Columbus, Ohio 43215

After recordation return to:

Eugene L. Hollins, Esq.
Frost Brown Todd LLC
10 West Broad Street, Suite 2300
Columbus, Ohio 43215

EXHIBIT
A-1

EXHIBIT "A"

GRANTEE PROPERTY

BOUNDARY DESCRIPTION FOR
0.875 ACRE
East of Gender Road
South of Winchester Boulevard

Situated in the State of Ohio, County of Franklin, City of Canal Winchester, Section 25, Township 11, Range 21, Congress Lands and being out of the remainder of that 68.985 acre tract conveyed to Trine Street Investors, Ltd. of record in Instrument Number 200302260056380 and described as follows:

Beginning at an iron pin set marking the easterly terminus of the northerly right-of-way line for Canal Street as shown on Plat Book 102, Page 38;

thence with said northerly right-of-way line, being a curve to the left, having a central angle of 03° 13' 24", a radius of 635.00 feet and an arc length of 35.72 feet, a chord bearing and chord distance of North 74° 56' 22" West, 35.72 feet to an iron pin set;

thence across of said 68.985 acre tract, the follow courses:

North 59° 13' 23" East, 88.41 feet to an iron pin set;

North 67° 42' 23" East, 61.89 feet to an iron pin set;

North 56° 26' 25" East, 34.02 feet to an iron pin set;

North 69° 16' 25" East, 42.09 feet to an iron pin set;

North 84° 20' 25" East, 63.43 feet to an iron pin set;

South 82° 48' 22" East, 28.46 feet to an iron pin set;

North 83° 02' 26" East, 50.37 feet to an iron pin set in a westerly line of that 24.628 acre tract conveyed to Wal-Mart Real Estate Business Trust of record in Instrument Number 200307110212169;

thence South 04° 44' 57" West, with said westerly line, 93.33 feet to an iron pin set marking the southwesterly corner thereof, in a northerly line of that 27.834 acre tract conveyed to Trine Street Investors, Ltd. of record in Instrument Number 200302260056382;

thence South 69° 26' 03" West, with said northerly line, 332.96 feet to an iron pin set marking the southeasterly corner of Parcel 4 as shown in the deed to Waterloo Crossing Limited of record in Instrument Number 200307310240491;

thence North 20° 33' 57" West, with the easterly line of said Parcel 4, 23.95 feet to an iron pin set at the easterly terminus of the southerly right-of-way line for said Canal Street as shown on Plat Book 102, Page 38;

BOUNDARY DESCRIPTION FOR
0.875 ACRE
-Page 2-

thence North 16° 40' 19" East, with said easterly terminus of Canal Street, 70.00 feet to the *Point of Beginning*. Containing 0.875 acre, more or less, from Auditor's Parcel 184-002628.

PARCEL A-1
0-046-E
ALL OF
(184)
002989

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

This description is based on existing records and prior surveys and an actual field survey performed by EMH&T, Inc.

Bearings are based on the Ohio State Plane Coordinate System per NAD83 (1986 adjustment). Control for bearings was from coordinates of monuments FCGS 2270 (Reset) and FCGS 4452, having a bearing of North 04° 44' 36" East, as established by the Franklin County Engineering Department.

All references refer to the records of the Recorder's Office, Franklin County, Ohio.

EVANS, MECHWART, HAMBLETON AND TILTON, INC.

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY: _____
DATE: 01/04/05

John C. Dodgion
Professional Surveyor No. 8069
01/04/05

STATE OF OHIO
JOHN C. DODGION
8-8069
REGISTERED
SURVEYOR

JCD:dw January 4, 05
0_875 acre 43274.doc

046E
SPLIT
.875 Ac
FROM
(184)
2628

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY: _____
DATE: 1/14/05

15-05-01
APPROVED
JAN 14 2005
Planning & Zoning
Carol Winchester

PARCEL A-1
ALL OF
(184)
002989

EXHIBIT
A-2

PARCEL 4
1.200 ACRE

Situated in the State of Ohio, County of Franklin, City of Canal Winchester, being located in Section 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 1196.93 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 80.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to The Village of Canal Winchester by deed of record in Official Record 34797E20, being the True Point of Beginning;

thence across said 68.985 acre tract, being the southerly right-of-way line of proposed Canal Street, the following courses:

South 85° 40' 02" East, a distance of 226.91 feet to an iron pin set at a point of curvature of a curve to the right; and

southeasterly, with the arc of said curve (Delta = 12° 20' 21", Radius = 565.00 feet) a chord bearing and distance of South 79° 29' 51" East, 121.44 feet to an iron pin set in the easterly terminus of said Canal Street;

thence South 20° 33' 57" East, across said 68.985 acre tract, a distance of 23.95 feet to an iron pin set in the northerly line of that 27.834 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056382;

thence South 69° 26' 03" West, with the northerly line of said 27.834 acre tract, a distance of 43.67 feet to an iron pin set;

thence South 61° 26' 36" West, continuing with said northerly line, a distance of 380.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of said Parcel No. 3;

thence with said easterly right-of-way line, being the easterly line of said Parcel 3, the following courses:

North 00° 27' 15" East, a distance of 145.56 feet to an iron pin set;

North 07° 36' 20" East, a distance of 100.12 feet to an iron pin set;

North 31° 18' 30" East, a distance of 11.18 feet to an iron pin set; and

North 04° 44' 36" East, a distance of 4.36 feet to the True Point of Beginning, and containing 1.200 acre of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

PARCEL A-2
0-0416-E
ALL OF
(184)
002666

EVANS, MECHWART, HAMBLETON & TILTON, INC.

7/11/03

Clark E. White
Registered Surveyor No. 7868

STATE OF OHIO
CLARK E WHITE
7868
REGISTERED
PROFESSIONAL SURVEYOR

CEW.

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY:
DATE: 10/14/2005

PRELIMINARY APPROVAL
FRANKLIN COUNTY ENGINEERING DEPT.
DATE: 7/15/03 BY: BB

LS-03-07
APPROVED
JUL 28 2003
Andrea Butler
Planning & Zoning
Carol Winchester

SPLIT
1.200 ac
out of
(184)
2628

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY:
DATE: 7/31/03

PARCEL A-2
ALL OF
(184)
002666

DESCRIPTION VERIFIED
CORNELL R. ROBERTSON, P.E., P.S.
BY:
DATE 05/23/2019

EXHIBIT "B"

RESERVED STORM WATER DRAINAGE EASEMENT

Grantor, for itself, its successors and assigns, reserves a perpetual exclusive easement ("Storm Water Drainage Easement") for the purpose of replacing, modifying, operating, accessing, and/or maintaining a storm water drainage system and/or other storm water drainage facilities (the "Storm Water Drainage System"), in, through, over and across the 1.20 acre portion of the real property described in the foregoing Exhibit "A" (the "Reserved Storm Water Drainage Easement Area"), the location of such easement area being generally depicted on Exhibit "B-1" attached hereto, together with ingress and egress thereto.

Grantor, its successors and assigns, shall have the right to ingress to and egress from the real property described in the foregoing Exhibit "A" (the "Grantee Property") occupied or to be occupied by said Storm Water Drainage System, and the right to do any and all things necessary, proper or incidental to the successful operation and maintenance thereof. Grantor, its successors and assigns, shall restore all property to its original condition insofar as practicable, after entering upon said premises for any of the purposes herein set forth, including construction, repair, maintenance, replacement, modification, relocation, operation, inspection and maintenance of all facilities and improvements of Grantor, its successors and assigns, within the Reserved Storm Water Drainage Easement Area and rights-of-way.

EXHIBIT "B-1"

RENDERING OF RESERVED STORM WATER DRAINAGE EASEMENT AREA

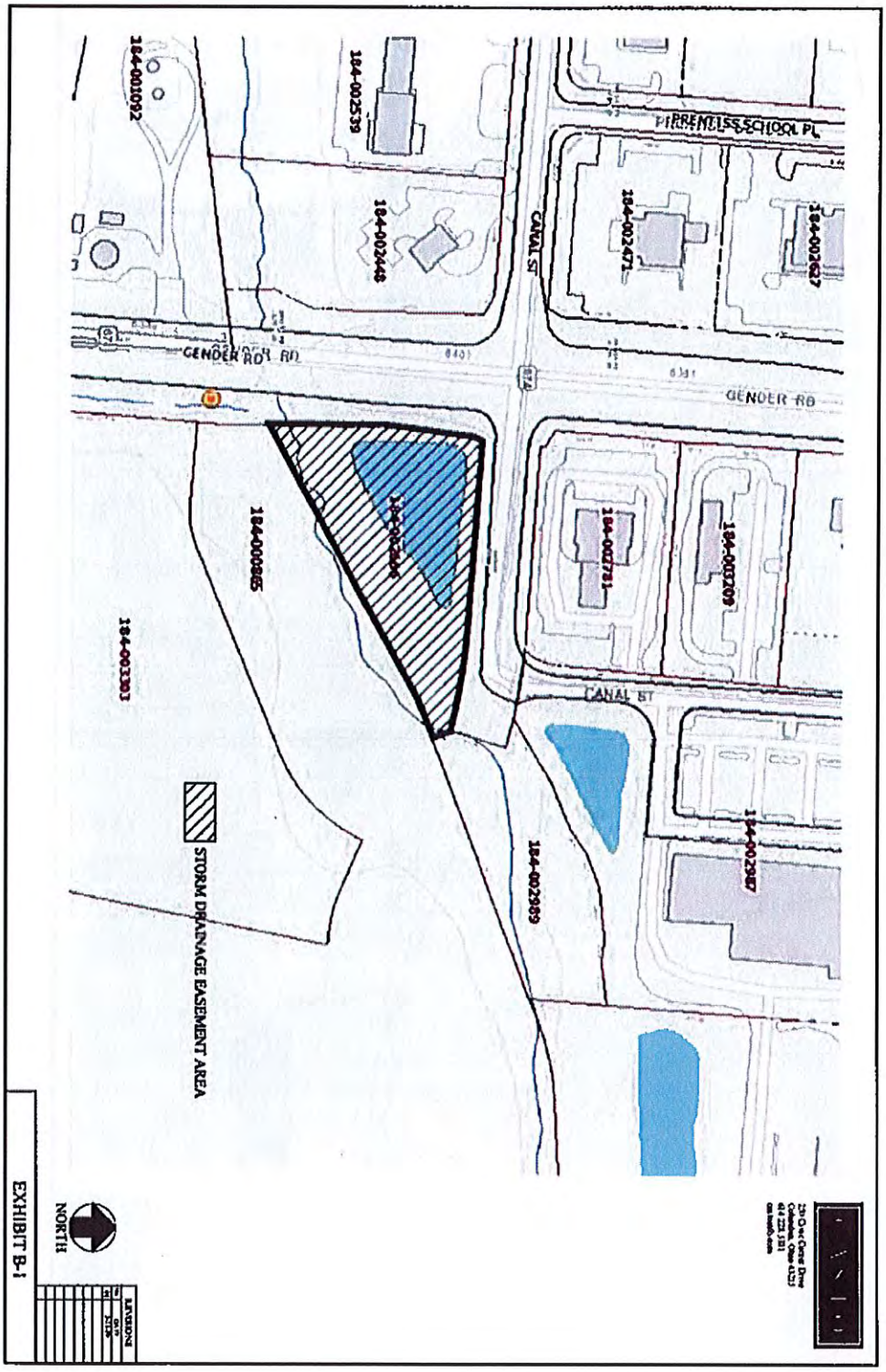


EXHIBIT "B-2"

PYLON SIGN ENVELOPE

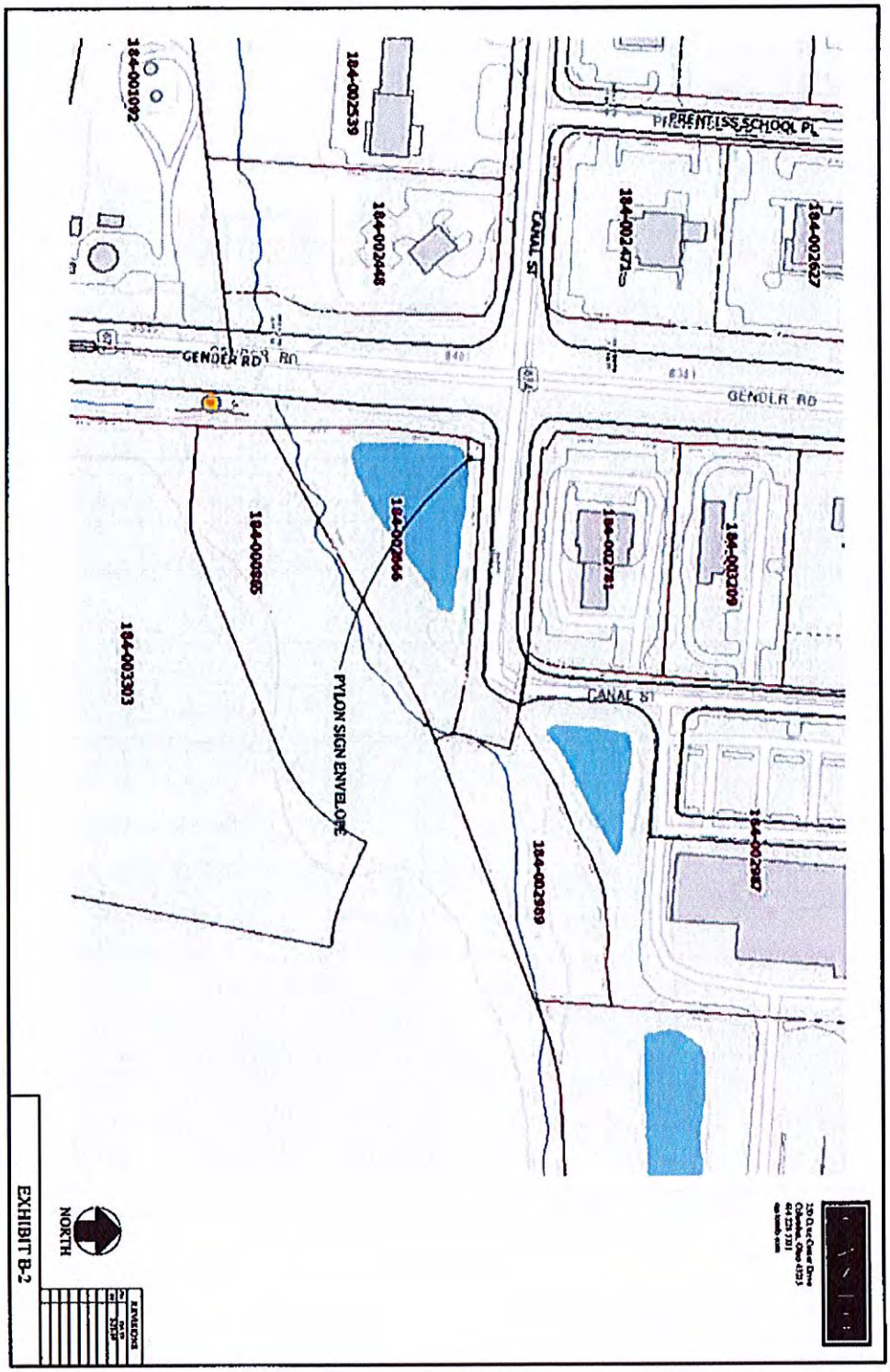


EXHIBIT "C"

PERMITTED ENCUMBERANCES

1.

EXHIBIT "D"

SIGNAGE ENVELOPE DEED RESTRICTION

The Grantee Property shall be subject to the following restrictions, which shall be real covenants running with the land in perpetuity and shall be binding upon and enforceable against the Grantee Property and Grantee, its successors and assigns, and inure to the benefit of part of the real property described as the "Grantor Parcels" recorded at Recorder's Office, Franklin County, Ohio, as more specifically set forth on Exhibit "D-1", attached hereto and made a part hereof and be enforceable by Grantor, to wit:

Grantee, its successors and assigns, may landscape the Grantee Property, but shall not construct any improvements which would or might restrict Grantor's, its successors or assigns' access to or use of the Storm Water Drainage System. No above grade structures, dams or other obstructions to the flow of storm water runoff are permitted within the Reserved Storm Water Drainage Easement Area as delineated in the Exhibits; provided however, that Grantee shall have the right to (i) construct one (1) pylon sign within the perimeters of the building envelope ("Pylon Sign Envelope") as shown on the site plan attached hereto as Exhibit "B-2" and (ii) construct the Canal Street road improvements specifically identified in those certain Crossroads Church Roadway Extension Plans prepared by ADR & Associates, Ltd. of Newark, Ohio, stamped by engineers Ronald Bonnette and Justin Hartfield on September 25, 2018 and signed by City of Canal Winchester's Municipal Engineer on October 11, 2018.

Grantee's construction of one pylon sign on the Grantee Property which would be located outside the perimeters of the Pylon Sign Envelope" shall not be commenced without first receiving Grantor's written approval of such relocated building footprint area, which approval shall not be unreasonably withheld, conditioned or delayed. Notwithstanding anything to the contrary contained herein, any sign constructed within the Pylon Sign Envelope shall not be subject to Grantor approval. Grantor's approval of Grantee's relocated sign footprint area shall not constitute a warranty or representation by Grantor as to the technical sufficiency or adequacy or safety of the structures or any of their component parts or of any physical condition or feature pertaining to the property described herein.

EXHIBIT "D-1"

GRANTOR PARCELS

12.897 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, being located in Sections 24 and 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 119.06 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 95.00 feet to a point in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to the Village of Canal Winchester by deed of record in Official Record 34797E20;

thence crossing said 68.985 acre tract, being the southerly right-of-way line of proposed Winchester Square Boulevard the following courses:

South 86° 15' 44" East, a distance of 9.11 feet to an iron pin set at a point of curvature of a curve to the left; and

northeasterly, with the arc of said curve (Delta = 17° 29' 15", Radius = 700.00 feet) a chord bearing and distance of North 84° 59' 38" East, 212.82 feet an iron pin set at to the True Point of Beginning;

thence northeasterly, continuing across said 68.985 acre tract, being said southerly right-of-way line, continuing with said curve (Delta = 39° 40' 11", Radius = 700.00 feet) a chord bearing and distance of North 56° 24' 55" East, 475.04 feet to an iron pin set;

thence North 83° 04' 39" East, continuing across said 68.985 acre tract, with said proposed right-of-way line, a distance of 20.93 feet to an iron pin set;

thence crossing said 68.985 acre tract, the following courses:

South 54° 35' 54" East, a distance of 19.55 feet to an iron pin set at a point of curvature of a curve to the right;

southeasterly, with the arc of said curve (Delta = 53° 43' 26", Radius = 95.00 feet) a chord bearing and distance of South 27° 44' 11" East, 85.85 feet to an iron pin set at a point of tangency;

South 00° 52' 28" East, a distance of 64.40 feet to an iron pin set;

North 89° 07' 32" East, a distance of 105.58 feet to an iron pin set;

South 04° 44' 57" West, a distance of 438.48 feet to an iron pin set;

South 85° 15' 03" East, a distance of 77.79 feet to an iron pin set;

South 04° 44' 57" West, a distance of 161.17 feet to an iron pin set;

North 85° 15' 03" West, a distance of 80.00 feet to an iron pin set;

South 04° 44' 57" West, a distance of 155.83 feet to an iron pin set;

North 85° 15' 03" West, a distance of 140.00 feet to an iron pin set;

South 04° 44' 57" West, a distance of 317.83 feet to an iron pin set;

South 83° 02' 26" West, a distance of 50.37 feet to an iron pin set;

North 82° 48' 22" West, a distance of 28.46 feet to an iron pin set;

South 84° 20' 25" West, a distance of 63.43 feet to an iron pin set;

South 69° 16' 25" West, a distance of 42.09 feet to an iron pin set;

South 56° 26' 25" West, a distance of 34.02 feet to an iron pin set;

South 67° 42' 23" West, a distance of 61.89 feet to an iron pin set; and

South 59° 13' 23" West, a distance of 88.41 feet to an iron pin set in the northerly right-of-way line of proposed Canal Street;

thence northwesterly, continuing across said 68.985 acre tract, being said northerly right-of-way line, with the arc of a curve to the left (Delta = 06° 37' 40", Radius = 635.00 feet) a chord bearing and distance of North 79° 51' 54" West, 73.41 feet to an iron pin set on the arc of a curve to the left;

thence crossing said 68.985 acre tract, the following courses:

northeasterly, with the arc of said curve (Delta = 24° 57' 28", Radius = 34.00 feet) a chord bearing and distance of North 39° 25' 55" East, 14.69 feet to an iron pin set at a point of compound curvature;

northeasterly, with the arc of said compound curve (Delta = 22° 37' 15", Radius = 99.00 feet) a chord bearing and distance of North 15° 38' 36" East, 38.83 feet to an iron pin set at a point of tangency;

North 04° 20' 00" East, a distance of 926.89 feet to an iron pin set at a point of curvature of a curve to the left;

northwesterly, with the arc of said curve (Delta = 21° 02' 22", Radius 119.00 feet) a chord bearing and distance of North 06° 11' 11" West, 43.45 feet to an iron pin set at point of compound curvature; and

northwesterly, with the arc of said compound curve (Delta = 41° 31' 05", Radius = 44.00 feet) a chord bearing and distance of North 37° 27' 54" West, 31.19 feet to the True Point of Beginning and containing 12.897 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED PROFESSIONAL SURVEYOR

CEW:cew/june03

EVANS, MECHWART, HAMBLETON & TILTON, INC.

Clark E. White 6/19/03

Clark E. White
Registered Surveyor No. 7868

0.676 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, Section 24, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference, at Franklin County Geodetic Survey Monument Number 9951 found marking the northeasterly corner of Section 25, the southeasterly corner of said Section 24, said monument being North 04° 42' 39" East, with the easterly line of said Section 25, a distance of 103.55 feet from Franklin County Geodetic Survey Monument Number 9937 found marking the southwesterly corner of Section 30, the northwesterly corner of Section 19, Township 15, Range 20;

thence North 85° 27' 14" West, with the common line of said Sections 24 and 25, being across a portion of said 68.985, a distance of 2041.42 feet to a point;

thence North 04° 32' 46" East, across said 68.985 acre tract, a distance of 363.77 feet to an iron pin set in the southerly right-of-way line of proposed Waterloo Street;

thence with the southerly and easterly proposed right-of-way line, the following courses:

North 82° 49' 04" West, a distance of 45.83 feet to an iron pin set on the arc of a curve to the right;

northwesterly with the arc of said curve (Delta = 32° 34' 48", Radius 118.00 feet) a chord bearing and distance of North 11° 25' 16" West, 66.20 feet to an iron pin set at a point of tangency; and

North 04° 52' 07" East, a distance of 133.89 feet to an iron pin set in the southerly right-of-way line of existing Waterloo Street;

thence South 84° 39' 53" East, with said existing southerly right-of-way line, a distance of 197.54 feet to an iron pin set;

thence South 85° 37' 10" East, continuing with said existing southerly right-of-way line, a distance of 66.55 feet to an iron pin set in the westerly right-of-way line of proposed Waterloo Street;

thence southwesterly, with said proposed right-of-way line, with the arc of a curve to the left (Delta = 23° 12' 29", Radius = 700.00 feet) a chord bearing and distance of South 50° 07' 21" West, 281.61 feet to the True Point of Beginning, and containing 0.676 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings shown hereon are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings is from coordinates of monuments Franklin County Geodetic Survey 2270 and Franklin County Geodetic Survey 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED PROFESSIONAL SURVEYOR

EVANS, MECHWART, HAMBLETON & TILTON, INC.

Clark E. White 6/19/03

Clark E. White
Registered Surveyor No. 7868

CEW:cewjune03

5.003 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, being located in Section 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 119.06 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 95.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to the Village of Canal Winchester by deed of record in Official Record 34797E20, and being the True Point of Beginning:

thence crossing said 68.985 acre tract, being the southerly right-of-way line of proposed Winchester Square Boulevard the following courses:

South 86° 15' 44" East, a distance of 9.11 feet to an iron pin set at a point of curvature of a curve to the left; and

northeasterly, with the arc of said curve (Delta = 14° 00' 31", Radius = 700.00 feet) a chord bearing and distance of North 86° 44' 00" East, 170.72 feet to an iron pin set;

thence South 04° 20' 00" West, across said 68.985 acre tract, a distance of 1030.41 feet to an iron pin set in the northerly right-of-way line of proposed Canal Street;

thence North 85° 40' 02" West, continuing across said 68.985 acre tract, being said proposed northerly right-of-way line, a distance of 200.54 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of said Parcel 3;

thence with said easterly right-of-way line, being the easterly line of said Parcel 3, the following courses:

North 04° 44' 36" East, a distance of 5.64 feet to an iron pin set;

North 58° 41' 30" West, a distance of 22.36 feet to an iron pin set;

North 04° 44' 36" East, a distance of 100.00 feet to an iron pin set;

North 07° 02' 02" East, a distance of 50.04 feet to an iron pin set;

North 04° 44' 36" East, a distance of 650.00 feet to an iron pin set;

North 10° 27' 14" East, a distance of 100.50 feet to an iron pin set;

North 26° 32' 41" East, a distance of 11.04 feet to an iron pin set;

North 81° 56' 20" East, a distance of 21.43 feet to an iron pin set; and

North 04° 44' 36" East, a distance of 27.23 feet to the True Point of Beginning and containing 5.003 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED
PROFESSIONAL SURVEYOR

CEW:cew/ra/051

EVANS, MECHWART, HAMBLETON & TILTON, INC.

6/2/03

Clark E. White
Registered Surveyor No. 7868

1.641 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, being located in Section 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 119.06 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 95.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to the Village of Canal Winchester by deed of record in Official Record 34797E20;

thence crossing said 68.985 acre tract, being the southerly right-of-way line of proposed Winchester Square Boulevard the following courses:

South 86° 15' 44" East, a distance of 9.11 feet to an iron pin set at a point of curvature of a curve to the left; and

northeasterly, with the arc of said curve (Delta = 14° 00' 31", Radius = 700.00 feet) a chord bearing and distance of North 86° 44' 00" East, 170.72 feet to an iron pin set at the True Point of Beginning;

thence northeasterly, continuing with said proposed southerly right-of-way line, being the arc of said curve (Delta = 03° 28' 44", Radius = 700.00 feet) a chord bearing and distance of North 77° 59' 23" East, 42.50 feet to an iron pin set on the arc of a curve to the right;

thence crossing said 68.985 acre tract, the following courses:

southeasterly, with the arc of said curve (Delta = 41° 31' 05", Radius = 44.00 feet) a chord bearing and distance of South 37° 27' 54" East, 31.19 feet to an iron pin set at a point of compound curvature;

southeasterly, with the arc of said compound curve (Delta = 21° 02' 22", Radius = 119.00 feet) a chord bearing and distance of South 06° 11' 11" East, 43.45 feet to an iron pin set at a point of tangency;

South 04° 20' 00" West, a distance of 926.89 feet to an iron pin set at a point of curvature of a curve to the right;

southwesterly, with the arc of said curve (Delta = 22° 37' 15", Radius = 99.00 feet) a chord bearing and distance of South 15° 38' 36" West, 38.83 feet to an iron pin set at a point of compound curvature; and

southwesterly, with the arc of said compound curve (Delta = 24° 57' 28", Radius = 34.00 feet) a chord bearing and distance of South 39° 25' 55" West, 14.69 feet to an iron pin set in the northerly right-of-way line of proposed Canal Street, being on the arc of a curve to the left;

thence continuing across said 68.985 acre tract, being said northerly right-of-way line, the following courses:

northwesterly, with the arc of said curve (Delta = 02° 29' 17", Radius = 635.00 feet) a chord bearing and distance of North 84° 25' 23" West, 27.57 feet to an iron pin set at a point of tangency; and

North 85° 40' 02" West, a distance of 25.87 feet to an iron pin set;

thence North 04° 20' 00" East, continuing across said 68.985 acre tract, a distance of 1030.41 feet to the True Point of Beginning and containing 1.641 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED
PROFESSIONAL SURVEYOR

EVANS, MECHWART, HAMBLETON & TILTON, INC.

6/2/03

Clark E. White
Registered Surveyor No. 7868

CEW:cew/may03

BOUNDARY DESCRIPTION FOR
1.150 ACRES
North of Winchester Boulevard
East of Gender Road

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, Section 24, Township 11, Range 21, Congress Lands and being out of the remainder of that 68.985 acre tract conveyed to Trine Street Investors, Ltd. of record in Instrument Number 200302260056380 and described as follows:

Beginning, for reference, at the centerline intersection of Gender Road with Winchester Boulevard as shown on Plat Book 102, Page 38, said intersection being South 04° 44' 36" West, with said centerline of Gender Road, 70.72 feet from monument FCGS 2270 (Reset) found;

thence with said centerline of Winchester Boulevard, the following courses:

South 86° 15' 44" East, 103.24 feet to a point of curvature;

with a curve to the left, having a central angle of 20° 08' 22", a radius of 650.00 feet and an arc length of 228.48 feet, a chord bearing and chord distance of North 83° 40' 04" East, 227.30 feet;

thence North 16° 24' 07" West, leaving said centerline, 50.00 feet to an iron pin set marking the southeasterly corner of that 1.727 acre tract conveyed to Waterloo Crossing Limited of record in Instrument Number 200307310240491, in the northerly right-of-way line for said Winchester Boulevard, the *True Point of Beginning*;

thence North 16° 24' 07" West, with an easterly line of said 1.727 acre tract, 69.80 feet to an iron pin set;

thence North 04° 19' 36" East, with an easterly line of said 1.727 acre tract, 180.63 feet to an iron pin set;

thence South 85° 40' 22" East, across said 68.985 acre tract, 309.18 to an iron pin set in the westerly right-of-way line for Waterloo Street (Plat Book 102, Page 38);

thence with said westerly right-of-way line and said northerly right-of-way line, the following courses:

South 05° 43' 37" East, 16.95 feet to an iron pin set;

with a curve to the right, having a central angle of 35° 40' 55", a radius of 600.00 feet and an arc length of 373.66 feet, a chord bearing and chord distance of South 55° 45' 26" West, 367.65 feet to the *True Point of Beginning*. Containing 1.150 acres, more or less, from Auditor's Parcel 184-002628.

BOUNDARY DESCRIPTION FOR
1.150 ACRES
-Page 2-

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

This description is based on existing records and prior surveys and an actual field survey performed by EMH&T, Inc.

Bearings are based on the Ohio State Plane Coordinate System per NAD83 (1986 adjustment). Control for bearings was from coordinates of monuments FCGS 2270 (Reset) and FCGS 4452, having a bearing of North 04° 44' 36" East, as established by the Franklin County Engineering Department.

All references refer to the records of the Recorder's Office, Franklin County, Ohio.

EVANS, MECHWART, HAMBLETON AND TILTON, INC.

John C. Dodgion
Professional Surveyor No. 8069
01/14/05

STATE OF OHIO
JOHN C. DODGION
S-8069
REGISTERED SURVEYOR

JCDjab/January 13, 05
1_150 acres 50091.doc

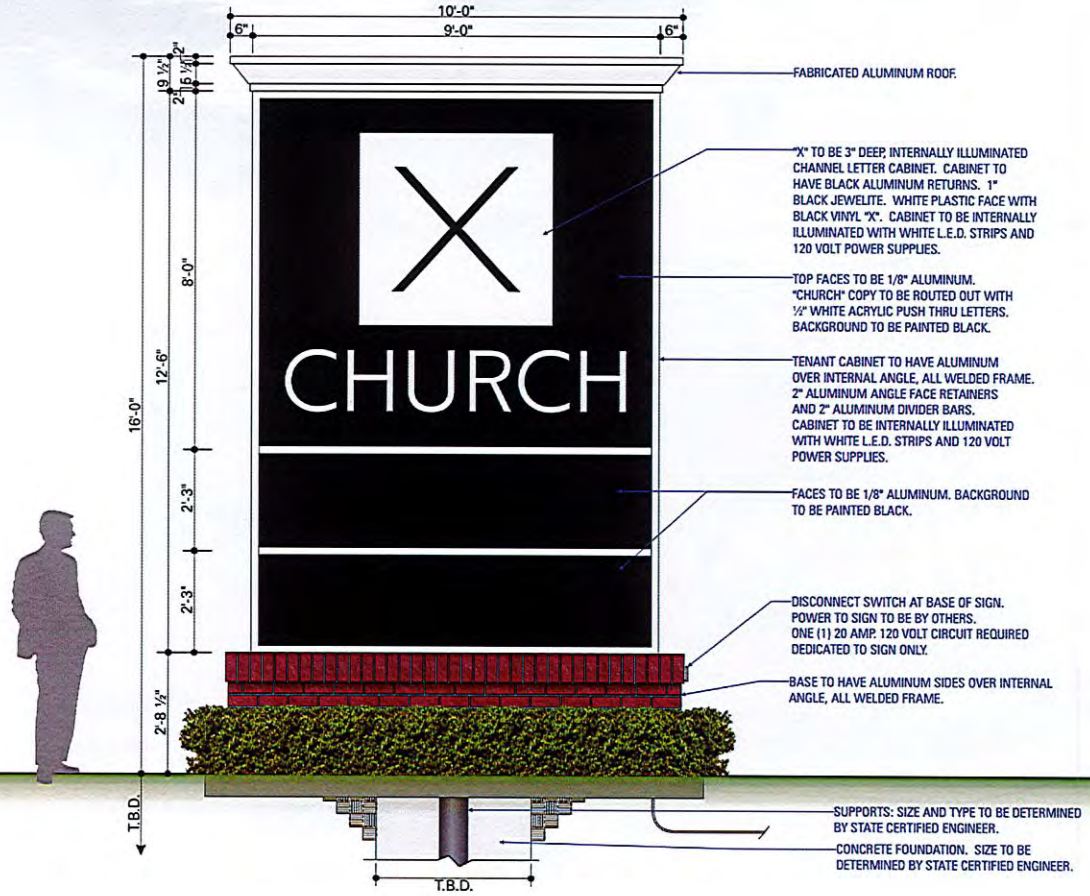
0-46-E
All of
(187)
2628

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY: AG
DATE: 18 Jan 05

LS-05-15
APPROVED
NOV 16 2005
Planning & Zoning
Canal Winchester

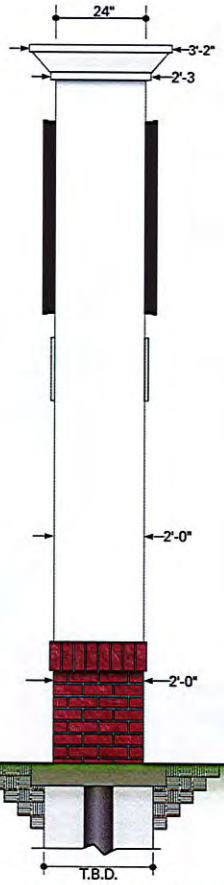
INTERSECTION OF GENDER RD. / BIGGERTON BEND

EXHIBIT B



1 *MONUMENT SIGN FRONT ELEVATION*
SCALE: 3/8" = 1'-0"

ONE (1) DOUBLE FACE, INTERNALLY ILLUMINATED MONUMENT SIGN REQUIRED.
TOTAL SQUARE FEET = 112.50



2 *MONUMENT SIGN SIDE ELEVATION*
SCALE: 3/8" = 1'-0"

INTERNATIONAL C & C CORPORATION
DBA: SIGN X-PRESS
INTERNATIONAL Sign FLORIDA
10831 Canal Street
Largo, FL 33777
1-727-541-5573
Fax: 1-727-544-7745
LIC. #ES 12000419
www.IntlSign.com

Client:
CHURCH X
CANAL WINCHESTER
LITHOPOLIS, OH.

Date:
AUGUST 15, 2019

Drawing Number:
H19127-50R3-X-CHURCH

Revisions:

	DATE:	DESCRIPTION:
1	10-23	NR
2	10-30	CHANGE DESIGN
3	11-04	NR
4	00-00	NR
5	00-00	NR
6	00-00	NR
7	00-00	NR
8	00-00	NR
9	00-00	NR
10	00-00	NR

Sales Person:
JOE RUSSELL

Scale:
AS NOTED

Drawn by:
O. BARNITZ

CLIENT/LANDLORD APPROVAL
☐ APPROVED
☐ APPROVED AS NOTED
☐ REVISE AND RESUBMIT
Signature:
Title:
Date:
SIGNATURE ABOVE ACKNOWLEDGES THAT ALL SPECIFICATIONS AND DIMENSIONS ON THESE DRAWINGS ARE ENDORSED AND CORRECT.

THIS IS AN ORIGINAL DRAWING PROVIDED AS PART OF A PLANNED PROJECT AND IS NOT TO BE EXHIBITED, COPIED OR REPRODUCED WITHOUT THE WRITTEN PERMISSION OF INTERNATIONAL SIGN COMPANY OR IT'S AUTHORIZED AGENTS. ALL RIGHTS RESERVED.

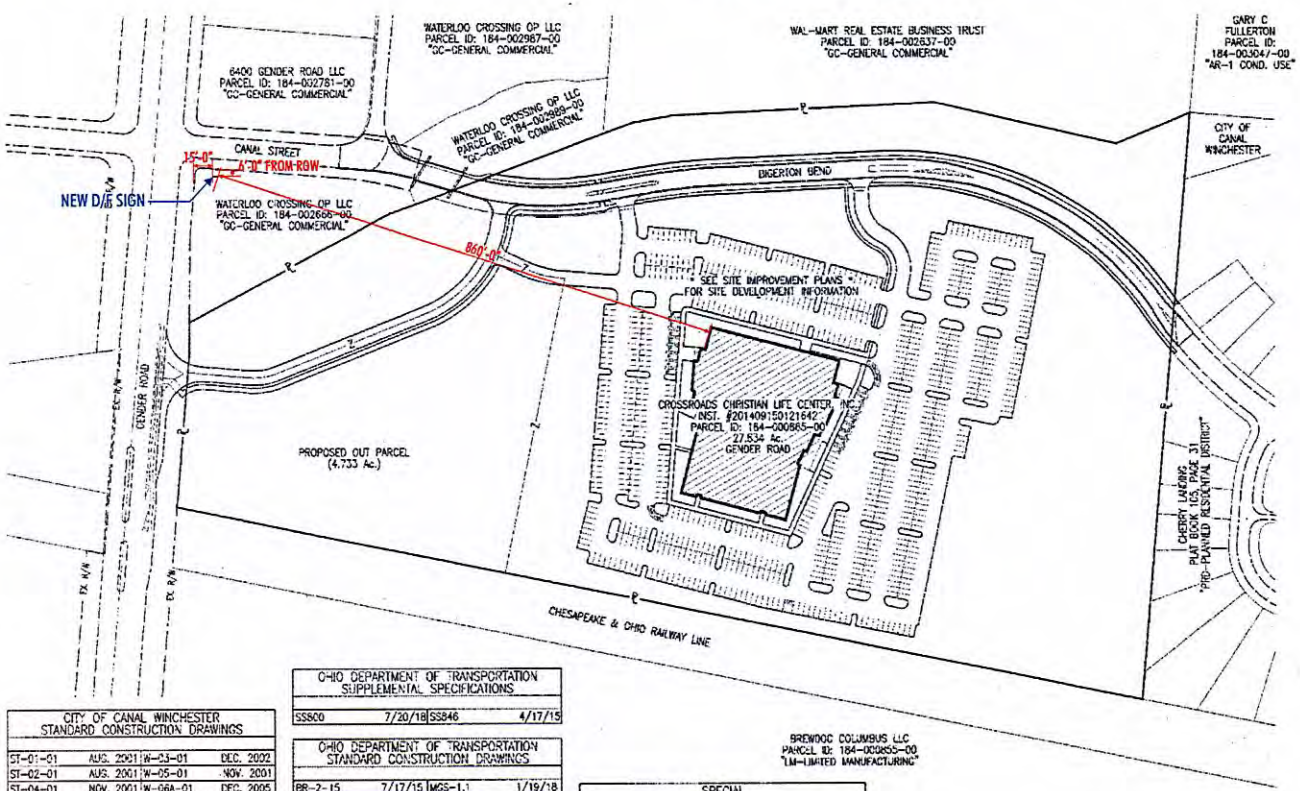
PRIMARY ELECTRICAL POWER TO SIGN TO BE BY OTHERS. ALL POWER TO BE 120 VOLT UNLESS OTHERWISE STATED.
ELECTRICAL TO USE U.L. LISTED COMPONENTS AND SHALL MEET ALL N.E.C. STANDARDS 2014
SIGN MUST BE GROUNDED IN COMPLIANCE WITH ARTICLE 600 OF THE NATIONAL ELECTRIC CODE.

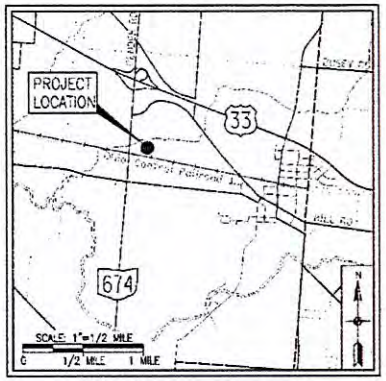
SHEET NO. 104

EXHIBIT C

CROSSROADS CHURCH
ROADWAY EXTENSION PLANS
SITUATED IN THE CITY OF CANAL WINCHESTER, FRANKLIN COUNTY, OHIO

OWNER	GENERAL CONTRACTOR	ARCHITECT
CROSSROADS CHURCH TIM MOORE, PASTOR 11573 LITHOPOLIS ROAD LITHOPOLIS, OHIO 43136 (614) 837-9800	ELEVATED INTEGRITY AARON CARROLL 1055 WEST MARKET STREET BALTIMORE, OHIO 43105 (740) 409-5038	THE McKNIGHT GROUP PHILLIP TIPTON, AIA 3351 McDOWELL ROAD GROVE CITY, OHIO 43123 (614) 575-1689





ROADWAY PLAN INDEX

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TRAFFIC CONTROL PLAN 20

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SUPERSTRUCTURE DETAILS 28-31
REINFORCING STEEL LIST 32

* ALSO SEE SITE IMPROVEMENT AND SANITARY SEWER EXTENSION PLANS.

CITY OF CANAL WINCHESTER STANDARD CONSTRUCTION DRAWINGS			
ST-01-01	AUG. 2001	W-03-01	DEC. 2002
ST-02-01	AUG. 2001	W-05-01	NOV. 2001
ST-04-01	NOV. 2001	W-06A-01	DEC. 2005
ST-05-02	JUL. 2002		
ST-07-01	JUN. 1992		
ST-08-02	JUL. 2002		

OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATIONS			
SS800	7/20/18	SS846	4/17/15

OHIO DEPARTMENT OF TRANSPORTATION STANDARD CONSTRUCTION DRAWINGS			
BR-2-15	7/17/15	MGS-1.1	1/19/18
CPA-1-08	7/18/08	MGS-2.1	1/19/18
PSBD-2-07	7/20/18	MGS-3.1	1/19/18
SDR-1-13	7/20/18	MGS-4.2	7/19/13

SPECIAL PROVISIONS
NATIONWIDE PERMIT LRH-2016-1011-SCR-TUSSING DITCH

SIGNATURES BELOW SIGNIFY ONLY CONCURRENCE WITH THE GENERAL PURPOSES AND GENERAL LOCATION OF THE PROJECT. ALL TECHNICAL DETAILS REMAIN THE RESPONSIBILITY OF THE ENGINEER PREPARING THE PLAN.

MAYOR, CITY OF CANAL WINCHESTER — DATE 10-10-18

DIRECTOR OF PUBLIC SERVICE, CITY OF CANAL WINCHESTER — DATE 10-9-18

SUPERINTENDENT, DIVISION OF WATER — DATE 10-9-18

SUPERINTENDENT, DIVISION OF WATER RECLAMATION — DATE 10/9/18

SUPERINTENDENT, DIVISION OF STREETS, LANDS & BUILDINGS — DATE 10/9/18

MUNICIPAL ENGINEER, CITY OF CANAL WINCHESTER — DATE 10/11/18

ADR
Newark Office:
88 West Church Street
Newark, OH 43055
(740) 348-1821 (ph)
(740) 345-4894 (fax)
www.adrinnovation.com

STATE OF OHIO RONALD BONNETTE E-67476 REGISTERED PROFESSIONAL ENGINEER

9-25-2018

RONALD S. BONNETTE, P.E., P.S.
OHIO PROFESSIONAL ENGINEER #67476
DATE

SHEETS 1-20
SEAL

CITY OFFICIALS

MICHAEL EBERT	MAYOR
AMANDA JACKSON	FINANCE DIRECTOR
MATTHEW C. PEOPLES	DIRECTOR OF PUBLIC SERVICE
WILLIAM E. SAMS	CONSTRUCTION SERVICES ADMINISTRATOR
LUCAS M. HAIRE	DEVELOPMENT DIRECTOR

STATE OF OHIO JUSTIN T. HARTFIELD 80189 REGISTERED PROFESSIONAL ENGINEER

September 25, 2018

JUSTIN T. HARTFIELD, P.E.
OHIO PROFESSIONAL ENGINEER #80189
DATE

SHEETS 1-20
SEAL

CITY COUNCIL

BRUCE JARVIS	PRESIDENT
MIKE WALKER	VICE PRESIDENT
JILL AMOS	COUNCIL PERSON
WILL BENNETT	COUNCIL PERSON
ROBERT CLARK	COUNCIL PERSON
MIKE COOLMAN	COUNCIL PERSON
PATRICK LYNCH	COUNCIL PERSON

SITE INFORMATION:

OWNER:	CROSSROADS CHRISTIAN LIFE CENTER, INC.
ADDRESS:	6450 GENDER ROAD
AREA:	27.834 Ac.
EXISTING USE:	CROP FIELD PARTIALLY WOODED
PROPOSED USE:	58,488 S.F. 2-STORY BUILDING & PARKING,
LOT COVERAGE:	9.459 Ac.
CLASS:	AR-1 (CONDITIONAL USE)
BUILDING SETBACKS:	100' FRONT 75' SIDE 75' REAR
FLOOD INFO:	ZONES A, AE, AND X AS SHOWN ON MAP No. 1904900425K, DATED JUNE 17, 2008
BUILDING USE:	CROSSROADS CHURCH

HORIZONTAL SCALE IN FEET 0 100 200

DRAWN BY: CHECKED BY: REVIEWED BY:

REVISIONS

TITLE SHEET

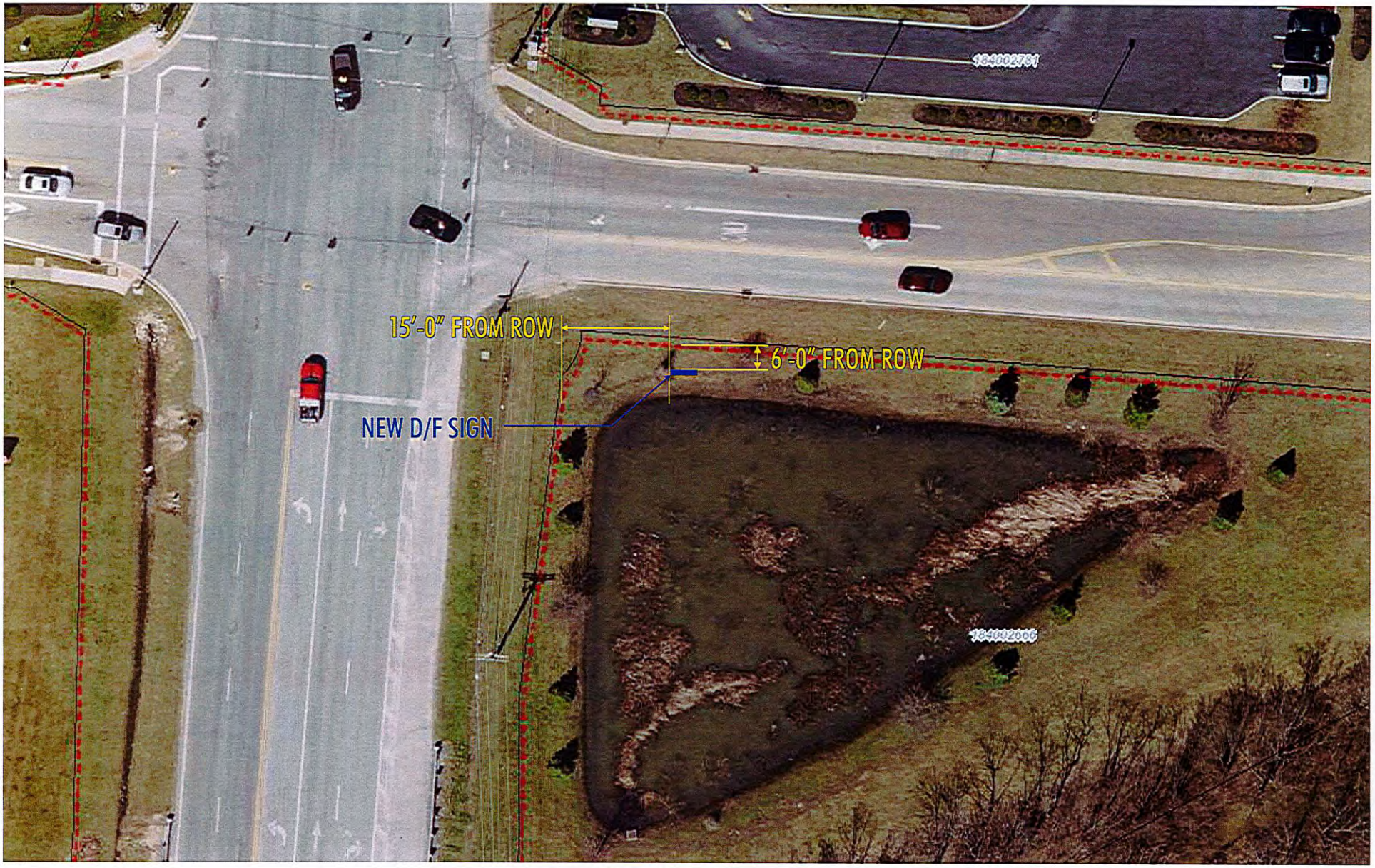
CROSSROADS CHURCH
CANAL WINCHESTER, OHIO

JULY 31, 2018
JOB #290301

1 / 32

PLOTTED 9/25/2018 11:04:17 AM P:\JOBS\2015\290301 Crossroads Ph Church - Canal Winchester\Roadway Extension Plans\01 title.dgn

Recycled Paper


15'-0" FROM ROW
6'-0" FROM ROW
NEW D/F SIGN

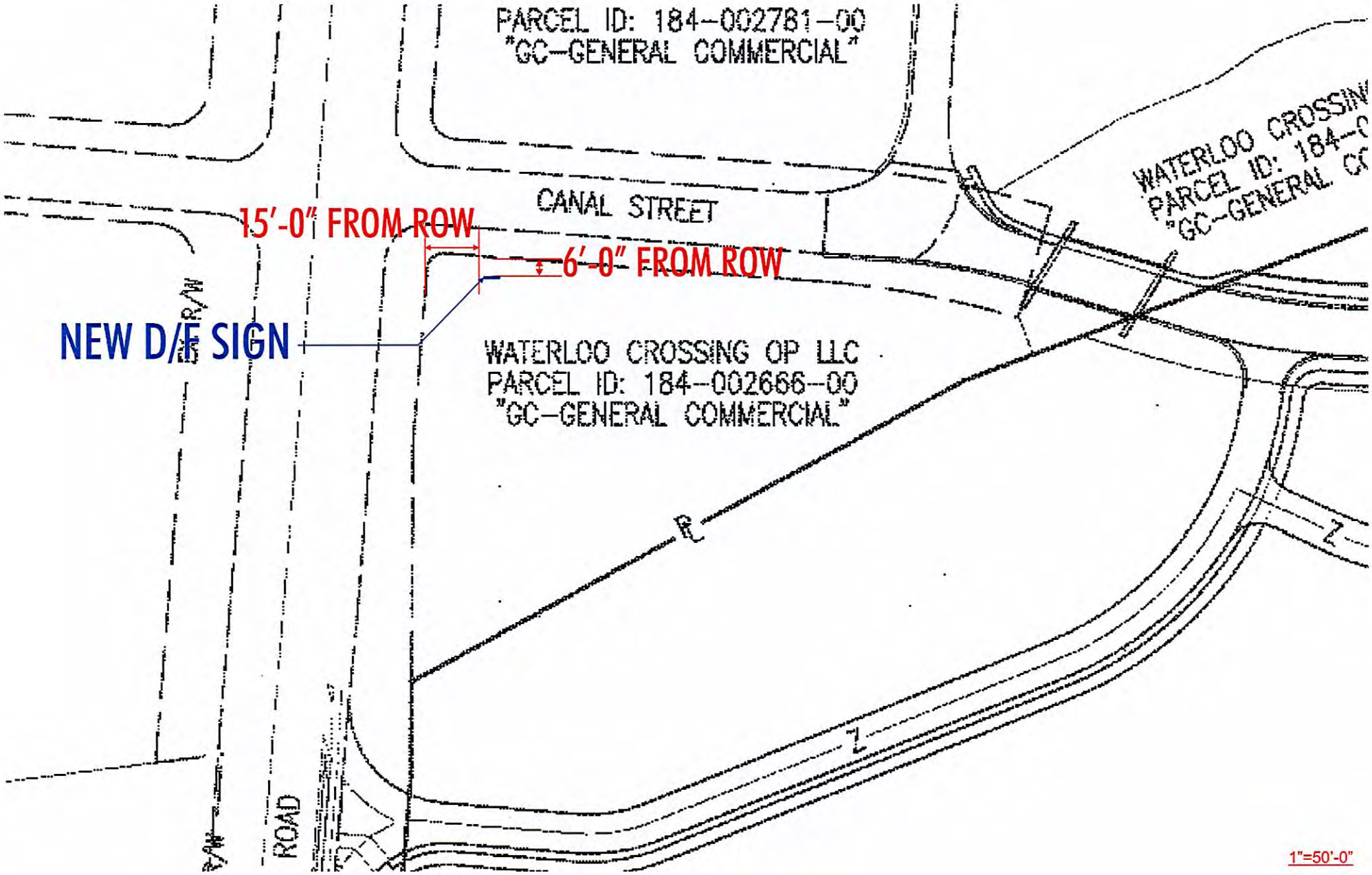
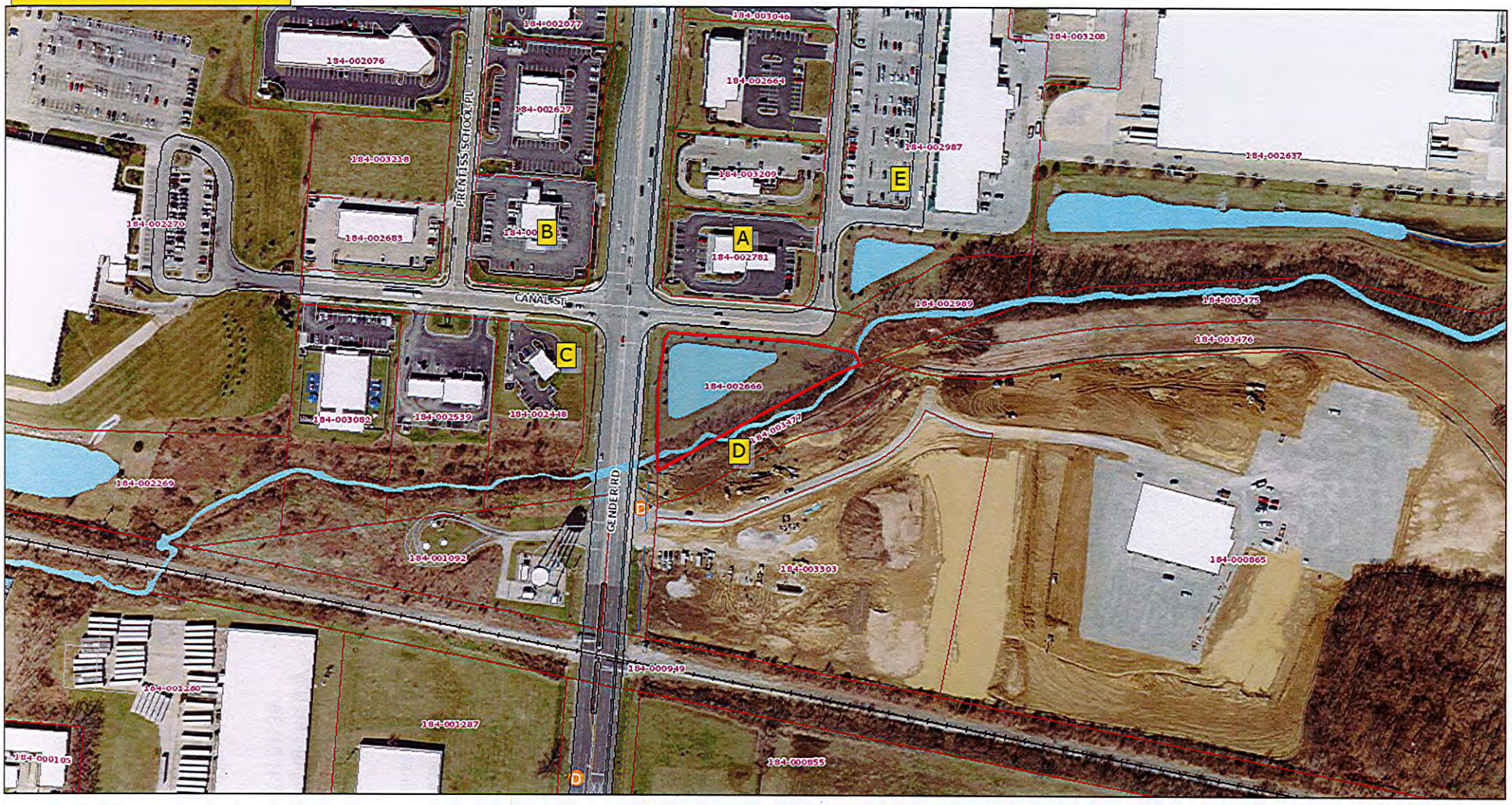

PARCEL ID: 184-002781-00
"GC-GENERAL COMMERCIAL"
CANAL STREET
15'-0" FROM ROW
6'-0" FROM ROW
NEW D/F SIGN
WATERLOO CROSSING OP LLC
PARCEL ID: 184-002666-00
"GC-GENERAL COMMERCIAL"
WATERLOO CROSSIN
PARCEL ID: 184-0
"GC-GENERAL CO
R/W
ROAD
1"=50'-0"

EXHIBIT D

002666_Plot Plan



April 16, 2020

1:2,762

0 190 380 760 ft

0 55 110 220 m

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Franklin County Auditors Office
Copyright 2015

EXHIBIT E

Neighboring Property Owners:

1. 6400 Gender Road LLC / GENDER RD 21 T11 S25
   Owner Address:
   9474 Big Bear Ave
   Powell OH 43065

   Property Address:
   6400 Gender Rd
   Canal Winchester OH 43110

2. Wal-mart Real Estate Business Trust / GENDER RD R21 T11 S25
   Owner Address:
   PO Box 8050 MS 0555
   Bentonville AR 72712

   Property Address:
   6647 Winchester Blvd
   Canal Winchester OH 43110

3. Valvoline LLC / GENDER RD R21 T11 S25
   Owner Address:
   3499 Blazer Pkwy
   Lexington KY 40509

   Property Address:
   6445 Canal St
   Canal Winchester OH 43110

4. First Bremen Bank / GENDER RD R21 T11 S25
   Owner Address:
   521 E Main St
   Lancaster OH 43130

   Property Address:
   6380 Prentiss School Dr
   Canal Winchester OH 43110

5. Crossroads Christian Life Center Inc
   Owner Address:
   11573 Lithopolis Rd NW
   Lithopolis OH 43136

   Property Address:
   6600 Bigerton Bl
   Canal Winchester OH 43110

Variance #VA-20-004
Crossroads Church

Owner:	Crossroads Christian Church
Applicant:	DaNite Sign Co.
Location:	6600 Bigerton Bend
Existing Zoning:	AR-1 (Multi-Family Residential)
Request:	Variance to Chapter 1189.08(b)(1) & (3) to allow for a freestanding sign to be taller and larger than setback requirements

Location and Surrounding Land Uses

The subject property, approximately 23 acres, is on the southeast corner of Bigerton Bend and Gender Rd and is zoned for AR-1 (Multi Family). The property to the south consists of 40+ acres for BrewDog and is zoned LM (Limited Manufacturing). Property to the east is zoned PRD (Planned Residential District) and is a single-family development for Cherry Landing, consisting of approximately 180 lots. Properties to the north are zoned GC (General Commercial) and consist of the Waterloo Crossing Shopping center. Properties to the west are zoned GC and consist of a few out parcels containing The Goddard School, a car wash, Valvoline Oil, and Bremen Bank.

Analysis

The subject building is a 58,488 sq. ft., 1,200 seat church facility that is currently finishing construction on the site. The applicant is requesting approval to install a freestanding multi-tenant sign off-site in an adjacent parcel. The free standing sign is being requested to be larger and taller than setback requirements.

Chapter 1189.08(b)(1) of the Zoning Code, which regulates Complex Identification Signs, states: "The display area per face of a complex identification sign shall not exceed fifty (50) square feet when the sign is located ten (10) feet from the public right-of-way. For each additional one (1) foot setback from the public right-of-way, an additional two (2) square foot per sign face shall be permitted, up to a maximum of one hundred and seventy-two (172) square feet per sign face."

Chapter 1189.08(b)(3) of the Zoning Code, which regulates Complex Identification Signs, states: "The height of a complex identification sign shall not exceed six (6) feet when the sign is located ten (10) feet from the primary frontage street right-of-way line. For each additional two (2) feet setback from the street right-of-way line, an additional one (1) foot in height will be permitted for a complex identification sign up to a maximum of sixteen (16) feet high"

The sign that is being requested is designed at 112.5 sq. ft. at 17.79 feet tall. The complex identification sign features a 72 sq. ft. area to advertise for the church at the top and two future tenant panels below at 20.25 sq. ft. each. The base of the sign is proposed to be a solid brick base at 4.5 feet tall. The exact location of the sign is unclear based on the application submittal, however, regardless of location the sign proposed is 1.79 feet taller than the maximum 16 foot height permitted.

Criteria For Approval

(a) That special circumstances or conditions exist which are not applicable to other lands or structures in the same zoning district.

(b) That a literal interpretation of the provisions of this Zoning Code would deprive the applicant of rights commonly enjoyed by other properties in the same zoning district under the provisions of this Zoning Code.

(c) That the special conditions and circumstances do not result from the actions of the applicant.

(d) That the granting of the variance will not confer on the applicant any undue privilege that is denied by this Zoning Code to other lands or structures in the same zoning district.

(e) That the granting of the variance will in no other manner adversely affect the public health, safety, convenience, comfort, prosperity, and general welfare.

(f) That the granting of the variance is not solely based upon the showing that the property could be put to better economic use than presently permitted by zoning regulations.

(g) That the granting of the variance will not permit a use that is otherwise not permitted within the respective zoning district.

Staff Recommendation

Staff recommends variance application #VA-20-004 be tabled at this time so a more complete application can be submitted for review.

City of Canal Winchester

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

VARIANCE APPLICATION

rev. 09/24/2013

PROPERTY OWNER

Name CROSSROADS CHRISTIAN CHURCH

Address 11573 LITHOPOLIS RD NW LITHOPOLIS OH 43136

Daytime Phone 614.829.5800 Email pastortim@thex.church

APPLICANT

Name DANITE SIGN COMPANY

Address 1640 HARMON AVE COLUMBUS OH 43223

Daytime Phone 614.444.3333 Email LHAWKINS@DANITESIGN.COM

Address of Subject Property INTERSECTION OF GENDER RD & BIGGERTON

Current Zoning GC Variance Request to Section 1189.08 (b) 1 (b) 3

Requested Variance Variance for setback and height of proposed sign

Attach a legal description and current survey (within 2 years) of the subject property and all supporting materials as required by Section 1147.02(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.

Property Owner's or Authorize Agent' Signature **Date** 3.31.20

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: VA - _____

VARIANCE TEXT
X CHURCH

(1)
Current Zoning: General Commercial
Proposed Zoning: General Commercial
PID: 184-002666
Property Address: Gender Rd.
Owner: City of Canal Winchester
36 S High St
Canal Winchester OH 43110
Applicant: Crossroads Christian Life Center Inc
11573 Lithopolis Rd NW
Lithopolis OH 43136
Represented by,
DaNite Sign Company
Lisa Hawkins / Pam Meeks
1640 Harmon Ave
Columbus OH 43223
614.444.3333 (O)

Date of Text: 2.1.20

(2)
Legal Description: See Exhibit A

(3)
Nature of Variance: This variance is being requested, as the current code

1189.08 FREESTANDING SIGNS

(b) Complex Identification Signs. Non-residential developments shall be permitted complex identification signs to identify such development and its current occupants subject to the following requirements:

(1) The display area per face of a complex identification sign shall not exceed fifty (50) square feet when the sign is located ten (10) feet from the public right-of-way. For each additional one (1) foot setback from the public right-of-way, an additional two (2) square foot per sign face shall be permitted, up to a maximum of one hundred and seventy-two (172) square feet per sign face.

(3) The height of a complex identification sign shall not exceed six (6) feet when the sign is located ten (10) feet from the primary frontage street right-of-way line. For each additional two (2) feet setback from the street right-of-way line, an additional one (1) foot in height will be permitted for a complex identification sign up to a maximum of sixteen (16) feet high.

The client is requesting a variance for this off premises complex identification sign to be located 60' east of Gender Rd and 20' South of Canal St. This would place the sign just behind the street right-of-way line with no further setback due to utilities placement and a retention pond on the property, inhibiting the sign to be installed at a proper setback. Additionally, the client requests a variance for the overall height of the sign to be 17'-9 ½", including the sign base and

decorative finial trim cap at the top of the sign. The graphic area of the sign is 112.5 sq ft with and overall height of 12'-6" and width of 9'-0". (See Exhibit B)

(4)
1147.03 Criteria:

a. The special circumstances or conditions which are not applicable to other lands or structures in the same zoning districts are that PID 184-002666 has multiple utilities, recently moved, and a retention pond that prohibits the sign from being installed per codified ordinances. After review of the site and location of existing utilities, it was determined that the proposed sign be located 60' from the right-of-way line East of Gender Rd and at 0' setback from the right-of-way line South of Canal St. (See Exhibit C) The proposed overall height of the sign is 17'-9 ½" in order to accommodate for mature tree line in the line of site where the footprint of the sign is being proposed. Without increasing the height of the sign, the visibility would be difficult to read by drivers heading North of Gender Rd. The proposed 0' setback South of Canal St is due to the sloping soil/grading conditions towards the retention pond. (See Photos A, B, & C)

b. The literal interpretation of the provisions of the Zoning Code would deprive the church of promoting their business because the church is located so far off the main back from Gender Rd. Additionally, due to underground utilities and the retention pond, the proposed sign cannot be located at another place on the property while still maintaining visibility by drivers passing by.

c. The special conditions and circumstances do not result from the actions of the applicant, as the pond and utilities already existing on the property.

d. The granting of the variance will not confer on the church any undue privilege that is denied by this Zoning Code, as the church would benefit from being able to promote their business the same as neighboring land or structures in the same zoning district. The land could not be put to better use, as the retention pond could not be drained in order to build another commercial business on the parcel.

e. The granting of the variance will not adversely affect the public health, safety, convenience, comfort, prosperity and general welfare.

f. The granting of this variance is not solely based upon the showing that the property could be put to better use. There is a retention pond on this particular property with no other structure or service. The retention pond could not be drained in order to build another commercial business on the parcel.
(See Exhibit D)

g. The granting of this variance will not permit the use that is otherwise not permitted as complex on premises signs are permitted on commercial properties.

(5)
List of Property Owners: See Exhibit E

(6)
Plot Plan: See Exhibit E

EXHIBIT A

DO NOT DETACH

Instrument Number: 201905230061002
Recorded Date: 05/23/2019 2:49:43 PM

Daniel J. O'Connor Jr.
Franklin County Recorder
373 South High Street, 18th Floor
Columbus, OH 43215
(614) 525-3930
http://Recorder.FranklinCountyOhio.gov
Recorder@FranklinCountyOhio.gov

Return To (Mail Envelope):
FROST BROWN TODD

Mail Envelope

Transaction Number: T20190029382
Document Type: DEED
Document Page Count: 24

Submitted By (Walk-In):
FROST BROWN TODD

Walk-In

First Grantor:
WATERLOO CROSSING OP LLC

First Grantee:
CANAL WINCHESTER CITY OF

Fees:

Document Recording Fee:	$28.00
Additional Pages Fee:	$176.00
Total Fees:	$204.00
Amount Paid:	$204.00
Amount Due:	$0.00

Instrument Number: 201905230061002
Recorded Date: 05/23/2019 2:49:43 PM

OFFICIAL RECORDING COVER PAGE

DO NOT DETACH

THIS PAGE IS NOW PART OF THIS RECORDED DOCUMENT

NOTE: If the document data differs from this cover sheet, please first check the document on our website to ensure it has been corrected. The document data always supersedes the cover page.

If an error on the cover page appears on our website after review please let our office know.

COVER PAGE DOES NOT INCLUDE ALL DATA, PLEASE SEE INDEX AND DOCUMENT FOR ANY ADDITIONAL INFORMATION.

24
45

CONVEYANCE TAX
EXEMPT
A DB
MICHAEL STINZIANO
FRANKLIN COUNTY AUDITOR
90004700

TRANSFERRED

MAY 23 2019

MICHAEL STINZIANO
AUDITOR
FRANKLIN COUNTY, OHIO

STATE OF OHIO

COUNTY OF FRANKLIN

LIMITED WARRANTY DEED

THIS INDENTURE is made as of May 17, 2019, between **WATERLOO CROSSING OP, LLC**, an Ohio limited liability company, c/o Casto, 250 Civic Center Drive, Suite 500, Columbus, Ohio 43215 (herein called "Grantor"), and **CITY OF CANAL WINCHESTER**, an Ohio municipal corporation, 36 South High Street, Canal Winchester, Ohio 43110 (herein called "Grantee").

WITNESSETH: That Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, in hand paid at and before the sealing and delivery of these presents, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, alienated, conveyed and confirmed and by these presents does grant, bargain, sell, alienate, convey and confirm unto Grantee all of the following tracts or parcels of land:

Parcel One: Being a 0.875 acre parcel of land, as described with more particularity in the legal description attached hereto as Exhibit A-1 and incorporated herein by reference.

Parcel Two: Being a 1.200 acre parcel of land, as described with more particularity in the legal description attached hereto as Exhibit A-2 and incorporated herein by reference.

PARCEL NUMBERS: FRANKLIN COUNTY NO. 184-002989, 184-002666

INSTRUMENT REFERENCE: PRIOR INSTRUMENT NUMBER 201510140145469
RECORDER'S OFFICE; FRANKLIN COUNTY, OHIO

TO HAVE AND TO HOLD the said bargained premises, together with all and singular the rights, members and appurtenances thereof, to the same being, belonging or in any wise appertaining, to the only proper use, benefit and behoof of Grantee, forever, **IN FEE SIMPLE**, reserving, however, in

favor of Grantor, its successors and assigns, easements more particularly described on Exhibit "B" attached hereto and made a part hereof, for the benefit of those certain parcels described on Exhibit "D-1" attached hereto and made a part hereof.

This deed and the warranty of title contained herein are made expressly subject to the rights of tenants under unrecorded leases; the lien of all ad valorem real estate taxes and assessments not yet due and payable; local, state and federal laws, ordinances or governmental regulations, including but not limited to building and zoning laws, ordinances and regulations; all matters of record encumbering the property, including but not limited to those items set forth on Exhibit "C" attached hereto and made a part hereof; and the deed restrictions set forth on Exhibit "D" attached hereto and made a part hereof.

Grantor will warrant and forever defend the right and title to the above described property unto Grantee against the lawful claims of all persons owning, holding or claiming by, through or under Grantor, but not otherwise.

(The words "Grantor" and "Grantee" include all genders, plural and singular, and their respective heirs, successors and assigns where the context requires or permits.)

WATERLOO CROSSING OP, LLC, an Ohio limited liability company

By: CRI Holdings, Inc., an Ohio corporation,
Its Managing Member

By: _____

Name: William J. Rist

Title: Vice President

State of Ohio
County of Franklin

The foregoing was acknowledged before me, a Notary Public, in and for said county, by WILLIAM J. RIST, who is personally known to me and who is the VICE PRESIDENT of CRI Holdings, Inc., an Ohio corporation, Managing Member of WATERLOO CROSSING OP, LLC, an Ohio limited liability company, on behalf of the limited liability company, this 17th day of MAY, 2019.

_____
Notary Public

NOTARIAL SEAL
STATE OF OHIO

HELENA BRUS
Notary Public, State of Ohio
My Commission Expires 09-14-2021

Instrument prepared by:

Louis Visco, Esq.
Casto
250 Civic Center Drive, Suite 500
Columbus, Ohio 43215

After recordation return to:

Eugene L. Hollins, Esq.
Frost Brown Todd LLC
10 West Broad Street, Suite 2300
Columbus, Ohio 43215

EXHIBIT
A-1

EXHIBIT "A"

GRANTEE PROPERTY

BOUNDARY DESCRIPTION FOR
0.875 ACRE
East of Gender Road
South of Winchester Boulevard

Situated in the State of Ohio, County of Franklin, City of Canal Winchester, Section 25, Township 11, Range 21, Congress Lands and being out of the remainder of that 68.985 acre tract conveyed to Trine Street Investors, Ltd. of record in Instrument Number 200302260056380 and described as follows:

Beginning at an iron pin set marking the easterly terminus of the northerly right-of-way line for Canal Street as shown on Plat Book 102, Page 38;

thence with said northerly right-of-way line, being a curve to the left, having a central angle of 03° 13' 24", a radius of 635.00 feet and an arc length of 35.72 feet, a chord bearing and chord distance of North 74° 56' 22" West, 35.72 feet to an iron pin set;

thence across of said 68.985 acre tract, the follow courses;

North 59° 13' 23" East, 88.41 feet to an iron pin set;

North 67° 42' 23" East, 61.89 feet to an iron pin set;

North 56° 26' 25" East, 34.02 feet to an iron pin set;

North 69° 16' 25" East, 42.09 feet to an iron pin set;

North 84° 20' 25" East, 63.43 feet to an iron pin set;

South 82° 48' 22" East, 28.46 feet to an iron pin set;

North 83° 02' 26" East, 50.37 feet to an iron pin set in a westerly line of that 24.628 acre tract conveyed to Wal-Mart Real Estate Business Trust of record in Instrument Number 200307110212169;

thence South 04° 44' 57" West, with said westerly line, 93.33 feet to an iron pin set marking the southwesterly corner thereof, in a northerly line of that 27.834 acre tract conveyed to Trine Street Investors, Ltd. of record in Instrument Number 200302260056382;

thence South 69° 26' 03" West, with said northerly line, 332.96 feet to an iron pin set marking the southeasterly corner of Parcel 4 as shown in the deed to Waterloo Crossing Limited of record in Instrument Number 200307310240491;

thence North 20° 33' 57" West, with the easterly line of said Parcel 4, 23.95 feet to an iron pin set at the easterly terminus of the southerly right-of-way line for said Canal Street as shown on Plat Book 102, Page 38;

BOUNDARY DESCRIPTION FOR
0.875 ACRE
-Page 2-

thence North 16° 40' 19" East, with said easterly terminus of Canal Street, 70.00 feet to the *Point of Beginning*. Containing 0.875 acre, more or less, from Auditor's Parcel 184-002628.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

This description is based on existing records and prior surveys and an actual field survey performed by EMH&T, Inc.

Bearings are based on the Ohio State Plane Coordinate System per NAD83 (1986 adjustment). Control for bearings was from coordinates of monuments FCGS 2270 (Reset) and FCGS 4452, having a bearing of North 04° 44' 36" East, as established by the Franklin County Engineering Department.

All references refer to the records of the Recorder's Office, Franklin County, Ohio.

EVANS, MECHWART, HAMBLETON AND TILTON, INC.

John C. Dodgion
Professional Surveyor No. 8069
01/04/05

JCD:dw/January 4, 05
0_875 acre 42274.doc

PARCEL A-1
0-946-E
ALL OF
(184)
002989

DESCRIPTION VERIFIED
DEAN C. RINGLE P.E.-P.S.
BY: _____
DATE: 10/14/2015

STATE OF OHIO
JOHN C. DODGION
S-8069
REGISTERED
SURVEYOR

946E
SPLIT
.875 Ac
FROM
(184)
2628

DESCRIPTION VERIFIED
DEAN C. RINGLER P.E.-P.S.
BY: _____
DATE: 11/18/02
10 JUN 05

15-05-01
APPROVED
JAN 14 2005
Planning & Zoning
Canal Winchester

PARCEL A-1
ALL OF
(184)
002989

EXHIBIT
tabbies
A-2

PARCEL 4
1.200 ACRE

Situated in the State of Ohio, County of Franklin, City of Canal Winchester, being located in Section 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 1196.93 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 80.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to The Village of Canal Winchester by deed of record in Official Record 34797E20, being the True Point of Beginning;

thence across said 68.985 acre tract, being the southerly right-of-way line of proposed Canal Street, the following courses:

South 85° 40' 02" East, a distance of 226.91 feet to an iron pin set at a point of curvature of a curve to the right; and

southeasterly, with the arc of said curve (Delta = 12° 20' 21", Radius = 565.00 feet) a chord bearing and distance of South 79° 29' 51" East, 121.44 feet to an iron pin set in the easterly terminus of said Canal Street;

thence South 20° 33' 57" East, across said 68.985 acre tract, a distance of 23.95 feet to an iron pin set in the northerly line of that 27.834 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056382;

thence South 69° 26' 03" West, with the northerly line of said 27.834 acre tract, a distance of 43.67 feet to an iron pin set;

thence South 61° 26' 36" West, continuing with said northerly line, a distance of 380.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of said Parcel No. 3;

thence with said easterly right-of-way line, being the easterly line of said Parcel 3, the following courses:

North 00° 27' 15" East, a distance of 145.56 feet to an iron pin set;

North 07° 36' 20" East, a distance of 100.12 feet to an iron pin set;

North 31° 18' 30" East, a distance of 11.18 feet to an iron pin set; and

North 04° 44' 36" East, a distance of 4.36 feet to the True Point of Beginning, and containing 1.200 acre of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

PARCEL A-2
0.0416-E
ALL OF
(184)
002666

EVANS, MECHWART, HAMBLETON & TILTON, INC.

7/11/03

Clark E. White
Registered Surveyor No. 7868

STATE OF OHIO
CLARK E WHITE
7868
REGISTERED
PROFESSIONAL SURVEYOR

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY:
DATE: 10/14/2003

PRELIMINARY APPROVAL
FRANKLIN COUNTY ENGINEERING DEPT.
DATE: 7/15/03 BY: PB

LS-03-07
APPROVED
JUL 28 2003
Planning & Zoning
Carol Winchester

SPLIT
1.200 AC
OUT OF
(184)
2623

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY:
DATE: 7/31/03

PARCEL A-2
ALL OF
(184)
002666

DESCRIPTION VERIFIED
CORNELL R. ROBERTSON, P.E., P.S.
BY:
DATE 05/23/2019

EXHIBIT "B"

RESERVED STORM WATER DRAINAGE EASEMENT

Grantor, for itself, its successors and assigns, reserves a perpetual exclusive easement ("Storm Water Drainage Easement") for the purpose of replacing, modifying, operating, accessing, and/or maintaining a storm water drainage system and/or other storm water drainage facilities (the "Storm Water Drainage System"), in, through, over and across the 1.20 acre portion of the real property described in the foregoing Exhibit "A" (the "Reserved Storm Water Drainage Easement Area"), the location of such easement area being generally depicted on Exhibit "B-1" attached hereto, together with ingress and egress thereto.

Grantor, its successors and assigns, shall have the right to ingress to and egress from the real property described in the foregoing Exhibit "A" (the "Grantee Property") occupied or to be occupied by said Storm Water Drainage System, and the right to do any and all things necessary, proper or incidental to the successful operation and maintenance thereof. Grantor, its successors and assigns, shall restore all property to its original condition insofar as practicable, after entering upon said premises for any of the purposes herein set forth, including construction, repair, maintenance, replacement, modification, relocation, operation, inspection and maintenance of all facilities and improvements of Grantor, its successors and assigns, within the Reserved Storm Water Drainage Easement Area and rights-of-way.

EXHIBIT "B-1"

RENDERING OF RESERVED STORM WATER DRAINAGE EASEMENT AREA

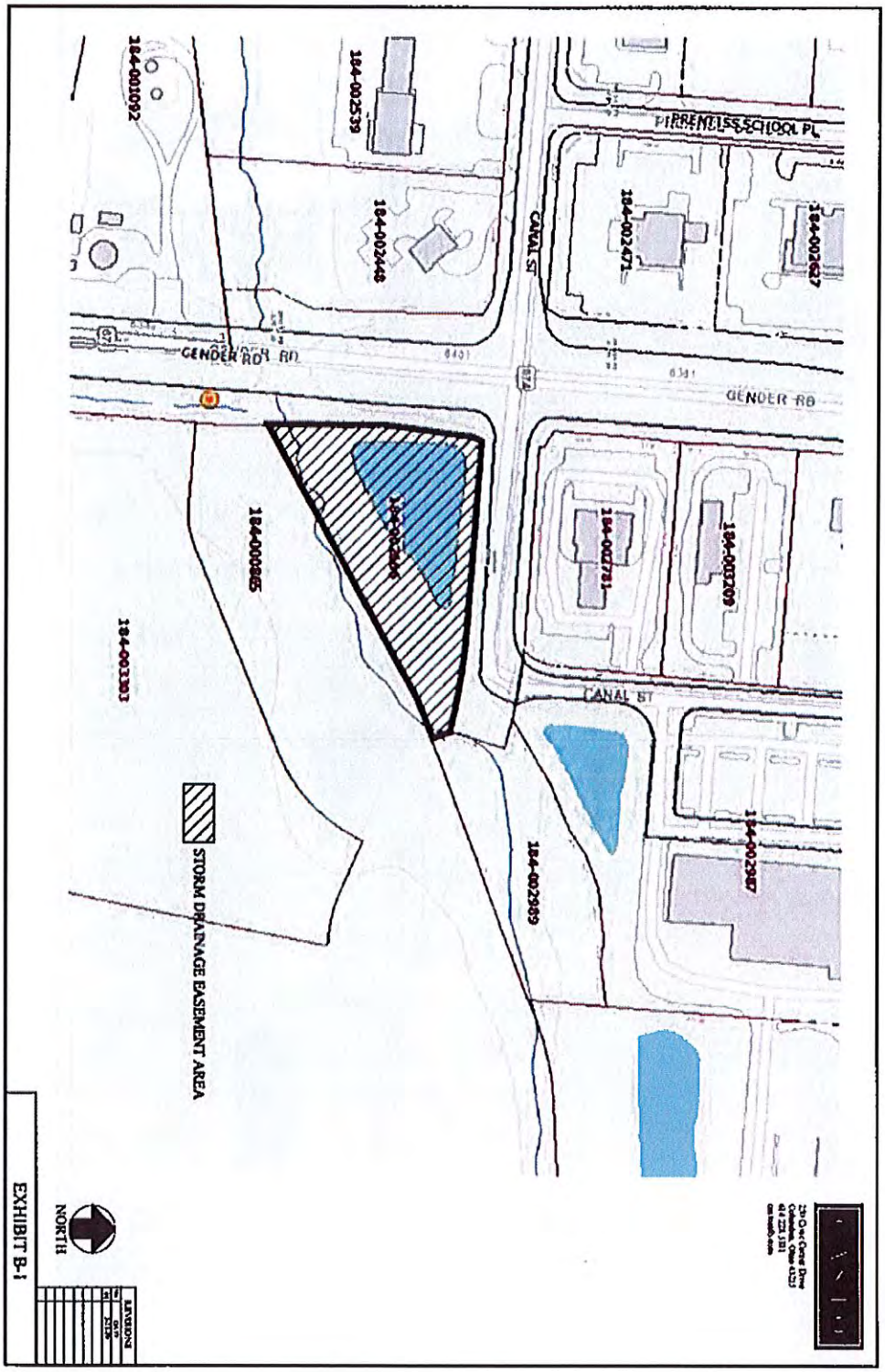


EXHIBIT "B-2"

PYLON SIGN ENVELOPE

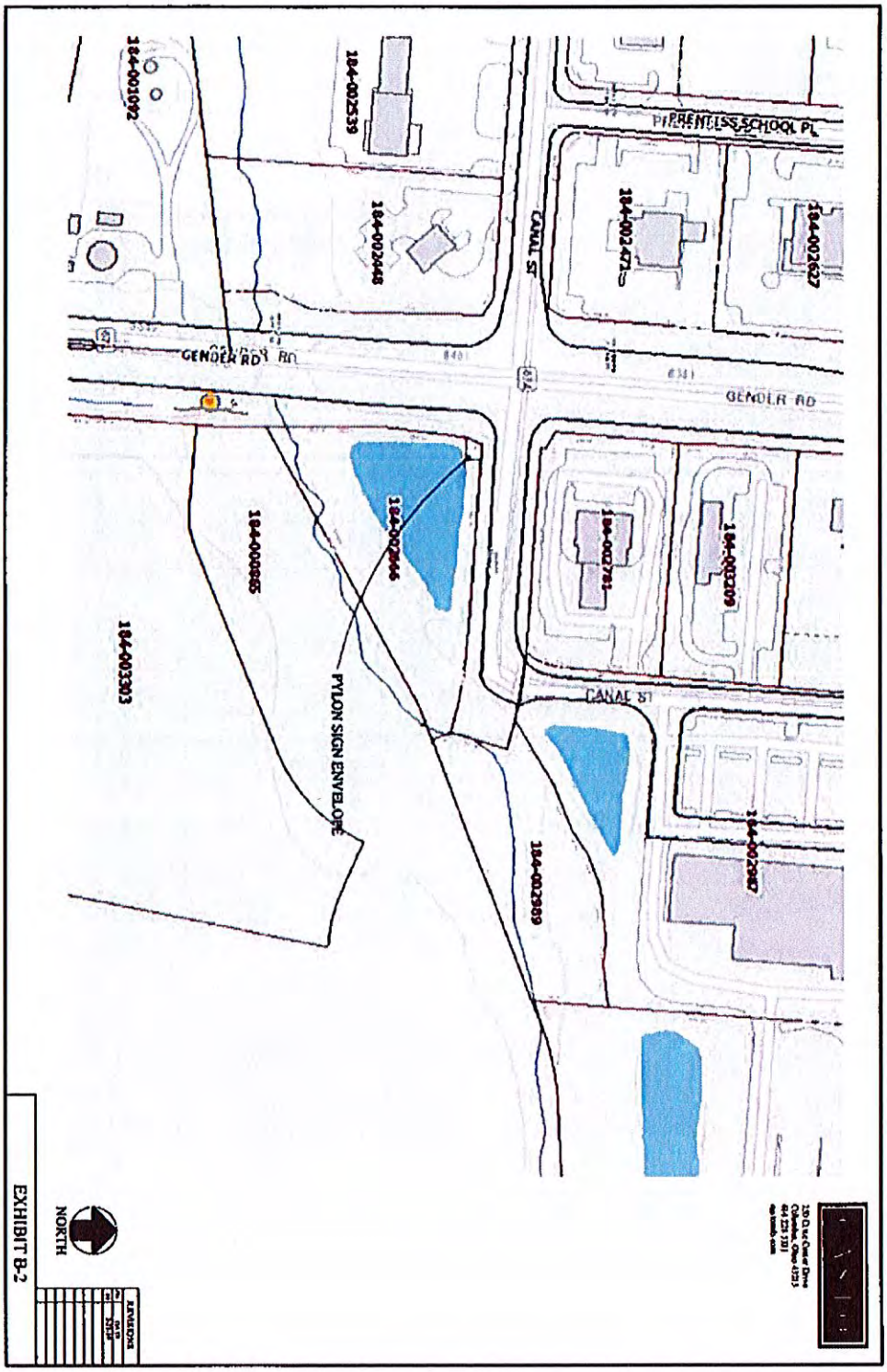


EXHIBIT "C"

PERMITTED ENCUMBERANCES

1.

EXHIBIT "D"

SIGNAGE ENVELOPE DEED RESTRICTION

The Grantee Property shall be subject to the following restrictions, which shall be real covenants running with the land in perpetuity and shall be binding upon and enforceable against the Grantee Property and Grantee, its successors and assigns, and inure to the benefit of part of the real property described as the "Grantor Parcels" recorded at Recorder's Office, Franklin County, Ohio, as more specifically set forth on Exhibit "D-1", attached hereto and made a part hereof and be enforceable by Grantor, to wit:

Grantee, its successors and assigns, may landscape the Grantee Property, but shall not construct any improvements which would or might restrict Grantor's, its successors or assigns' access to or use of the Storm Water Drainage System. No above grade structures, dams or other obstructions to the flow of storm water runoff are permitted within the Reserved Storm Water Drainage Easement Area as delineated in the Exhibits; provided however, that Grantee shall have the right to (i) construct one (1) pylon sign within the perimeters of the building envelope ("Pylon Sign Envelope") as shown on the site plan attached hereto as Exhibit "B-2" and (ii) construct the Canal Street road improvements specifically identified in those certain Crossroads Church Roadway Extension Plans prepared by ADR & Associates, Ltd. of Newark, Ohio, stamped by engineers Ronald Bonnette and Justin Hartfield on September 25, 2018 and signed by City of Canal Winchester's Municipal Engineer on October 11, 2018.

Grantee's construction of one pylon sign on the Grantee Property which would be located outside the perimeters of the Pylon Sign Envelope" shall not be commenced without first receiving Grantor's written approval of such relocated building footprint area, which approval shall not be unreasonably withheld, conditioned or delayed. Notwithstanding anything to the contrary contained herein, any sign constructed within the Pylon Sign Envelope shall not be subject to Grantor approval. Grantor's approval of Grantee's relocated sign footprint area shall not constitute a warranty or representation by Grantor as to the technical sufficiency or adequacy or safety of the structures or any of their component parts or of any physical condition or feature pertaining to the property described herein.

EXHIBIT "D-1"

GRANTOR PARCELS

12.897 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, being located in Sections 24 and 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 119.06 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 95.00 feet to a point in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to the Village of Canal Winchester by deed of record in Official Record 34797E20;

thence crossing said 68.985 acre tract, being the southerly right-of-way line of proposed Winchester Square Boulevard the following courses:

South 86° 15' 44" East, a distance of 9.11 feet to an iron pin set at a point of curvature of a curve to the left; and

northeasterly, with the arc of said curve (Delta = 17° 29' 15", Radius = 700.00 feet) a chord bearing and distance of North 84° 59' 38" East, 212.82 feet an iron pin set at to the True Point of Beginning;

thence northeasterly, continuing across said 68.985 acre tract, being said southerly right-of-way line, continuing with said curve (Delta = 39° 40' 11", Radius = 700.00 feet) a chord bearing and distance of North 56° 24' 55" East, 475.04 feet to an iron pin set;

thence North 83° 04' 39" East, continuing across said 68.985 acre tract, with said proposed right-of-way line, a distance of 20.93 feet to an iron pin set;

thence crossing said 68.985 acre tract, the following courses:

South 54° 35' 54" East, a distance of 19.55 feet to an iron pin set at a point of curvature of a curve to the right;

southeasterly, with the arc of said curve (Delta = 53° 43' 26", Radius = 95.00 feet) a chord bearing and distance of South 27° 44' 11" East, 85.85 feet to an iron pin set at a point of tangency;

South 00° 52' 28" East, a distance of 64.40 feet to an iron pin set;

North 89° 07' 32" East, a distance of 105.58 feet to an iron pin set;

South 04° 44' 57" West, a distance of 438.48 feet to an iron pin set;

South 85° 15' 03" East, a distance of 77.79 feet to an iron pin set;

South 04° 44' 57" West, a distance of 161.17 feet to an iron pin set;

North 85° 15' 03" West, a distance of 80.00 feet to an iron pin set;

South 04° 44' 57" West, a distance of 155.83 feet to an iron pin set;

North 85° 15' 03" West, a distance of 140.00 feet to an iron pin set;

South 04° 44' 57" West, a distance of 317.83 feet to an iron pin set;

South 83° 02' 26" West, a distance of 50.37 feet to an iron pin set;

North 82° 48' 22" West, a distance of 28.46 feet to an iron pin set;

South 84° 20' 25" West, a distance of 63.43 feet to an iron pin set;

South 69° 16' 25" West, a distance of 42.09 feet to an iron pin set;

South 56° 26' 25" West, a distance of 34.02 feet to an iron pin set;

South 67° 42' 23" West, a distance of 61.89 feet to an iron pin set; and

South 59° 13' 23" West, a distance of 88.41 feet to an iron pin set in the northerly right-of-way line of proposed Canal Street;

thence northwesterly, continuing across said 68.985 acre tract, being said northerly right-of-way line, with the arc of a curve to the left (Delta = 06° 37' 40", Radius = 635.00 feet) a chord bearing and distance of North 79° 51' 54" West, 73.41 feet to an iron pin set on the arc of a curve to the left;

thence crossing said 68.985 acre tract, the following courses:

northeasterly, with the arc of said curve (Delta = 24° 57' 28", Radius = 34.00 feet) a chord bearing and distance of North 39° 25' 55" East, 14.69 feet to an iron pin set at a point of compound curvature;

northeasterly, with the arc of said compound curve (Delta = 22° 37' 15", Radius = 99.00 feet) a chord bearing and distance of North 15° 38' 36" East, 38.83 feet to an iron pin set at a point of tangency;

North 04° 20' 00" East, a distance of 926.89 feet to an iron pin set at a point of curvature of a curve to the left;

northwesterly, with the arc of said curve (Delta = 21° 02' 22", Radius 119.00 feet) a chord bearing and distance of North 06° 11' 11" West, 43.45 feet to an iron pin set at point of compound curvature; and

northwesterly, with the arc of said compound curve (Delta = 41° 31' 05", Radius = 44.00 feet) a chord bearing and distance of North 37° 27' 54" West, 31.19 feet to the True Point of Beginning and containing 12.897 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED PROFESSIONAL SURVEYOR

CEW:cew/june03

EVANS, MECHWART, HAMBLETON & TILTON, INC.

Clark E. White 6/19/03

Clark E. White
Registered Surveyor No. 7868

0.676 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, Section 24, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference, at Franklin County Geodetic Survey Monument Number 9951 found marking the northeasterly corner of Section 25, the southeasterly corner of said Section 24, said monument being North 04° 42' 39" East, with the easterly line of said Section 25, a distance of 103.55 feet from Franklin County Geodetic Survey Monument Number 9937 found marking the southwesterly corner of Section 30, the northwesterly corner of Section 19, Township 15, Range 20;

thence North 85° 27' 14" West, with the common line of said Sections 24 and 25, being across a portion of said 68.985, a distance of 2041.42 feet to a point;

thence North 04° 32' 46" East, across said 68.985 acre tract, a distance of 363.77 feet to an iron pin set in the southerly right-of-way line of proposed Waterloo Street;

thence with the southerly and easterly proposed right-of-way line, the following courses:

North 82° 49' 04" West, a distance of 45.83 feet to an iron pin set on the arc of a curve to the right;

northwesterly with the arc of said curve (Delta = 32° 34' 48", Radius 118.00 feet) a chord bearing and distance of North 11° 25' 16" West, 66.20 feet to an iron pin set at a point of tangency; and

North 04° 52' 07" East, a distance of 133.89 feet to an iron pin set in the southerly right-of-way line of existing Waterloo Street;

thence South 84° 39' 53" East, with said existing southerly right-of-way line, a distance of 197.54 feet to an iron pin set;

thence South 85° 37' 10" East, continuing with said existing southerly right-of-way line, a distance of 66.55 feet to an iron pin set in the westerly right-of-way line of proposed Waterloo Street;

thence southwesterly, with said proposed right-of-way line, with the arc of a curve to the left (Delta = 23° 12' 29", Radius = 700.00 feet) a chord bearing and distance of South 50° 07' 21" West, 281.61 feet to the True Point of Beginning, and containing 0.676 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings shown hereon are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings is from coordinates of monuments Franklin County Geodetic Survey 2270 and Franklin County Geodetio Survey 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED PROFESSIONAL SURVEYOR

EVANS, MECHWART, HAMBLETON & TILTON, INC.

Clark E. White 6/19/03

Clark E. White
Registered Surveyor No. 7868

CEW:cewjune03

5.003 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, being located in Section 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 119.06 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 95.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to the Village of Canal Winchester by deed of record in Official Record 34797E20, and being the True Point of Beginning:

thence crossing said 68.985 acre tract, being the southerly right-of-way line of proposed Winchester Square Boulevard the following courses:

South 86° 15' 44" East, a distance of 9.11 feet to an iron pin set at a point of curvature of a curve to the left; and

northeasterly, with the arc of said curve (Delta = 14° 00' 31", Radius = 700.00 feet) a chord bearing and distance of North 86° 44' 00" East, 170.72 feet to an iron pin set;

thence South 04° 20' 00" West, across said 68.985 acre tract, a distance of 1030.41 feet to an iron pin set in the northerly right-of-way line of proposed Canal Street;

thence North 85° 40' 02" West, continuing across said 68.985 acre tract, being said proposed northerly right-of-way line, a distance of 200.54 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of said Parcel 3;

thence with said easterly right-of-way line, being the easterly line of said Parcel 3, the following courses:

North 04° 44' 36" East, a distance of 5.64 feet to an iron pin set;

North 58° 41' 30" West, a distance of 22.36 feet to an iron pin set;

North 04° 44' 36" East, a distance of 100.00 feet to an iron pin set;

North 07° 02' 02" East, a distance of 50.04 feet to an iron pin set;

North 04° 44' 36" East, a distance of 650.00 feet to an iron pin set;

North 10° 27' 14" East, a distance of 100.50 feet to an iron pin set;

North 26° 32' 41" East, a distance of 11.04 feet to an iron pin set;

North 81° 56' 20" East, a distance of 21.43 feet to an iron pin set; and

North 04° 44' 36" East, a distance of 27.23 feet to the True Point of Beginning and containing 5.003 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED
PROFESSIONAL SURVEYOR

CEW:cew/[illegible]

EVANS, MECHWART, HAMBLETON & TILTON, INC.

Clark E. White 6/2/03

Clark E. White
Registered Surveyor No. 7868

1.641 ACRES

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, being located in Section 25, Township 11, Range 21, Congress Lands and being all out of that 68.985 acre tract as conveyed to Trine Street Investors, Ltd. by deed of record in Instrument Number 200302260056380 (all references refer to the records of the Recorder's Office, Franklin County, Ohio) and described as follows:

Beginning, for reference at Franklin County Geodetic Survey Monument Number 2270 in the common line between Sections 24 and 25, being in the centerline of Gender Road;

thence South 04° 44' 36" West, with said centerline, a distance of 119.06 feet to a point;

thence South 85° 15' 24" East, across said Gender Road, a distance of 95.00 feet to an iron pin set in the easterly right-of-way line of said Gender Road, being the easterly line of Parcel No. 3 as conveyed to the Village of Canal Winchester by deed of record in Official Record 34797E20;

thence crossing said 68.985 acre tract, being the southerly right-of-way line of proposed Winchester Square Boulevard the following courses:

South 86° 15' 44" East, a distance of 9.11 feet to an iron pin set at a point of curvature of a curve to the left; and

northeasterly, with the arc of said curve (Delta = 14° 00' 31", Radius = 700.00 feet) a chord bearing and distance of North 86° 44' 00" East, 170.72 feet to an iron pin set at the True Point of Beginning;

thence northeasterly, continuing with said proposed southerly right-of-way line, being the arc of said curve (Delta = 03° 28' 44", Radius = 700.00 feet) a chord bearing and distance of North 77° 59' 23" East, 42.50 feet to an iron pin set on the arc of a curve to the right;

thence crossing said 68.985 acre tract, the following courses:

southeasterly, with the arc of said curve (Delta = 41° 31' 05", Radius = 44.00 feet) a chord bearing and distance of South 37° 27' 54" East, 31.19 feet to an iron pin set at a point of compound curvature;

southeasterly, with the arc of said compound curve (Delta = 21° 02' 22", Radius = 119.00 feet) a chord bearing and distance of South 06° 11' 11" East, 43.45 feet to an iron pin set at a point of tangency;

South 04° 20' 00" West, a distance of 926.89 feet to an iron pin set at a point of curvature of a curve to the right;

southwesterly, with the arc of said curve (Delta = 22° 37' 15", Radius = 99.00 feet) a chord bearing and distance of South 15° 38' 36" West, 38.83 feet to an iron pin set at a point of compound curvature; and

southwesterly, with the arc of said compound curve (Delta = 24° 57' 28", Radius = 34.00 feet) a chord bearing and distance of South 39° 25' 55" West, 14.69 feet to an iron pin set in the northerly right-of-way line of proposed Canal Street, being on the arc of a curve to the left;

thence continuing across said 68.985 acre tract, being said northerly right-of-way line, the following courses:

northwesterly, with the arc of said curve (Delta = 02° 29' 17", Radius = 635.00 feet) a chord bearing and distance of North 84° 25' 23" West, 27.57 feet to an iron pin set at a point of tangency; and

North 85° 40' 02" West, a distance of 25.87 feet to an iron pin set;

thence North 04° 20' 00" East, continuing across said 68.985 acre tract, a distance of 1030.41 feet to the True Point of Beginning and containing 1.641 acres of land, more or less.

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

Bearings are based on the Ohio State Plane Coordinate System as per NAD83. Control for bearings was from coordinates of monuments FCGS 2270 & FCGS 4452 established by the Franklin County Engineering Department, using Global Positioning System procedures and equipment.

STATE OF OHIO
CLARK E. WHITE
7868
REGISTERED
PROFESSIONAL SURVEYOR

EVANS, MECHWART, HAMBLETON & TILTON, INC.

6/2/03

Clark E. White
Registered Surveyor No. 7868

CEW:cew/may03

BOUNDARY DESCRIPTION FOR
1.150 ACRES
North of Winchester Boulevard
East of Gender Road

Situated in the State of Ohio, County of Franklin, Village of Canal Winchester, Section 24, Township 11, Range 21, Congress Lands and being out of the remainder of that 68.985 acre tract conveyed to Trine Street Investors, Ltd. of record in Instrument Number 200302260056380 and described as follows:

Beginning, for reference, at the centerline intersection of Gender Road with Winchester Boulevard as shown on Plat Book 102, Page 38, said intersection being South 04° 44' 36" West, with said centerline of Gender Road, 70.72 feet from monument FCGS 2270 (Reset) found;

thence with said centerline of Winchester Boulevard, the following courses:

South 86° 15' 44" East, 103.24 feet to a point of curvature;

with a curve to the left, having a central angle of 20° 08' 22", a radius of 650.00 feet and an arc length of 228.48 feet, a chord bearing and chord distance of North 83° 40' 04" East, 227.30 feet;

thence North 16° 24' 07" West, leaving said centerline, 50.00 feet to an iron pin set marking the southeasterly corner of that 1.727 acre tract conveyed to Waterloo Crossing Limited of record in Instrument Number 200307310240491, in the northerly right-of-way line for said Winchester Boulevard, the *True Point of Beginning*;

thence North 16° 24' 07" West, with an easterly line of said 1.727 acre tract, 69.80 feet to an iron pin set;

thence North 04° 19' 36" East, with an easterly line of said 1.727 acre tract, 180.63 feet to an iron pin set;

thence South 85° 40' 22" East, across said 68.985 acre tract, 309.18 to an iron pin set in the westerly right-of-way line for Waterloo Street (Plat Book 102, Page 38);

thence with said westerly right-of-way line and said northerly right-of-way line, the following courses:

South 05° 43' 37" East, 16.95 feet to an iron pin set;

with a curve to the right, having a central angle of 35° 40' 55", a radius of 600.00 feet and an arc length of 373.66 feet, a chord bearing and chord distance of South 55° 45' 26" West, 367.65 feet to the *True Point of Beginning*. Containing 1.150 acres, more or less, from Auditor's Parcel 184-002628.

BOUNDARY DESCRIPTION FOR
1.150 ACRES
-Page 2-

Subject, however, to all legal rights-of-way and/or easements, if any, of previous record.

Iron pins set, where indicated, are iron pipes, thirteen sixteenths (13/16) inch inside diameter, thirty (30) inches long with a plastic plug placed in the top bearing the initials EMHT INC.

This description is based on existing records and prior surveys and an actual field survey performed by EMH&T, Inc.

Bearings are based on the Ohio State Plane Coordinate System per NAD83 (1986 adjustment). Control for bearings was from coordinates of monuments FCGS 2270 (Reset) and FCGS 4452, having a bearing of North 04° 44' 36" East, as established by the Franklin County Engineering Department.

All references refer to the records of the Recorder's Office, Franklin County, Ohio.

EVANS, MECHWART, HAMBLETON AND TILTON, INC.

John C. Dodgion
Professional Surveyor No. 8069
01/14/05

STATE OF OHIO
JOHN C. DODGION
S-8069
REGISTERED SURVEYOR

JCD:sbl/January 13, 05
1_150 acres 50091.doc

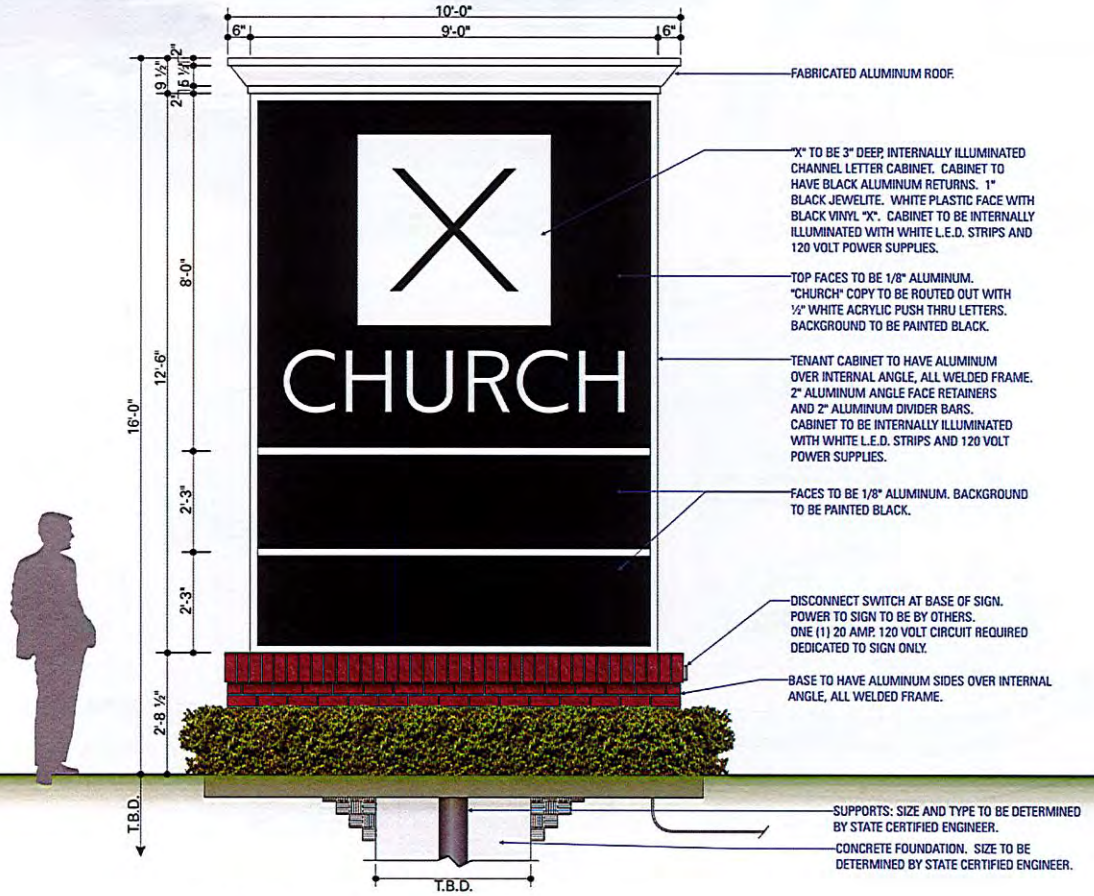
0-46-E
All of
(184)
2628

DESCRIPTION VERIFIED
DEAN C. RINGLE, P.E., P.S.
BY: _____
DATE: 18 Jan 05

LS-05-15
APPROVED
NOV 16 2005
Planning & Zoning
Canal Winchester

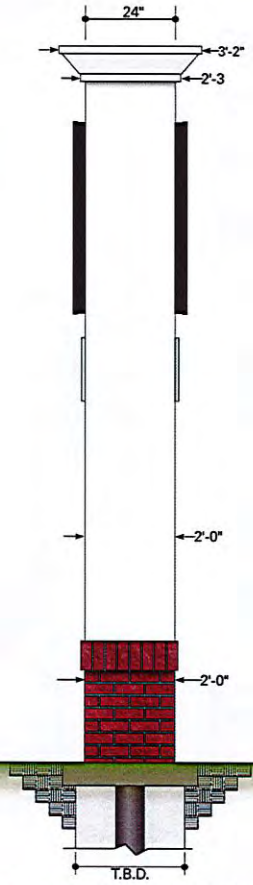
INTERSECTION OF GENDER RD. / BIGGERTON BEND

EXHIBIT B



1 *MONUMENT SIGN FRONT ELEVATION*
SCALE: 3/8" = 1'-0"

ONE (1) DOUBLE FACE, INTERNALLY ILLUMINATED MONUMENT SIGN REQUIRED.
TOTAL SQUARE FEET = 112.50



2 *MONUMENT SIGN SIDE ELEVATION*
SCALE: 3/8" = 1'-0"

INTERNATIONAL C & C CORPORATION
DBA: SIGN X-PRESS
INTERNATIONAL Sign FLORIDA
10831 Canal Street
Largo, FL 33777
1-727-541-5573
Fax: 1-727-544-7745
LIC. #ES 12000419
www.IntlSign.com

Client:
CHURCH X
CANAL WINCHESTER
LITHOPOLIS, OH.

Date:
AUGUST 15, 2019

Drawing Number:
H19127-50R3-X-CHURCH

Revisions:

	DATE:	DESCRIPTION:
1	10-23	NR
2	10-30	CHANGE DESIGN
3	11-04	NR
4	00-00	NR
5	00-00	NR
6	00-00	NR
7	00-00	NR
8	00-00	NR
9	00-00	NR
10	00-00	NR

Sales Person:
JOE RUSSELL

Scale:
AS NOTED

Drawn by:
O. BARNITZ

CLIENT/LANDLORD APPROVAL
☐ APPROVED
☐ APPROVED AS NOTED
☐ REVISE AND RESUBMIT

Signature: _____
Title: _____
Date: _____

SIGNATURE ABOVE ACKNOWLEDGES THAT ALL SPECIFICATIONS AND DIMENSIONS ON THESE DRAWINGS ARE UNDERSTOOD AND CORRECT.

THIS IS AN ORIGINAL DRAWING PROVIDED AS PART OF A PLANNED PROJECT AND IS NOT TO BE EXHIBITED, COPIED OR REPRODUCED WITHOUT THE WRITTEN PERMISSION OF INTERNATIONAL SIGN COMPANY OR IT'S AUTHORIZED AGENTS. ALL RIGHTS RESERVED.

PRIMARY ELECTRICAL POWER TO SIGN TO BE BY OTHERS. ALL POWER TO BE 120 VOLT UNLESS OTHERWISE STATED.

ELECTRICAL TO USE U.L. LISTED COMPONENTS AND SHALL MEET ALL N.E.C. STANDARDS 2014

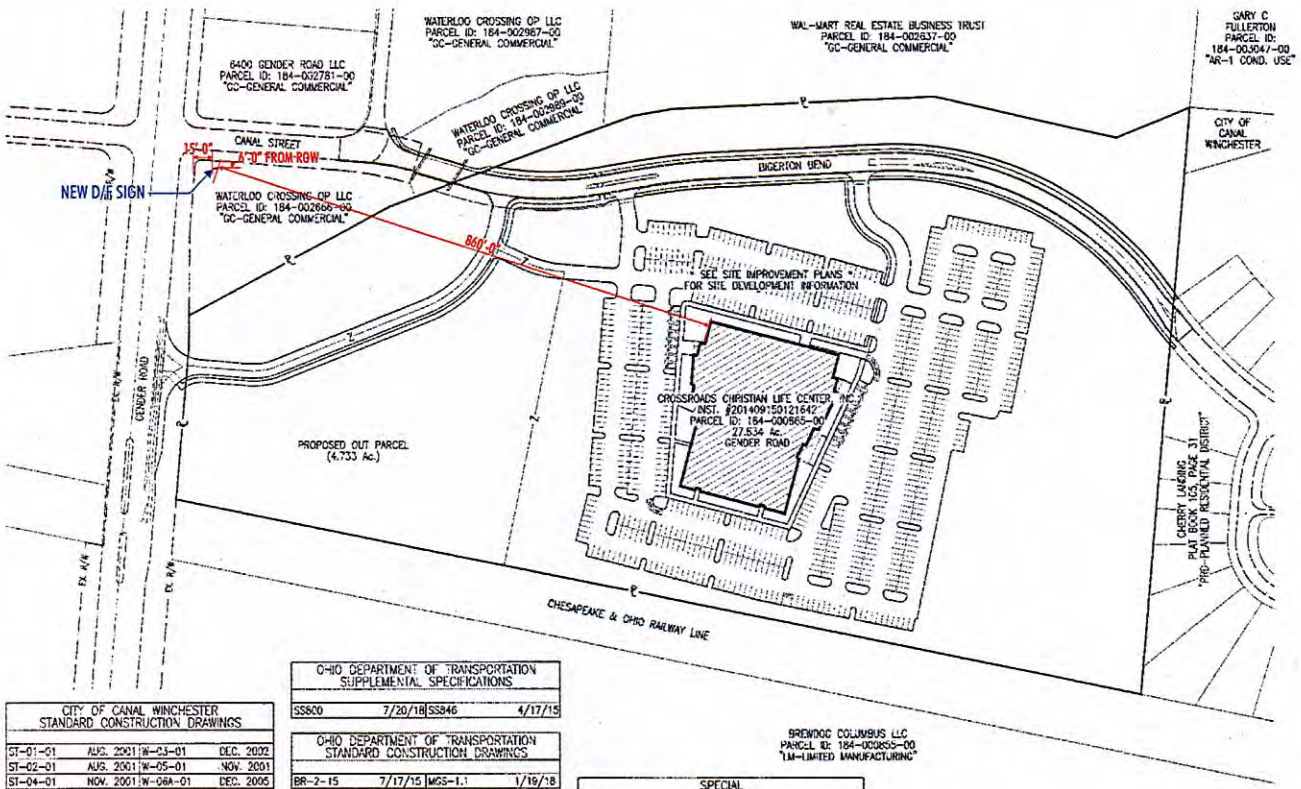
SIGN MUST BE GROUNDED IN COMPLIANCE WITH ARTICLE 600 OF THE NATIONAL ELECTRIC CODE.

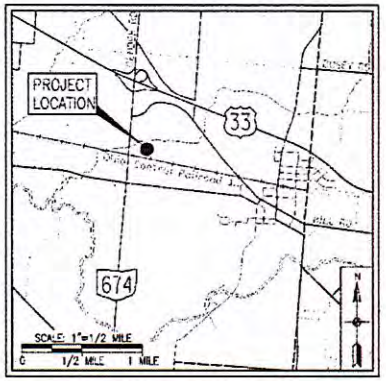
SHEET NO. 104

EXHIBIT C

CROSSROADS CHURCH
ROADWAY EXTENSION PLANS
SITUATED IN THE CITY OF CANAL WINCHESTER, FRANKLIN COUNTY, OHIO

OWNER	GENERAL CONTRACTOR	ARCHITECT
CROSSROADS CHURCH TIM MOORE, PASTOR 11573 LITHOPOLIS ROAD LITHOPOLIS, OHIO 43136 (614) 837-9800	ELEVATED INTEGRITY AARON CARROLL 1055 WEST MARKET STREET BALTIMORE, OHIO 43105 (740) 409-5038	THE McKNIGHT GROUP PHILLIP TIPTON, AIA 3351 McDOWELL ROAD GROVE CITY, OHIO 43123 (614) 875-1699





ROADWAY PLAN INDEX

TITLE SHEET	1
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* ALSO SEE SITE IMPROVEMENT AND SANITARY SEWER EXTENSION PLANS.

CITY OF CANAL WINCHESTER STANDARD CONSTRUCTION DRAWINGS			
ST-01-01	AUG. 2001	W-03-01	DEC. 2002
ST-02-01	AUG. 2001	W-05-01	NOV. 2001
ST-04-01	NOV. 2001	W-06A-01	DEC. 2005
ST-05-02	JUL. 2002		
ST-07-01	JUN. 1992		
ST-08-02	JUL. 2002		

OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATIONS			
SS800	7/20/18	SS846	4/17/15

OHIO DEPARTMENT OF TRANSPORTATION STANDARD CONSTRUCTION DRAWINGS			
BR-2-15	7/17/15	MGS-1.1	1/19/18
CPA-1-08	7/18/08	MGS-2.1	1/19/18
PSBD-2-07	7/20/18	MGS-3.1	1/19/18
SDR-1-13	7/20/18	MGS-4.2	7/19/13

SPECIAL PROVISIONS
NATIONWIDE PERMIT LRH-2016-1011-SCR-TUSSING DITCH

SIGNATURES BELOW SIGNIFY ONLY CONCURRENCE WITH THE GENERAL PURPOSES AND GENERAL LOCATION OF THE PROJECT. ALL TECHNICAL DETAILS REMAIN THE RESPONSIBILITY OF THE ENGINEER PREPARING THE PLAN.

10-10-18
MAYOR, CITY OF CANAL WINCHESTER — DATE

10-9-18
DIRECTOR OF PUBLIC SERVICE, CITY OF CANAL WINCHESTER — DATE

10-9-18
SUPERINTENDENT, DIVISION OF WATER — DATE

10/9/18
SUPERINTENDENT, DIVISION OF WATER RECLAMATION — DATE

10/9/18
SUPERINTENDENT, DIVISION OF STREETS, LANDS & BUILDINGS — DATE

10/11/18
MUNICIPAL ENGINEER, CITY OF CANAL WINCHESTER — DATE

ADR
Newark Office:
88 West Church Street
Newark, OH 43055
(740) 345-1821 (ph)
(740) 345-4694 (fax)
www.adrinnovation.com

STATE OF OHIO RONALD S. BONNETTE E-67476 REGISTERED PROFESSIONAL ENGINEER
SHEETS 1-20 SEAL

9-25-2018
RONALD S. BONNETTE, P.E., P.S. — DATE
OHIO PROFESSIONAL ENGINEER #67476

STATE OF OHIO JUSTIN T. HARTFIELD 80189 REGISTERED PROFESSIONAL ENGINEER
SHEETS 21-32 SEAL

September 25, 2018
JUSTIN T. HARTFIELD, P.E. — DATE
OHIO PROFESSIONAL ENGINEER #80189

CITY OFFICIALS

MICHAEL EBERT	MAYOR
AMANDA JACKSON	FINANCE DIRECTOR
MATTHEW C. PEOPLES	DIRECTOR OF PUBLIC SERVICE
WILLIAM E. SIMS	CONSTRUCTION SERVICES ADMINISTRATOR
LUCAS M. HAIRE	DEVELOPMENT DIRECTOR

CITY COUNCIL

BRUCE JARVIS	PRESIDENT
MIKE WALKER	VICE PRESIDENT
JILL AMOS	COUNCIL PERSON
WILL BENNETT	COUNCIL PERSON
ROBERT CLARK	COUNCIL PERSON
MIKE COOLMAN	COUNCIL PERSON
PATRICK LYNCH	COUNCIL PERSON

SITE INFORMATION:

OWNER:	CROSSROADS CHRISTIAN LIFE CENTER, INC.
ADDRESS:	6450 GENDER ROAD
AREA:	27.834 Ac.
EXISTING USE:	CROP FIELD PARTIALLY WOODED
PROPOSED USE:	58,488 S.F. 2-STORY BUILDING & PARKING.
LOT COVERAGE:	9.450 Ac.
CLASS:	AR-1 (CONDITIONAL USE)
BUILDING SETBACKS:	100' FRONT 75' SIDE 75' REAR
FLOOD INFO:	ZONES A, AE, AND X AS SHOWN ON MAP No. 19049C0425K, DATED JUNE 17, 2008
BUILDING USE:	CROSSROADS CHURCH

N
0 100 200 HORIZONTAL SCALE IN FEET

ADR

REVISIONS

TITLE SHEET

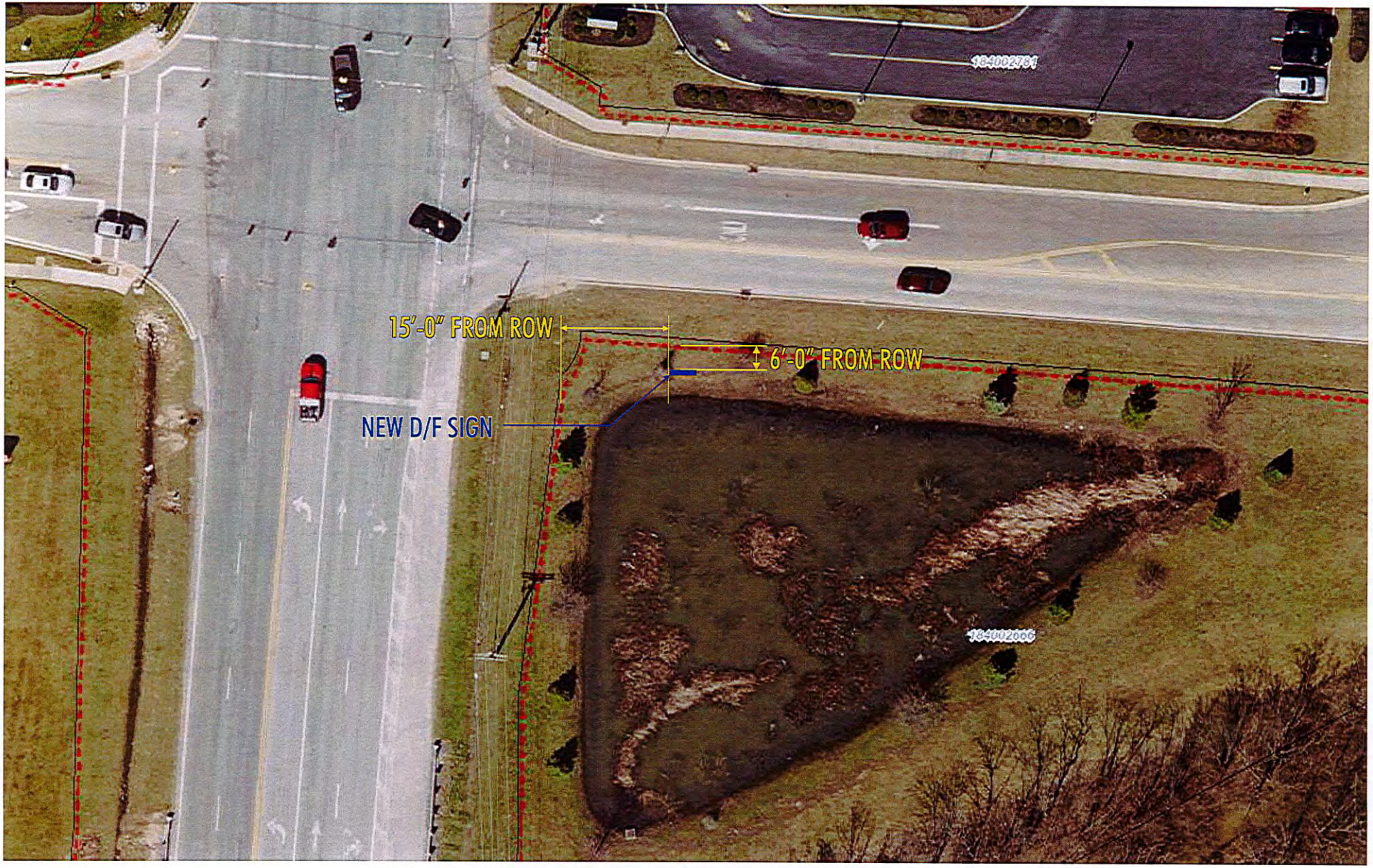
CROSSROADS CHURCH
CANAL WINCHESTER, OHIO

JULY 31, 2018
JOB 290301

1 / 32

PRINTED 9/25/2018 11:04:17 AM P:\JOB\2015\290301 Crossroads Dr Church - Canal Winchester\Logo\Roadway Extension Plans\01 Title.dgn

Recycled Paper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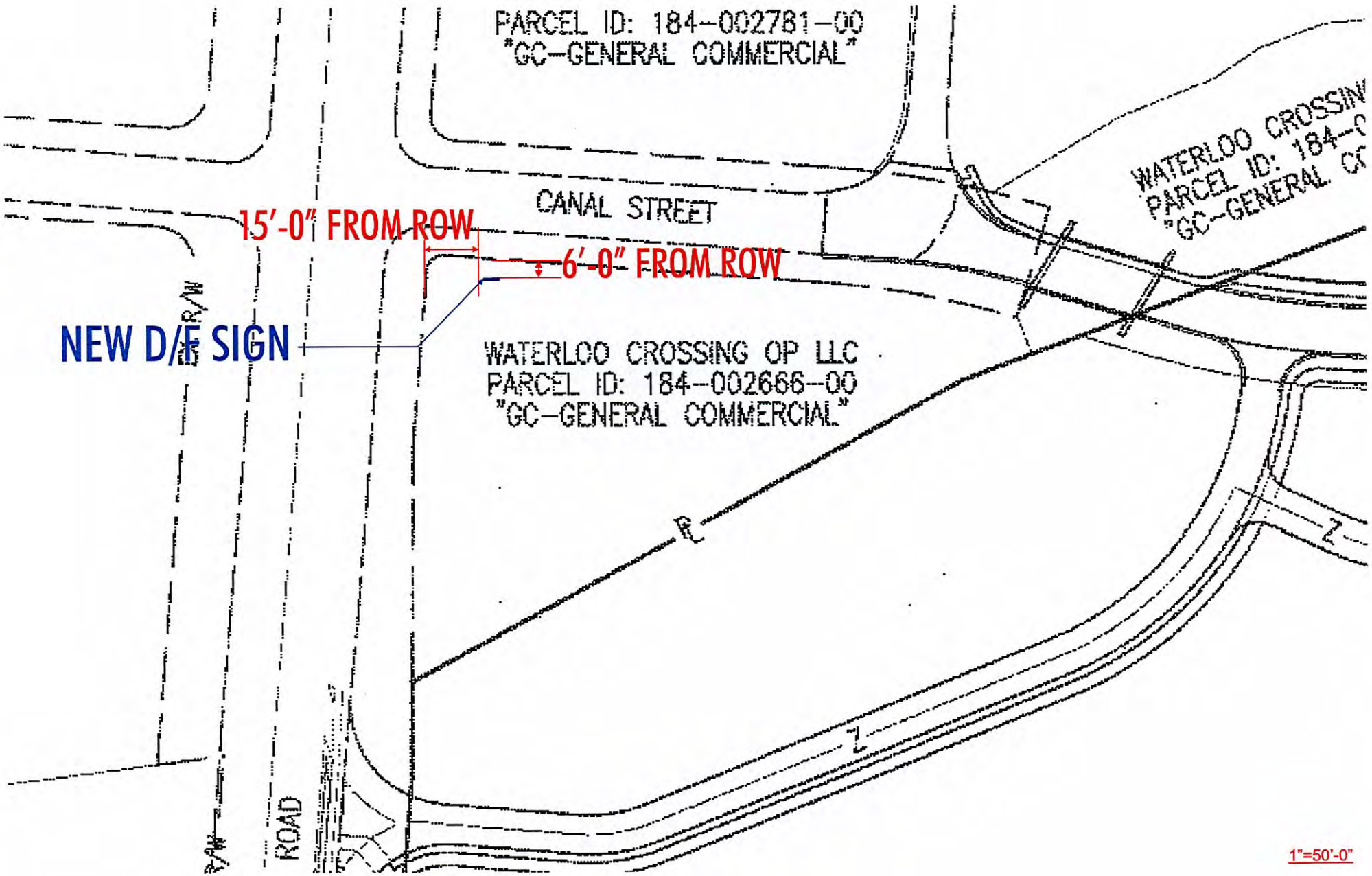
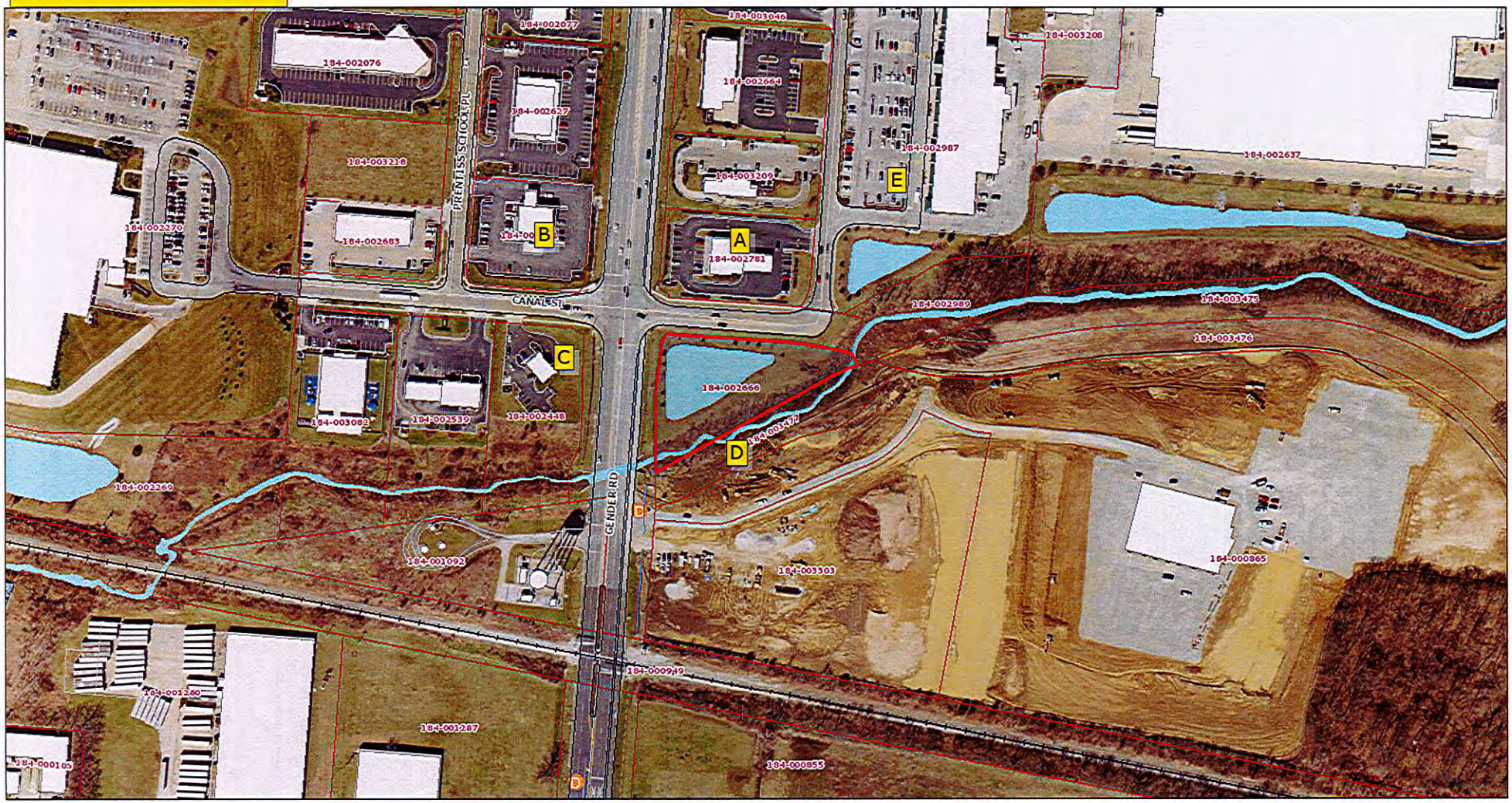
6'-0" FROM ROW
NEW D/F SIGN


PARCEL ID: 184-002781-00
"GC-GENERAL COMMERCIAL"
CANAL STREET
15'-0" FROM ROW
6'-0" FROM ROW
NEW D/F SIGN
WATERLOO CROSSING OP LLC
PARCEL ID: 184-002666-00
"GC-GENERAL COMMERCIAL"
WATERLOO CROSSIN
PARCEL ID: 184-0
"GC-GENERAL CO
R/W
ROAD
1"=50'-0"

PNC BANK
PNC BANK

EXHIBIT D

002666_Plot Plan



April 16, 2020

1:2,762

0 190 380 760 ft

0 55 110 220 m

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Franklin County Auditors Office
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EXHIBIT E

Neighboring Property Owners:

1. 6400 Gender Road LLC / GENDER RD 21 T11 S25
   Owner Address:
   9474 Big Bear Ave
   Powell OH 43065

   Property Address:
   6400 Gender Rd
   Canal Winchester OH 43110

2. Wal-mart Real Estate Business Trust / GENDER RD R21 T11 S25
   Owner Address:
   PO Box 8050 MS 0555
   Bentonville AR 72712

   Property Address:
   6647 Winchester Blvd
   Canal Winchester OH 43110

3. Valvoline LLC / GENDER RD R21 T11 S25
   Owner Address:
   3499 Blazer Pkwy
   Lexington KY 40509

   Property Address:
   6445 Canal St
   Canal Winchester OH 43110

4. First Bremen Bank / GENDER RD R21 T11 S25
   Owner Address:
   521 E Main St
   Lancaster OH 43130

   Property Address:
   6380 Prentiss School Dr
   Canal Winchester OH 43110

5. Crossroads Christian Life Center Inc
   Owner Address:
   11573 Lithopolis Rd NW
   Lithopolis OH 43136

   Property Address:
   6600 Bigerton Bl
   Canal Winchester OH 43110

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.

<u>Traffic Study</u>
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 ability to construct the turn lane improvements within the existing right-of-way on Hill Road. A letter of support was provided form Fairfield County Engineer's Office on the design. That support letter notes that a temporary construction easement will need to be obtained from the property owner to the east for the construction.

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. Fairfield County Engineer's Office review of the traffic study discusses that the improvements along Hill Road should occur with the construction of Phase 1 of the development. Staff is recommending that the turn lane be constructed with Phase 1, to mirror the county's request.

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 a temporary construction easement from a property to the east. 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 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 approved with the following recommendations:

1. The applicant provides a letter of guarantee that the temporary construction easement for the turn lane improvements have been obtained prior to City Council approving the Final Development Plan.

2. The turn lane improvements along Hill Road be constructed with Phase 1 of the development.

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

May 27, 2020

City of Canal Winchester
36 S. High Street
Canal Winchester, OH 43110

ATTN: Andrew Moore, Planning & Zoning Administrator

Dear Mr. Moore:

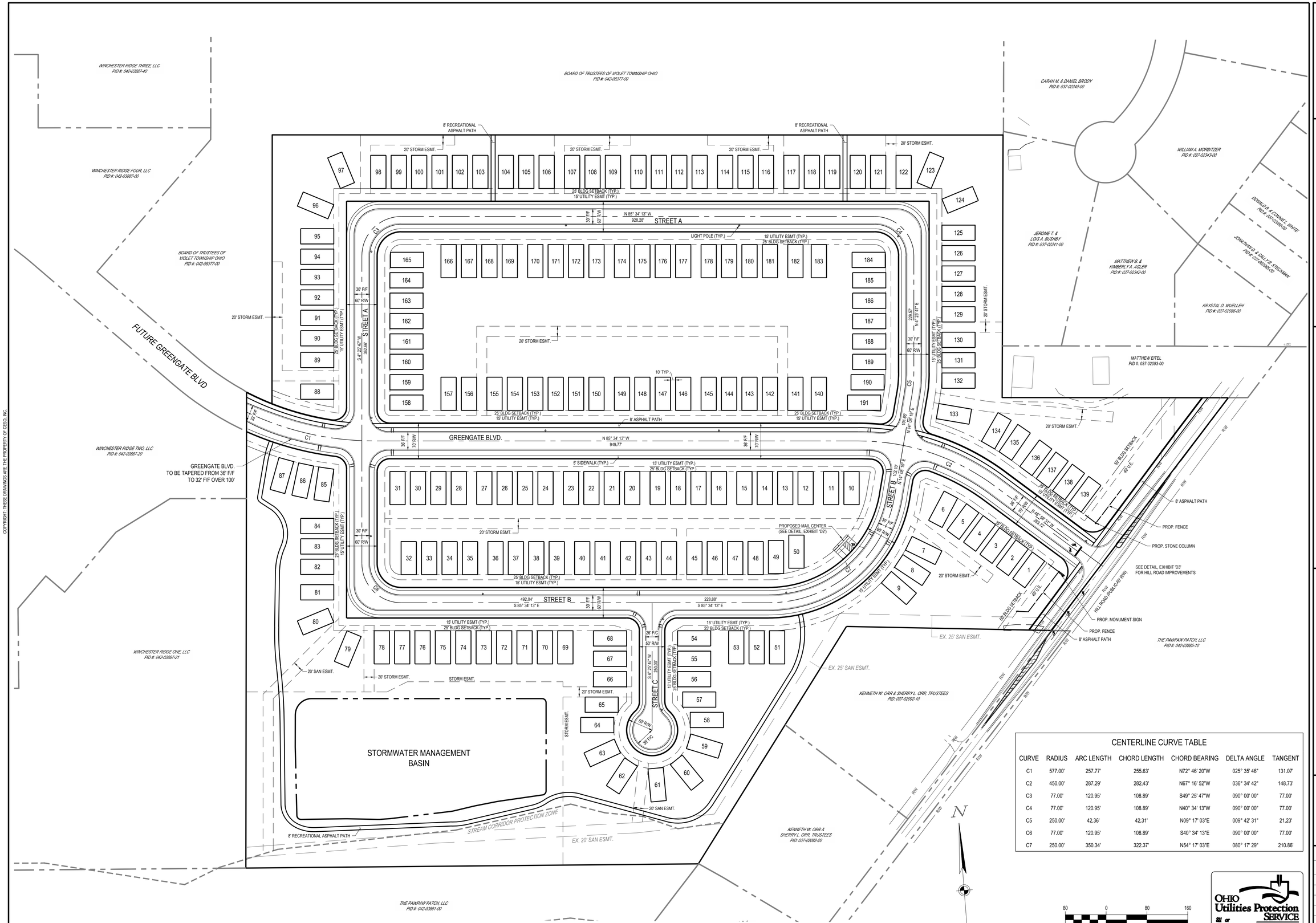
CESO, Inc. has submitted preliminary design development drawings for the Hill Road widening to add a north bound left turn lane. They will need to prepare full construction documents in order to attain a final approval. Our office has reviewed the design development plans and agree that the proposed road changes can be achieved.

The final road widening, turn lane, ditch and other adjustments will remain within the existing right-of-way. We will require that the developer attain a temporary grading easement along the east side of Hill Road in order to make a smooth grade transition between the road right-of-way and adjacent parcel.

Feel free to contact me should you wish to discuss this matter further.

Sincerely,

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



CENTERLINE CURVE TABLE

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DELTA ANGLE	TANGENT
C1	577.00'	257.77'	255.63'	N72° 46' 20"W	025° 35' 46"	131.07'
C2	450.00'	287.29'	282.43'	N67° 16' 52"W	036° 34' 42"	148.73'
C3	77.00'	120.95'	108.89'	S49° 25' 47"W	090° 00' 00"	77.00'
C4	77.00'	120.95'	108.89'	N40° 34' 13"W	090° 00' 00"	77.00'
C5	250.00'	42.36'	42.31'	N09° 17' 03"E	009° 42' 31"	21.23'
C6	77.00'	120.95'	108.89'	S40° 34' 13"E	090° 00' 00"	77.00'
C7	250.00'	350.34'	322.37'	N54° 17' 03"E	080° 17' 29"	210.86'

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CESO
WWW.CESOINC.COM

NO.	DATE	REVISION DESCRIPTION

FINAL DEVELOPMENT PLAN

GREENGATE

CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

SITE PLAN

ISSUE: NOT FOR CONSTRUCTION
DATE: 5.27.2020

JOB NO.:	757010
DESIGN:	JSB
DRAWN:	CWS
CHECKED:	JEE

SHEET NO.
EXHIBIT 'D1'

OHIO Utilities Protection SERVICE
811 or 1-800-362-2764 Call Before You Dig

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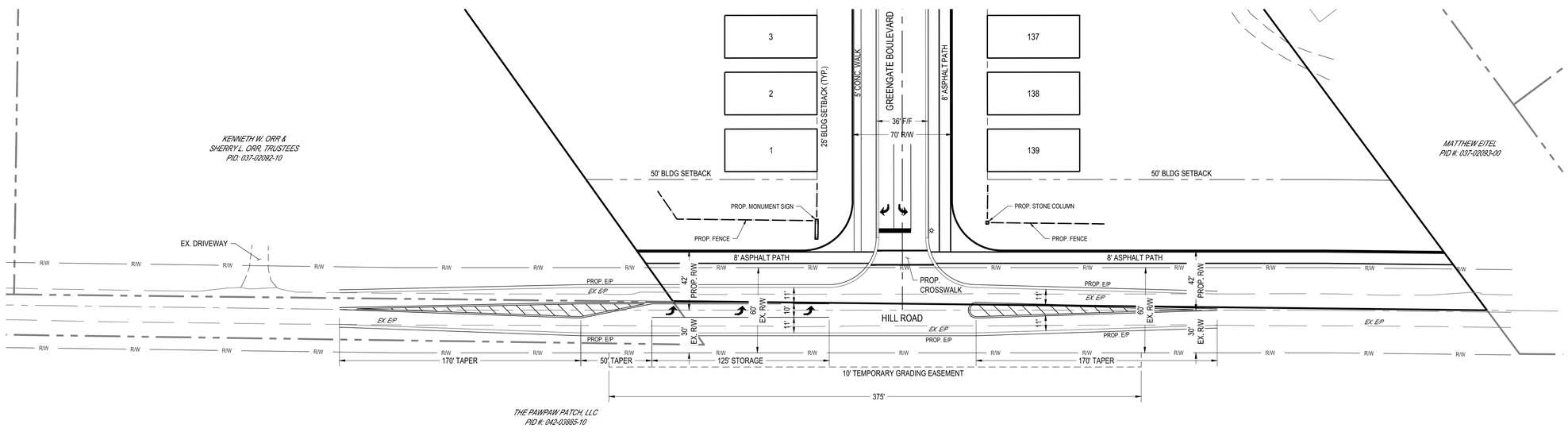
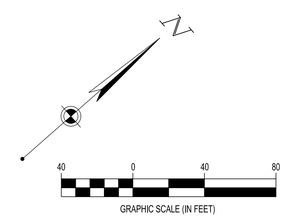


HILL ROAD IMPROVEMENTS

SCALE: 1" = 40'



NOTES:

1. ROADWAY IMPROVEMENTS ALONG HILL ROAD SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED TRAFFIC STUDY RECOMMENDATIONS.

2. FINAL LAYOUT AND GEOMETRY OF THE HILL ROAD IMPROVEMENTS SHALL BE SUBJECT TO CITY OF CANAL WINCHESTER ENGINEER AND FAIRFIELD COUNTY ENGINEER APPROVALS.

OHIO Utilities Protection SERVICE
811 or 1-800-362-2764 Call Before You Dig

CESO
WWW.CESOINC.COM

NO.	DATE	REVISION DESCRIPTION

FINAL DEVELOPMENT PLAN

GREENGATE

CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

HILL ROAD IMPROVEMENTS

ISSUE: NOT FOR CONSTRUCTION	
DATE: 5.27.2020	
JOB NO.:	757010
DESIGN:	JSB
DRAWN:	CWS
CHECKED:	JEE
SHEET NO.	EXHIBIT 'D3'

W:\PROJECTS\CAP 5 DEVELOPMENT\757010-01 GREENGATE\03-CIVIL\FDP\PLAN\757010_PLAN.DWG - 5/27/2020 1:47 PM

2800 Corporate Exchange Drive, Suite 400
Columbus, Ohio 43231-7628
(614) 794-7080
www.cesoinc.com

CESO

May 8, 2020

City of Canal Winchester
36 S. High Street
Canal Winchester, OH 43110
Attn: Andrew Moore

Fairfield County Engineer Office
3026 West Fair Avenue
Lancaster, OH 43130
Attn: Eric McCrady, PE

RE: Greengate Development Traffic Impact Study – Canal Winchester, Fairfield County, Ohio

Dear Mr. Moore and Mr. McCrady:

We are in receipt of the City of Canal Winchester review comments dated 03/27/2020 and the Fairfield County review comments dated 03/20/2020 for the above-reference project, to which we provide the following responses. Your comments are reiterated below with corresponding responses for each. Please review these responses and let us know if you have any additional comments/questions.

City of Canal Winchester Comment Letter (03/27/2020):

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.

   Response: Pass-by trips were removed from the AM traffic projections.

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.

   Response: The MORPC growth rates are listed in the report text and included in Appendix B.

3) Please provide 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.

   Response: A request for Diley Road was submitted to MORPC on 03/21/2020, and a growth rate has not been received. After further discussion with the City of Canal Winchester and EMH&T, a linear growth rate of 1.3%/year was agreed upon and applied to the volumes on Diley Road and Howe Industrial Parkway.

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.

   Response: The LOS threshold has been added to the narrative of the report. CESO referenced the ODOT State Highway Access Management Manual, which denotes LOS "D" or better condition as acceptable.

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.

   Response: A directional distribution memorandum was sent to the City of Canal Winchester and Fairfield County on 04/09/2020 documenting the basis for the distribution, calculations, and the proposed

percentages. After review, a directional distribution of 65% to/from the south and 35% to/from the north was agreed upon for both the AM and PM Peak Hours. The directional distribution is based on the existing traffic counts, location of popular destinations near the site, and the operation of the development land uses.

6) Figure 10.F on page 37 is labeled "primary" trips but appears to represent pass-by trips.

   Response: Addressed.

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 Section 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.

   Response: As discussed in the phone conversation with the City of Canal Winchester, Fairfield County, and EMH&T, the turn lane analysis tables were reformatted to denote the type of intersection control (signalized, free flow, or stop controlled). If a turning movement at a signalized intersection operates with poor levels of service, a turn lane was considered warranted based on capacity analysis. Further explanation has been added to the narrative of the report in cases where turn lanes were recommended to improve the level of service at an intersection.

8) Improvements:
   a. Site Access: We concur that the site developer is responsible for an eastbound left-turn lane at the site access point. ***Response: Noted.***
   b. Hill Road/Busey Road: The report recommends adding a northbound (on Hill Road) left-turn lane as a background improvement not related to the 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. ***Response: The percentage shares were calculated and are shown in Table 17 of the report.***
   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 met prior to 2023, signalization should not be recommended in 2022. ***Response: Warrant 3 (Peak Hour) was met in the 2022 No-Build Traffic Scenario. The Greengate Development contribution to the overall intersection volume during the 2024 Build Scenario is 15.0% in the AM Peak Hour and 11.0% in the PM Peak Hour. The contribution during the 2034 Build Scenario decreases to 6.6% in the AM Peak Hour and 4.7% in the PM Peak Hour.***
      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. ***Response: Correct.***
      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. ***Response: The percentage shares were calculated and are shown in Table 17 of the report.***

d. Diley Road/Greengate Boulevard/Howe Industrial Parkway:
   i. Improvements recommended for this intersection could change once the MORPC growth rate is updated. ***Response: Noted.***
   ii. Most improvements are driven by future commercial development and are not related to site development. ***Response: Correct.***
   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. ***Response: The percentage shares were calculated and are shown in Table 17 of the report.***

Fairfield County Comment Letter (03/20/2020):

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 two (2) levels of service in 2034, which is not acceptable.

   Response: The revised study includes improvements at the Hill Road and Kings Crossing intersection to mitigate the degradation.

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.

   Response: The Greengate Development percentage share was calculated for the study intersections and is shown in Table 17 of the report.

3) The study shows three (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 three (3) consecutive years are so close together.

   Response: Noted.

4) We need to discuss and agree on the directional distribution of the development generated traffic. 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 is 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.

   Response: A directional distribution memorandum was sent to the City of Canal Winchester and Fairfield County on 04/09/2020 documenting the basis for the distribution, calculations, and the proposed percentages. After review, a directional distribution of 65% to/from the south and 35% to/from the north was agreed upon for both the AM and PM Peak Hours. The directional distribution is based on the existing traffic counts, location of popular destinations near the site, and the operation of the development land uses.

5) There are no plans on the counties 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 nonexistent turn lanes, unless the development is planning to construct these.

Response: The NB left-turn lane was removed from the Hill Road and Busey Road intersection. The SB left-turn lane was kept in the analysis files for the Hill Road and Kings Crossing intersection, as it was necessary to mitigate the LOS "F" at the SB approach under the 2034 No-Build Traffic Scenario. Responsibility for the improvement is yet to be determined, so the report assigns responsibility to "others."

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.

   Response: The revised study recommends a traffic signal at the intersection, which removes the need for a WB to NB right-turn lane.

Please continue with your review and provide approval at your earliest convenience. If you should have any comments or questions, please do not hesitate to contact me directly.

Should you have any further questions, please do not hesitate to contact me.

Respectfully,

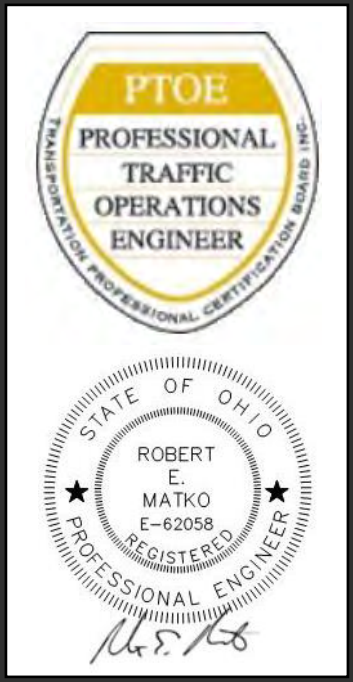
Robert Matko, PE, PS, PTOE
Engineering Manager
matko@cesoinc.com
(517) 212-4188

cc: Jon Buchanan, J.D. Damrath - CESO, Inc.
Ryan Reed – DDC Management, LLC

CESO

TRAFFIC IMPACT STUDY

Greengate Residential Development
City of Canal Winchester
Fairfield County, Ohio
March 5th, 2020
Revised: May 8th, 2020



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1. Executive Summary

1.1. Summary

Note: This report was revised on May 8th, 2020 to address comments received from the City of Canal Winchester on March 27th, 2020 and comments received from Fairfield County on March 20th, 2020.

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 a few of the movements, which operate at LOS "E" or "F". The SBLR movement at the Hill Road and Kings Crossing intersection operates at LOS "F" under the 2022 No-Build PM Peak Hour and the 2034 No-Build PM Peak Hour. The EBLT movement at the Hill Road and Kings crossing intersection operates at LOS "F" during the 2034 No-Build PM Peak Hour. The EBL movement at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection operates at LOS "F" in the 2034 No-Build AM and PM Peak Hours. In addition, the WBL movement at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection operates at LOS "E" during the AM Peak Hour and LOS "F" during the PM Peak Hour. 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 (178 in/109 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. 27-28). 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. 29-30).

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 with the exception of the EBLR movement at the Hill Road and Busey Road intersection, which operates at LOS "E" – 36.6 during the 2034 Build PM Peak Hour. In addition, all intersections have an overall LOS "C" or better condition.

<u>CESO conducted turn lane analyses for the study network and reached the following conclusions:</u>

- 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. Table 8 shows the SBLR movement operating at a LOS "F" – 61.8 during the 2034 No-Build PM Peak Hour, which warrants a left-turn lane on Kings Crossing.

- Note: Although a NB left-turn lane is warranted at the Hill Road and Busey Road intersection, Fairfield County has no plans to install the improvement. Therefore, the turn lane was not shown in the analysis and is not recommended.

- 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. Table 8 shows the SBLR movement operating at a LOS "F" – 61.8 during the 2034 No-Build PM Peak Hour, which warrants a right-turn lane on Kings Crossing.

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.

CESO calculated the Greengate Development impact for the study intersections. The percentages are presented in Table 17 in Section 10.1.

1.3. Summary of Recommendations

All recommendations are illustrated on Figures 16.A-16.C (pg. 60-62) of the report.

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

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.
- 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:
Note: CESO recommends re-evaluating the need for a signal at this intersection once further development occurs along Diley Road. For the purpose of mitigating the poor levels of service in the analysis, a traffic signal and roadway improvements are recommended.

- Construct extension of Greengate Boulevard to connect with Diley Road. Provide one outbound left-turn lane, one outbound thru-right turn lane, and one inbound lane. Construct a WB to SB left-turn lane to provide 175 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 SB to EB left-turn lane to provide 450 feet of storage plus a 50-foot taper.
- Construct 3-phase traffic signal with a 100 second cycle length.

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:

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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).

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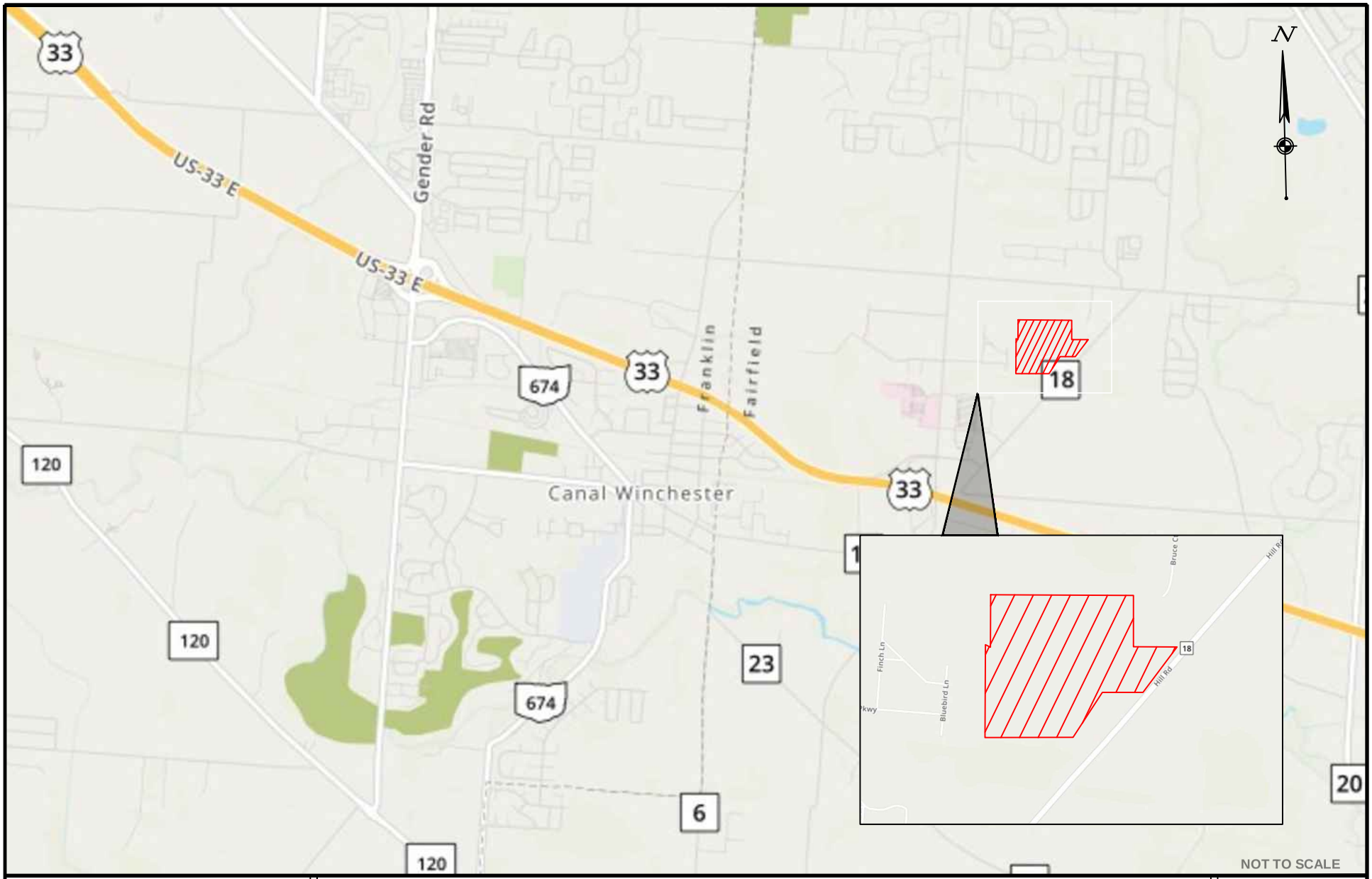
2022/2023 and 2024 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2022/2023 and 2024, without the proposed Greengate Development.

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

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 1

DATE:	05/08/2020
JOB NO.:	757010-01
DESIGN:	TMC
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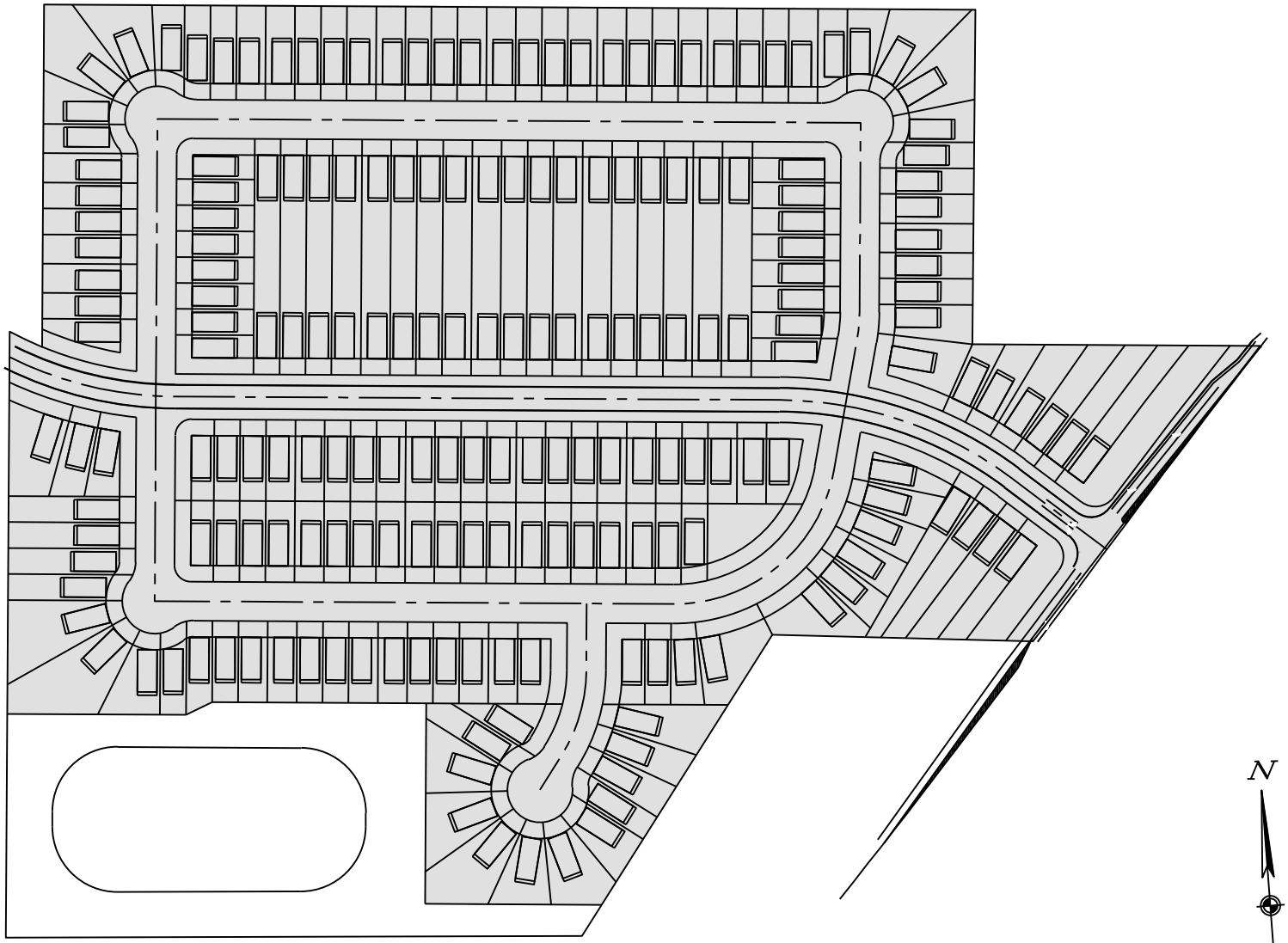

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SITE PLAN

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 2

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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. Calculations were completed to determine the Greengate Development impact on the study intersections.

15. 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. (2016 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).

7. *State Highway Access Management Manual (January 2020)*. 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

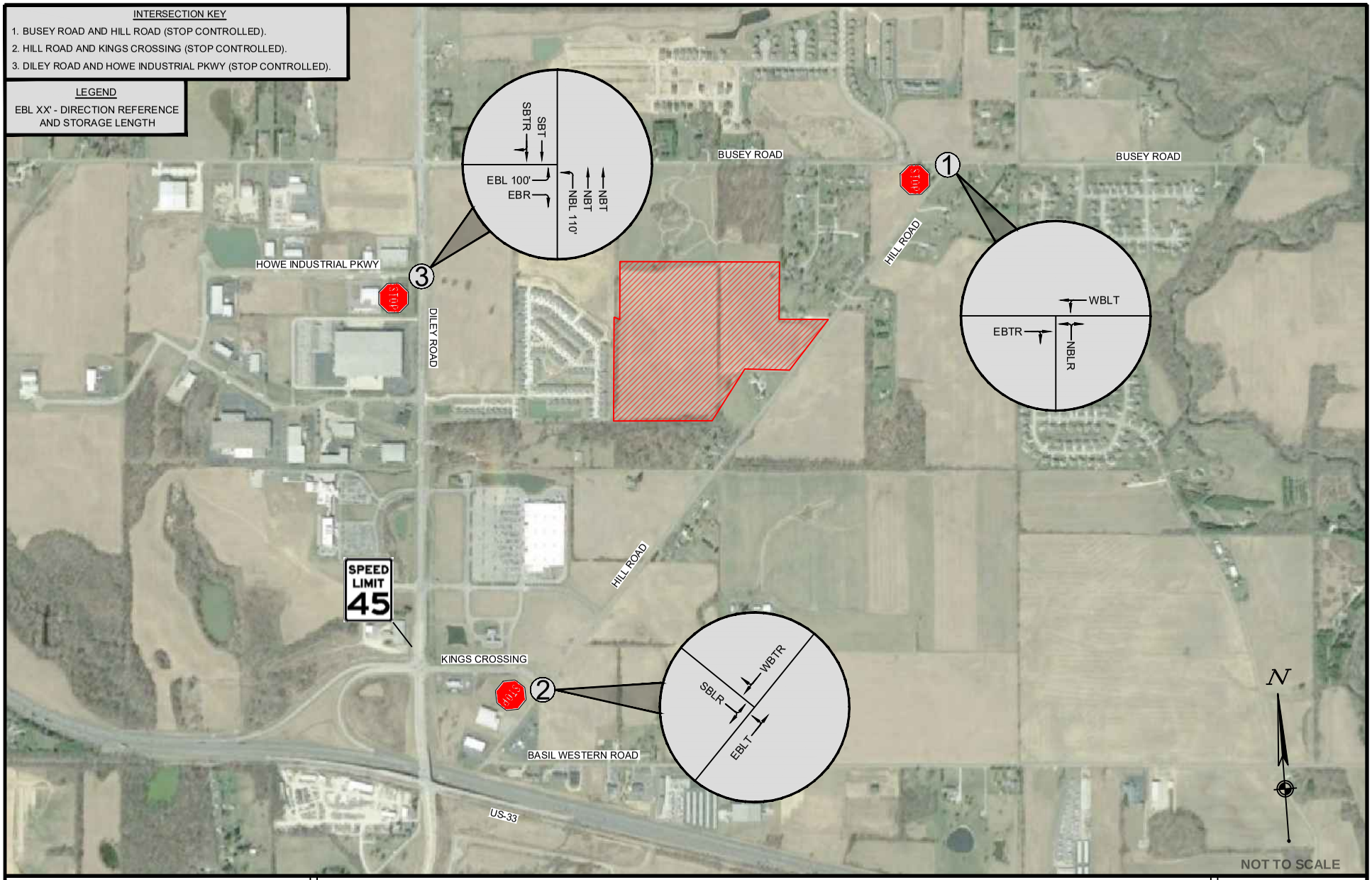
Hill Road – Hill Road runs in the northeast/south westbound direction in the vicinity of the Site. At the intersection with Kings Crossing and the proposed Greengate Boulevard, Hill Road is labeled as east/westbound throughout the analysis. At the intersection with Busey Road, Hill Road is labeled as 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.



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EXISTING TRANSPORTATION SYSTEM

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 3	
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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:

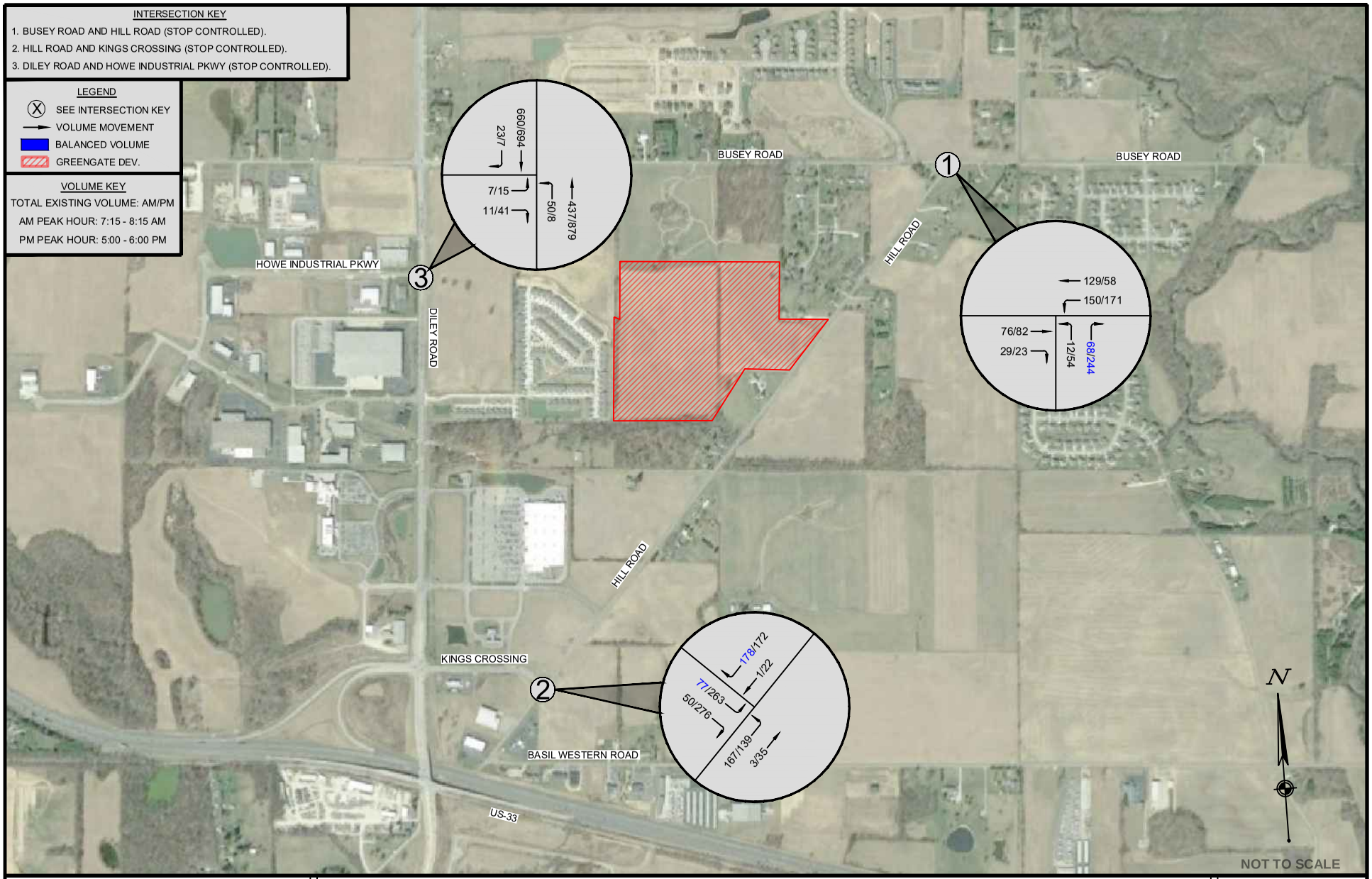
- Diley Road & Howe Industrial Parkway (Stop Controlled).

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.



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EXISTING WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 4	
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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)*, 2016 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. (2016 Edition). Transportation Research Board.

Highway Capacity Manual 2016 (HCM 2016) 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. (2016 Edition). Transportation Research Board.

According to the ODOT State Highway Access Management Manual (SHAMM), all intersection movements shall operate at level of service (LOS) "D" or better condition.

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, 2016 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). The linear growth rates provided by MORPC are as follows:

- Hill Road north of Kings Crossing – 2.3%/year
- Hill Road south of Kings Crossing – 3.6%/year
- Hill Road south of Busey Road – 3.0%/year
- Busey Road east of Hill Road – 3.6%/year
- Busey Road west of Hill Road – 4.0%/year
- Kings Crossing west of Hill Road – 3.0%/year

Note: *The original MORPC request did not include the Diley Road and Howe Industrial Parkway intersection. An additional request was submitted to MORPC, however a response was not received in time. Larry Creed with EMH&T provided a growth rate of 1.3%/year to apply to the volumes on Diley Road and Howe Industrial Parkway.* The growth rates are attached in Appendix B.

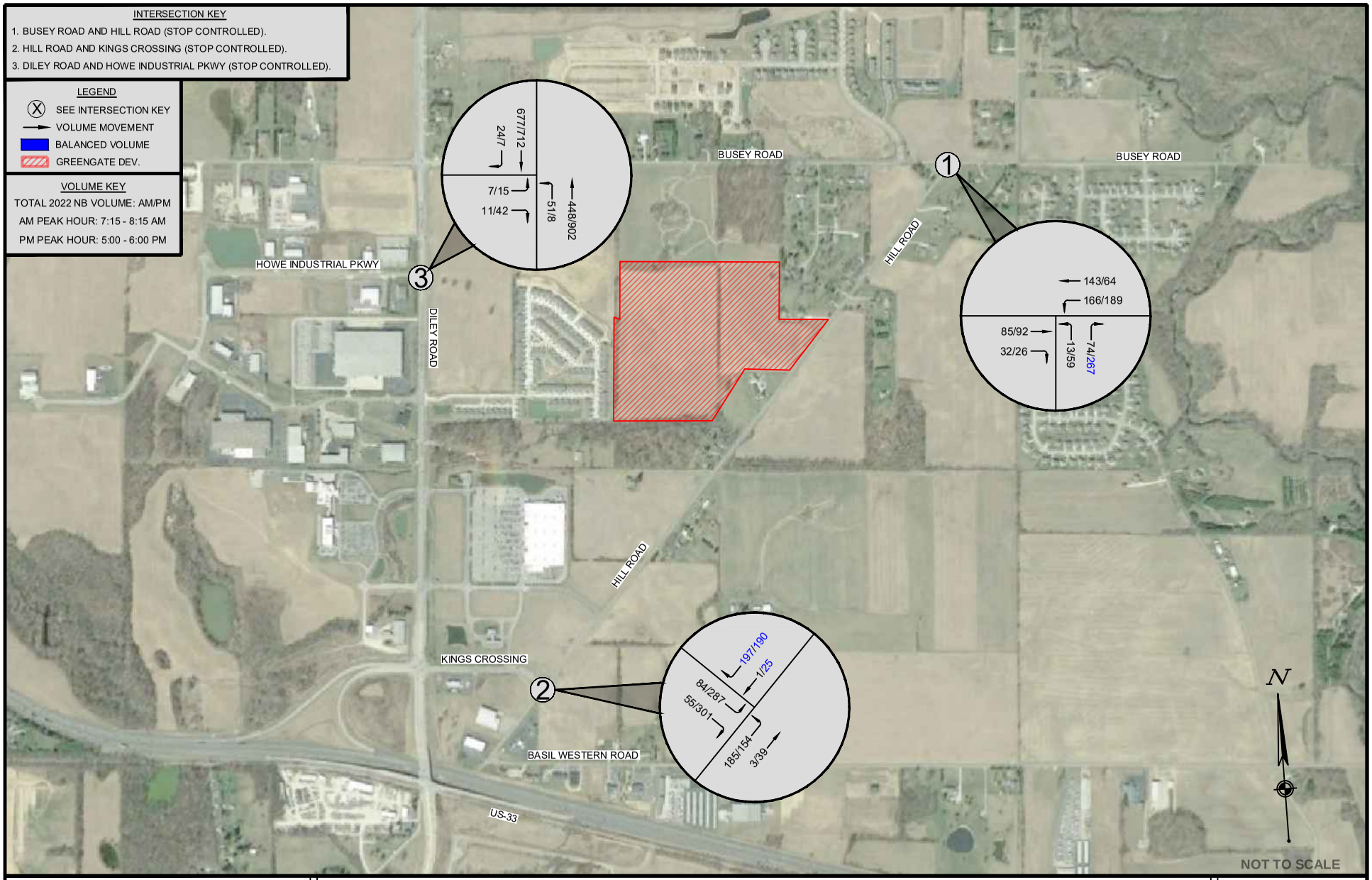
For the 2034 No-Build Traffic Volumes, additional development traffic was added to Figure 8 to account for the Greengate Boulevard extension. Once completed, trips from an existing residential development along with a proposed commercial development will reroute to Greengate Boulevard. The estimated 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, 2016 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 a few of the movements, which operate at LOS “E” or “F”. The SBLR movement at the Hill Road and Kings Crossing intersection operates at LOS “F” under the 2022 No-Build PM Peak Hour and the 2034 No-Build PM Peak Hour. The EBLT movement at the Hill Road and Kings crossing intersection operates at LOS “F” during the 2034 No-Build PM Peak Hour. The EBL movement at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection operates at LOS “F” in the 2034 No-Build AM and PM Peak Hours. In addition, the WBL movement at the Diley Road and Howe Industrial Parkway/Greengate Boulevard intersection operates at LOS “E” during the AM Peak Hour and LOS “F” during the PM Peak Hour. 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.



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2022 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 5	
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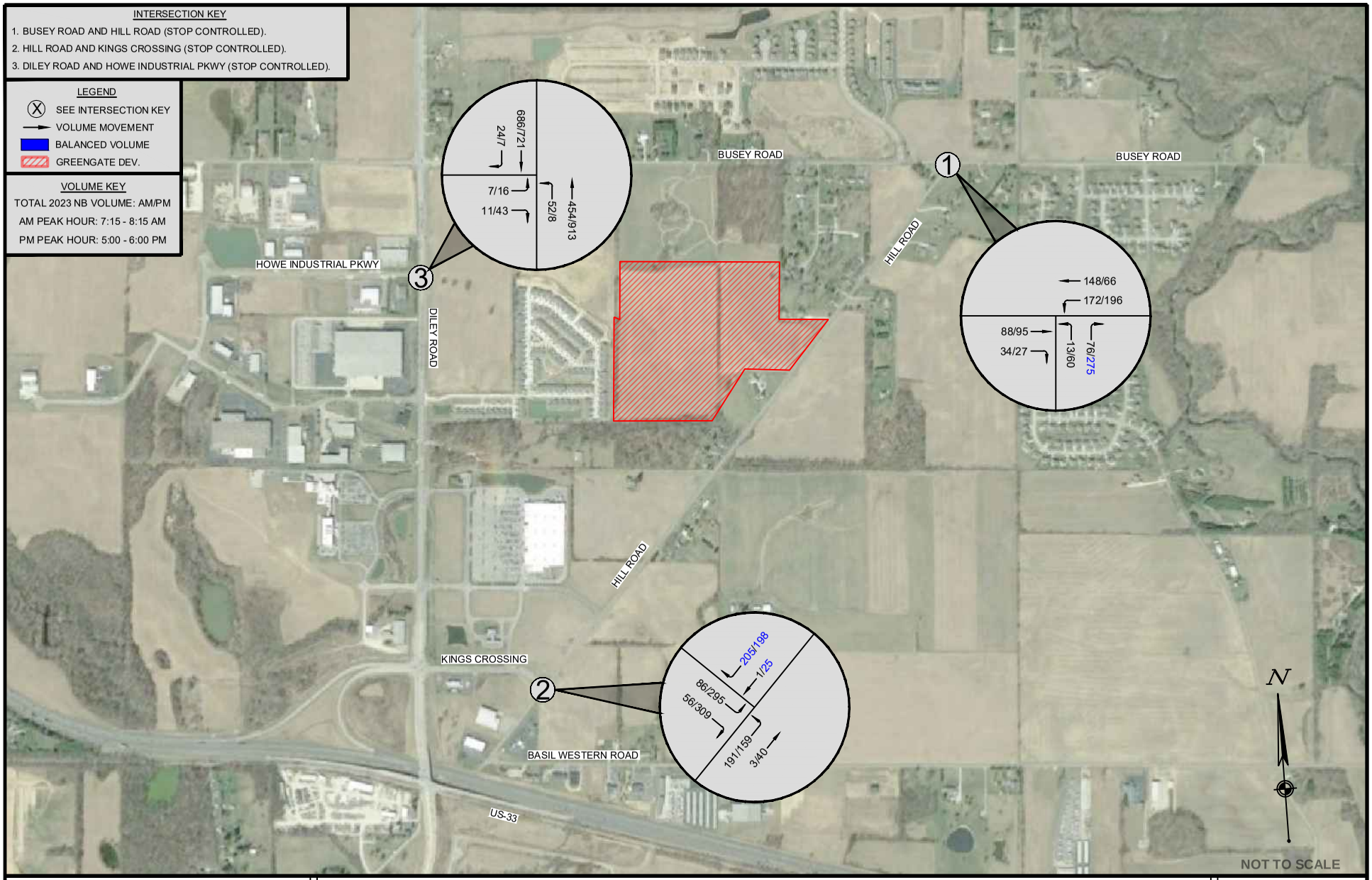

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2023 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 6	
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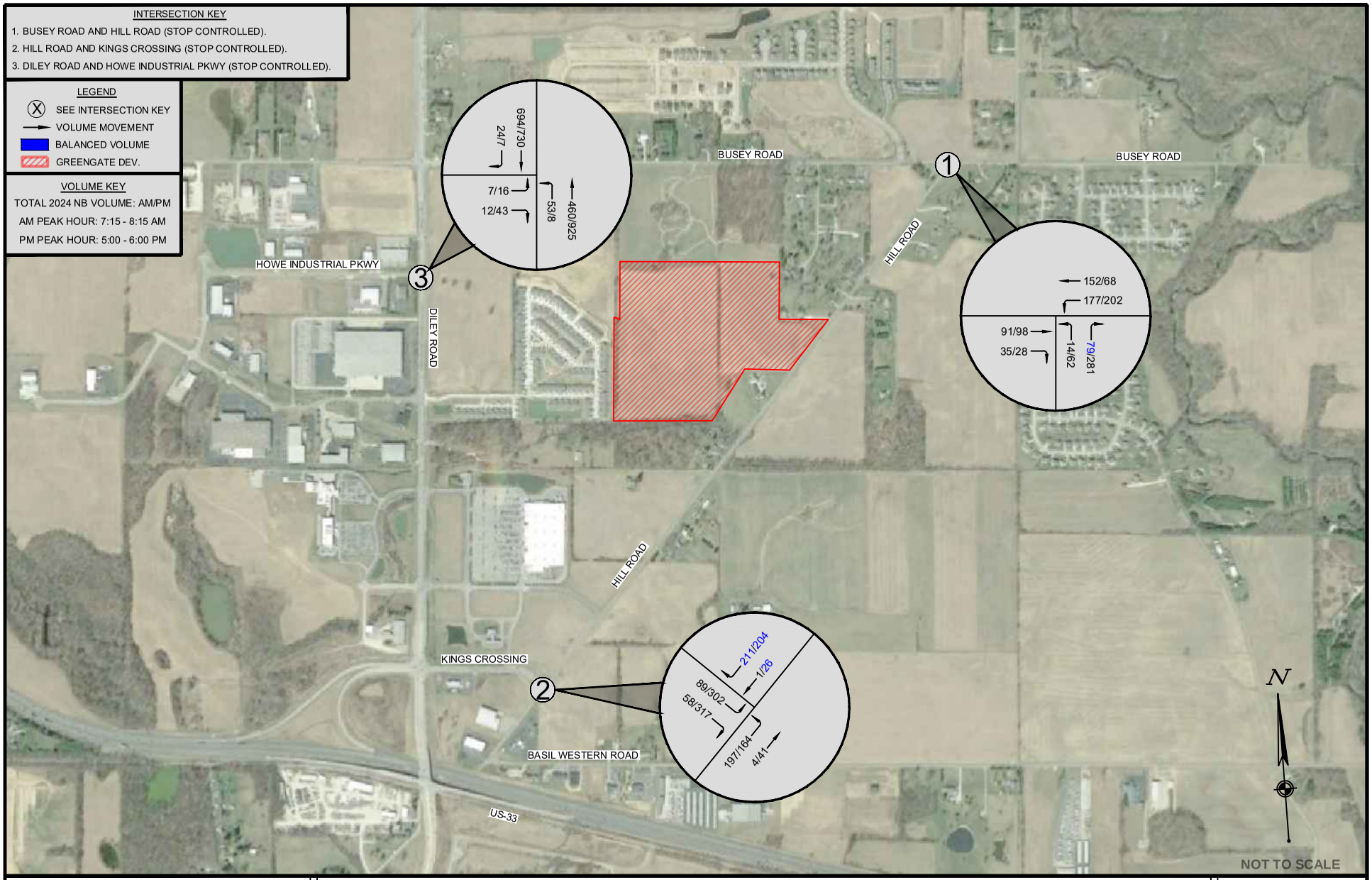

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2024 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

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FIGURE 7	
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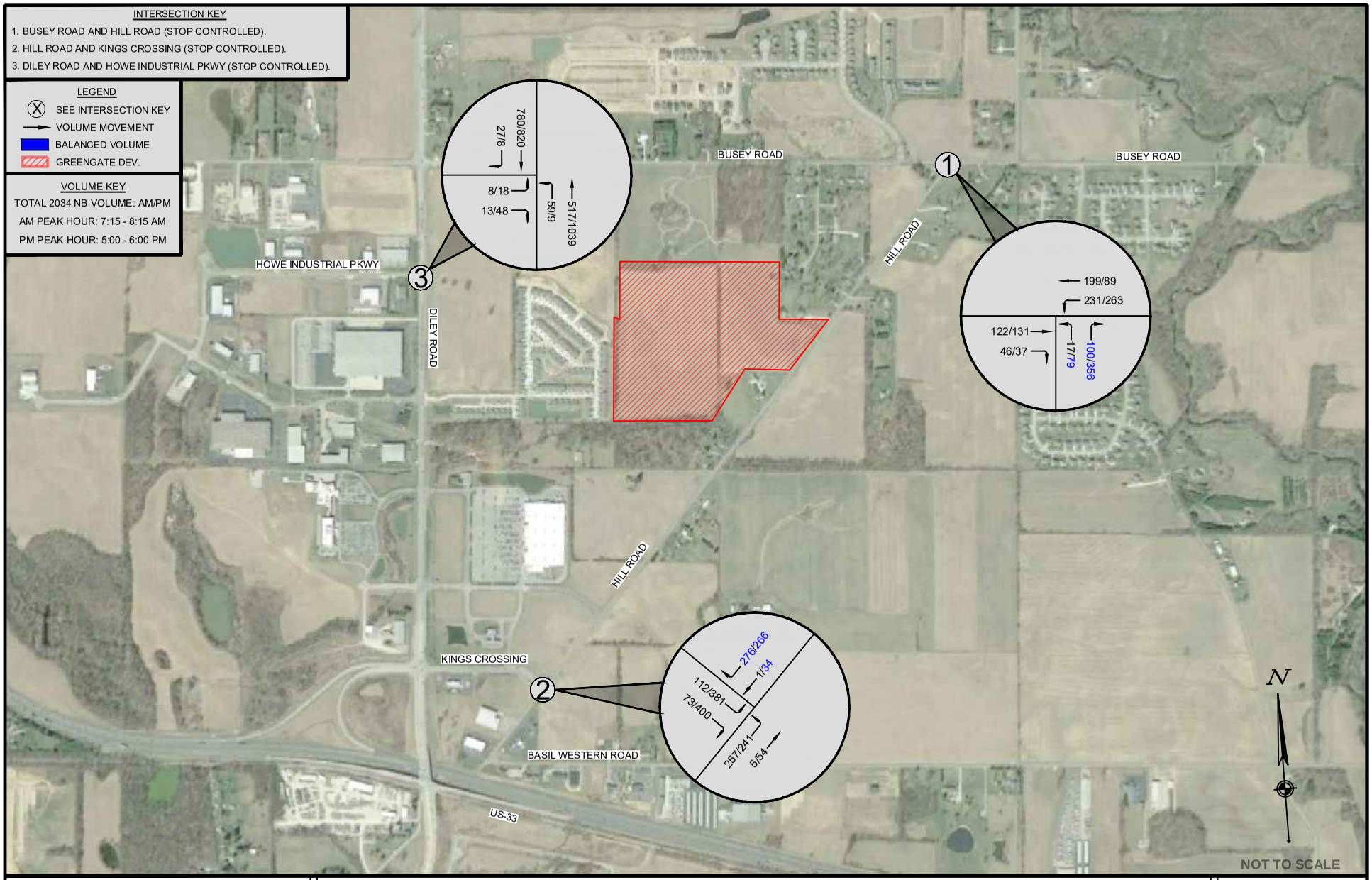

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2034 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 8	
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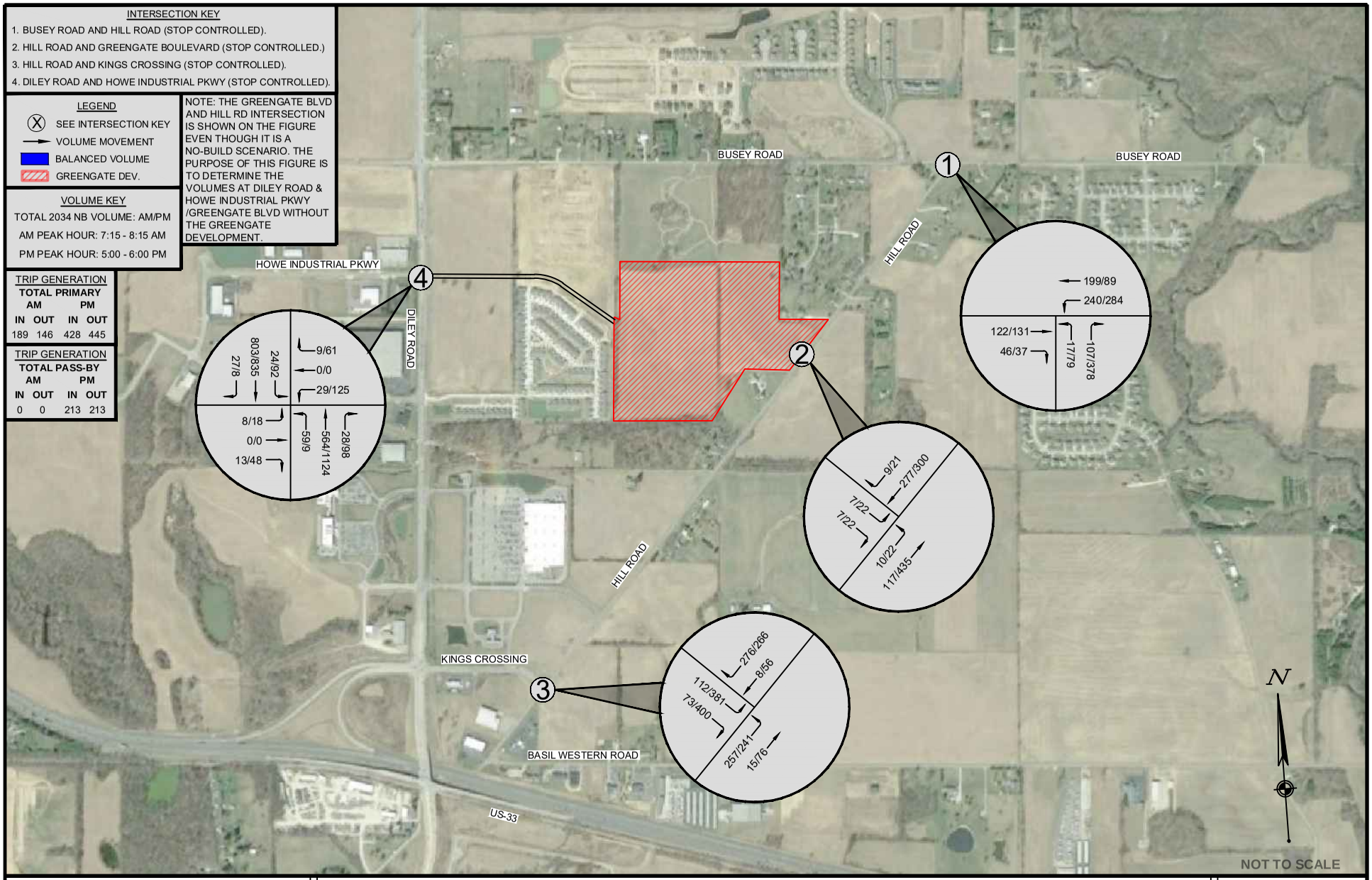

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2034 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 14	
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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 of 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	178	109	--	1,240	391	423	426
ITE Cat. 210 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*62%*	*38%*	*0%*	*100%*	*48%*	*52%*	*34%*
TOTAL				**13,548**	**6,774**	**6,774**	**335**	**189**	**146**	**0**	**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 directional distribution for this site was determined based on the existing traffic patterns, location of popular destinations in the surrounding areas, and operation of the land uses. The proposed directional distribution was approved by the City of Canal Winchester and Fairfield County.

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.

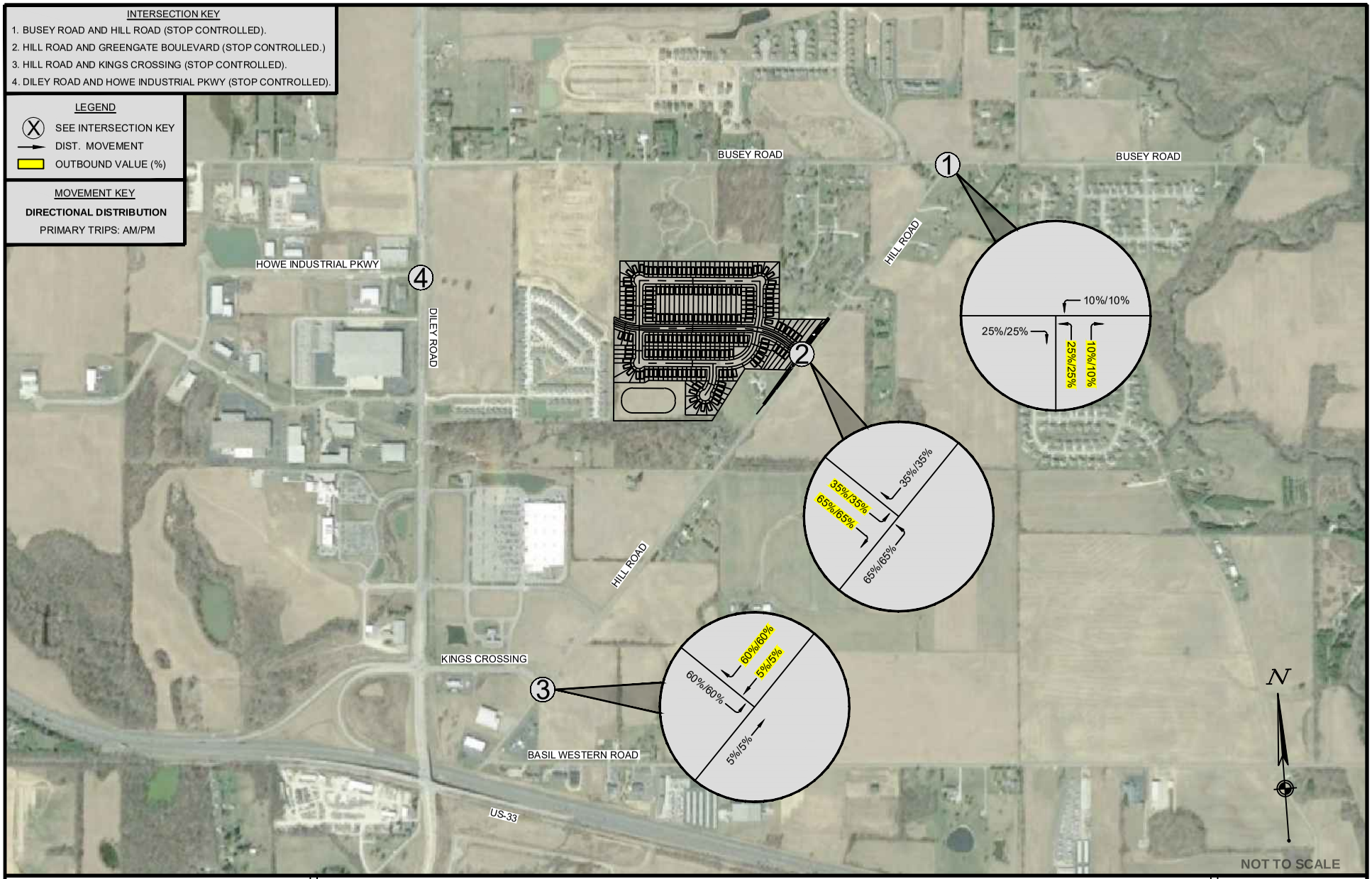
The anticipated directional distribution of trips generated by the proposed Greengate and Future Development are shown in Table 6. Additionally, Figure 9.A-9.B illustrates the directional distribution for the Greengate Development. Figure 9.C-9.D illustrate the directional distribution for the Future 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%	25%/25%
To/From the West on Hill Road	5%/5%	5%/5%
To/From the North on Kings Crossing	60%/60%	60%/60%
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%	30%/30%
To/From the North on Diley Road	20%/20%	20%/20%
To/From the South on Diley Road	30%/30%	30%/30%
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.

Note: Additional driveways are shown on the directional distribution and trip generation figures for the commercial area. The City of Canal Winchester noted that the future development traffic shall be dispersed between five potential driveway locations: one (1) full access connection to Busey Road, two (2) full access connections to Diley Road (at Greengate Boulevard and Dove Parkway), and two (2) right-in/right-out connections to Diley Road.



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DIRECTIONAL DIST. OF DEV. GENERATED TRAFFIC VOLUMES (2022, 2023, AND 2024)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 9.A	
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JOB NO.:	757010-01
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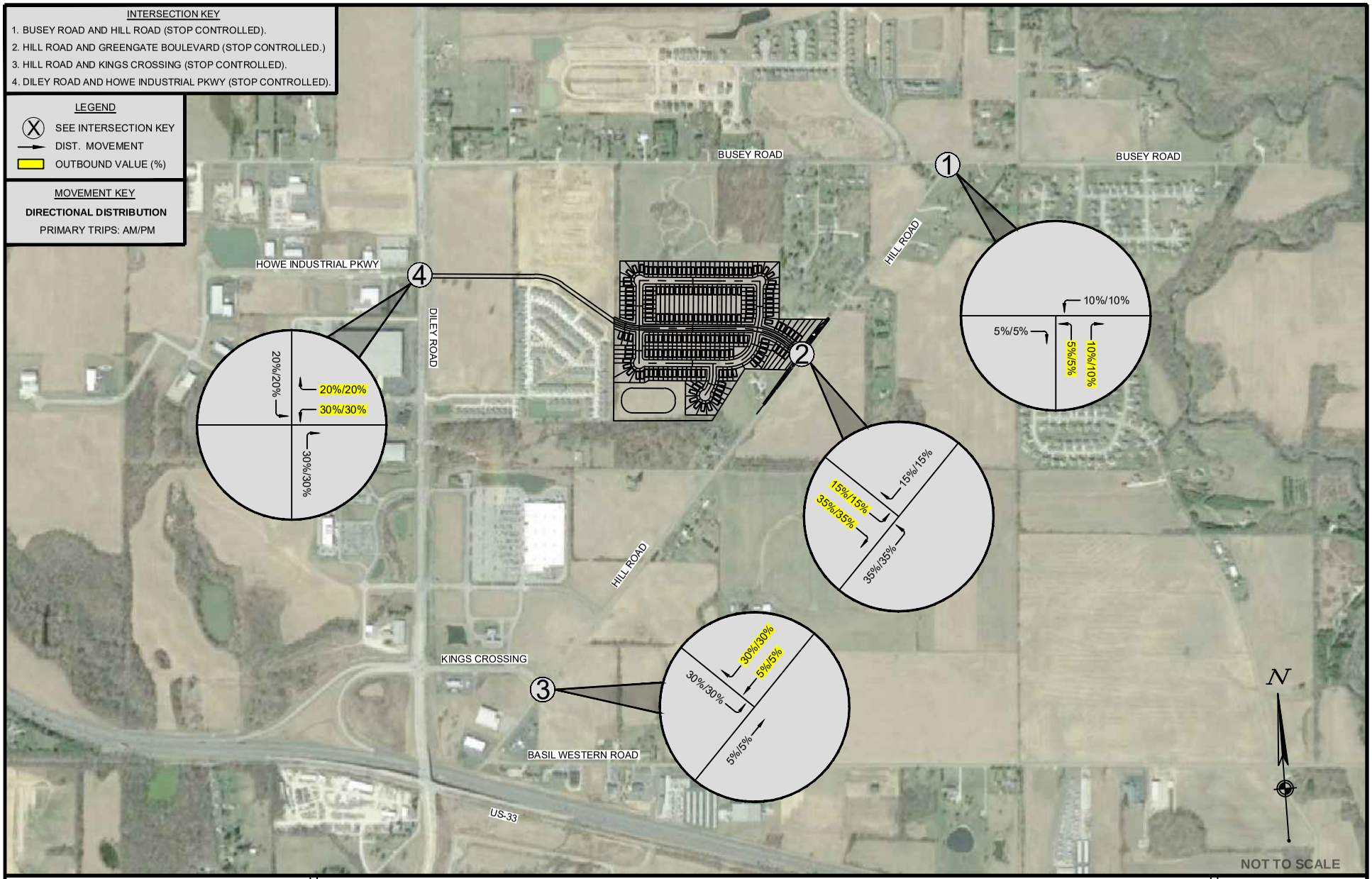

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DIRECTIONAL DIST. OF DEV. GENERATED TRAFFIC VOLUMES (2034)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 9.B	
DATE:	05/08/2020
JOB NO.:	757010-01
DESIGN:	TMC
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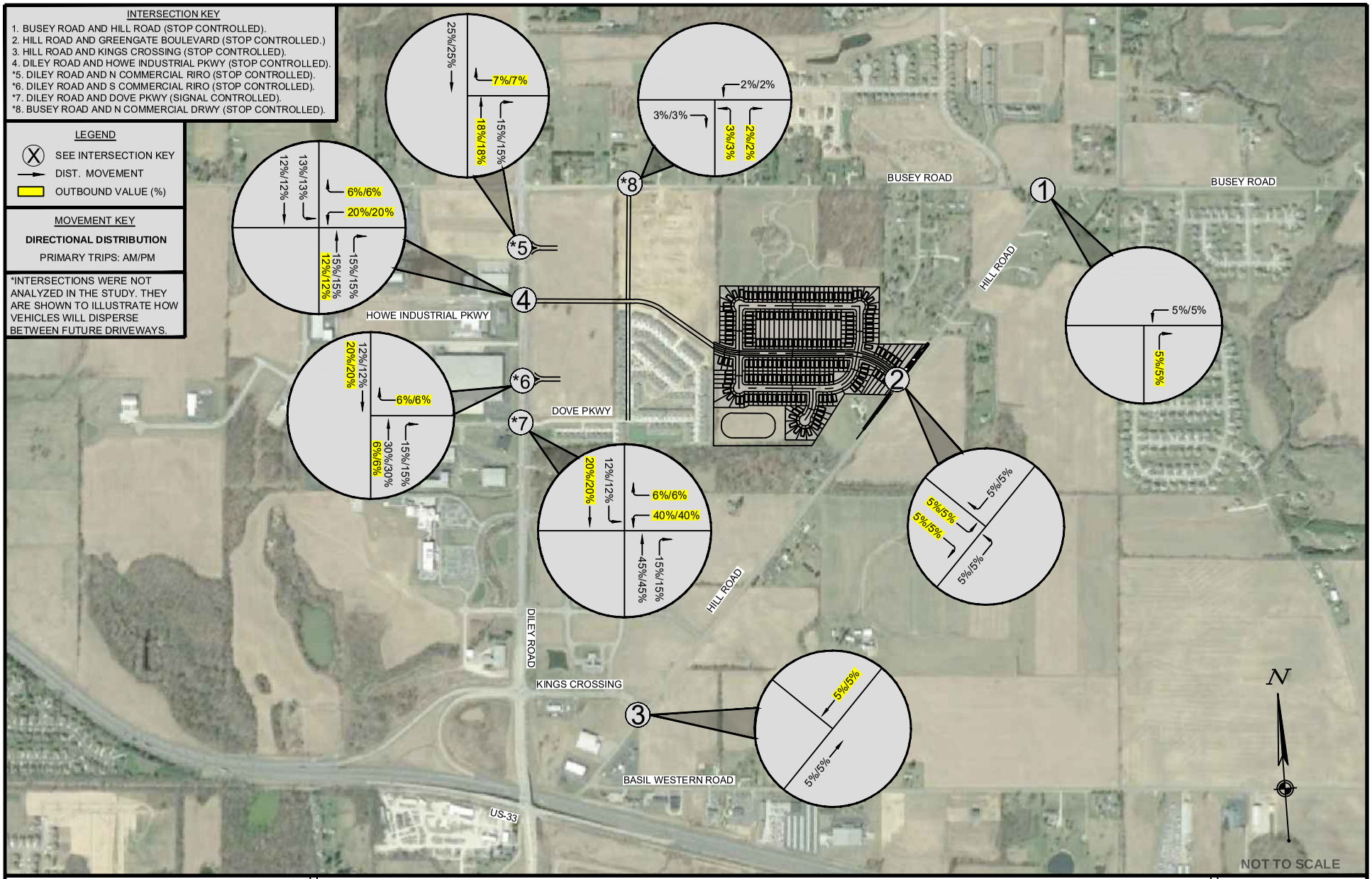

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DIRECTIONAL DIST. OF FUTURE DEV. GENERATED TRAFFIC VOLUMES (2034 - PRIMARY)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 9.C	
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JOB NO.:	757010-01
DESIGN:	TMC
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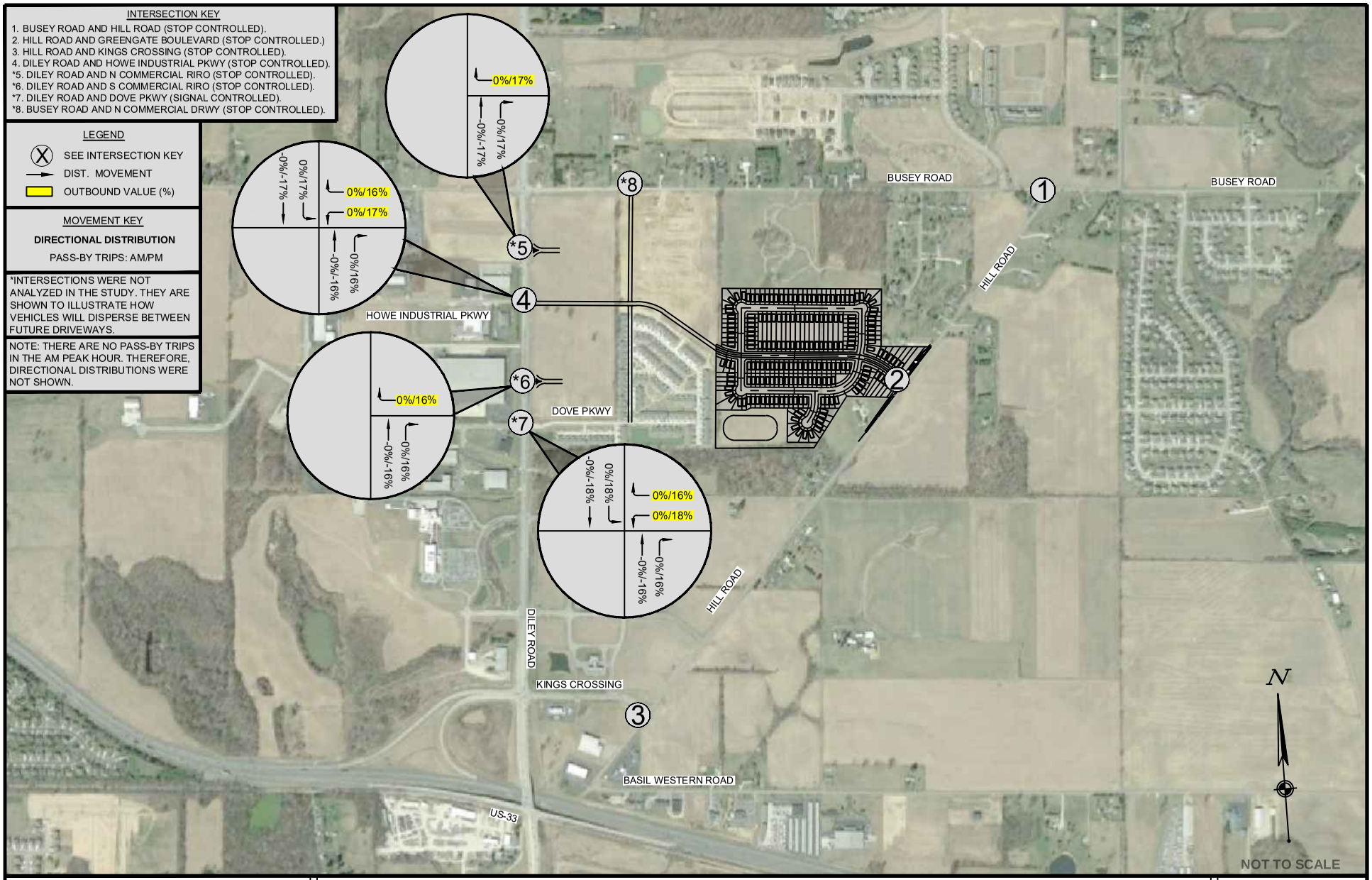

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DIRECTIONAL DIST. OF FUTURE DEV. GENERATED TRAFFIC VOLUMES (2034 - PASS-BY)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 9.D	
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JOB NO.:	757010-01
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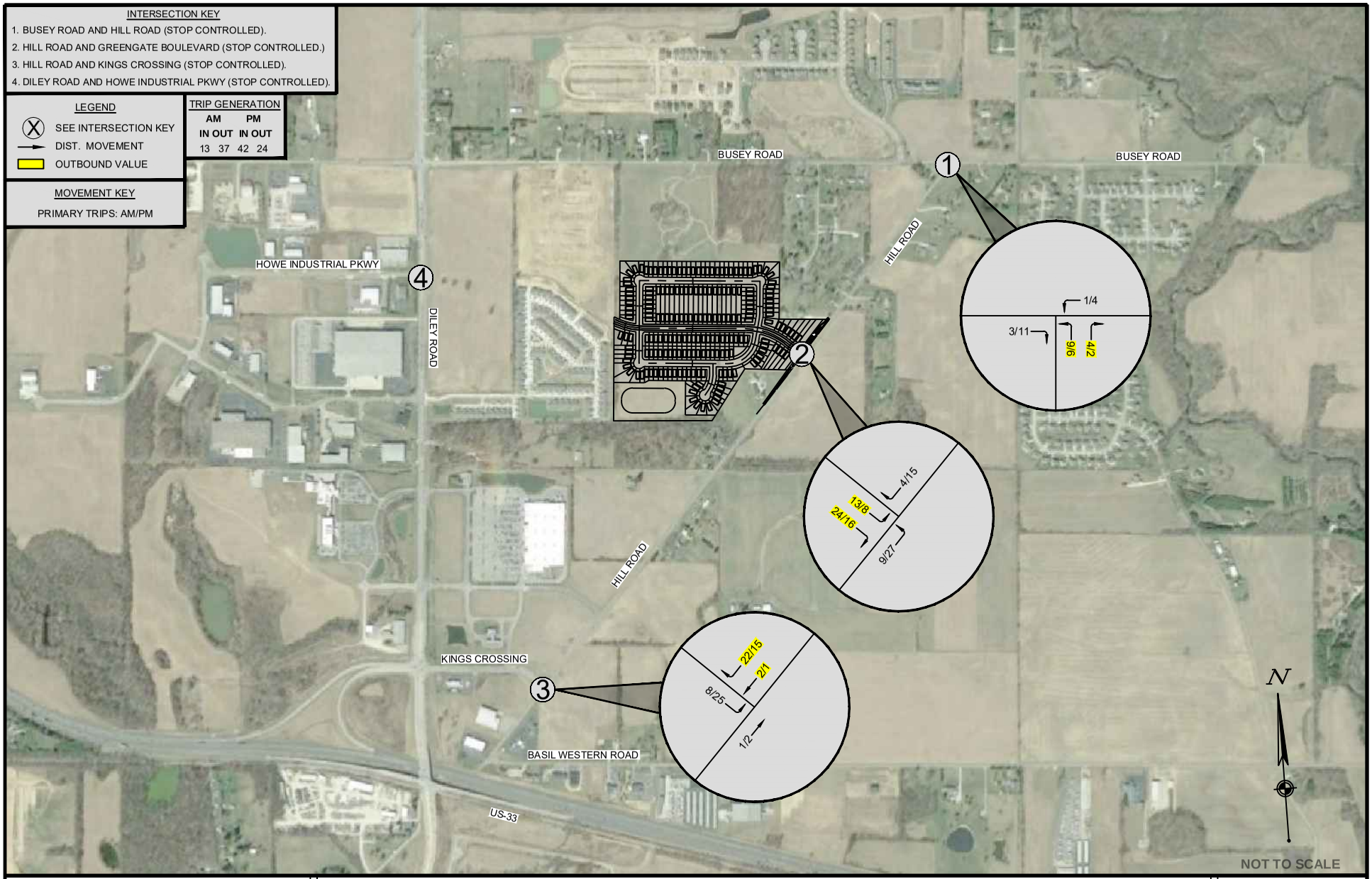

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GREENGATE DEV. GENERATED TRAFFIC VOLUMES (2022 - PHASE 1 & 2)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 10.A	
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JOB NO.:	757010-01
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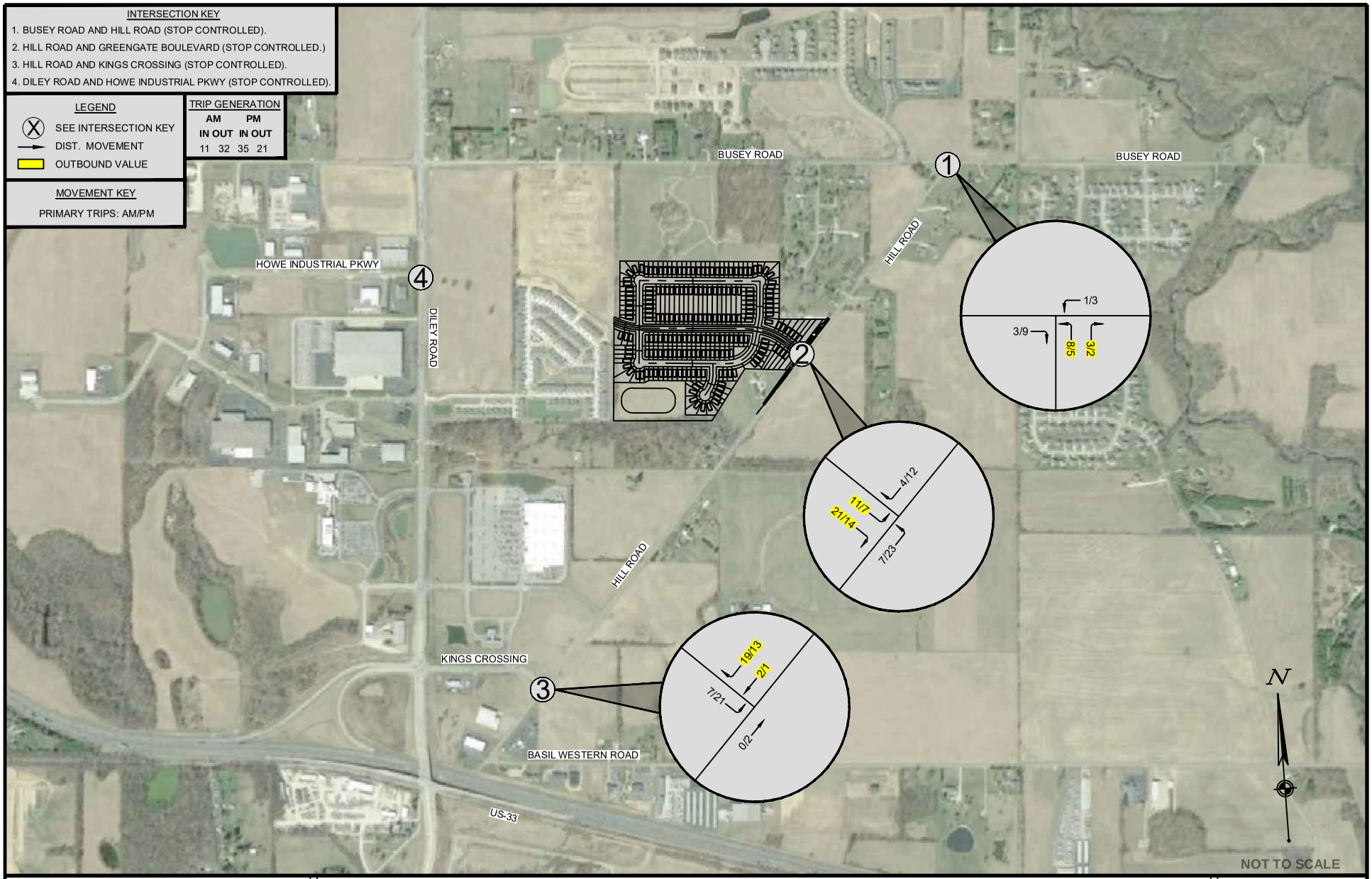
PAGE	31



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GREENGATE DEV. GENERATED TRAFFIC VOLUMES (2023 - PHASE 3 & 5)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 10.B	
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JOB NO.:	757010-01
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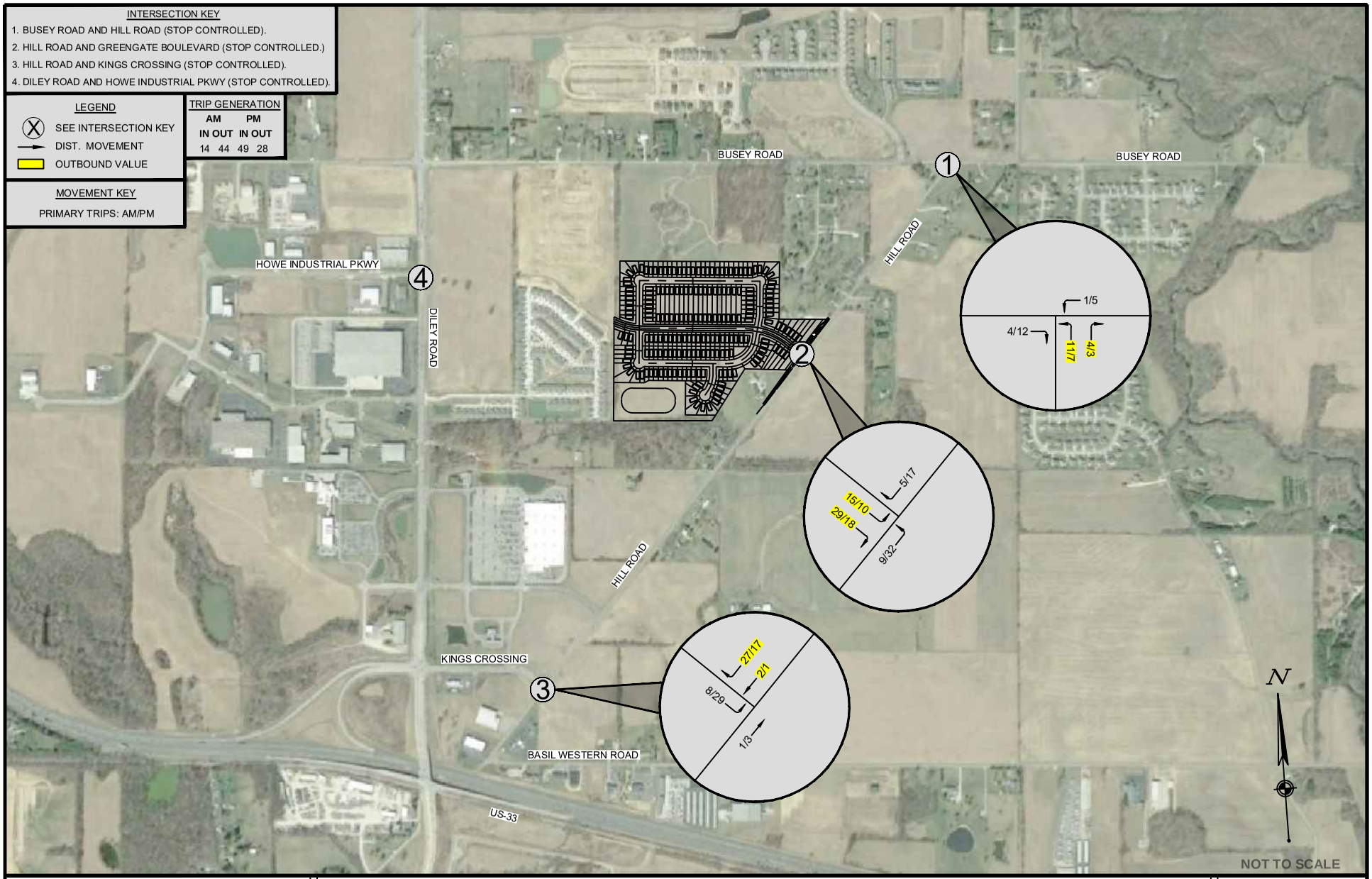

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GREENGATE DEV. GENERATED TRAFFIC VOLUMES (2024 - PHASE 4, 6, & 7)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 10.C	
DATE:	05/08/2020
JOB NO.:	757010-01
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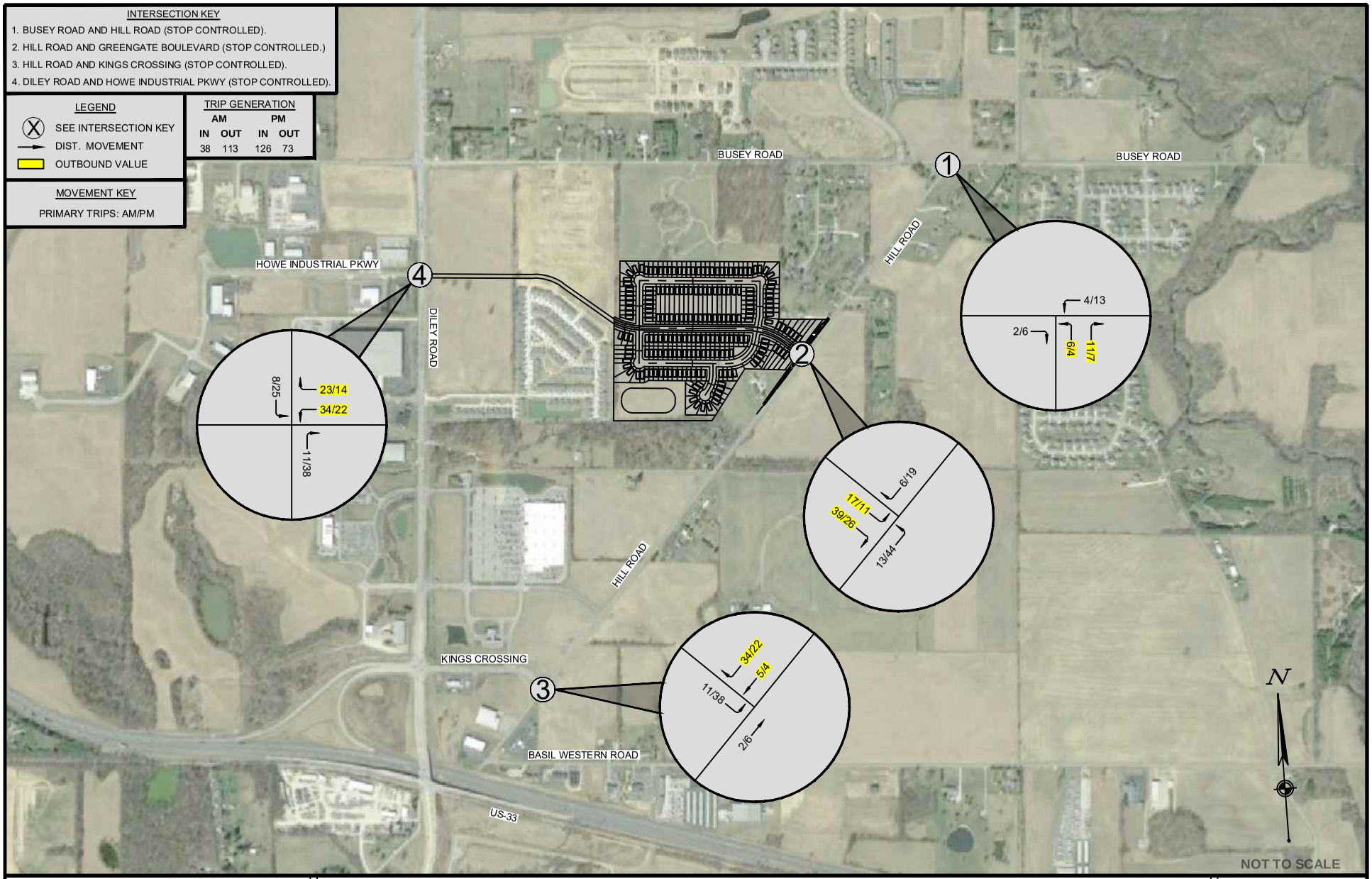
PAGE	33



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GREENGATE DEV. GENERATED TRAFFIC VOLUMES (2034 - ALL PHASES)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 10.D	
DATE:	05/08/2020
JOB NO.:	757010-01
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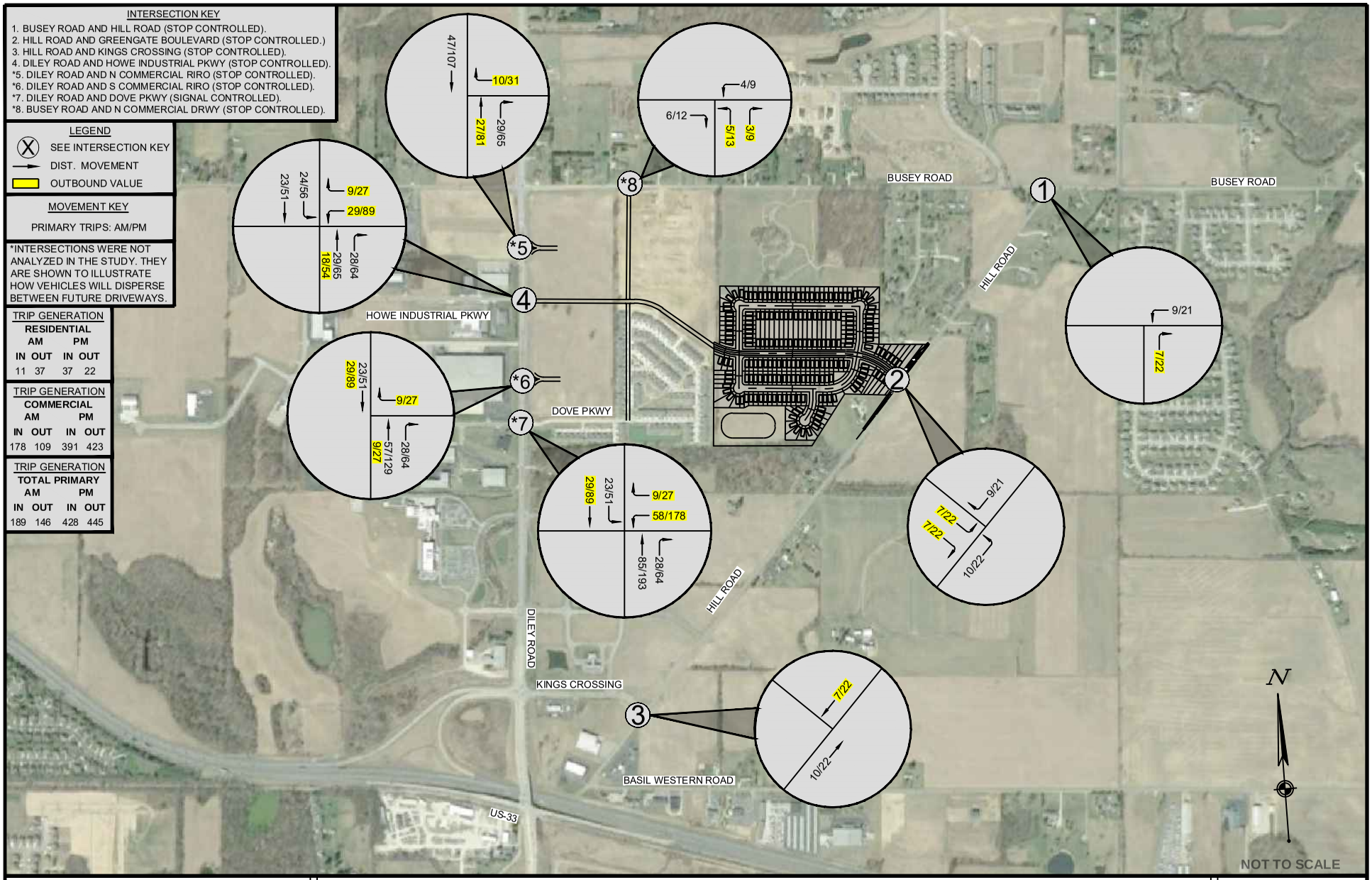
PAGE	34



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FUTURE DEV. GENERATED TRAFFIC VOLUMES (2034 - PRIMARY)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 10.E	
DATE:	05/08/2020
JOB NO.:	757010-01
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DRAWN:	TMC
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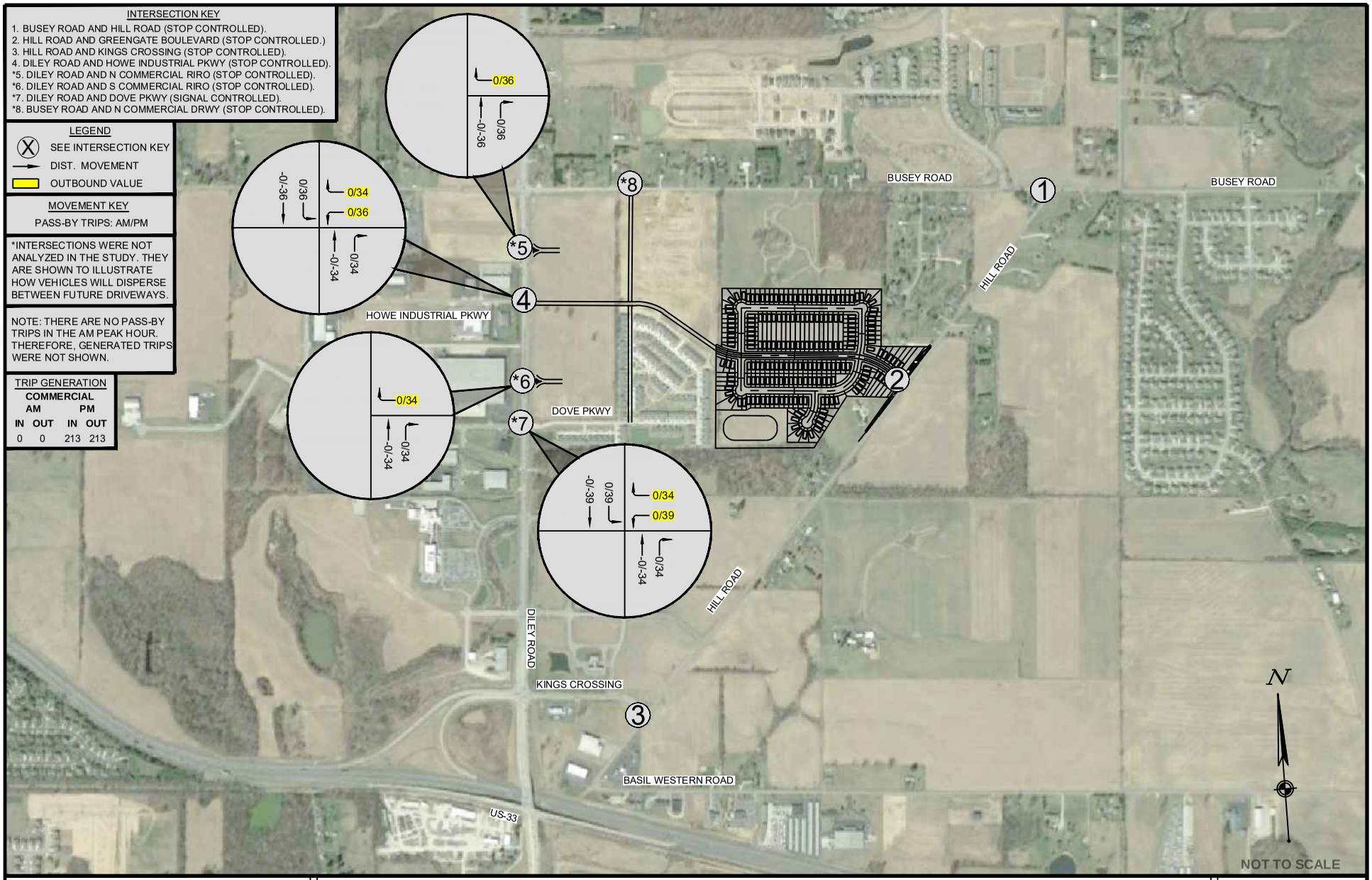
PAGE	35



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FUTURE DEV. GENERATED TRAFFIC VOLUMES (2034 - PASS-BY)

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 10.F	
DATE:	05/08/2020
JOB NO.:	757010-01
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PAGE	36

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, 2016 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 with the exception of the EBLR movement at the Hill Road and Busey Road intersection, which operates at LOS “E” – 36.6 during the 2034 Build PM Peak Hour. 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.

Table 7
Summary of Capacity Analysis – AM Peak Hour

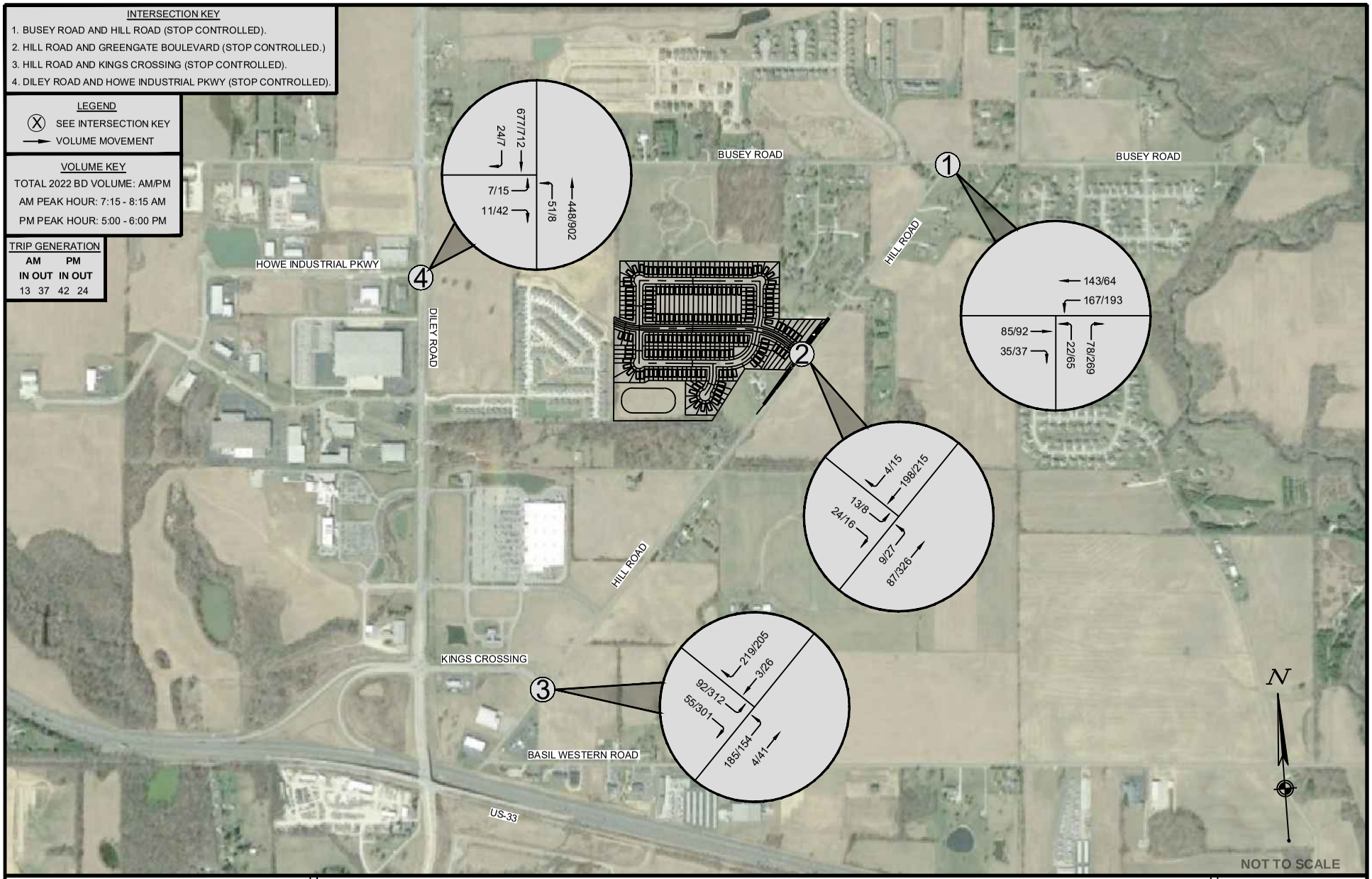
Intersection →	Year →	2022/2023/2024/2034 AM Peak Hour																					
	Volume →	No-Build & Build - Year 2022/2023/2024/2034																					
	Geometry →	Existing																					
	Movement	2022 NB		2022 NB IMP		2022 BD		2022 BD IMP		2023 NB		2023 BD		2024 NB		2024 BD		2034 NB		2034 NB IMP		2034 BD	
		LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del
Hill Rd. & Busey Rd. (Stop Controlled)	EBLR	B	11.8	--	--	B	12.0	--	--	B	11.9	B	12.5	B	12.2	B	13.2	C	15.0	--	--	C	15.6
	NBLT	A	7.9	--	--	A	8.0	--	--	A	8.0	A	8.0	A	8.0	A	8.1	A	8.3	--	--	A	8.4
Intersection Overall →		--	--	B	14.5	B	14.7	--	--	B	14.6	B	15.0	B	14.7	B	15.4	B	16.1	B	15.6	B	16.1
Hill Rd. & Kings Crossing (Stop Controlled, Signal Controlled w/ Imp.)	EBLT	A	8.1	B	11.8	B	12.4	--	--	B	12.1	B	13.2	B	12.3	B	14.2	B	15.5	B	15.5	B	16.9
	WBTR	--	--	A	8.4	A	8.6	--	--	A	8.5	A	8.8	A	8.5	A	9.1	A	9.1	A	9.1	A	9.4
	SBLR	B	13.8	C	26.7	C	26.9	--	--	C	26.8	C	27.1	C	26.9	C	27.3	C	27.7	--	--	--	--
	SBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	26.0	C	26.2
	SBR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	25.5	C	25.5
Hill Rd. & Greengate Blvd. (Stop Controlled)	EBLT	--	--	--	--	A	7.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EBL	--	--	--	--	--	--	A	7.7	--	--	A	7.7	--	--	A	7.8	A	7.9	--	--	A	7.9
	SBL	--	--	--	--	B	10.6	B	10.6	--	--	B	10.9	--	--	B	11.4	B	11.5	--	--	B	12.1
	SBR	--	--	--	--	A	9.5	A	9.5	--	--	A	9.7	--	--	A	10.0	A	9.9	--	--	B	10.3
Intersection Overall →		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	18.4	B	18.7
Diley Rd. & Howe/ Greengate (Stop Controlled, Signal Controlled w/ Imp.)	EBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	F	60.7	C	23.6	C	24.4
	EBTR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	11.9	C	23.4	C	23.4
	WBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	E	46.9	C	24.1	C	24.8
	WBTR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	10.4	C	23.3	C	23.7
	NBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	10.4	C	21.6	C	21.6
	NBT	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	23.8	C	24.0
	NBR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	23.9	C	24.1
	SBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	A	8.9	B	12.9	B	13.0
	SBT	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	14.1	B	14.1
	SBTR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	14.1	B	14.1

*Delay in seconds L – Left T – Through R – Right

Table 8
Summary of Capacity Analysis – PM Peak Hour

Intersection →	Year →	2022/2023/2024/2034 PM Peak Hour																					
	Volume →	No-Build & Build - Year 2022/2023/2024/2034																					
	Geometry →	Existing																					
	Movement	2022 NB		2022 NB IMP		2022 BD		2022 BD IMP		2023 NB		2023 BD		2024 NB		2024 BD		2034 NB		2034 NB IMP		2034 BD	
		LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del	LOS	*Del
Hill Rd. & Busey Rd. (Stop Controlled)	EBLR	C	16.2	--	--	C	16.5	--	--	C	16.8	C	17.5	C	17.4	C	18.7	D	33.4	--	--	E	36.6
	NBLT	A	7.9	--	--	A	7.9	--	--	A	7.9	C	8.0	A	8.0	A	8.1	A	8.3	--	--	A	8.4
Intersection Overall →		--	--	C	23.4	C	24.6	--	--	C	24.3	C	27.0	C	25.2	C	31.3	E	63.9	C	23.9	C	25.0
Hill Rd. & Kings Crossing (Stop Controlled, Signal Controlled w/ Imp.)	EBLT	A	8.1	C	27.6	C	28.5	--	--	C	28.4	C	30.4	C	29.2	C	33.3	F	110.9	C	28.9	C	32.3
	WBTR	--	--	C	20.5	C	20.7	--	--	C	20.6	C	21.1	C	20.7	C	21.6	C	22.8	B	15.0	B	15.4
	SBLR	F	70.2	C	23.1	C	24.8	--	--	C	24.2	C	28.3	C	25.5	C	34.6	F	61.8	--	--	--	--
	SBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	23.7	C	25.3
	SBR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	27.3	C	27.3
Hill Rd. & Greengate Blvd. (Stop Controlled)	EBLT	--	--	--	--	A	7.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EBL	--	--	--	--	--	--	A	7.8	--	--	A	7.9	--	--	A	8.0	A	8.0	--	--	A	8.2
	SBL	--	--	--	--	B	13.7	B	13.7	--	--	C	15.0	--	--	C	17.3	C	17.0	--	--	C	20.5
	SBR	--	--	--	--	A	9.6	A	9.6	--	--	A	9.8	--	--	B	10.0	A	10.3	--	--	B	10.6
Intersection Overall →		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	22.5	C	23.6
Diley Rd. & Howe/ Greengate (Stop Controlled, Signal Controlled w/ Imp.)	EBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	F	168.9	C	30.3	C	30.9
	EBTR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	12.2	C	28.4	C	28.4
	WBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	F	1906.2	C	32.7	C	33.4
	WBTR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	15.6	C	28.6	C	28.9
	NBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	A	9.8	B	15.0	B	15.0
	NBT	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	29.4	C	30.9
	NBR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	29.7	C	31.5
	SBL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	13.4	B	16.3	B	18.2
	SBT	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	10.5	B	10.5
	SBTR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	B	10.5	B	10.5

*Delay in seconds L – Left T – Through R – Right



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2022 BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 11

DATE:	05/08/2020
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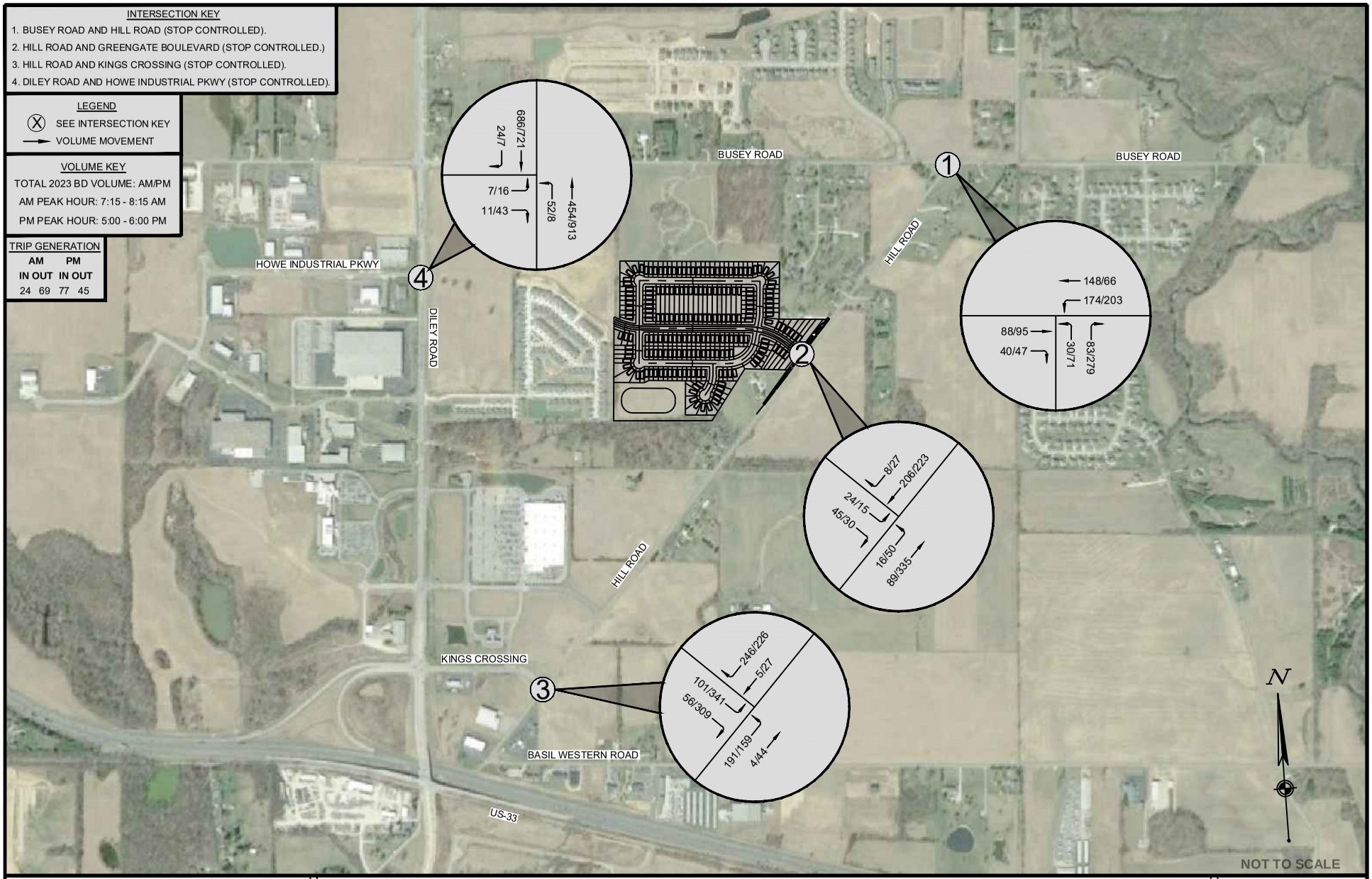

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2023 BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 12	
DATE:	05/08/2020
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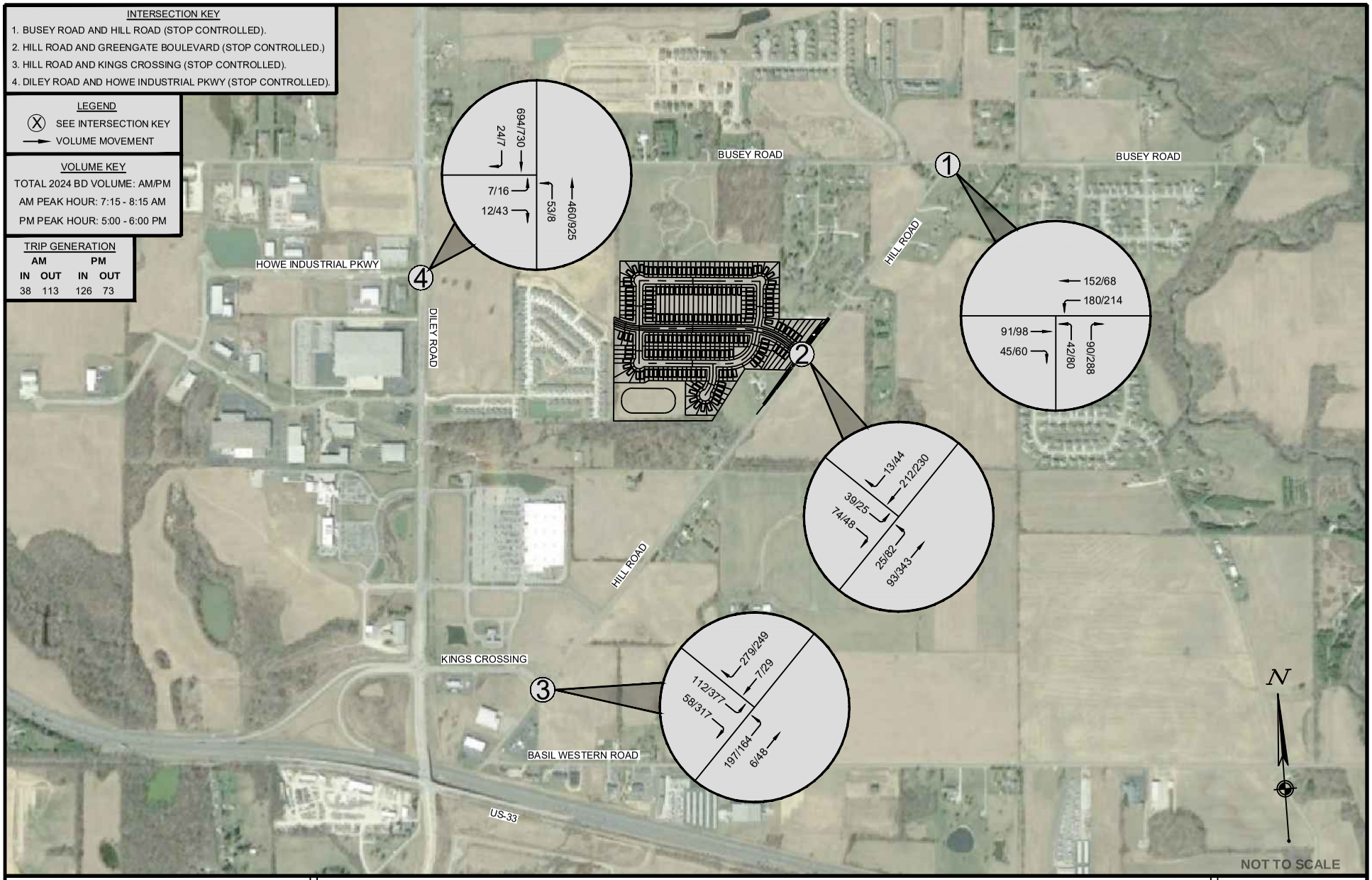

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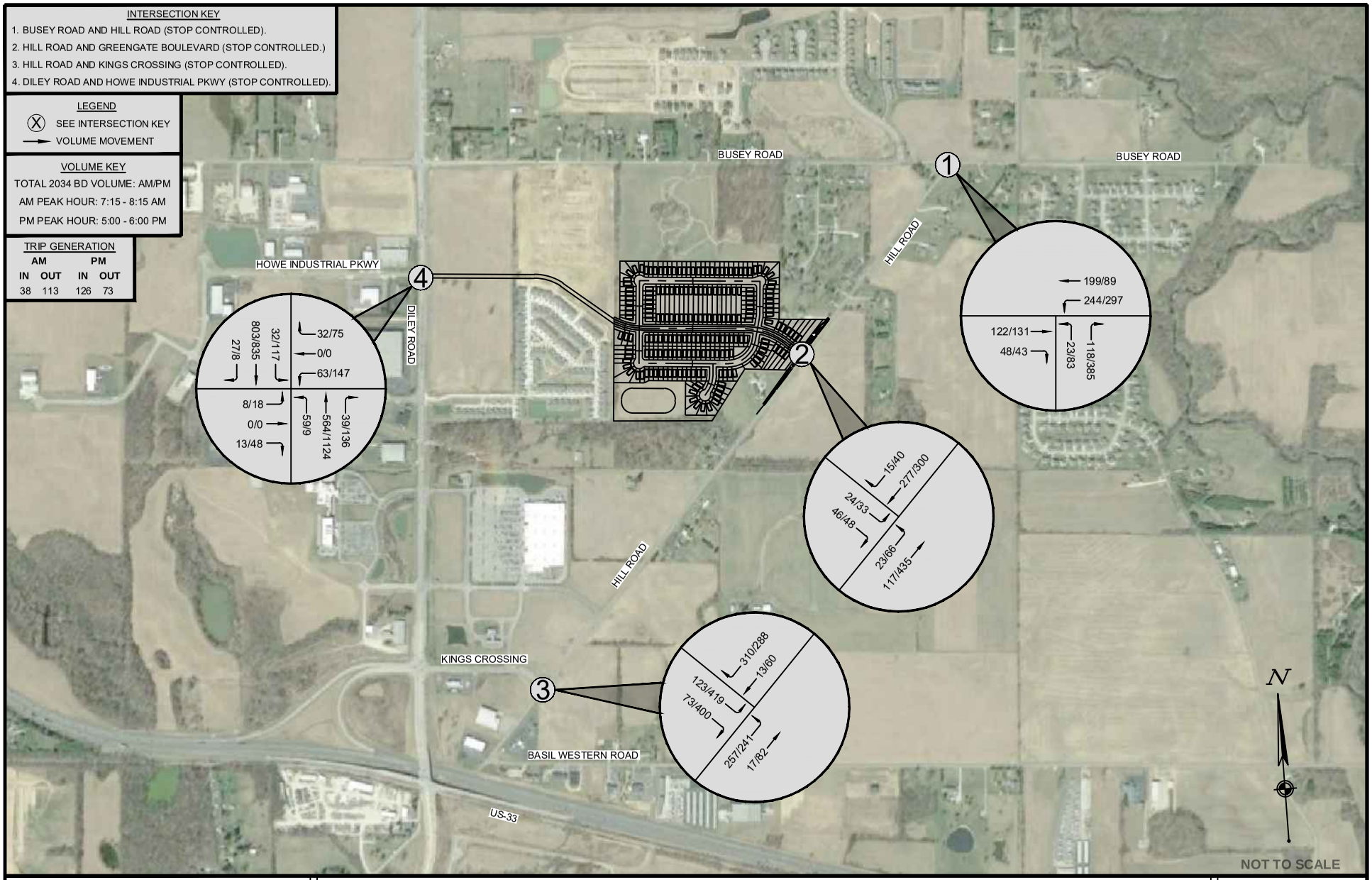
2024 BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 13

DATE:	05/08/2020
JOB NO.:	757010-01
DESIGN:	TMC
DRAWN:	TMC
CHECKED:	REM
PAGE	42



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2034 BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 15	
DATE:	05/08/2020
JOB NO.:	757010-01
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PAGE	43

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)	Control Type	Method/Chart Used	Warranted (am/pm)
2022 No-Build Traffic Scenario						
Hill Road and Kings Crossing	WBR	198/215	197/190	Signalized	Capacity	**No/No**
	SBR	139/588	55/301	Signalized	Capacity	**No/No**
2022 Build Traffic Scenario						
Hill Road and Greengate Boulevard	WBR	202/230	4/15	Free Flow	401-6b	**No/No**
Hill Road and Kings Crossing	WBR	222/231	219/205	Signalized	Capacity	**No/No**
	SBR	147/613	55/301	Signalized	Capacity	**No/No**
2023 No-Build Traffic Scenario						
Hill Road and Kings Crossing	WBR	206/223	205/198	Signalized	Capacity	**No/No**
	SBR	142/604	56/309	Signalized	Capacity	**No/No**
2023 Build Traffic Scenario						
Hill Road and Greengate Boulevard	WBR	214/250	8/27	Free Flow	401-6b	**No/No**
Hill Road and Kings Crossing	WBR	251/253	246/226	Signalized	Capacity	**No/No**
	SBR	157/650	56/309	Signalized	Capacity	**No/No**
2024 No-Build Traffic Scenario						
Hill Road and Kings Crossing	WBR	212/230	211/204	Signalized	Capacity	**No/No**
	SBR	147/619	58/317	Signalized	Capacity	**No/No**
2024 Build Traffic Scenario						
Hill Road and Greengate Boulevard	WBR	225/274	13/44	Free Flow	401-6b	**No/No**
Hill Road and Kings Crossing	WBR	286/278	279/249	Signalized	Capacity	**No/No**
	SBR	170/694	58/317	Signalized	Capacity	**No/No**
2034 No-Build Traffic Scenario						
Hill Road and Greengate Boulevard	WBR	286/321	9/21	Free Flow	401-6b	**No/No**
Hill Road and Kings Crossing	WBR	284/322	276/266	Signalized	Capacity	**No/No**
	SBR	185/781	73/400	Signalized	Capacity	**No/Yes**
Diley Road & Howe Industrial Parkway/Greengate Boulevard	EBR	21/66	13/48	Signalized	Capacity	**No/No**
	WBR	38/186	9/61	Signalized	Capacity	**No/No**
	NBR	651/1231	28/98	Signalized	Capacity	**No/No**
	SBR	854/935	27/8	Signalized	Capacity	**No/No**
2034 Build Traffic Scenario						
Hill Road and Greengate Boulevard	WBR	292/340	15/40	Free Flow	401-6b	**No/No**
Hill Road and Kings Crossing	WBR	323/348	310/288	Signalized	Capacity	**No/No**
	SBR	196/819	73/400	Signalized	Capacity	**No/Yes**
Diley Road & Howe Industrial Parkway/Greengate Boulevard	EBR	21/66	13/48	Signalized	Capacity	**No/No**
	WBR	95/222	32/75	Signalized	Capacity	**No/No**
	NBR	662/1269	39/136	Signalized	Capacity	**No/No**
	SBR	862/960	27/8	Signalized	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. Table 8 shows the SBLR movement operating at a LOS "F" – 61.8 during the 2034 No-Build PM Peak Hour, which warrants a right-turn lane on Kings Crossing.

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	Control Type	Method/ Chart Used	Warranted (am/pm)
2022 No-Build Traffic Scenario								
Hill Road and Busey Road	NBL	87/326	309/253	13/59	15%/18%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	188/193	198/215	185/154	98%/80%	Signalized	Capacity	**No/No**
	SBL	139/588	--	84/287	60%/49%	Signalized	Capacity	**No/No**
2022 Build Traffic Scenario								
Hill Road and Busey Road	NBL	100/334	310/257	22/65	22%/19%	Free Flow	401-5b	**No/Yes**
Hill Road and Greengate Boulevard	EBL	96/353	202/230	9/27	9%/8%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	189/195	222/231	185/154	98%/79%	Signalized	Capacity	**No/No**
	SBL	147/613	--	92/312	63%/51%	Signalized	Capacity	**No/No**
2023 No-Build Traffic Scenario								
Hill Road and Busey Road	NBL	89/335	320/262	13/60	15%/18%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	194/199	206/223	191/159	98%/80%	Signalized	Capacity	**No/No**
	SBL	142/604	--	86/295	61%/49%	Signalized	Capacity	**No/No**
2023 Build Traffic Scenario								
Hill Road and Busey Road	NBL	113/350	322/269	30/71	27%/20%	Free Flow	401-5b	**No/Yes**
Hill Road and Greengate Boulevard	EBL	105/385	214/250	16/50	15%/13%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	195/203	251/253	191/159	98%/78%	Signalized	Capacity	**No/No**
	SBL	157/650	--	101/341	64%/52%	Signalized	Capacity	**No/No**
2024 No-Build Traffic Scenario								
Hill Road and Busey Road	NBL	93/343	329/270	14/62	15%/18%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	201/205	212/230	197/164	98%/80%	Signalized	Capacity	**No/No**
	SBL	147/619	--	89/302	61%/49%	Signalized	Capacity	**No/No**
2024 Build Traffic Scenario								
Hill Road and Busey Road	NBL	132/368	332/282	42/80	32%/22%	Free Flow	401-5b	**No/Yes**
Hill Road and Greengate Boulevard	EBL	118/425	225/274	25/82	21%/19%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	203/212	286/278	197/164	97%/77%	Signalized	Capacity	**No/No**
	SBL	170/694	--	112/377	66%/54%	Signalized	Capacity	**No/No**
2034 No-Build Traffic Scenario								
Hill Road and Busey Road	NBL	124/457	439/373	17/79	14%/17%	Free Flow	401-5b	**No/Yes**
Hill Road and Greengate Boulevard	EBL	127/457	286/321	10/22	5%/8%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	272/317	284/322	257/241	94%/76%	Signalized	Capacity	**No/No**
	SBL	185/781	--	112/381	61%/49%	Signalized	Capacity	**No/Yes**
Diley Road and Howe/Greengate	WBL	38/186	21/66	29/125	76%/67%	Signalized	Capacity	**No/No**
2034 Build Traffic Scenario								
Hill Road and Busey Road	NBL	141/468	443/386	23/83	17%/16%	Free Flow	401-5b	**No/Yes**
Hill Road and Greengate Boulevard	EBL	140/501	292/340	23/66	16%/13%	Free Flow	401-5b	**No/Yes**
Hill Road and Kings Crossing	EBL	274/323	323/348	257/241	94%/75%	Signalized	Capacity	**No/No**
	SBL	196/816	--	123/416	63%/51%	Signalized	Capacity	**No/Yes**
Diley Road and Howe/Greengate	WBL	95/222	21/66	63/147	66%/66%	Signalized	Capacity	**No/No**

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. Table 8 shows the SBLR movement operating at a LOS "F" – 61.8 during the 2034 No-Build PM Peak Hour, which warrants a left-turn lane on Kings Crossing.

Note: Although a NB left-turn lane is warranted at the Hill Road and Busey Road intersection, Fairfield County has no plans to install the improvement. Therefore, the turn lane was not shown in the analysis and is not recommended.

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	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			
2022 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	9	1	60	0.2	45	50	--	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 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	16	1	60	0.3	45	50	--	175	175	--	175	No
	SBL	(50')	24	1	60	0.4	30	50	100	--	--	--	100	No
	SBR	--	45	1	60	0.8	30	50	--	--	--	50	--	--
2024 Build Traffic Scenario														
Hill Road & Greengate Blvd	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
	SBR	--	74	1	60	1.2	30	50	--	--	--	50	--	--
2034 No-Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	10	1	60	0.2	45	50	--	175	--	--	175	No
	SBL	(50')	7	1	60	0.1	30	50	100	--	--	--	100	No
	SBR	--	7	1	60	0.1	30	50	--	--	--	50	--	--
Hill Road & Kings Crossing	SBL	(250')	112	1	40	2.8	40	150	--	125	265	--	265	Yes
	SBR	--	73	1	40	1.8	40	100	--	--	--	100	--	--
Diley Road & Howe/Greengate	EBL	100'	8	1	36	0.2	30	50	100	--	--	--	100	No
	EBTR	--	13	1	36	0.4	30	50	--	--	--	50	--	--
	WBL	(175')	29	1	36	0.8	30	50	100	--	--	--	100	No
	WBTR	--	9	1	36	0.3	30	50	--	--	--	50	--	--
	NBL	110' (195')	59	1	36	1.6	50	100	--	225	245	--	375	Yes
	NBTR	--	592	2	36	8.2	50	325	--	--	--	325	--	--
	SBL	(450')	24	1	36	0.7	50	50	--	225	195	--	500	No
	SBTR	--	830	2	36	11.5	50	450	--	--	--	450	--	--

* 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 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	23	1	60	0.4	45	50	--	175	175	--	175	No
	SBL	(50')	24	1	60	0.4	30	50	100	--	--	--	100	No
	SBR	--	46	1	60	0.8	30	50	--	--	--	50	--	--
Hill Road & Kings Crossing	SBL	(250')	123	1	40	3.1	40	150	--	125	265	--	265	Yes
	SBR	--	73	1	40	1.8	40	100	--	--	--	100	--	--
Diley Road & Howe/Greengate	EBL	100'	8	1	36	0.2	30	50	100	--	--	--	100	No
	EBTR	--	13	1	36	0.4	30	50	--	--	--	50	--	--
	WBL	(175')	63	1	36	1.8	30	100	150	--	--	--	150	No
	WBTR	--	32	1	36	0.9	30	50	--	--	--	50	--	--
	NBL	110' (195')	59	1	36	1.6	50	100	--	225	245	--	375	Yes
	NBTR	--	603	2	36	8.4	50	325	--	--	--	325	--	--
	SBL	(450')	32	1	36	0.9	50	50	--	225	195	--	500	No
	SBTR	--	830	2	36	11.5	50	450	--	--	--	450	--	--

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

Table 12
Queue Length Analysis - Year 2022-2034 (PM 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			
2022 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	27	1	60	0.5	45	50	--	175	175	--	175	No
	SBL	(50')	8	1	60	0.1	30	50	100	--	--	--	100	No
	SBR	--	16	1	60	0.3	30	50	--	--	--	50	--	--
2023 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	50	1	60	0.8	45	50	--	175	175	--	175	No
	SBL	(50')	15	1	60	0.3	30	50	100	--	--	--	100	No
	SBR	--	30	1	60	0.5	30	50	--	--	--	50	--	--
2024 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	82	1	60	1.4	45	50	--	175	175	--	175	No
	SBL	(50')	25	1	60	0.4	30	50	100	--	--	--	100	No
	SBR	--	48	1	60	0.8	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	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 & Greengate Blvd	EBL	(125')	22	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	--	--
Hill Road & Kings Crossing	SBL	(250')	381	1	40	9.5	40	375	--	125	490	--	490	Yes
	SBR	--	400	1	40	10.0	40	375	--	--	--	375	--	--
Diley Road & Howe/Greengate	EBL	100'	18	1	36	0.5	30	50	100	--	--	--	100	No
	EBTR	--	48	1	36	1.3	30	50	--	--	--	50	--	--
	WBL	(175')	125	1	36	3.5	30	175	225	--	--	--	225	No
	WBTR	--	61	1	36	1.7	30	100	--	--	--	100	--	--
	NBL	110' (195')	9	1	36	0.3	50	50	--	225	195	--	650	Yes
	NBTR	--	1222	2	36	17.0	50	600	--	--	--	600	--	--
	SBL	(450')	92	1	36	2.6	50	150	--	225	295	--	500	No
	SBTR	--	843	2	36	11.7	50	450	--	--	--	450	--	--
2034 Build Traffic Scenario														
Hill Road & Greengate Blvd	EBL	(125')	66	1	60	1.1	45	50	--	175	175	--	175	No
	SBL	(50')	33	1	60	0.6	30	50	100	--	--	--	100	No
	SBR	--	48	1	60	0.8	30	50	--	--	--	50	--	--
Hill Road & Kings Crossing	SBL	(250')	419	1	40	10.5	40	400	--	125	515	--	515	Yes
	SBR	--	400	1	40	10.0	40	375	--	--	--	375	--	--
Diley Road & Howe/Greengate	EBL	100'	18	1	36	0.5	30	50	100	--	--	--	100	No
	EBTR	--	48	1	36	1.3	30	50	--	--	--	50	--	--
	WBL	(175')	147	1	36	4.1	30	175	225	--	--	--	225	No
	WBTR	--	75	1	36	2.1	30	100	--	--	--	100	--	--
	NBL	110' (195')	9	1	36	0.3	50	50	--	225	195	--	675	Yes
	NBT	--	1260	2	36	17.5	50	625	--	--	--	625	--	--
	SBL	(450')	117	1	36	3.3	50	150	--	225	295	--	500	No
	SBTR	--	843	2	36	11.7	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	No	**Yes**	No
2034 Build Traffic Scenario	2034	No	**Yes**	No

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. Greengate Development Impact

10.1. Greengate Development Impact

Per discussions with the City of Canal Winchester and Fairfield County, the percentage impact of the Greengate Development on the study intersections was calculated. Since the development will be constructed in phases, the impacts for the 2024 Build and 2034 Build Traffic Scenarios were calculated since they include the entire development fully constructed.

Note: The Hill Road and Greengate Boulevard intersection was not included since Cap 5 Development is responsible for the recommended improvements.

Table 17 presents the percentage impact under the 2024 Build Traffic Scenario.

Table 17
Greengate Development Impact – 2024 and 2034 Build

Intersection	Movement	Greengate Development Volume (am/pm)	Total Volume (am/pm)	% Impact (am/pm)
2024 Build Traffic Scenario				
Hill Road & Busey Road	Intersection Overall →	52/69	600/808	8.7%/8.5%
	EBT	0/0	91/98	0%/0%
	EBR	10/32	45/60	22.2%/53.3%
	WBL	3/12	180/214	1.7%/5.6%
	WBT	0/0	152/68	0%/0%
	NBL	28/18	42/80	66.7%/22.5%
	NBR	11/7	90/288	12.2%/2.4%
Hill Road & Kings Crossing	Intersection Overall →	99/130	659/1184	15.0%/11.0%
	EBL	0/0	197/164	0%/0%
	EBT	2/7	6/48	33.3%/14.6%
	WBT	6/3	7/29	85.7%/10.3%
	WBR	68/45	279/249	24.4%/18.1%
	SBL	23/75	112/377	20.5%/19.9%
	SBR	0/0	58/317	0%/0%
2034 Build Traffic Scenario				
Hill Road & Busey Road	Intersection Overall →	23/30	754/1028	3.1%/2.9%
	EBT	0/0	122/131	0%/0%
	EBR	2/6	48/43	4.2%/14.0%
	WBL	4/13	244/297	1.6%/4.4%
	WBT	0/0	199/89	0%/0%
	NBL	6/4	23/83	26.1%/4.8%
	NBR	11/7	118/385	9.3%/1.8%

Table 17 (Continued)
Greengate Development Impact – 2024 and 2034 Build

Intersection	Movement	Greengate Development Volume (am/pm)	Total Volume (am/pm)	% Impact (am/pm)
2034 Build Traffic Scenario (Continued)				
Hill Road & Kings Crossing	Intersection Overall →	52/70	793/1490	6.6%/4.7%
	EBL	0/0	257/241	0%/0%
	EBT	2/6	17/82	11.8%/7.3%
	WBT	5/4	13/60	38.5%/6.7%
	WBR	34/22	310/288	11.0%/7.6%
	SBL	11/38	123/419	8.9%/9.1%
	SBR	0/0	73/400	0%/0%
Diley Road & Howe Industrial Parkway/Greengate Boulevard	Intersection Overall →	76/99	1640/2517	4.6%/3.9%
	EBL	0/0	8/18	0%/0%
	EBT	0/0	0/0	0%/0%
	EBR	0/0	13/48	0%/0%
	WBL	34/22	63/147	54.0%/15.0%
	WBT	0/0	0/0	0%/0%
	WBR	23/14	32/75	71.9%/18.7%
	NBL	0/0	59/9	0%/0%
	NBT	0/0	564/1124	0%/0%
	NBR	11/38	39/136	28.2%/27.9%
	SBL	8/25	32/117	25.0%/21.4%
	SBT	0/0	803/835	0%/0%
	SBR	0/0	27/8	0%/0%

11. Summary of Recommendations

11.1. 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-16.C.

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

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.
- 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:
Note: CESO recommends re-evaluating the need for a signal at this intersection once further development occurs along Diley Road. For the purpose of mitigating the poor levels of service in the analysis, a traffic signal and roadway improvements are recommended.

- Construct extension of Greengate Boulevard to connect with Diley Road. Provide one outbound left-turn lane, one outbound thru-right turn lane, and one inbound lane. Construct the WB to SB left-turn lane to provide 175 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 SB to EB left-turn lane to provide 450 feet of storage plus a 50-foot taper.
- Construct 3-phase traffic signal with a 100 second cycle length.

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

- No further improvements are required.

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RECOMMENDED IMPROVEMENTS AT INTERSECTION OF HILL ROAD AND GREENGATE BOULEVARD

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER FAIRFIELD COUNTY, OHIO

FIGURE 16.A

DATE:	05/08/2020
JOB NO.:	757010-01
DESIGN:	TMC
DRAWN:	TMC
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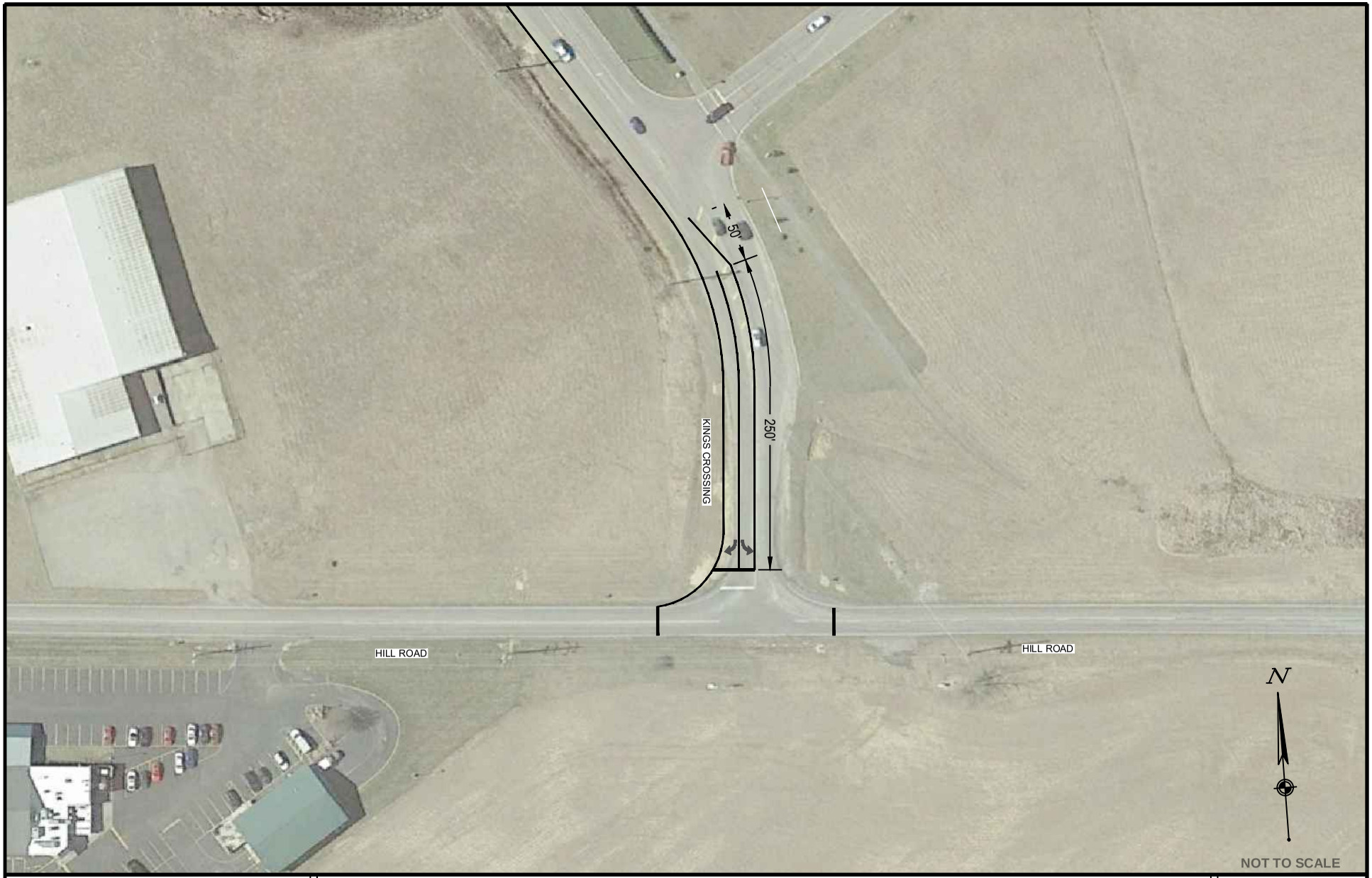
PAGE	60



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RECOMMENDED IMPROVEMENTS AT INTERSECTION OF HILL ROAD AND KINGS CROSSING

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 16.B

DATE:	05/08/2020
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DESIGN:	TMC
DRAWN:	TMC
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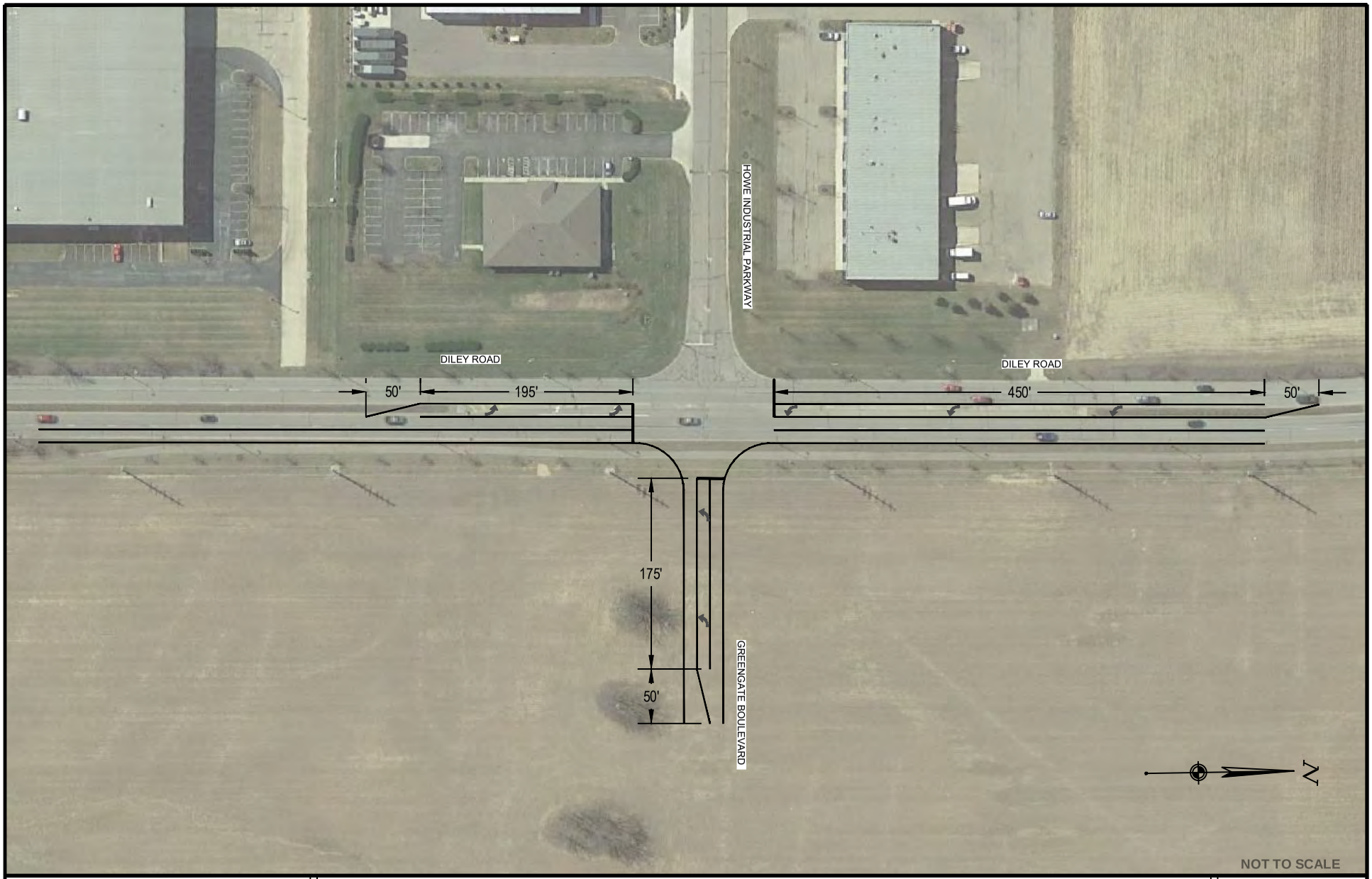
PAGE	61



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RECOMMENDED IMPROVEMENTS AT INTERSECTION OF DILEY ROAD & HOWE/GREENGATE

GREENGATE RESIDENTIAL DEVELOPMENT

CITY OF CANAL WINCHESTER — FAIRFIELD COUNTY, OHIO

FIGURE 16.C	
DATE:	05/08/2020
JOB NO.:	757010-01
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PAGE	62

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

3601 Rigby Road, Suite 300
Miamisburg, OH 45342
(937) 435-8584
www.cesoinc.com

CESO

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

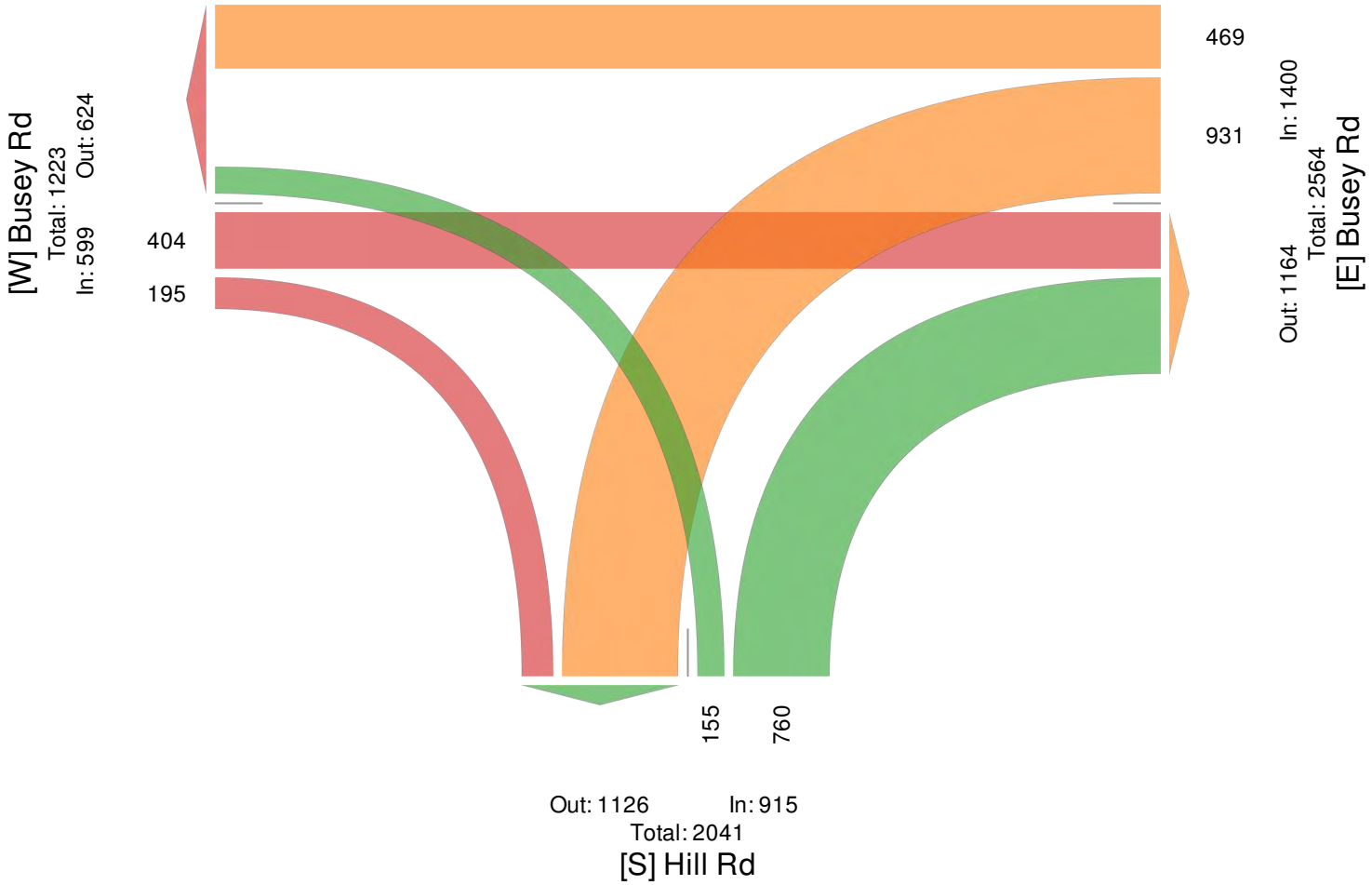
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Busey Rd Eastbound				Busey Rd Westbound				Hill Rd Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
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

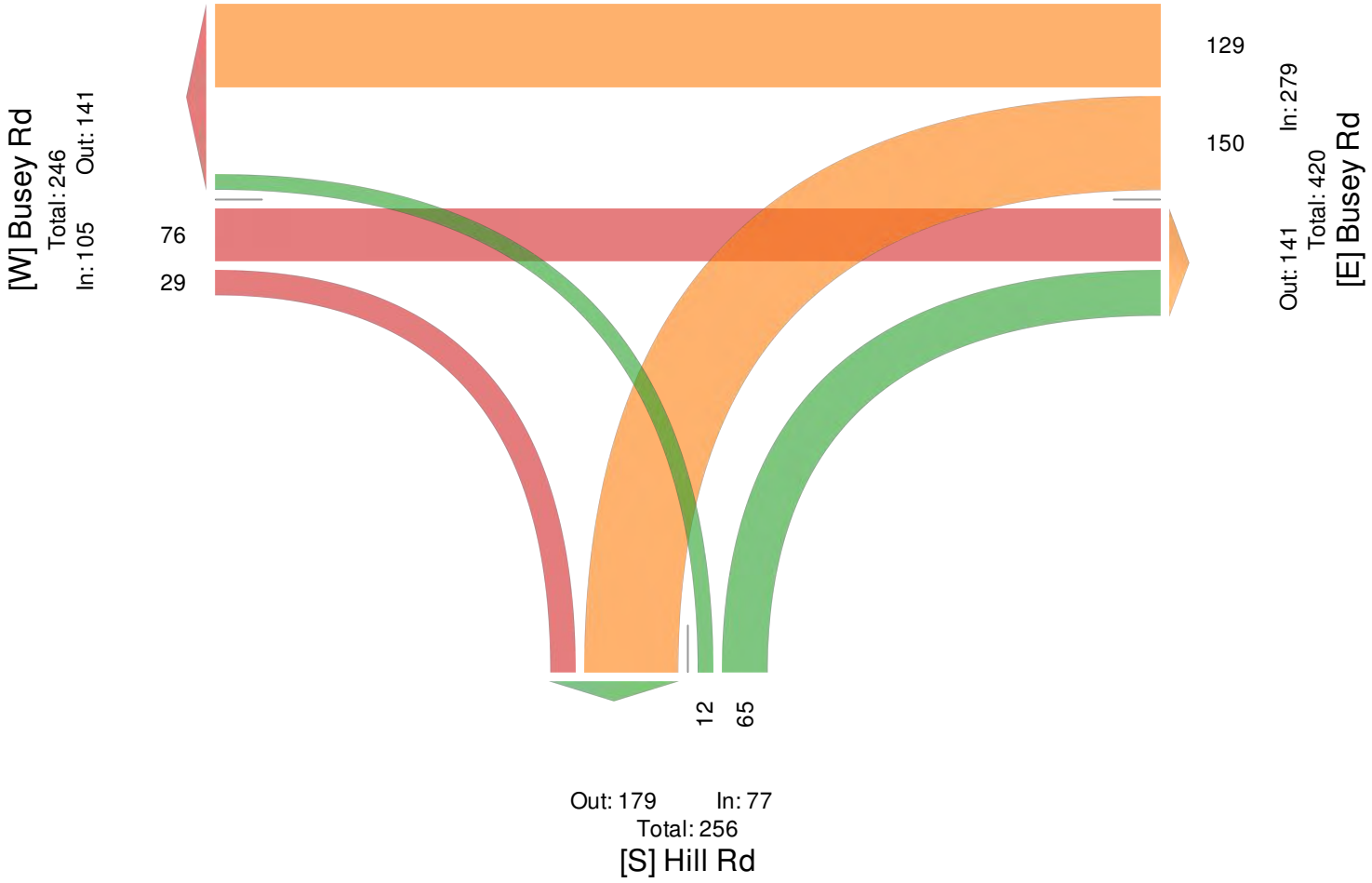
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Busey Rd Eastbound				Busey Rd Westbound				Hill Rd Northbound				
Time	T	R	U	**App**	L	T	U	**App**	L	R	U	**App**	**Int**
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

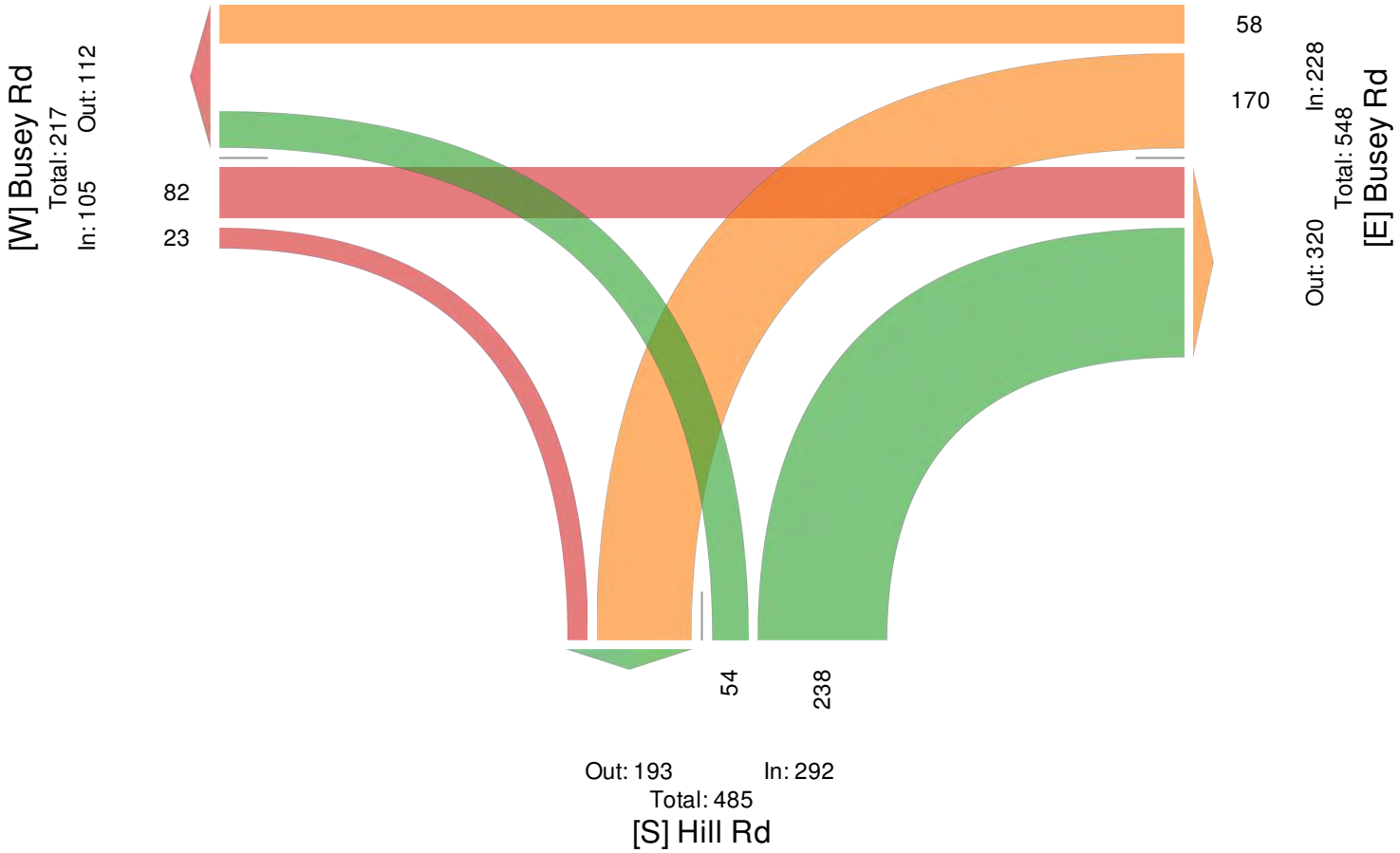
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Busey Rd Eastbound				Busey Rd Westbound				Hill Rd Northbound				
Time	T	R	U	**App**	L	T	U	**App**	L	R	U	**App**	**Int**
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: ,

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

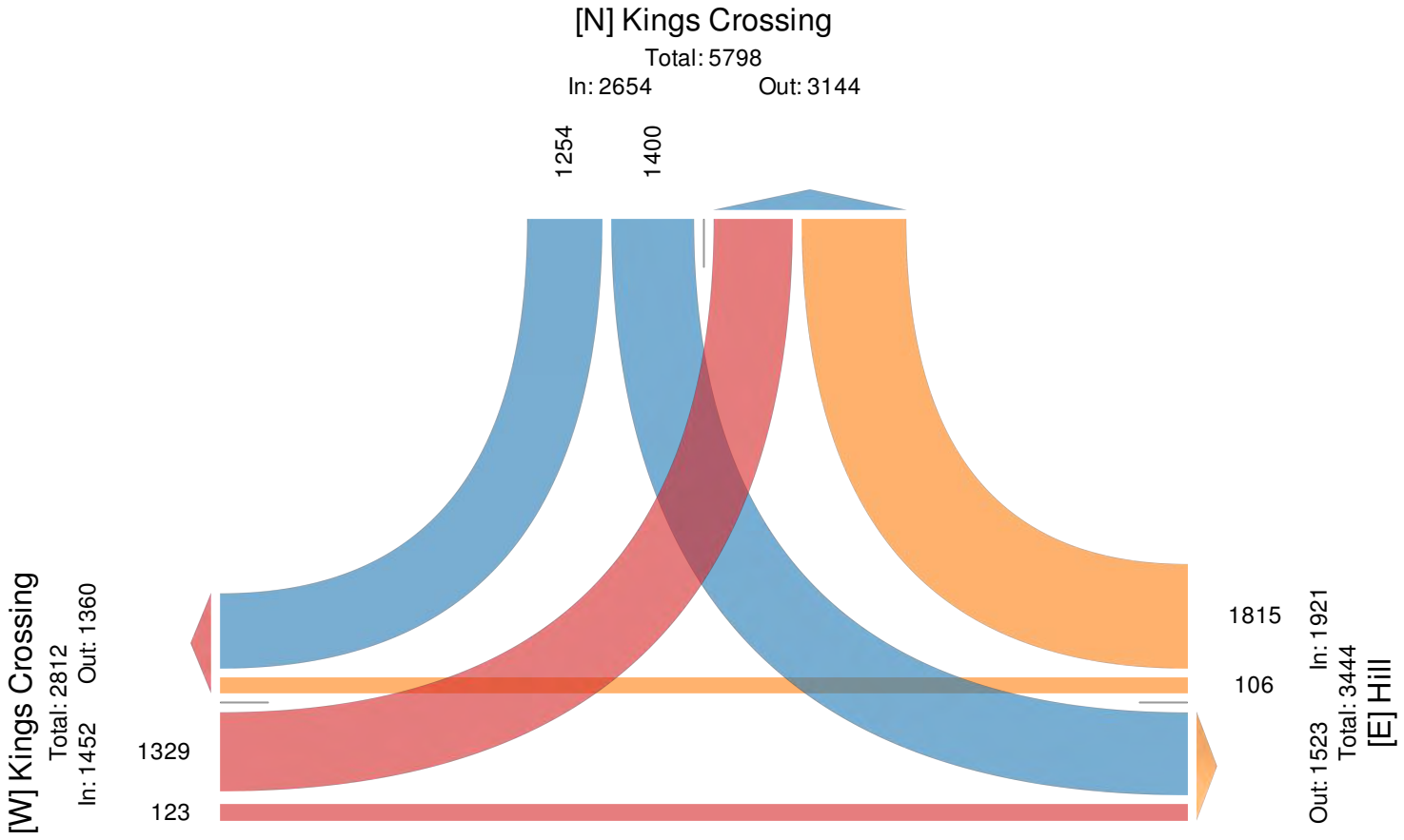
Leg Direction	Kings Crossing Eastbound				Hill Westbound				Kings Crossing Southbound				
Time	L	T	U	App	T	R	U	App	L	R	U	App	Int
2019-12-12 6:00AM	45	0	0	**45**	0	44	0	**44**	6	4	0	**10**	**99**
6:15AM	44	0	0	**44**	0	46	0	**46**	13	7	0	**20**	**110**
6:30AM	44	1	0	**45**	0	42	0	**42**	15	9	0	**24**	**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



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

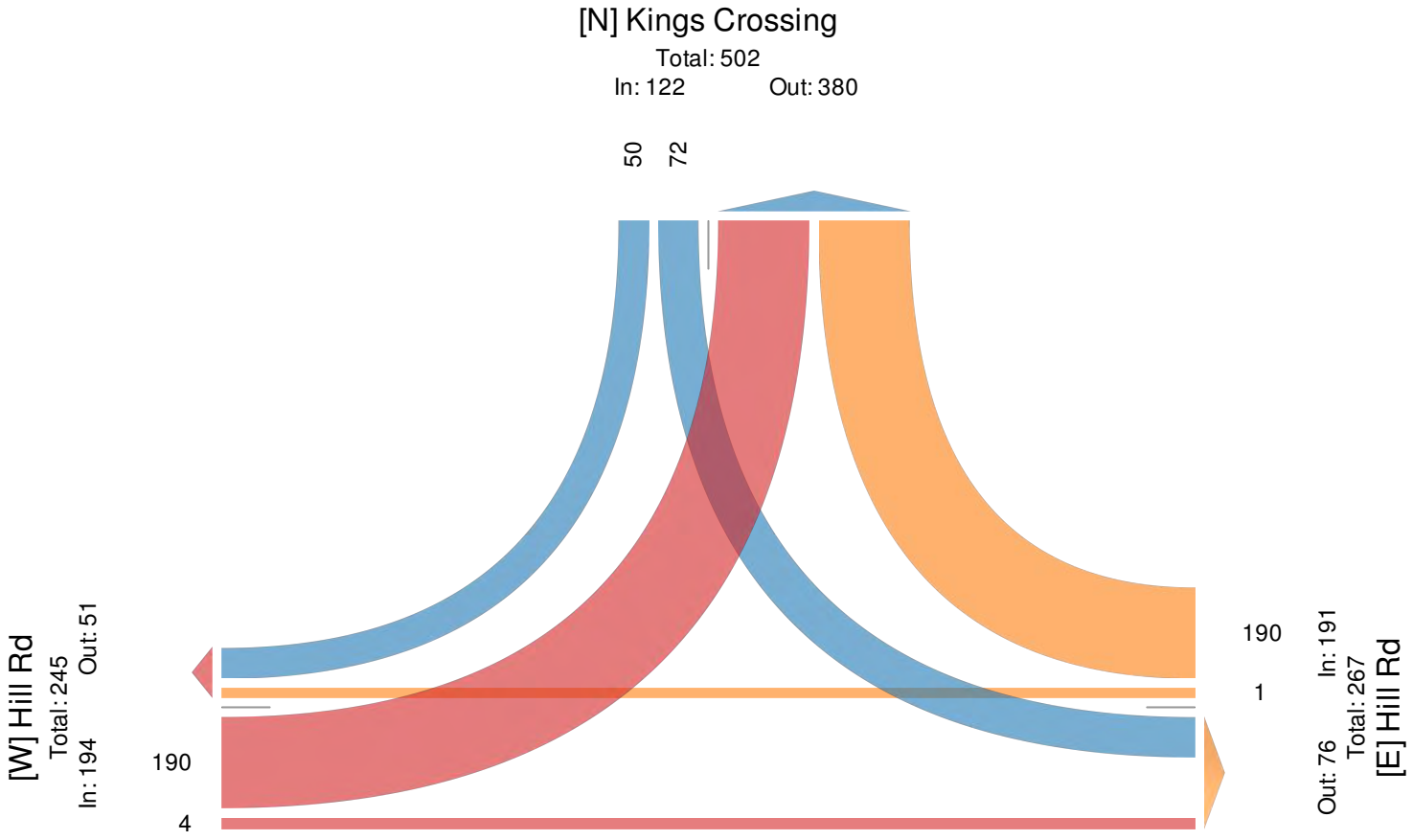
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hill Rd Eastbound				Hill Rd Westbound				Kings Crossing Southbound				
Time	L	T	U	**App**	T	R	U	**App**	L	R	U	**App**	**Int**
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



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

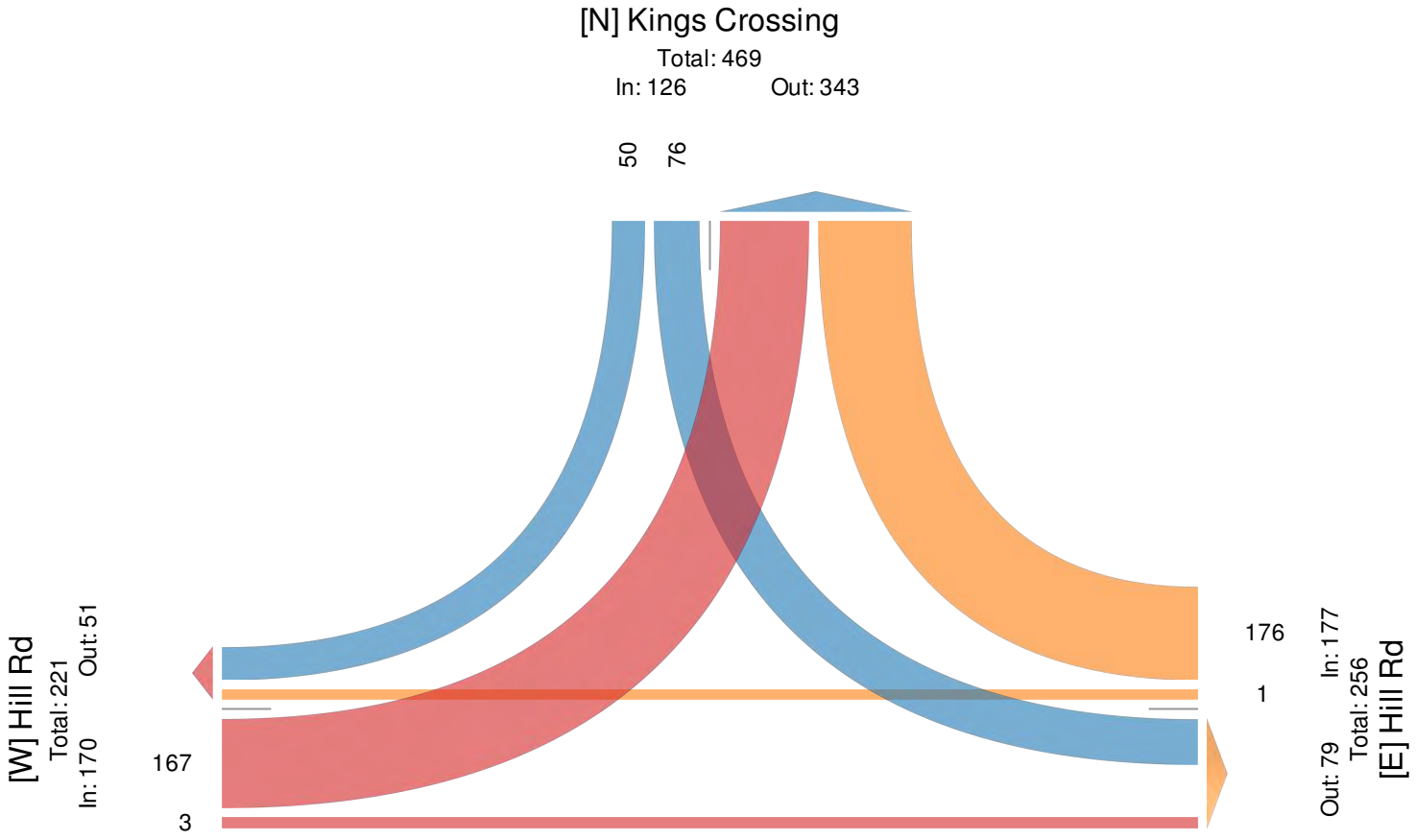
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hill Rd Eastbound				Hill Rd Westbound				Kings Crossing Southbound				
Time	L	T	U	**App**	T	R	U	**App**	L	R	U	**App**	**Int**
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



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

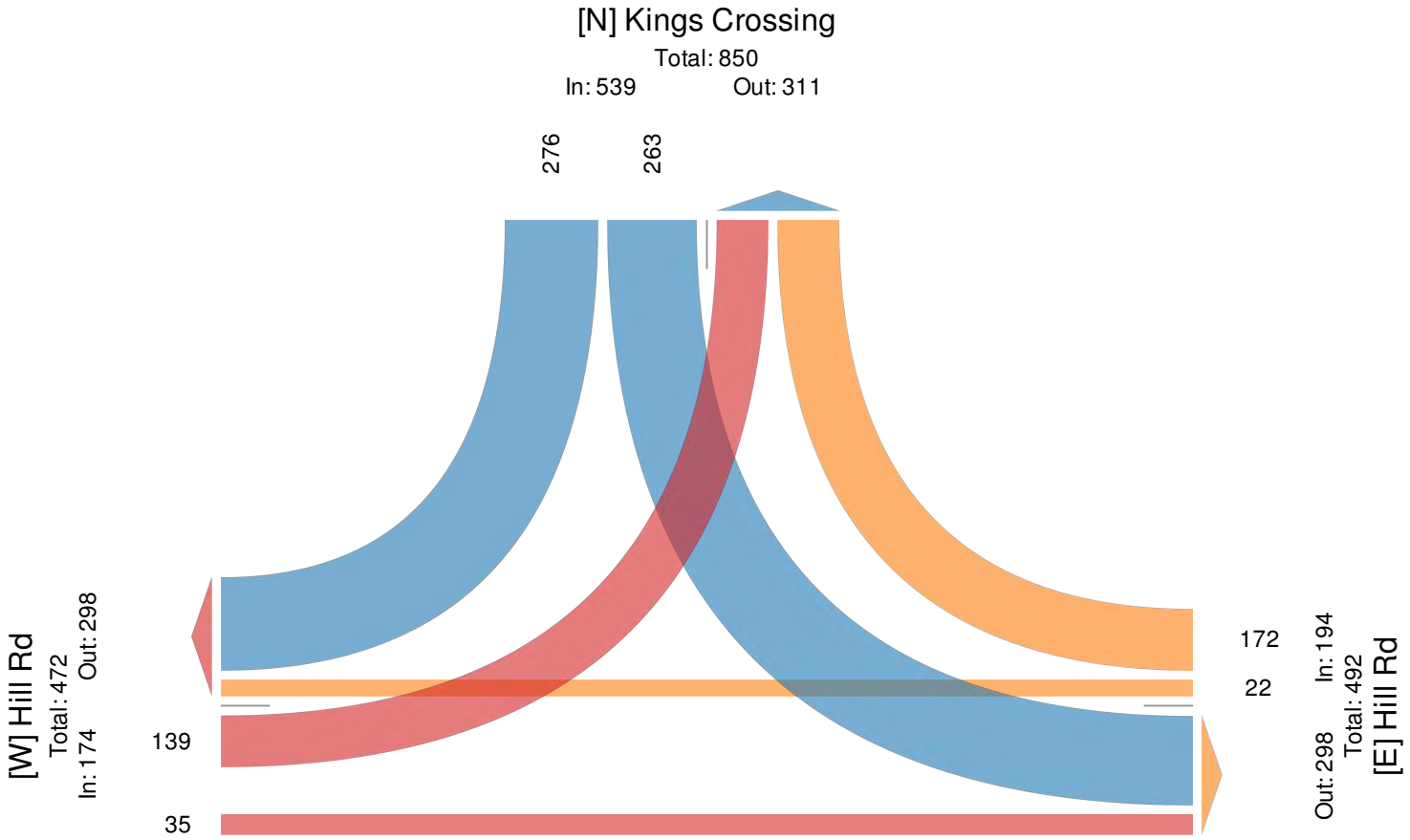
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hill Rd Eastbound				Hill Rd Westbound				Kings Crossing Southbound				
Time	L	T	U	**App**	T	R	U	**App**	L	R	U	**App**	**Int**
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



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: ,

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

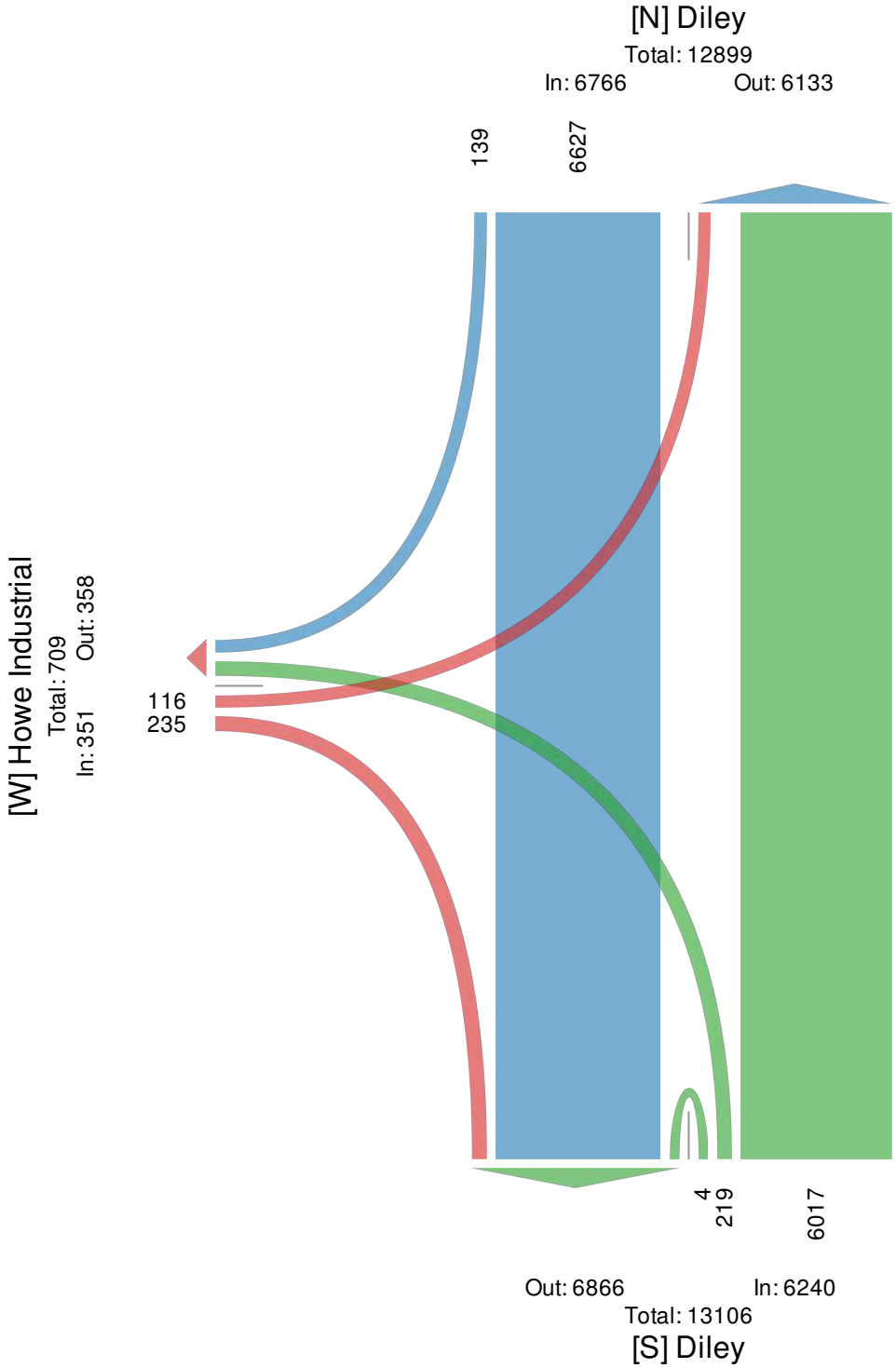
Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
2020-01-09 6:00AM	0	0	0	**0**	4	38	0	**42**	114	1	0	**115**	**157**
6:15AM	0	2	0	**2**	4	71	0	**75**	112	0	0	**112**	**189**
6:30AM	0	0	0	**0**	3	139	0	**142**	125	4	0	**129**	**271**
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

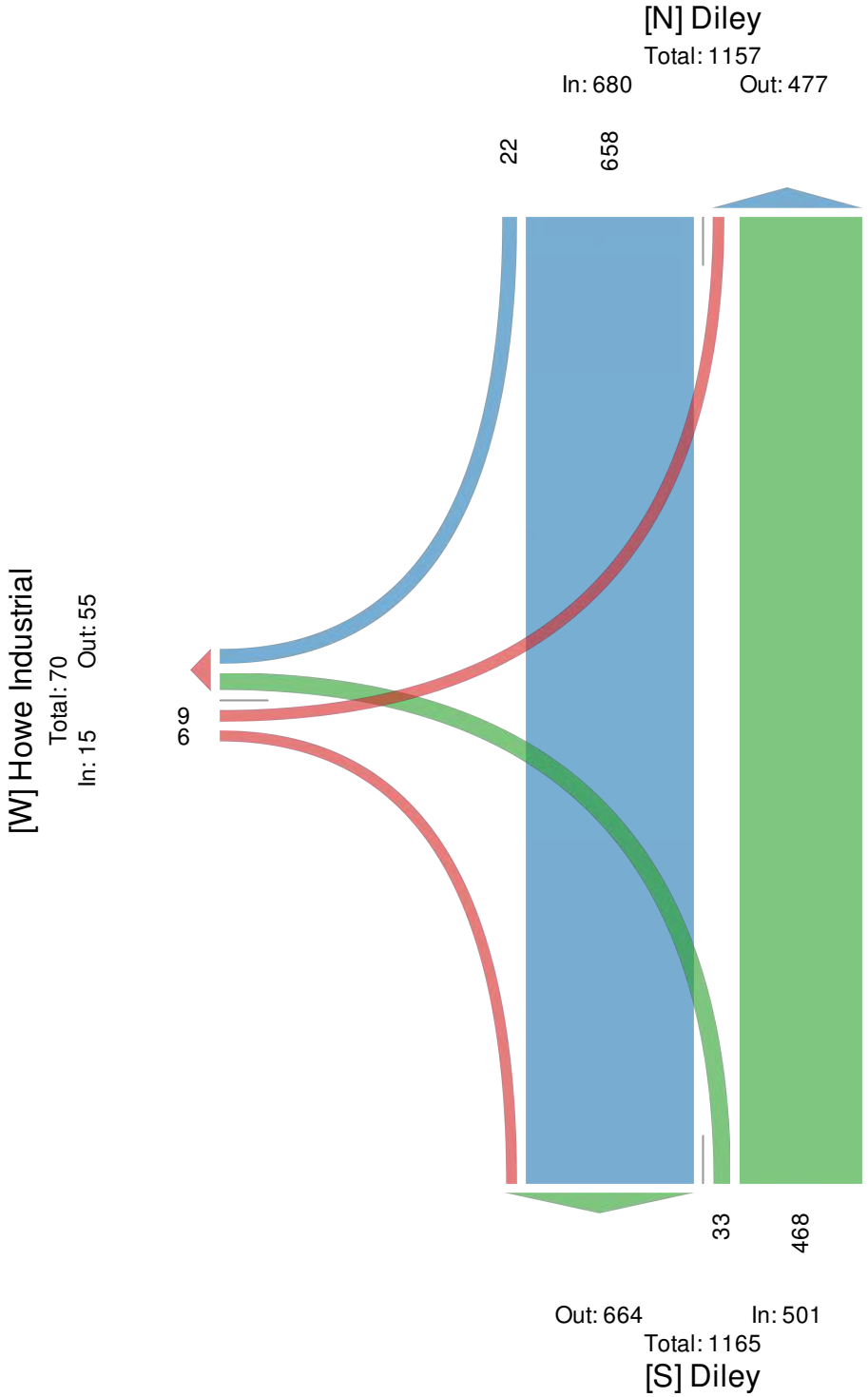
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Howe Industrial Eastbound				Diley Northbound				Diley Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
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

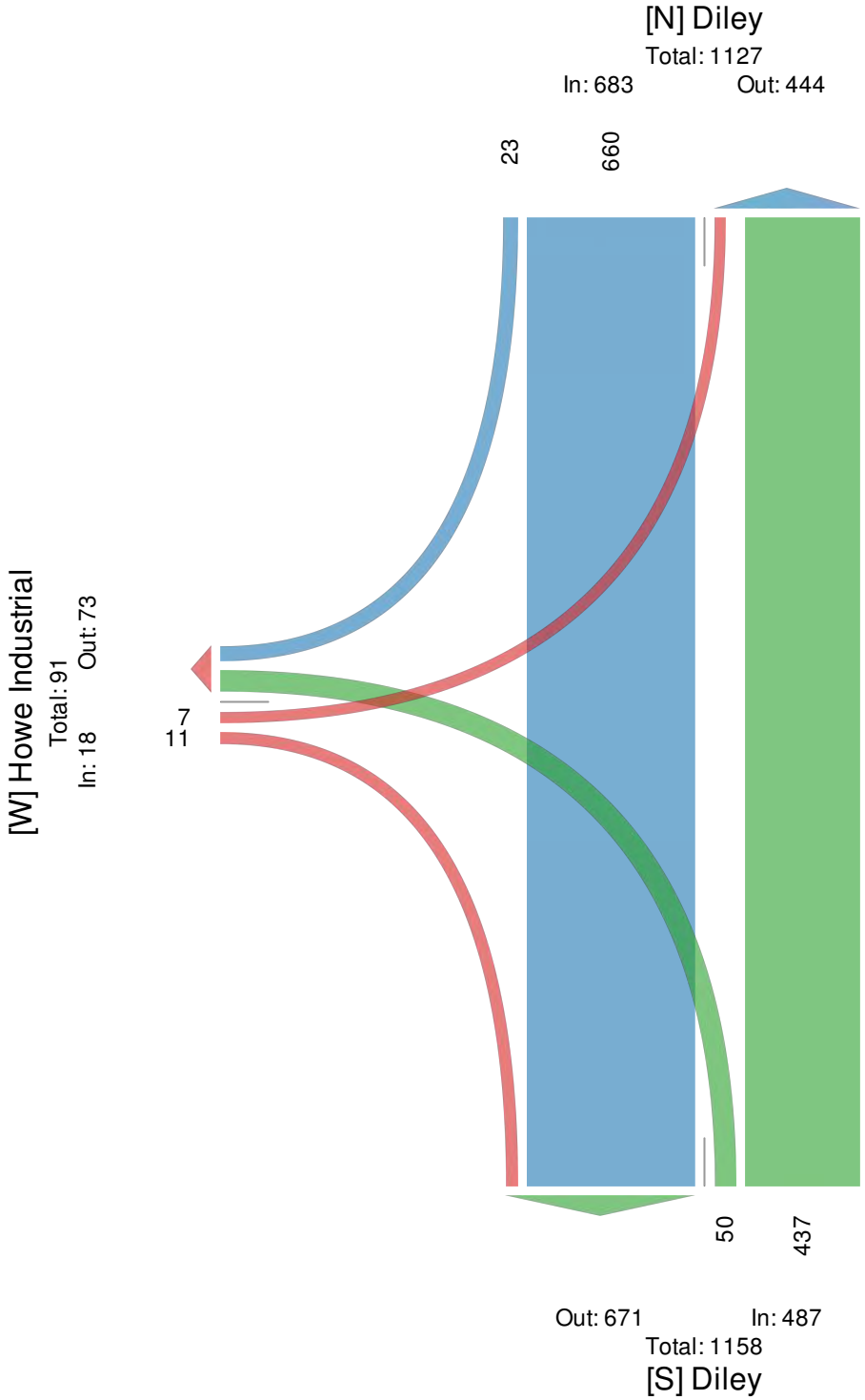
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

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 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

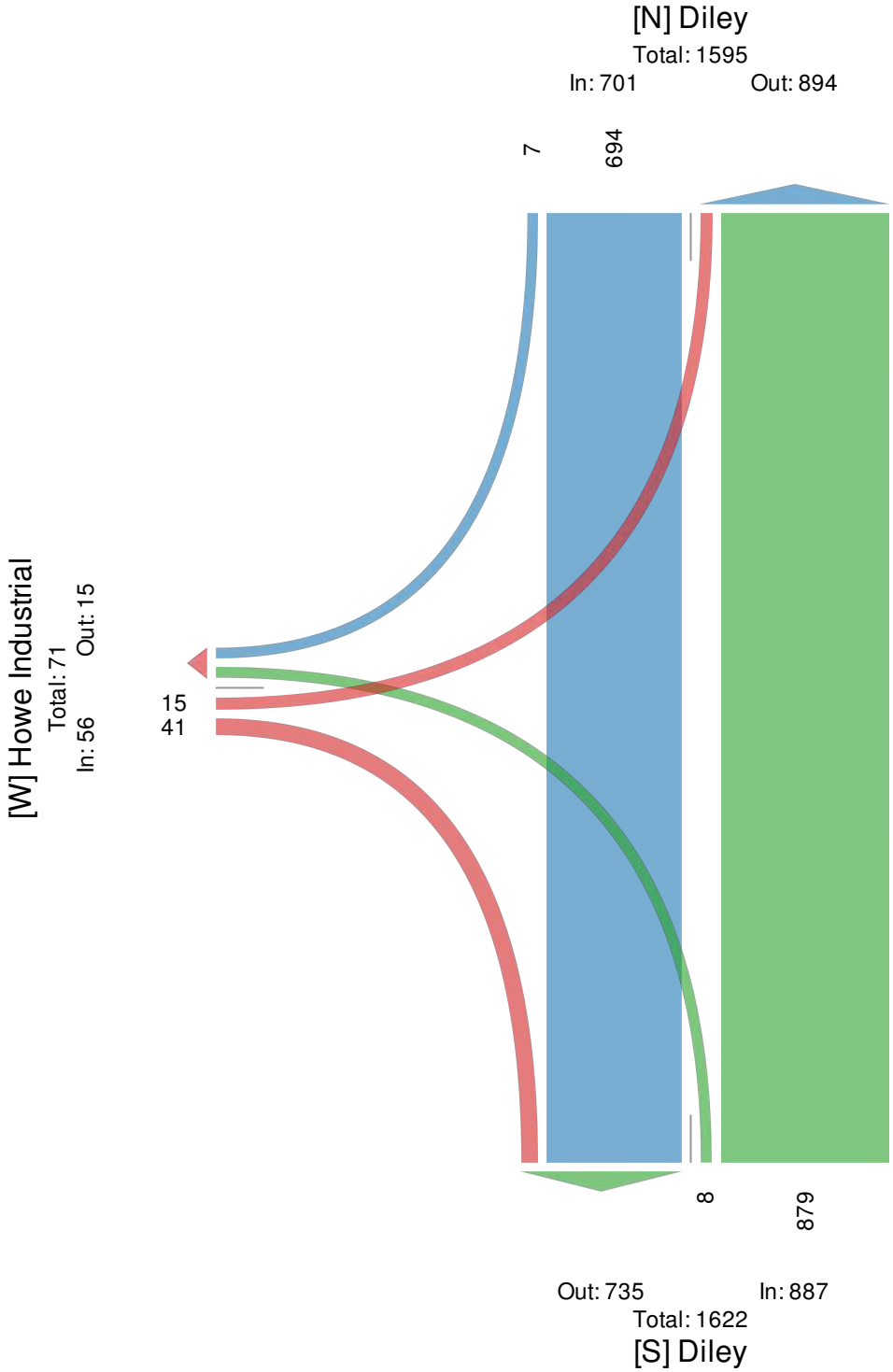
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

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



MORPC Growth Rates

From: Hwashik Jang <hjang@morpc.org>
Sent: Monday, February 10, 2020 4:15 PM
To: Taylor Cline <cline@cesoinc.com>
Cc: Robert Matko <matko@cesoinc.com>; Jon Buchanan <buchanan@cesoinc.com>; Zhuojun Jiang <zjiang@morpc.org>; Nick Gill <NGILL@morpc.org>
Subject: RE: Request for Traffic Growth Rate: Canal Winchester, Fairfield County, OH

Taylor,

We have completed processing growth rates for your study intersections.
Please use linear annual growth rates as summarized below.

Location	**Linear Annual Growth Rate**
Hill Rd n/o Kings Crossing	2.30%
Kings Crossing w/o Hill Rd	3.00%
Hill Rd s/o Kings Crossing	3.60%
Busey Rd e/o Hill Rd	3.60%
Busey Rd w/o Hill Rd	4.00%
Hill Rd s/o Busey Rd	3.00%

Note: The above rate was derived based on planning level analysis by using MORPC's regional travel demand model. These linear annual growth rates are provided as planning level ***background*** traffic growth on your traffic study area for you to calculate the desired growth rates by adding the proposed residential development in the proposed phases.

If you have any questions, please let me know.

Thanks,

HWASHIK JANG
Senior Planner | **Mid-Ohio Regional Planning Commission**
T: 614.233.4145 | hjang@morpc.org
111 Liberty Street, Suite 100 | Columbus, OH 43215

MID-OHIO REGIONAL
MORPC
PLANNING COMMISSION

APPENDIX C
EXISTING TRAFFIC SCENARIO CAPACITY ANALYSIS SUMMARY SHEETS

HCS7 Two-Way Stop-Control Report

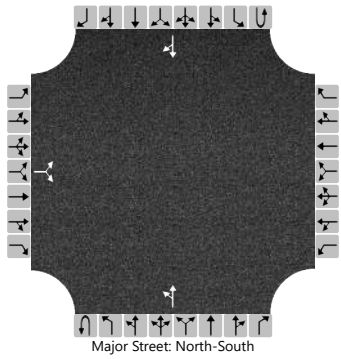
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2019
Time Analyzed	EXISTING AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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															

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HCS7 Two-Way Stop-Control Report

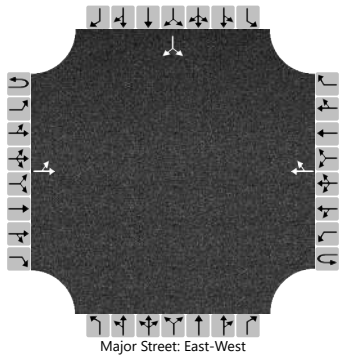
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2019
Time Analyzed	EXISTING AM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	KINGS CROSSING & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	KINGS CROSSING
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	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			

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HCS7 Two-Way Stop-Control Report

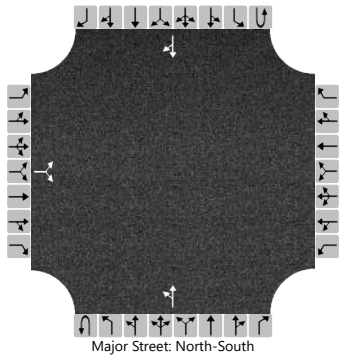
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2019
Time Analyzed	EXISTING PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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															

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HCS7 Two-Way Stop-Control Report

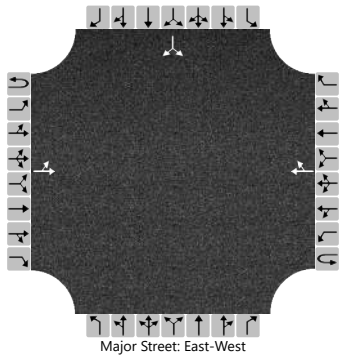
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2019
Time Analyzed	EXISTING PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	KINGS CROSSING & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	KINGS CROSSING
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	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)		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			

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

2022 NO-BUILD

HCS7 Two-Way Stop-Control Report

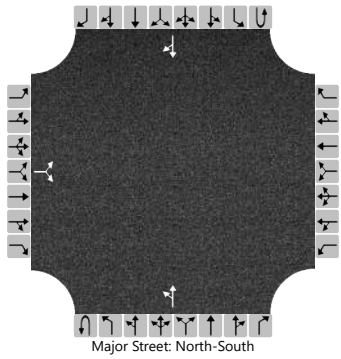
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	NO-BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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															

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HCS7 Two-Way Stop-Control Report

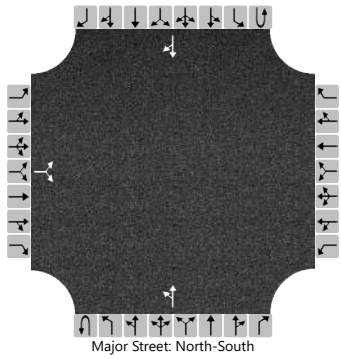
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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															

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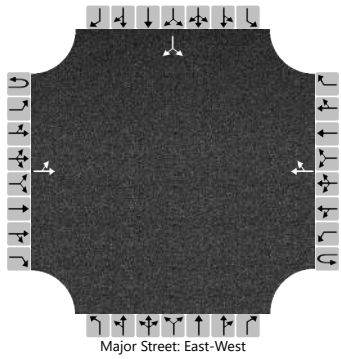
HCS7 Two-Way Stop-Control Report

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



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	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)		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			

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HCS7 Two-Way Stop-Control Report

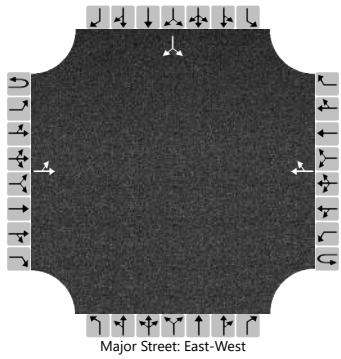
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	KINGS CROSSING & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	KINGS CROSSING
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	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)		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			

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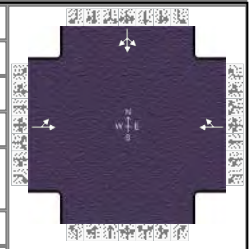
HCS7 Signalized Intersection Input Data

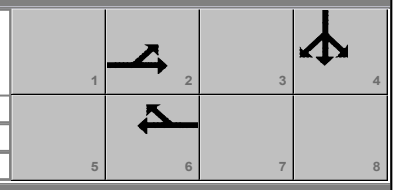
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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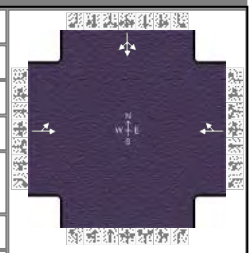
HCS7 Signalized Intersection Results Summary

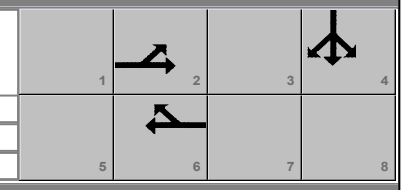
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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
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



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

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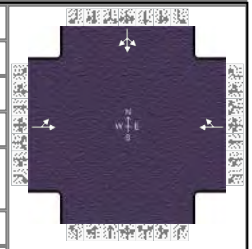
HCS7 Signalized Intersection Intermediate Values

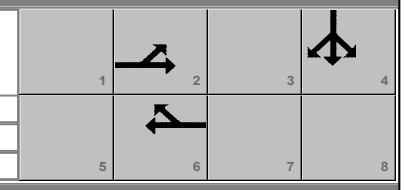
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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
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})	0.560	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				
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_f), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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

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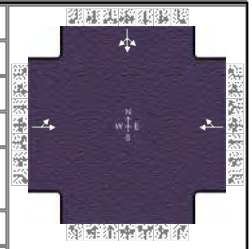
HCS7 Signalized Intersection Results Graphical Summary

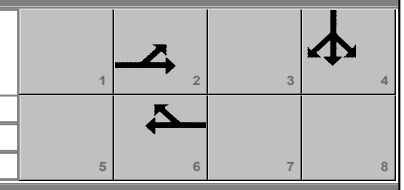
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD &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



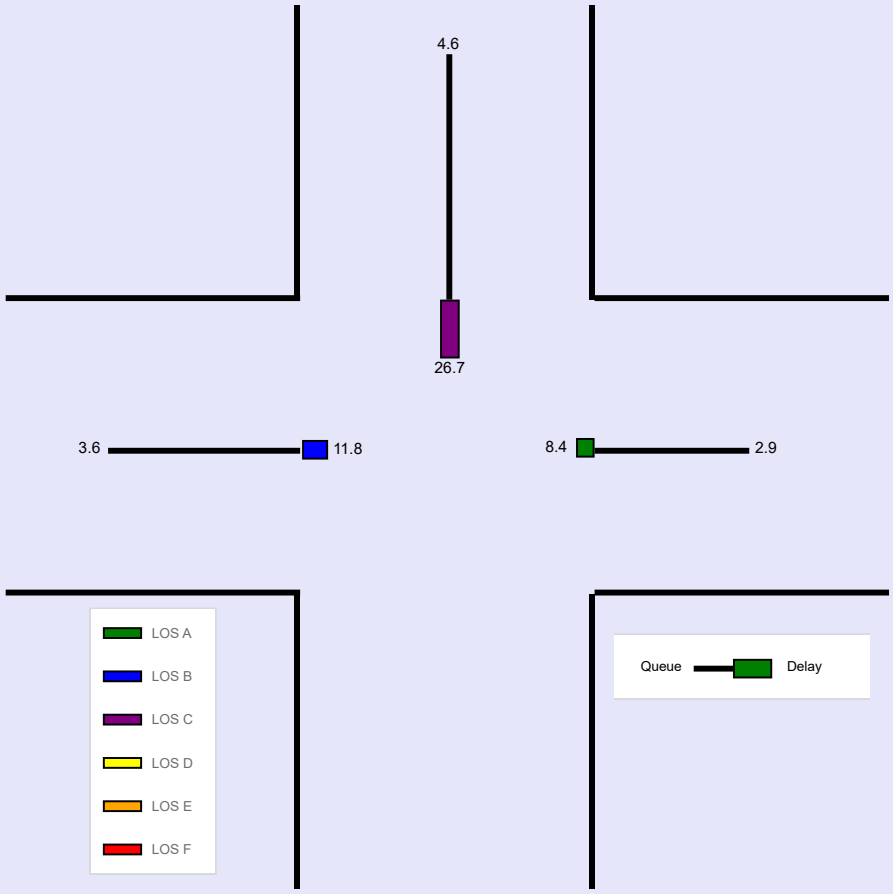
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	185	3			1	197				84	0	55

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
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)		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					



--- Messages ---

No errors or warnings exist.

--- Comments ---

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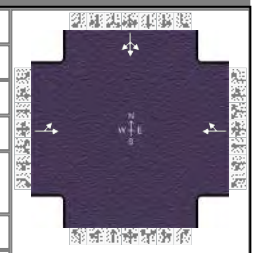
HCS7 Signalized Intersection Input Data

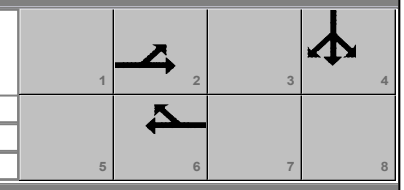
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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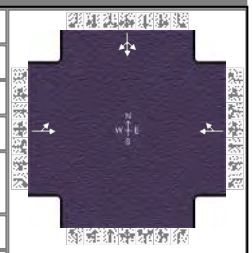
HCS7 Signalized Intersection Results Summary

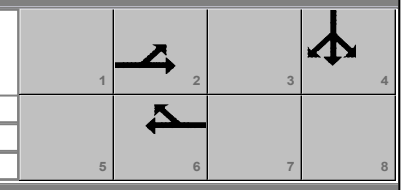
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD &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



Demand Information	EB			WB			NB			SB		
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



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		
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		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

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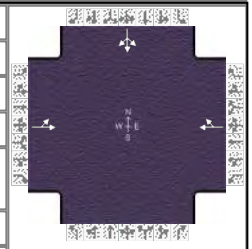
HCS7 Signalized Intersection Intermediate Values

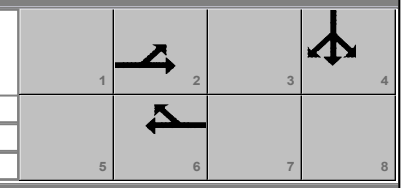
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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
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})	0.498	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_f), s		0.5		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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

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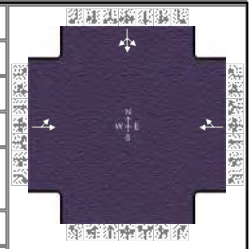
HCS7 Signalized Intersection Results Graphical Summary

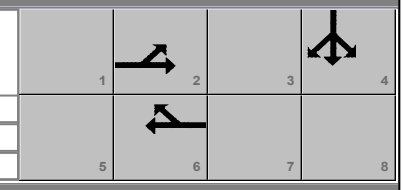
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD &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



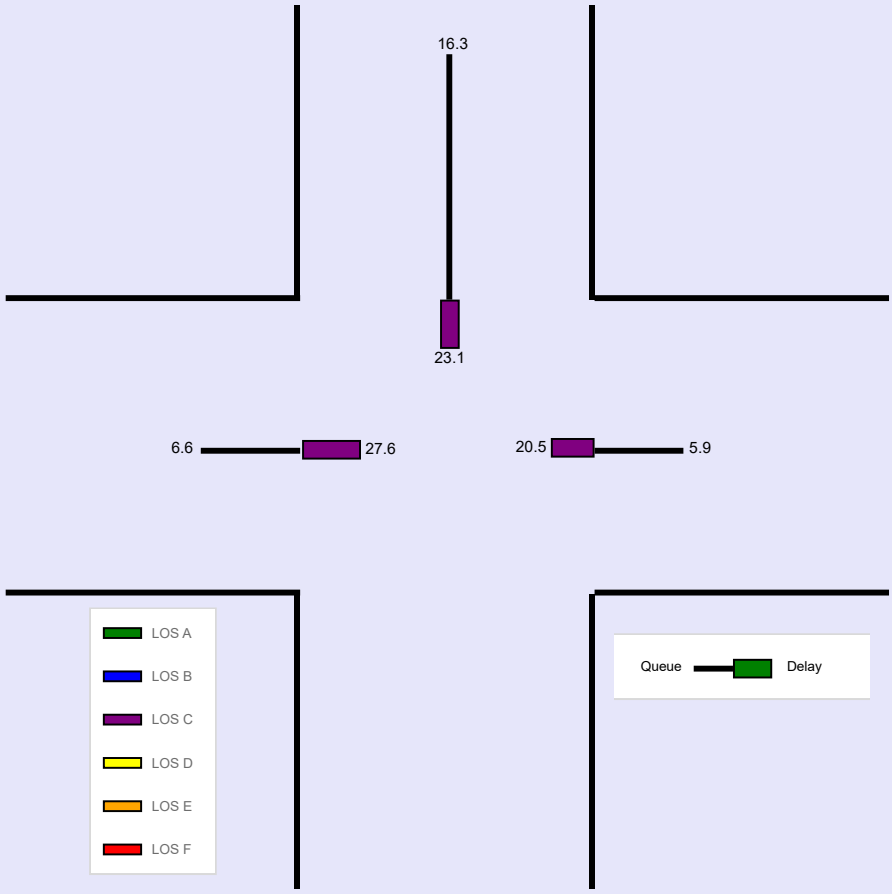
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	154	39			25	190				287	0	301

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					



--- Messages ---

No errors or warnings exist.

--- Comments ---

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2023 NO-BUILD

HCS7 Two-Way Stop-Control Report

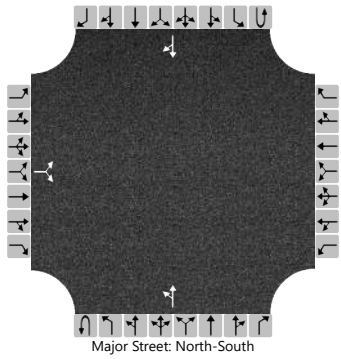
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2023
Time Analyzed	NO-BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			650							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															

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HCS7 Two-Way Stop-Control Report

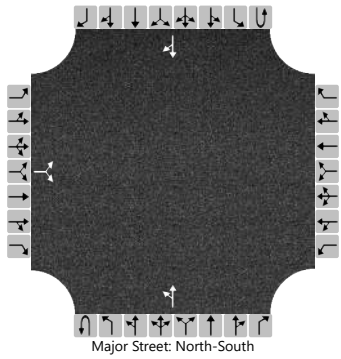
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2023
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			437							1289						
v/c Ratio			0.30							0.05						
95% Queue Length, Q_{95} (veh)			1.3							0.2						
Control Delay (s/veh)			16.8							7.9						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	16.8								1.8							
Approach LOS	C															

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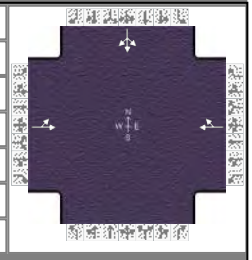
HCS7 Signalized Intersection Input Data

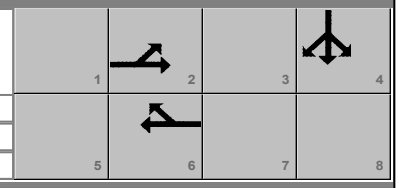
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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			
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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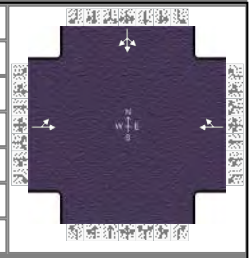
HCS7 Signalized Intersection Results Summary

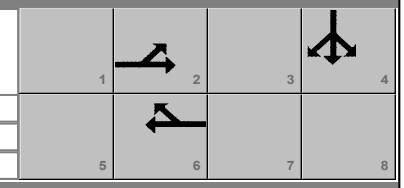
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
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
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		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		
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		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

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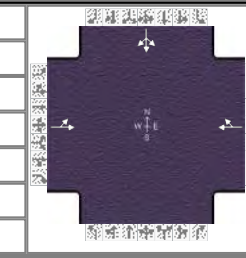
HCS7 Signalized Intersection Intermediate Values

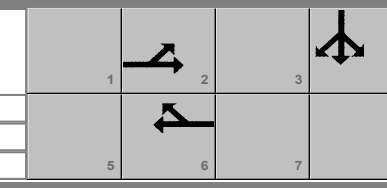
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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
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})	0.552	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_f), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.35	-3.64	0.37	-3.64		-3.64	0.25

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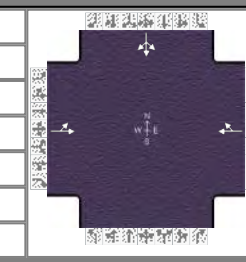
HCS7 Signalized Intersection Results Graphical Summary

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				

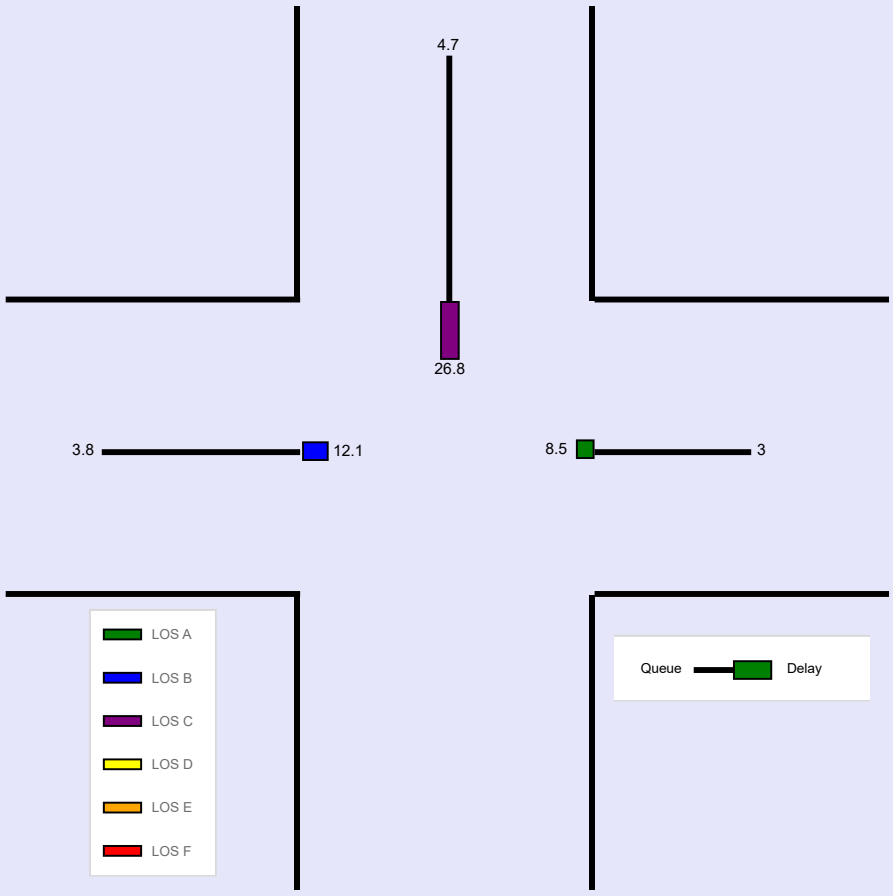


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	191	3			1	205				86	0	56

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

							1	2	3	4
Green	54.0	24.0	0.0	0.0	0.0	0.0	5	6	7	8
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)		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					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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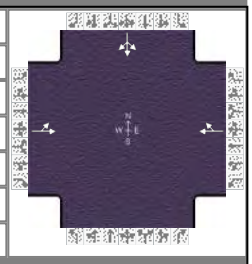
HCS7 Signalized Intersection Input Data

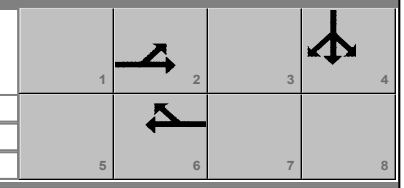
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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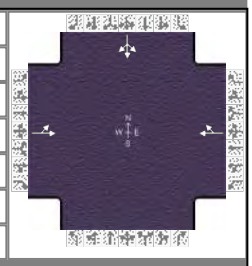
HCS7 Signalized Intersection Results Summary

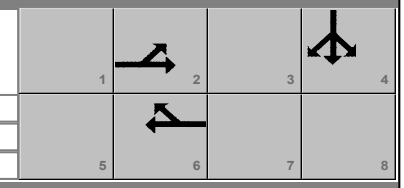
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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			
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		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

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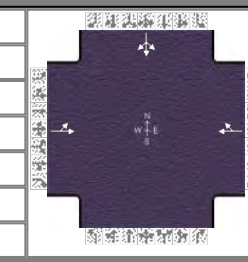
HCS7 Signalized Intersection Intermediate Values

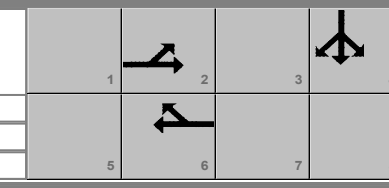
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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
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})	0.486	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_f), s		0.5		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.36	-3.64	0.40	-3.64		-3.64	1.08

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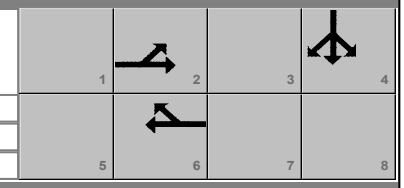
HCS7 Signalized Intersection Results Graphical Summary

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				

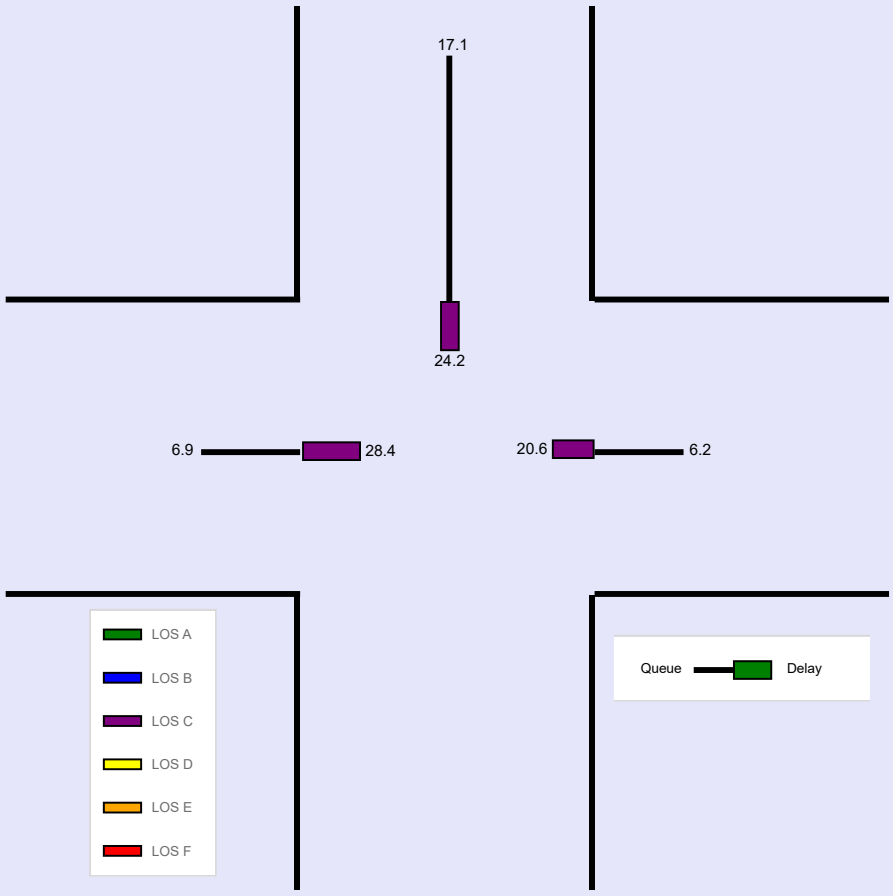
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	159	40			25	198				295	0	309

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
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)		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					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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2024 NO-BUILD

HCS7 Two-Way Stop-Control Report

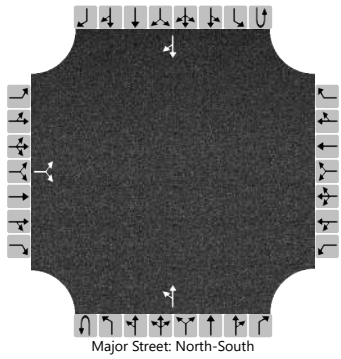
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2024
Time Analyzed	NO-BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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								1.3							
Approach LOS	B															

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HCS7 Two-Way Stop-Control Report

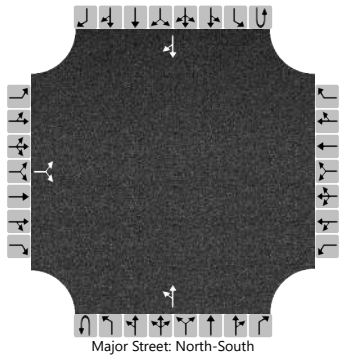
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2024
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			427							1280						
v/c Ratio			0.32							0.05						
95% Queue Length, Q_{95} (veh)			1.4							0.2						
Control Delay (s/veh)			17.4							8.0						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	17.4								1.9							
Approach LOS	C															

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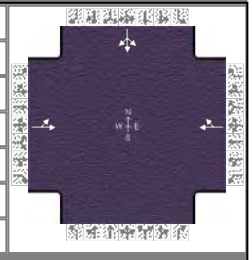
HCS7 Signalized Intersection Input Data

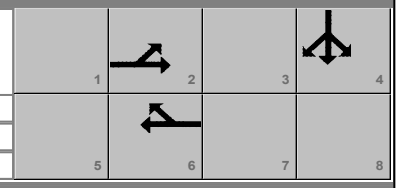
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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			
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



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_o), 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 (Pg), %		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 (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	

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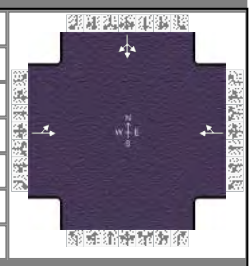
HCS7 Signalized Intersection Results Summary

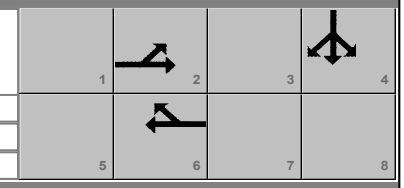
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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
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		18.2		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

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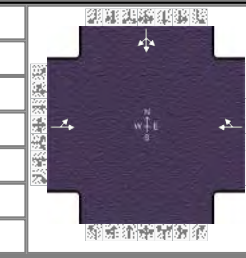
HCS7 Signalized Intersection Intermediate Values

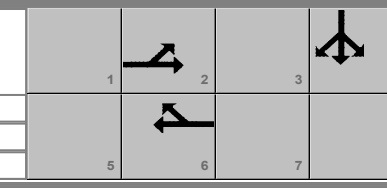
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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
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})	0.547	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_f), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.36	-3.64	0.38	-3.64		-3.64	0.26

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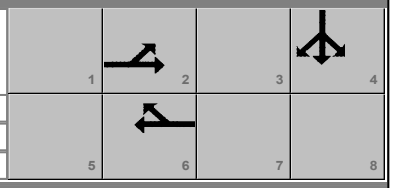
HCS7 Signalized Intersection Results Graphical Summary

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				

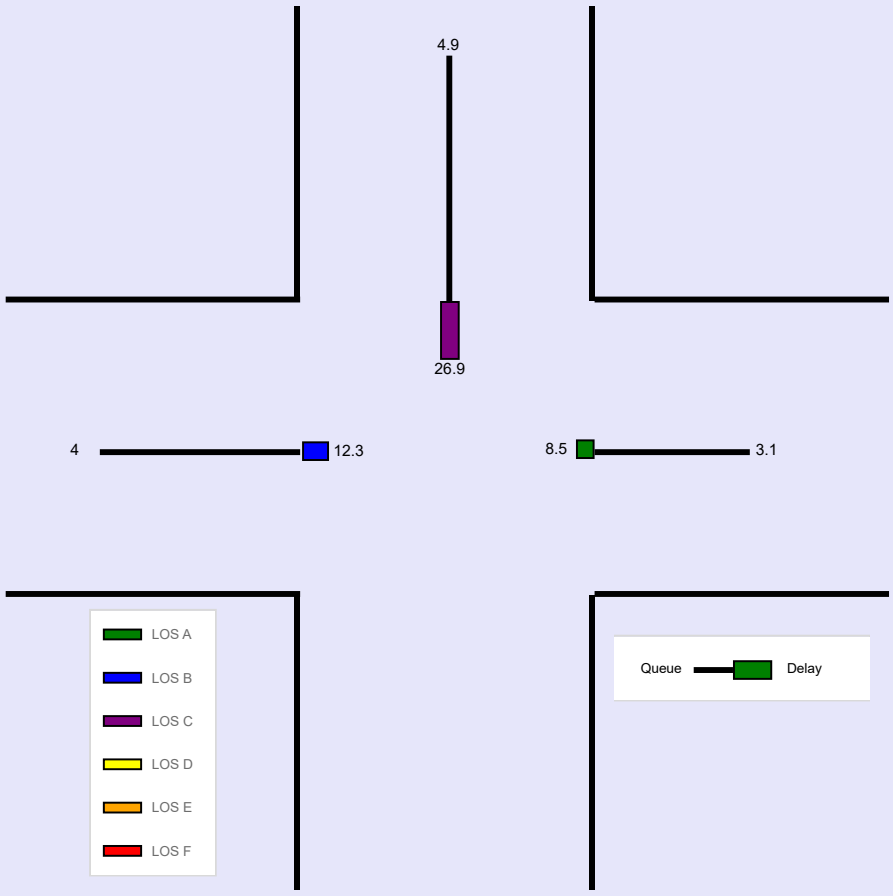
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197	4			1	211				89	0	58

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
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)		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					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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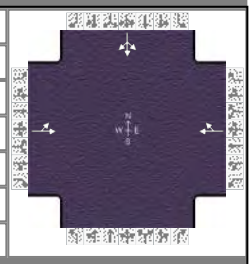
HCS7 Signalized Intersection Input Data

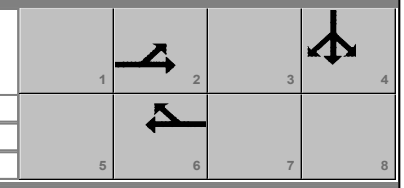
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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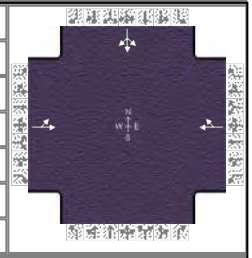
HCS7 Signalized Intersection Results Summary

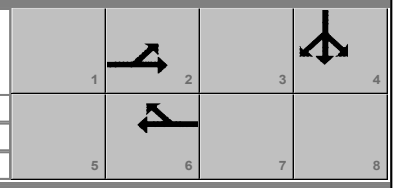
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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

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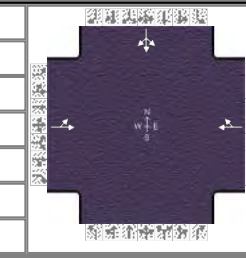
HCS7 Signalized Intersection Intermediate Values

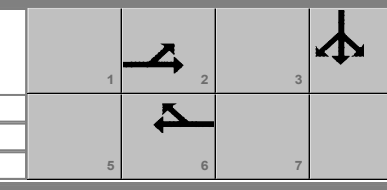
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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			
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})	0.476	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
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	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	0.49	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_f), s		0.5		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.37	-3.64	0.41	-3.64		-3.64	1.11

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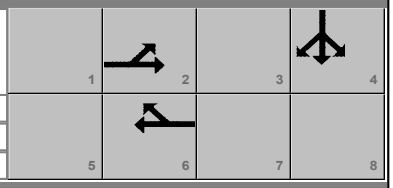
HCS7 Signalized Intersection Results Graphical Summary

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				

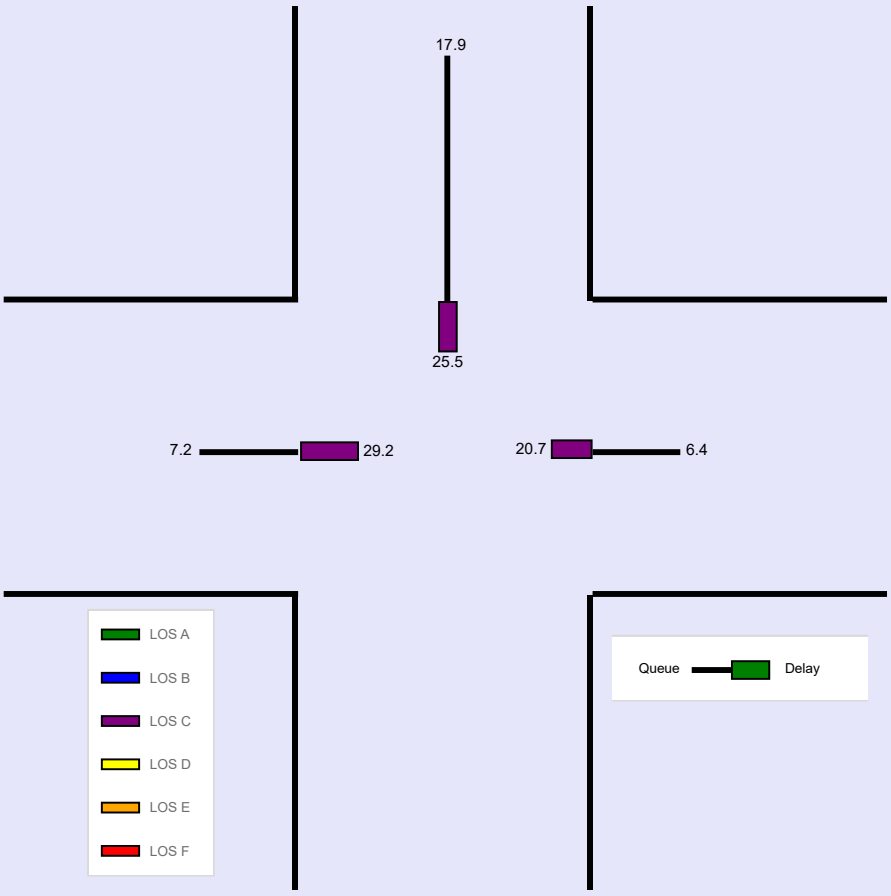
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	164	41			26	204				302	0	317

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					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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2034 NO-BUILD

HCS7 Two-Way Stop-Control Report

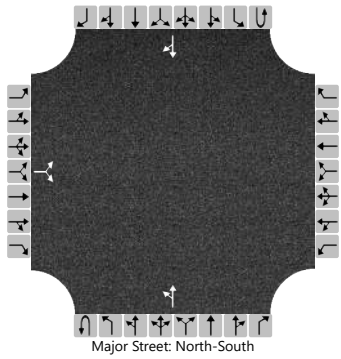
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	NO-BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		122		46						17	107				240	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)			541							1096						
v/c Ratio			0.34							0.02						
95% Queue Length, Q_{95} (veh)			1.5							0.1						
Control Delay (s/veh)			15.0							8.3						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	15.0								1.3							
Approach LOS	C															

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HCS7 Two-Way Stop-Control Report

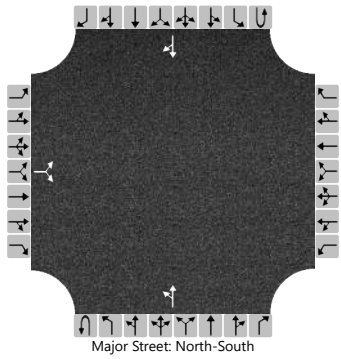
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			303							1164						
v/c Ratio			0.60							0.07						
95% Queue Length, Q_{95} (veh)			3.7							0.2						
Control Delay (s/veh)			33.4							8.3						
Level of Service (LOS)			D							A						
Approach Delay (s/veh)	33.4								2.1							
Approach LOS	D															

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HCS7 Two-Way Stop-Control Report

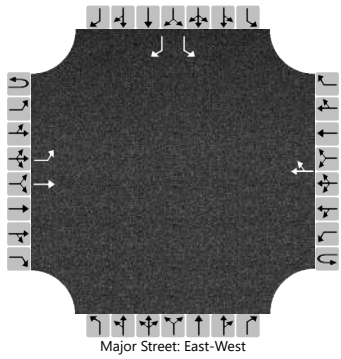
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	NO-BUILD AM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		10	117				277	9						7		7
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)		11												8		8
Capacity, c (veh/h)		1261												562		739
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												11.5		9.9
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)	0.6												10.7			
Approach LOS													B			

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HCS7 Two-Way Stop-Control Report

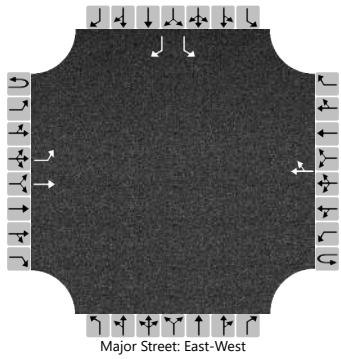
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		22	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)		24												24		24
Capacity, c (veh/h)		1221												323		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			

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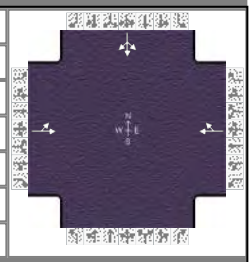
HCS7 Signalized Intersection Input Data

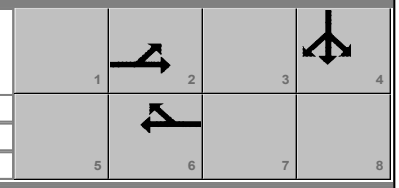
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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	15			8	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



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	15			8	276				112	0	73
Initial Queue (Q_b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s_o), 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 (*Pg*), %		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 (*lt*), 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	

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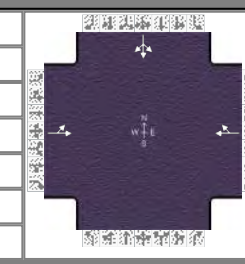
HCS7 Signalized Intersection Results Summary

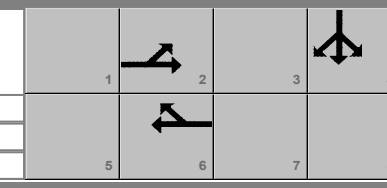
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	257	15			8	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



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		27.5		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		
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		296			309						201	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		910			1541						1698	
Queue Service Time (g_s), s		16.5			9.0						8.9	
Cycle Queue Clearance Time (g_c), s		25.5			9.0						8.9	
Green Ratio (*g/C*)		0.60			0.60						0.27	
Capacity (*c*), veh/h		624			925						453	
Volume-to-Capacity Ratio (*X*)		0.474			0.334						0.444	
Back of Queue (*Q*), ft/ln (95 th percentile)		165.9			118.2						160.1	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.5			4.5						6.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Uniform Delay (d_1), s/veh		15.3			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		15.5			9.1						27.7	
Level of Service (LOS)		B			A						C	
Approach Delay, s/veh / LOS	15.5	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	0.98	A	1.00	A			0.82	A

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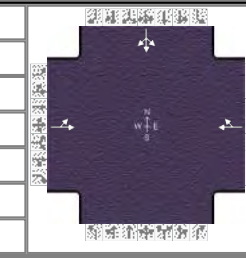
HCS7 Signalized Intersection Intermediate Values

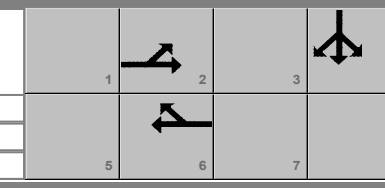
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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	15			8	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})	0.491	0.491		1.000	0.851					0.908	0.908	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.491		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	860	50	0	0	43	1498				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		1088		1419				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		16.5						
Time to First Blockage (g_f), s		0.1		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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
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	0.49	-3.64	0.51	-3.64		-3.64	0.33

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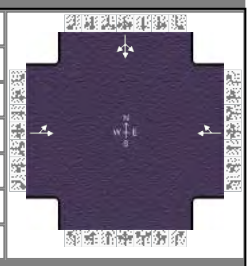
HCS7 Signalized Intersection Results Graphical Summary

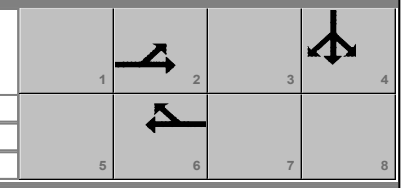
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



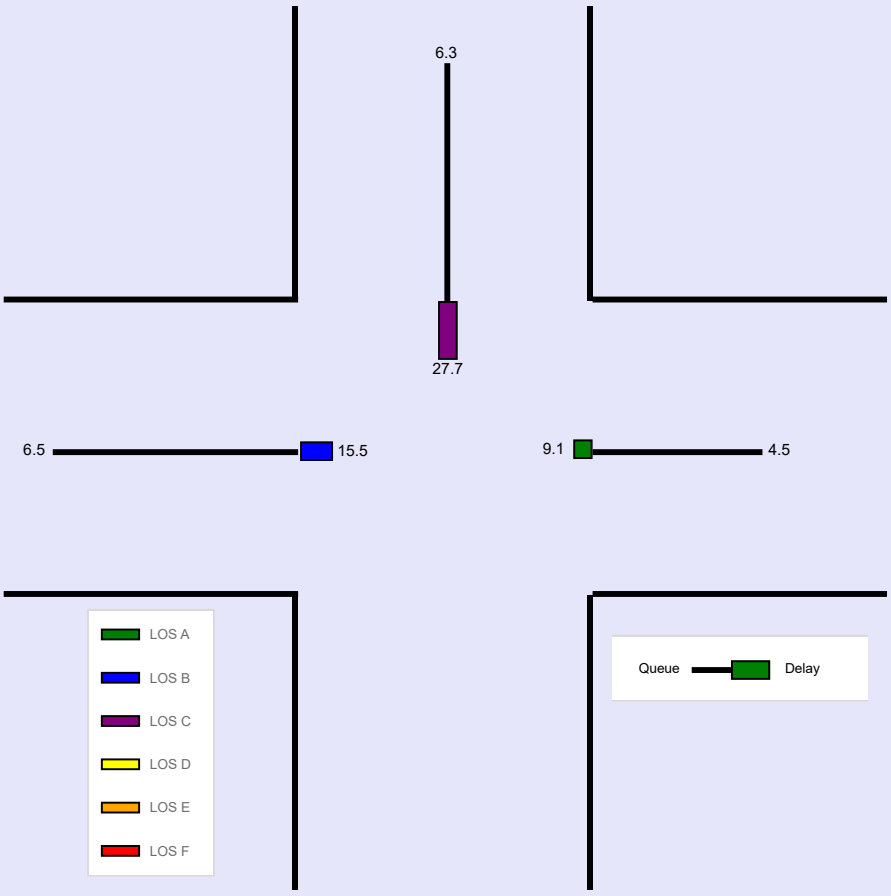
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	257	15			8	276				112	0	73

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



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)		165.9			118.2						160.1	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.5			4.5						6.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Control Delay (*d*), s/veh		15.5			9.1						27.7	
Level of Service (LOS)		B			A						C	
Approach Delay, s/veh / LOS	15.5		B	9.1		A	0.0			27.7		C
Intersection Delay, s/veh / LOS	16.1						B					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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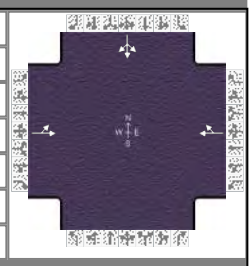
HCS7 Signalized Intersection Input Data

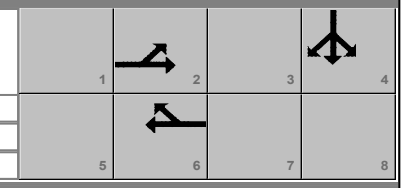
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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	76			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



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	76			56	266				381	0	400
Initial Queue (Q_b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s_o), 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 (*Pg*), %		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 (*lt*), 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	

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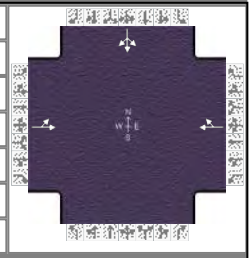
HCS7 Signalized Intersection Results Summary

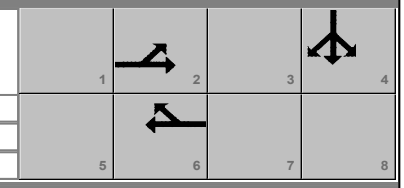
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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	76			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



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		345			350						849	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		658			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*)		1.080			0.560						1.028	
Back of Queue (*Q*), ft/ln (95 th percentile)		507.4			231.3						839.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		20.3			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		73.4			0.7						38.8	
Initial Queue Delay (d_3), s/veh		0.0			0.0						0.0	
Control Delay (*d*), s/veh		110.9			22.8						61.8	
Level of Service (LOS)		F			C						F	
Approach Delay, s/veh / LOS	110.9	F		22.8	C		0.0			61.8	E	
Intersection Delay, s/veh / LOS	63.9						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	1.06	A	1.07	A			1.89	B

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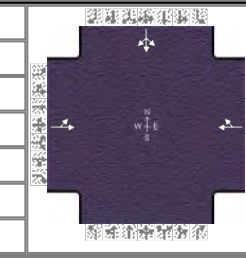
HCS7 Signalized Intersection Intermediate Values

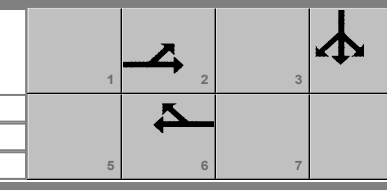
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS 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	76			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	500	158	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		1336				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_f), s		0.1		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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
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	0.57	-3.64	0.58	-3.64		-3.64	1.40

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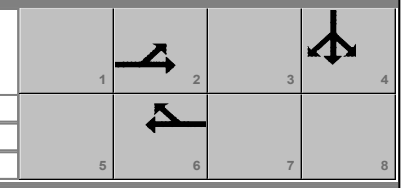
HCS7 Signalized Intersection Results Graphical Summary

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				

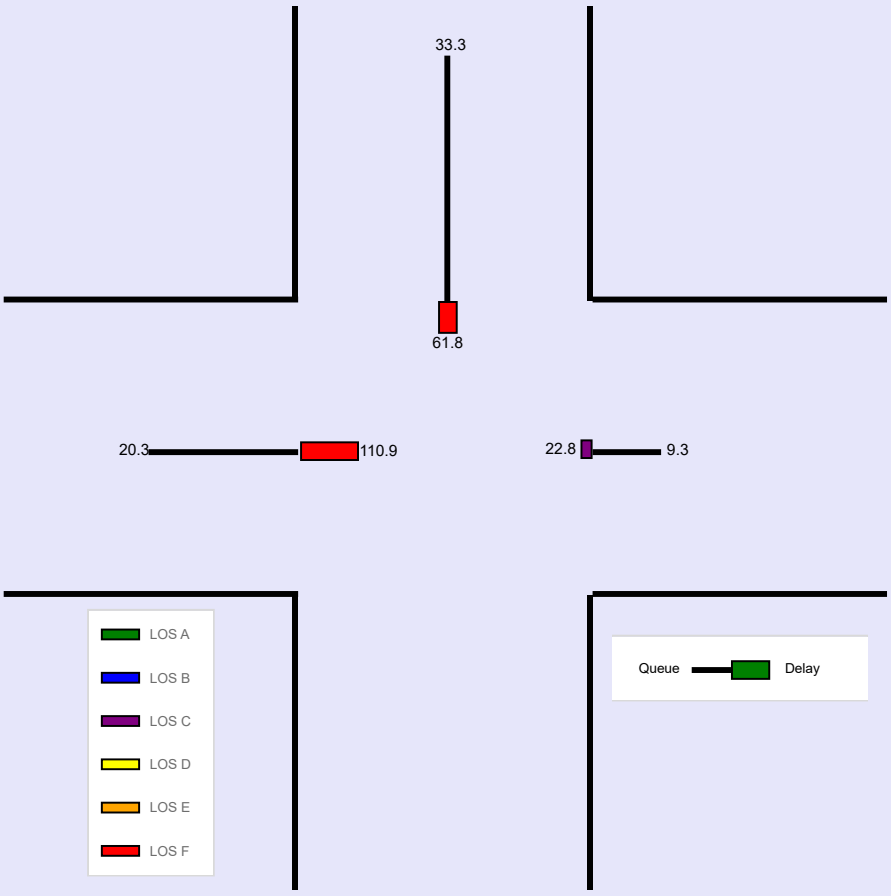
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	241	76			56	266				381	0	400

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)		507.4			231.3						839.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		20.3			9.3						33.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Control Delay (*d*), s/veh		110.9			22.8						61.8	
Level of Service (LOS)		F			C						F	
Approach Delay, s/veh / LOS	110.9		F	22.8		C	0.0			61.8		E
Intersection Delay, s/veh / LOS	63.9						E					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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HCS7 Two-Way Stop-Control Report

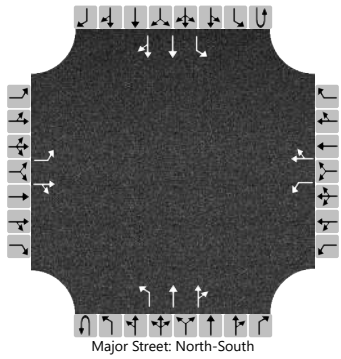
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	NO-BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	DILEY & HOWE/GREENGATE
Jurisdiction	CANAL WINCHESTER
East/West Street	HOWE/GREENGATE
North/South Street	DILEY RD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		8	1	13		29	1	9	0	59	564	28	0	24	803	27
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)		9		15		32		11		64				26		
Capacity, c (veh/h)		73		537		117		680		737				951		
v/c Ratio		0.12		0.03		0.27		0.02		0.09				0.03		
95% Queue Length, Q_{95} (veh)		0.4		0.1		1.0		0.0		0.3				0.1		
Control Delay (s/veh)		60.7		11.9		46.9		10.4		10.4				8.9		
Level of Service (LOS)		F		B		E		B		B				A		
Approach Delay (s/veh)	29.6				37.5				0.9				0.2			
Approach LOS	D				E											

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HCS7 Two-Way Stop-Control Report

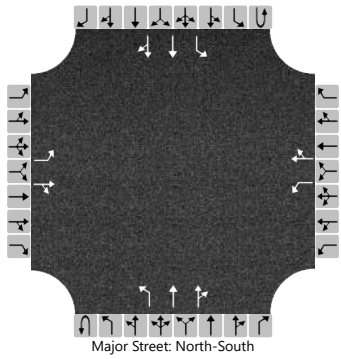
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	NO-BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	DILEY & HOWE/GREENGATE
Jurisdiction	CANAL WINCHESTER
East/West Street	HOWE/GREENGATE
North/South Street	DILEY RD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		18	1	48		125	1	61	0	9	1124	98	0	92	835	8
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)		20		53		136		67		10				100		
Capacity, c (veh/h)		39		555		29		408		753				526		
v/c Ratio		0.50		0.10		4.63		0.17		0.01				0.19		
95% Queue Length, Q_{95} (veh)		1.8		0.3		16.4		0.6		0.0				0.7		
Control Delay (s/veh)		168.9		12.2		1906.2		15.6		9.8				13.4		
Level of Service (LOS)		F		B		F		C		A				B		
Approach Delay (s/veh)	54.3				1279.3				0.1				1.3			
Approach LOS	F				F											

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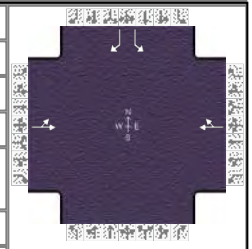
HCS7 Signalized Intersection Input Data

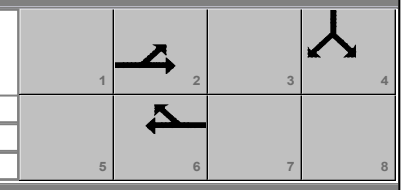
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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	15			8	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
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



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	15			8	276				112		73
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}), %		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 (*Pg*), %		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 (*lt*), 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	

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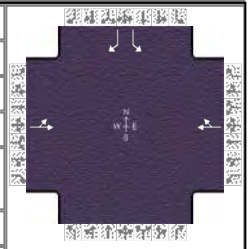
HCS7 Signalized Intersection Results Summary

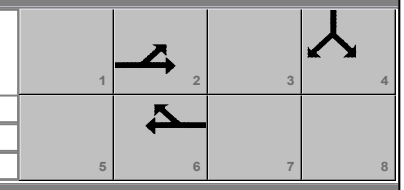
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	257	15			8	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
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



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		27.5		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		
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		296			309					122		79
Adjusted Saturation Flow Rate (*s*), veh/h/ln		910			1541					1810		1610
Queue Service Time (g_s), s		16.5			9.0					4.8		3.4
Cycle Queue Clearance Time (g_c), s		25.5			9.0					4.8		3.4
Green Ratio (*g/C*)		0.60			0.60					0.27		0.27
Capacity (*c*), veh/h		624			925					483		429
Volume-to-Capacity Ratio (*X*)		0.474			0.334					0.252		0.185
Back of Queue (*Q*), ft/ln (95 th percentile)		165.9			118.2					89.9		57.5
Back of Queue (*Q*), veh/ln (95 th percentile)		6.5			4.5					3.6		2.3
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00					0.36		0.00
Uniform Delay (d_1), s/veh		15.3			9.0					25.9		25.5
Incremental Delay (d_2), s/veh		0.2			0.1					0.1		0.1
Initial Queue Delay (d_3), s/veh		0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh		15.5			9.1					26.0		25.5
Level of Service (LOS)		B			A					C		C
Approach Delay, s/veh / LOS	15.5	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	0.98	A	1.00	A				F

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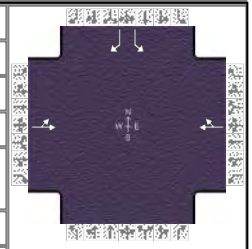
HCS7 Signalized Intersection Intermediate Values

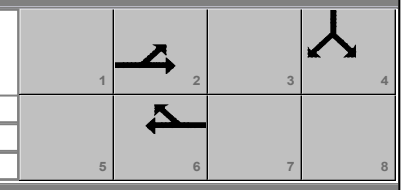
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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	15			8	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
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})	0.491	0.491		1.000	0.851					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.491		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	860	50	0	0	43	1498				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		1088		1419				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		16.5						
Time to First Blockage (g_f), s		0.1		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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
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	0.49	-3.64	0.51	-3.64		-3.64	

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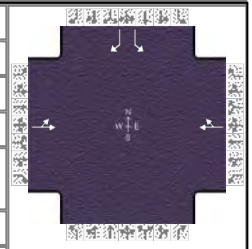
HCS7 Signalized Intersection Results Graphical Summary

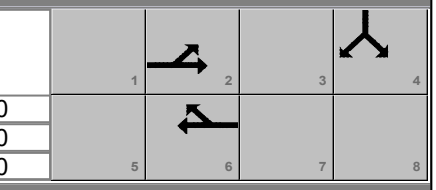
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



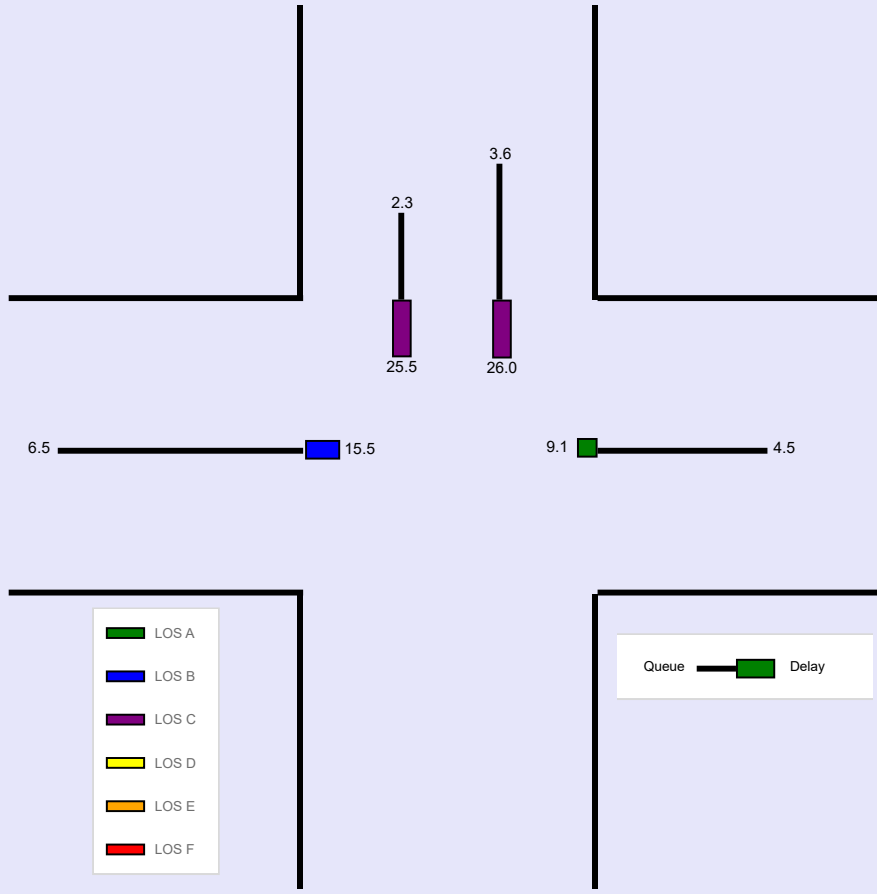
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	257	15			8	276				112		73

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
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



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)		165.9			118.2					89.9		57.5
Back of Queue (*Q*), veh/ln (95 th percentile)		6.5			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		15.5			9.1					26.0		25.5
Level of Service (LOS)		B			A					C		C
Approach Delay, s/veh / LOS	15.5		B	9.1		A	0.0			25.8		C
Intersection Delay, s/veh / LOS	15.6						B					



--- Messages ---

No errors or warnings exist.

--- Comments ---

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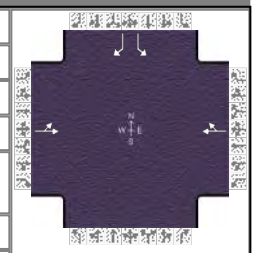
HCS7 Signalized Intersection Input Data

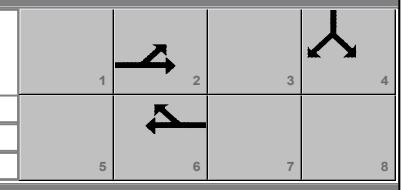
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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	76			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
Force Mode	Fixed	Simult. Gap N/S	On

Green	44.0	34.0	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



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	76			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 (*Pg*), %		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		44.0		44.0				34.0
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 (*lt*), 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	

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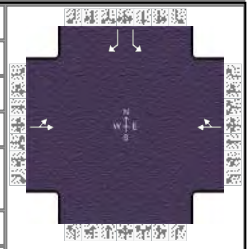
HCS7 Signalized Intersection Results Summary

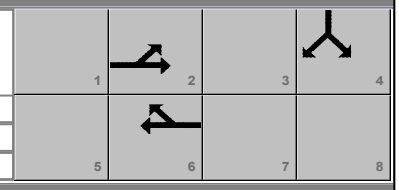
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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	76			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
Force Mode	Fixed	Simult. Gap N/S	On

Green	44.0	34.0	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				9.0
Phase Duration, s		50.0		50.0				40.0
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		37.2		14.3				22.7
Green Extension Time (g_e), s		1.2		1.7				1.7
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.25		0.00				0.05

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		345			350					414		435
Adjusted Saturation Flow Rate (*s*), veh/h/ln		872			1654					1810		1610
Queue Service Time (g_s), s		22.8			12.3					16.6		20.7
Cycle Queue Clearance Time (g_c), s		35.2			12.3					16.6		20.7
Green Ratio (*g/C*)		0.49			0.49					0.38		0.38
Capacity (*c*), veh/h		496			809					684		608
Volume-to-Capacity Ratio (*X*)		0.694			0.433					0.606		0.715
Back of Queue (*Q*), ft/ln (95 th percentile)		266.8			185.1					279.6		315.4
Back of Queue (*Q*), veh/ln (95 th percentile)		10.7			7.4					11.2		12.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00					1.12		0.00
Uniform Delay (d_1), s/veh		25.4			14.9					22.6		23.9
Incremental Delay (d_2), s/veh		3.5			0.1					1.1		3.4
Initial Queue Delay (d_3), s/veh		0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh		28.9			15.0					23.7		27.3
Level of Service (LOS)		C			B					C		C
Approach Delay, s/veh / LOS	28.9	C		15.0	B		0.0			25.5	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	1.06	A	1.07	A				F

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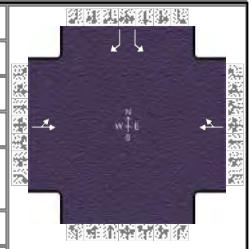
HCS7 Signalized Intersection Intermediate Values

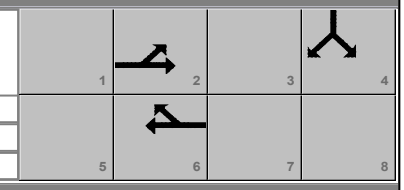
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & 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	76			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
Force Mode	Fixed	Simult. Gap N/S	On

Green	44.0	34.0	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})	0.459	0.459		1.000	0.871					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.459		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	663	209	0	0	288	1366				1810	0	1610
Proportion of Vehicles Arriving on Green (P)	0.49	0.49	0.00	0.00	0.49	0.49	0.00	0.00	0.00	0.38	0.00	0.38
Incremental Delay Factor (k)		0.22			0.04					0.14		0.24

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)		0.49		0.49				0.38
Permitted Saturation Flow Rate (s_p), veh/h/ln		1047		1336				1810
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1900				
Permitted Effective Green Time (g_p), s		44.0		0.0				0.0
Permitted Service Time (g_u), s		31.7		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		22.8						
Time to First Blockage (g_f), s		0.6		44.0				0.0
Queue Service Time Before Blockage (g_{fs}), s		0.6						
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
Pedestrian F_s / F_{delay}	0.000	0.099	0.000	0.099	0.000	0.157	0.000	0.159
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	977.78	11.76	977.78	11.76		50.14		52.27
Bicycle F_w / F_v	-3.64	0.57	-3.64	0.58	-3.64		-3.64	

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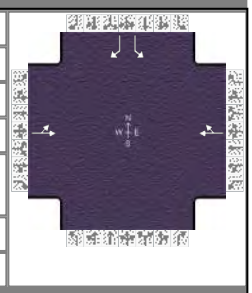
HCS7 Signalized Intersection Results Graphical Summary

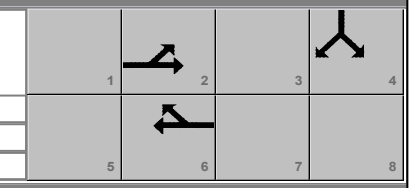
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS PM WIMP.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



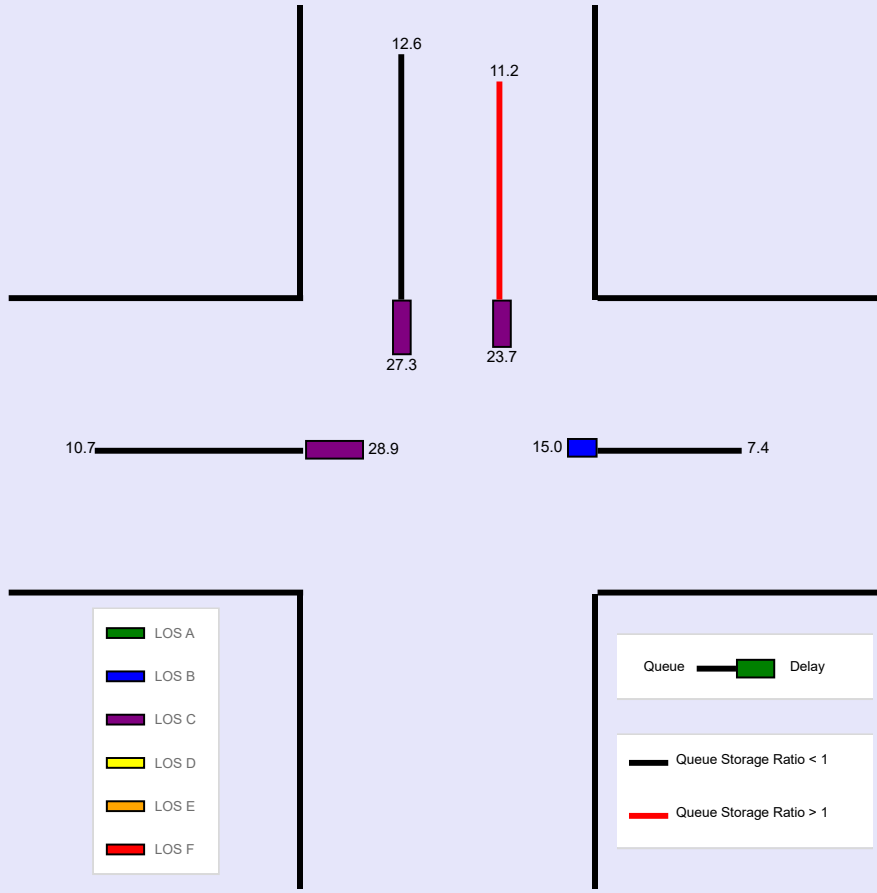
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	241	76			56	266				381		400

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	44.0	34.0	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)		266.8			185.1					279.6		315.4
Back of Queue (*Q*), veh/ln (95 th percentile)		10.7			7.4					11.2		12.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00					1.12		0.00
Control Delay (*d*), s/veh		28.9			15.0					23.7		27.3
Level of Service (LOS)		C			B					C		C
Approach Delay, s/veh / LOS	28.9		C	15.0		B	0.0			25.5		C
Intersection Delay, s/veh / LOS	23.9						C					



--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

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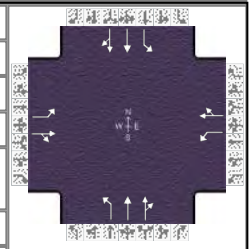
HCS7 Signalized Intersection Input Data

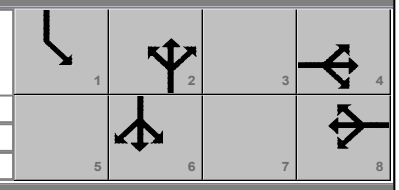
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	8	1	13	29	1	9	59	564	28	24	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	8	1	13	29	1	9	59	564	28	24	803	27
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), 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	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	
Turn Bay Length, ft	100	0		175	0		195	0		450	0	
Grade (*Pg*), %		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		38.0		38.0		46.0	16.0	62.0
Yellow Change Interval (*Y*), s		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
Minimum Green (G_{min}), s		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
Recall Mode		Off		Off		Min	Off	Min
Dual Entry		Yes		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	

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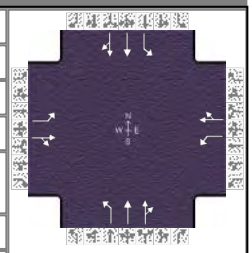
HCS7 Signalized Intersection Results Summary

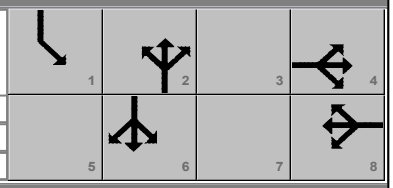
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	8	1	13	29	1	9	59	564	28	24	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		6.0		6.0		6.3	1.0	4.0
Phase Duration, s		38.0		38.0		46.0	16.0	62.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.4		3.4		0.0	3.0	0.0
Queue Clearance Time (g_s), s		3.0		4.2			2.7	
Green Extension Time (g_e), s		0.1		0.1		0.0	0.0	0.0
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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	9	15		32	11		64	324	319	26	454	448
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1103	1514		1420	1635		608	1826	1795	1810	1870	1849
Queue Service Time (g_s), s	0.5	0.7		1.6	0.5		7.1	13.0	13.0	0.7	14.1	14.1
Cycle Queue Clearance Time (g_c), s	1.0	0.7		2.2	0.5		7.1	13.0	13.0	0.7	14.1	14.1
Green Ratio (*g/C*)	0.32	0.32		0.32	0.32		0.40	0.40	0.40	0.52	0.56	0.56
Capacity (*c*), veh/h	420	484		517	523		315	730	718	469	1047	1035
Volume-to-Capacity Ratio (*X*)	0.021	0.031		0.061	0.021		0.203	0.444	0.445	0.056	0.433	0.433
Back of Queue (*Q*), ft/ln (95 th percentile)	8	12.1		23.9	8		49.6	244.9	233.3	11.7	239.5	233.7
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	0.5		1.0	0.3		1.9	9.4	9.3	0.5	9.4	9.3
Queue Storage Ratio (*RQ*) (95 th percentile)	0.08	0.00		0.14	0.00		0.25	0.00	0.00	0.03	0.00	0.00
Uniform Delay (d_1), s/veh	23.6	23.4		24.1	23.3		20.1	21.9	21.9	12.8	12.8	12.8
Incremental Delay (d_2), s/veh	0.0	0.0		0.0	0.0		1.5	2.0	2.0	0.0	1.3	1.3
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	23.6	23.4		24.1	23.3		21.6	23.8	23.9	12.9	14.1	14.1
Level of Service (LOS)	C	C		C	C		C	C	C	B	B	B
Approach Delay, s/veh / LOS	23.5	C		23.9	C		23.7	C		14.1	B	
Intersection Delay, s/veh / LOS	18.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.28	B	2.28	B	1.91	B	1.89	B
Bicycle LOS Score / LOS	0.53	A	0.56	A	1.07	A	1.25	A

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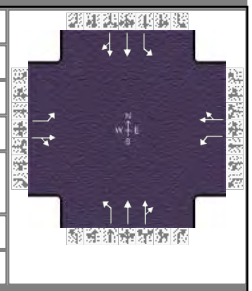
HCS7 Signalized Intersection Intermediate Values

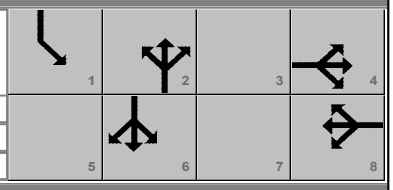
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	8	1	13	29	1	9	59	564	28	24	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	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	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.581	0.000		0.748	0.000		0.320	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.857	0.857		0.861	0.861		0.983	0.983		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	1103	108	1406	1420	164	1472	608	3450	171	1810	3598	121
Proportion of Vehicles Arriving on Green (P)	0.32	0.32	0.32	0.32	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
Green Ratio (g/C)		0.32		0.32		0.40	0.52	0.56
Permitted Saturation Flow Rate (s_p), veh/h/ln		1103		1420		608	799	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s		32.0		32.0		40.0	42.0	0.0
Permitted Service Time (g_u), s		31.5		31.3		40.0	27.0	0.0
Permitted Queue Service Time (g_{ps}), s		0.5		1.6		7.1	0.5	
Time to First Blockage (g_f), s		0.0		0.0		0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
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	1.557	0.000	1.557	0.000	1.198	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.126	0.000	0.126	0.000	0.116	0.000	0.091
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	640.00	23.12	640.00	23.12	800.00	18.00	1120.00	9.68
Bicycle F_w / F_v	-3.64	0.04	-3.64	0.07	-3.64	0.58	-3.64	0.77

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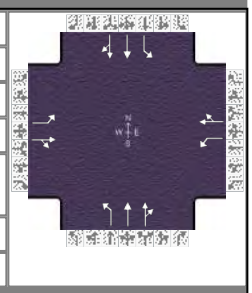
HCS7 Signalized Intersection Results Graphical Summary

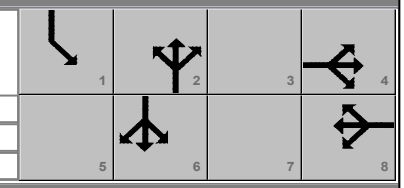
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	File Name	DILEY & HOWE AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



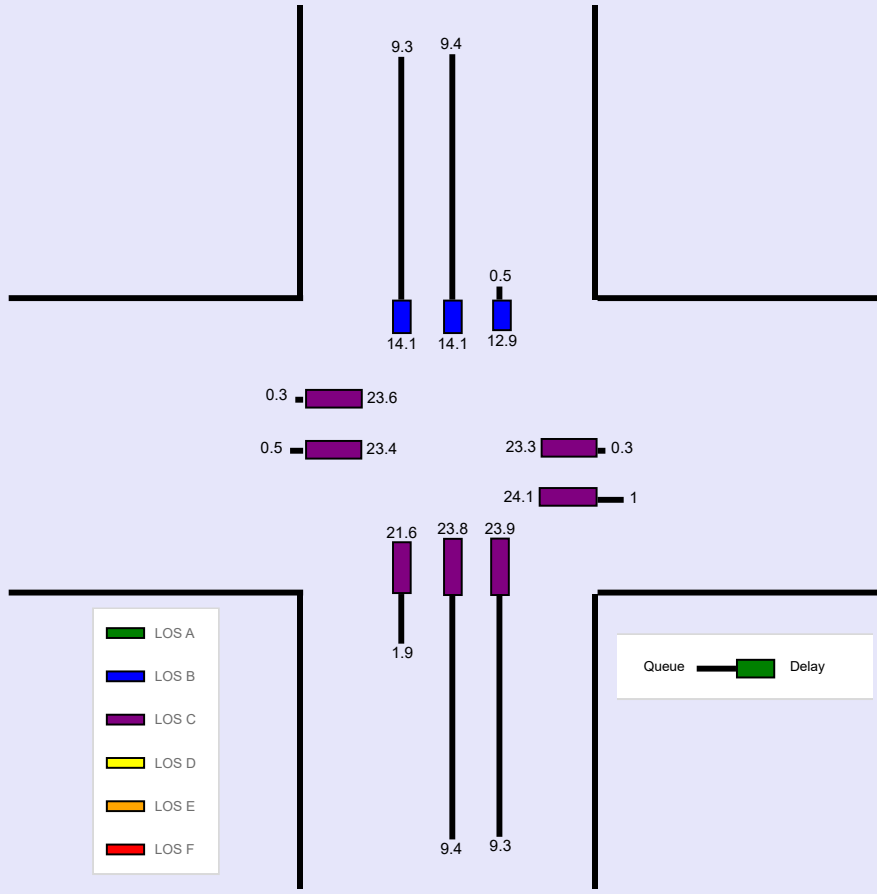
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	8	1	13	29	1	9	59	564	28	24	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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)	8	12.1		23.9	8		49.6	244.9	233.3	11.7	239.5	233.7
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	0.5		1.0	0.3		1.9	9.4	9.3	0.5	9.4	9.3
Queue Storage Ratio (*RQ*) (95 th percentile)	0.08	0.00		0.14	0.00		0.25	0.00	0.00	0.03	0.00	0.00
Control Delay (*d*), s/veh	23.6	23.4		24.1	23.3		21.6	23.8	23.9	12.9	14.1	14.1
Level of Service (LOS)	C	C		C	C		C	C	C	B	B	B
Approach Delay, s/veh / LOS	23.5	C		23.9	C		23.7	C		14.1	B	
Intersection Delay, s/veh / LOS	18.4						B					



--- Messages ---

No errors or warnings exist.

--- Comments ---

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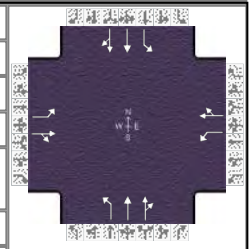
HCS7 Signalized Intersection Input Data

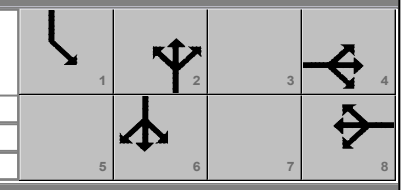
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	18	1	48	125	1	61	9	1124	98	92	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	18	1	48	125	1	61	9	1124	98	92	835	8
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), 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	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	
Turn Bay Length, ft	100	0		175	0		195	0		450	0	
Grade (*Pg*), %		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		32.0		32.0		52.0	16.0	68.0
Yellow Change Interval (*Y*), s		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
Minimum Green (G_{min}), s		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
Recall Mode		Off		Off		Min	Off	Min
Dual Entry		Yes		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	

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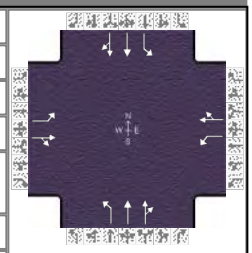
HCS7 Signalized Intersection Results Summary

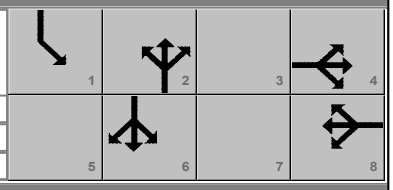
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	18	1	48	125	1	61	9	1124	98	92	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		6.0		6.0		6.3	1.0	4.0
Phase Duration, s		32.0		32.0		52.0	16.0	68.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.4		3.4		0.0	3.0	0.0
Queue Clearance Time (g_s), s		6.4		12.9			4.5	
Green Extension Time (g_e), s		0.6		0.5		0.0	0.1	0.0
Phase Call Probability		1.00		1.00			1.00	
Max Out Probability		0.00		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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	20	53		136	67		10	672	656	100	459	457
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1355	1615		1372	1614		619	1885	1832	1810	1885	1879
Queue Service Time (g_s), s	1.1	2.5		8.4	3.2		0.9	29.9	30.1	2.5	12.2	12.2
Cycle Queue Clearance Time (g_c), s	4.4	2.5		10.9	3.2		0.9	29.9	30.1	2.5	12.2	12.2
Green Ratio (*g/C*)	0.26	0.26		0.26	0.26		0.46	0.46	0.46	0.58	0.62	0.62
Capacity (*c*), veh/h	381	420		394	420		357	867	843	320	1169	1165
Volume-to-Capacity Ratio (*X*)	0.051	0.127		0.345	0.161		0.027	0.775	0.778	0.313	0.393	0.393
Back of Queue (*Q*), ft/ln (95 th percentile)	16.9	44.5		127.1	57		5.8	494.3	482	39.1	203	200.9
Back of Queue (*Q*), veh/ln (95 th percentile)	0.7	1.8		5.1	2.3		0.2	19.6	19.3	1.6	8.1	8.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17	0.00		0.73	0.00		0.03	0.00	0.00	0.09	0.00	0.00
Uniform Delay (d_1), s/veh	30.3	28.3		32.5	28.6		14.8	22.7	22.7	16.1	9.5	9.5
Incremental Delay (d_2), s/veh	0.0	0.0		0.2	0.1		0.1	6.7	7.0	0.2	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	30.3	28.4		32.7	28.6		15.0	29.4	29.7	16.3	10.5	10.5
Level of Service (LOS)	C	C		C	C		B	C	C	B	B	B
Approach Delay, s/veh / LOS	28.9	C		31.3	C		29.4	C		11.1	B	
Intersection Delay, s/veh / LOS	22.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.29	B	2.29	B	1.90	B	1.88	B
Bicycle LOS Score / LOS	0.61	A	0.82	A	1.59	B	1.33	A

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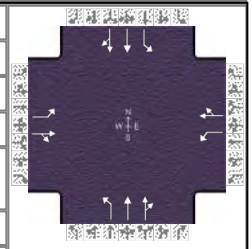
HCS7 Signalized Intersection Intermediate Values

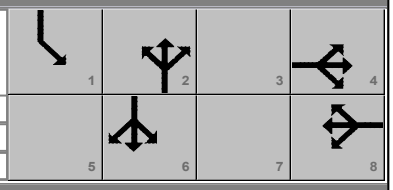
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	18	1	48	125	1	61	9	1124	98	92	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	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	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.713	0.000		0.722	0.000		0.326	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.850	0.850		0.850	0.850		0.972	0.972		0.997	0.997
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	1355	33	1582	1372	26	1588	619	3419	298	1810	3728	36
Proportion of Vehicles Arriving on Green (P)	0.26	0.26	0.26	0.26	0.26	0.26	0.46	0.46	0.46	0.10	0.62	0.62
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
Green Ratio (g/C)		0.26		0.26		0.46	0.58	0.62
Permitted Saturation Flow Rate (s_p), veh/h/ln		1355		1372		619	419	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s		26.0		26.0		46.0	48.0	0.0
Permitted Service Time (g_u), s		22.8		23.5		46.0	15.9	0.0
Permitted Queue Service Time (g_{ps}), s		1.1		8.4		0.9	10.1	
Time to First Blockage (g_f), s		0.0		0.0		0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
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	1.557	0.000	1.557	0.000	1.198	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.133	0.000	0.133	0.000	0.107	0.000	0.079
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	520.00	27.38	520.00	27.38	920.00	14.58	1240.00	7.22
Bicycle F_w / F_v	-3.64	0.12	-3.64	0.34	-3.64	1.10	-3.64	0.84

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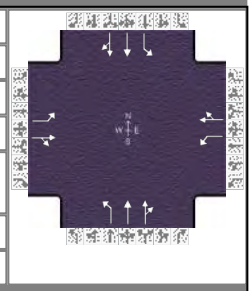
HCS7 Signalized Intersection Results Graphical Summary

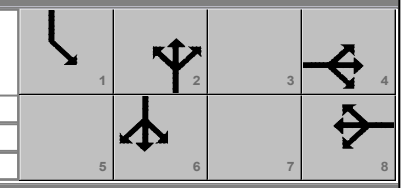
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 NO-BUILD W/ IMP	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	File Name	DILEY & HOWE PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



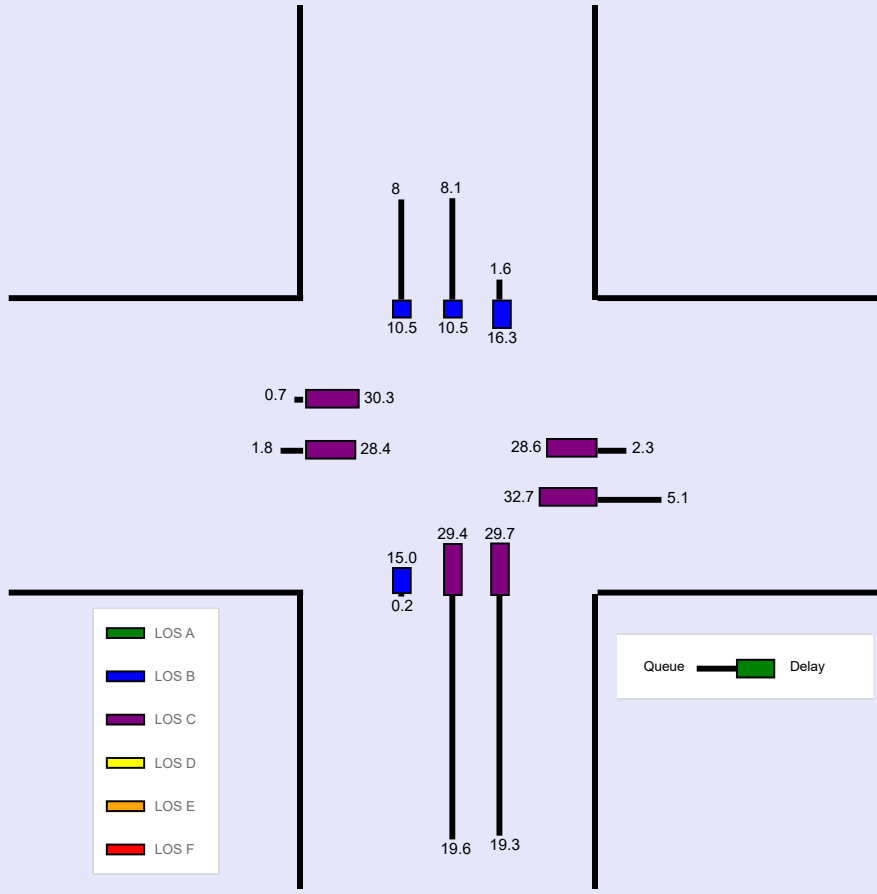
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	18	1	48	125	1	61	9	1124	98	92	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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)	16.9	44.5		127.1	57		5.8	494.3	482	39.1	203	200.9
Back of Queue (*Q*), veh/ln (95 th percentile)	0.7	1.8		5.1	2.3		0.2	19.6	19.3	1.6	8.1	8.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17	0.00		0.73	0.00		0.03	0.00	0.00	0.09	0.00	0.00
Control Delay (*d*), s/veh	30.3	28.4		32.7	28.6		15.0	29.4	29.7	16.3	10.5	10.5
Level of Service (LOS)	C	C		C	C		B	C	C	B	B	B
Approach Delay, s/veh / LOS	28.9	C		31.3	C		29.4	C		11.1	B	
Intersection Delay, s/veh / LOS	22.5						C					



--- Messages ---

No errors or warnings exist.

--- Comments ---

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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)

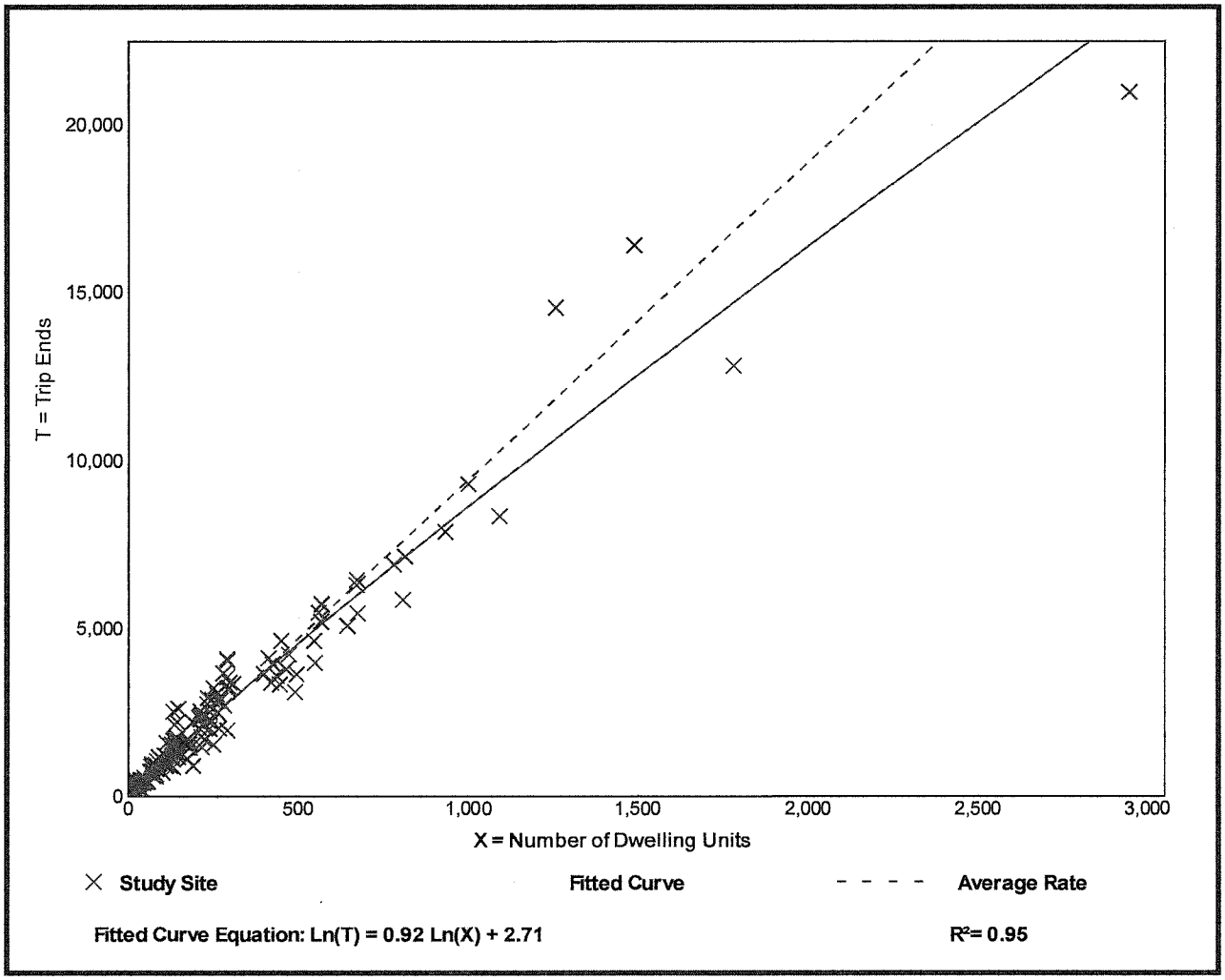
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

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



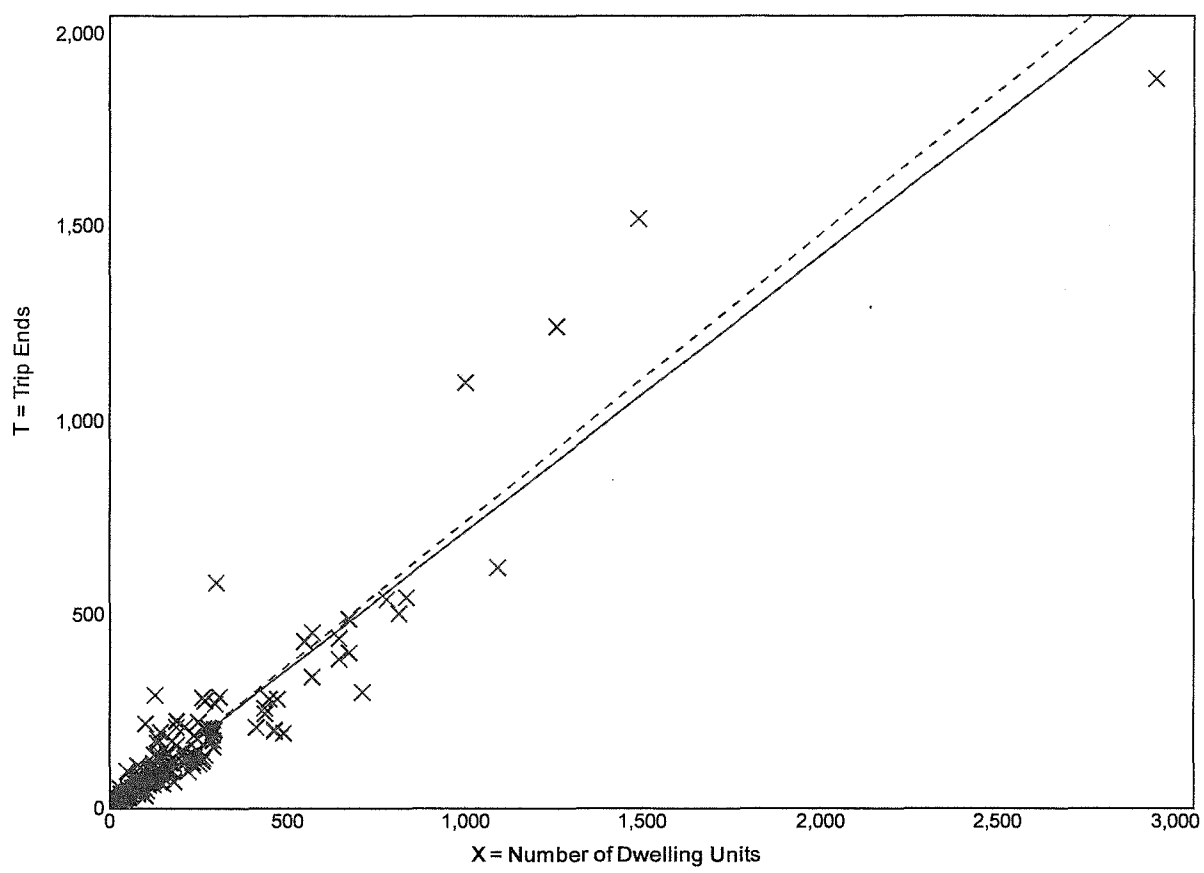
Single-Family Detached Housing
(210)

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



Fitted Curve Equation: T = 0.71(X) + 4.80

R^2= 0.89

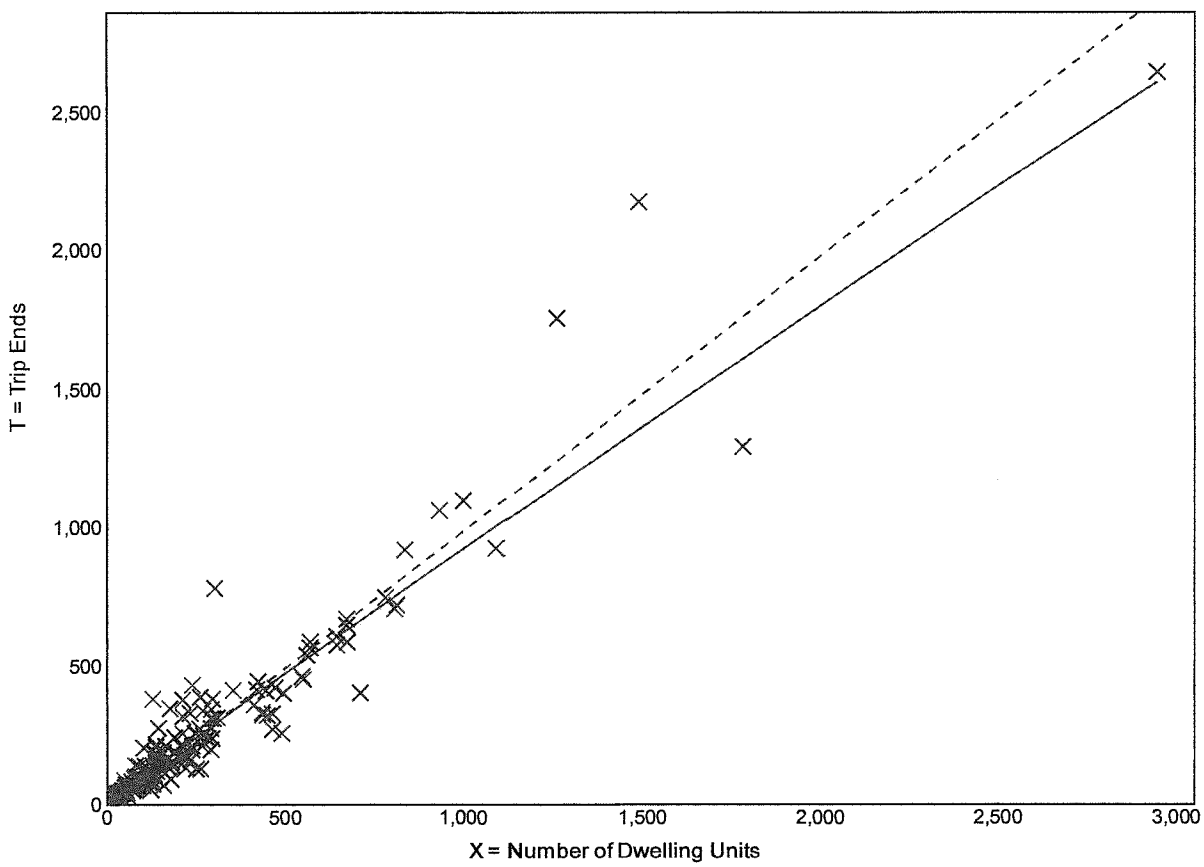
Single-Family Detached Housing
(210)

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



Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 0.20 R^2**= 0.92**

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Akron, Ohio 44321
(330) 665-0660
www.cesoinc.com

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

Ln(T) = [0.92 x Ln(63 Dwelling Units)] + 2.71; T = 679.72 ≈ 680 Trips (For Even Number)

680 Trips x 0.50 (50%) = 340 Trips Enter/340 Trips Exit

For AM Peak Hour → 25% Enter/75% Exit

T = 0.71 x (63 Dwelling Units) + 4.80; T = 49.53 ≈ 50 Trips

50 Trips x 0.25 (25%) = 13 Trips Enter

50 Trips x 0.75 (75%) = 37 Trips Exit

For PM Peak Hour → 63% Enter/37% Exit

Ln(T) = [0.96 x Ln(63 Dwelling Units)] + 0.20; T = 65.20 ≈ 66 Trips

66 Trips x 0.63 (63%) = 42 Trips Enter

66 Trips x 0.37 (37%) = 24 Trips Exit

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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 x Ln(53 Dwelling Units)] + 2.71; T = 579.79 ≈ 580 Trips (For Even Number)

580 Trips x 0.50 (50%) = 290 Trips Enter/290 Trips Exit

For AM Peak Hour → 25% Enter/75% Exit

T = 0.71 x (53 Dwelling Units) + 4.80; T = 42.43 ≈ 43 Trips

43 Trips x 0.25 (25%) = 11 Trips Enter

43 Trips x 0.75 (75%) = 32 Trips Exit

For PM Peak Hour → 63% Enter/37% Exit

Ln(T) = [0.96 x Ln(53 Dwelling Units)] + 0.20; T = 55.23 ≈ 56 Trips

56 Trips x 0.63 (63%) = 35 Trips Enter

56 Trips x 0.37 (37%) = 21 Trips Exit

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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 x Ln(75 Dwelling Units)] + 2.71; T = 797.98 ≈ 798 Trips (For Even Number)

798 Trips x 0.50 (50%) = 399 Trips Enter/399 Trips Exit

For AM Peak Hour → 25% Enter/75% Exit

T = 0.71 x (75 Dwelling Units) + 4.80; T = 58.05 ≈ 58 Trips

58 Trips x 0.25 (25%) = 14 Trips Enter

58 Trips x 0.75 (75%) = 44 Trips Exit

For PM Peak Hour → 63% Enter/37% Exit

Ln(T) = [0.96 x Ln(75 Dwelling Units)] + 0.20; T = 77.07 ≈ 77 Trips

77 Trips x 0.63 (63%) = 49 Trips Enter

77 Trips x 0.37 (37%) = 28 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)

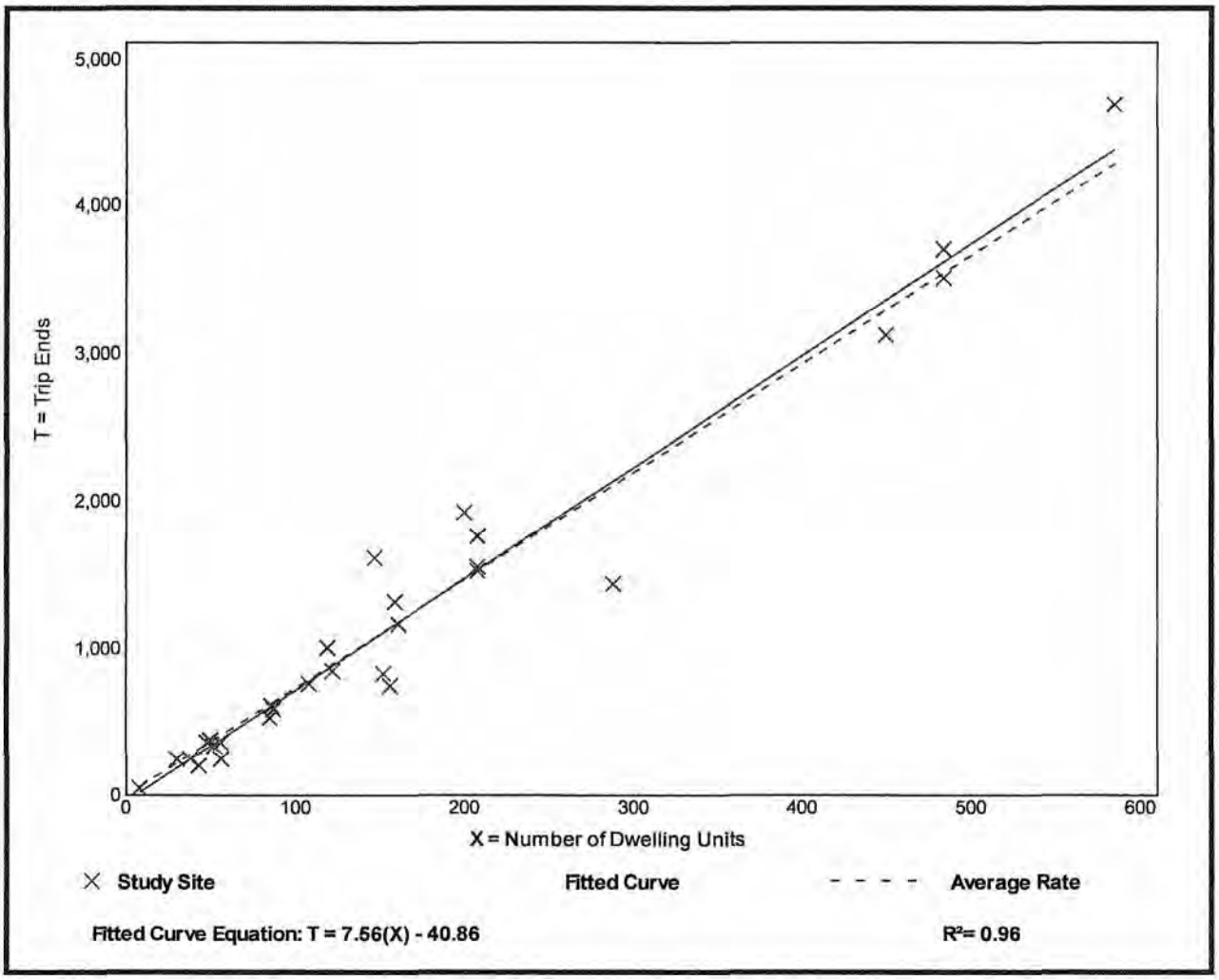
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

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



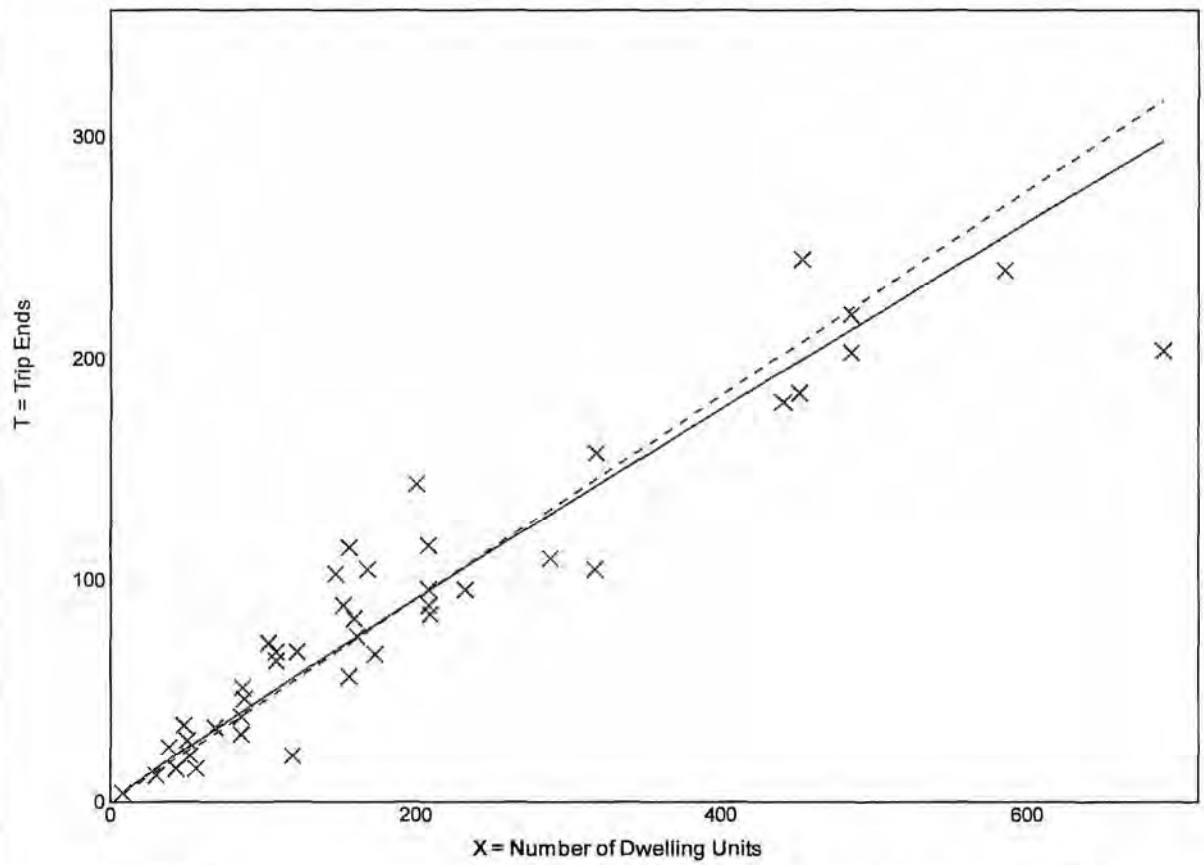
Multifamily Housing (Low-Rise)
(220)

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



Fitted Curve Equation: Ln(T) = 0.95 Ln(X) - 0.51 R^2**= 0.90**

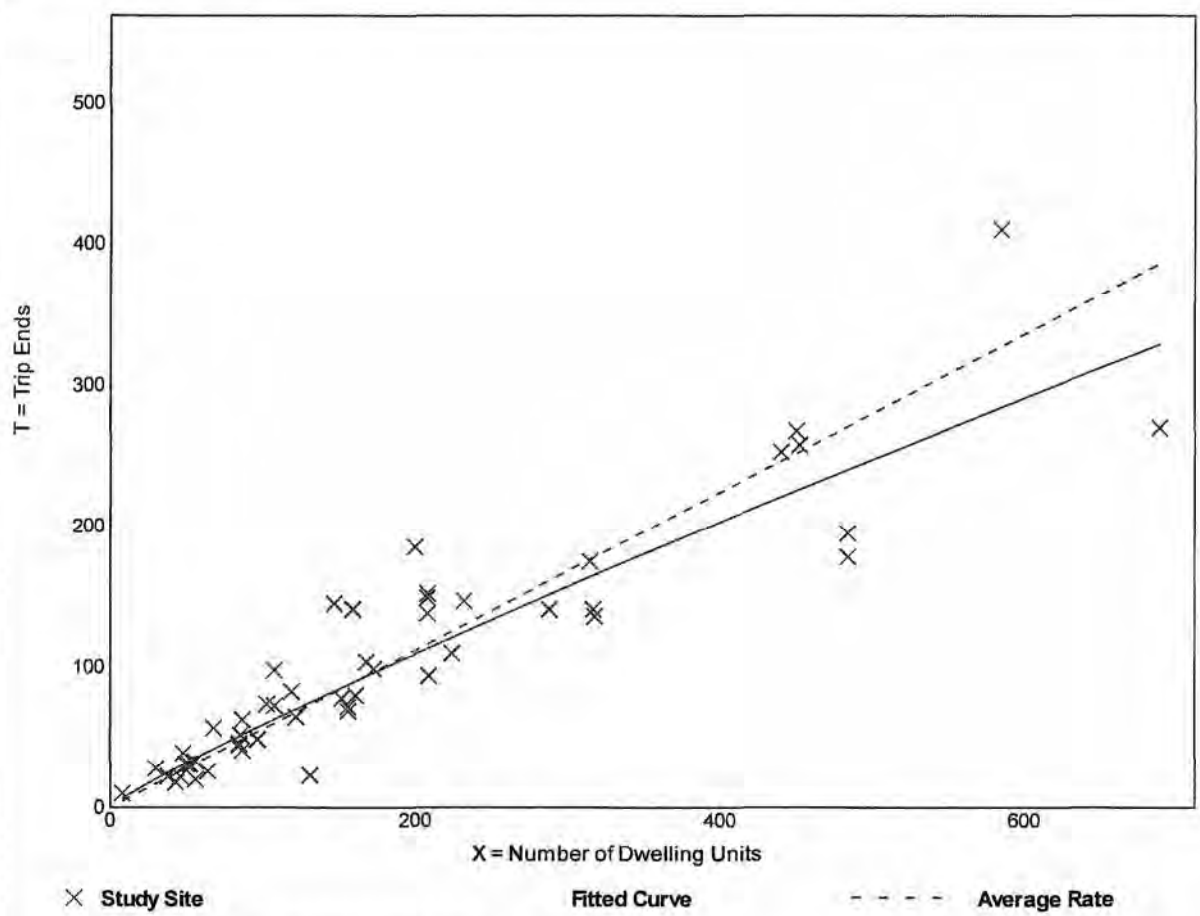
Multifamily Housing (Low-Rise)
(220)

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



Fitted Curve Equation: Ln(T) = 0.89 Ln(X) - 0.02 R^2**= 0.86**

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)

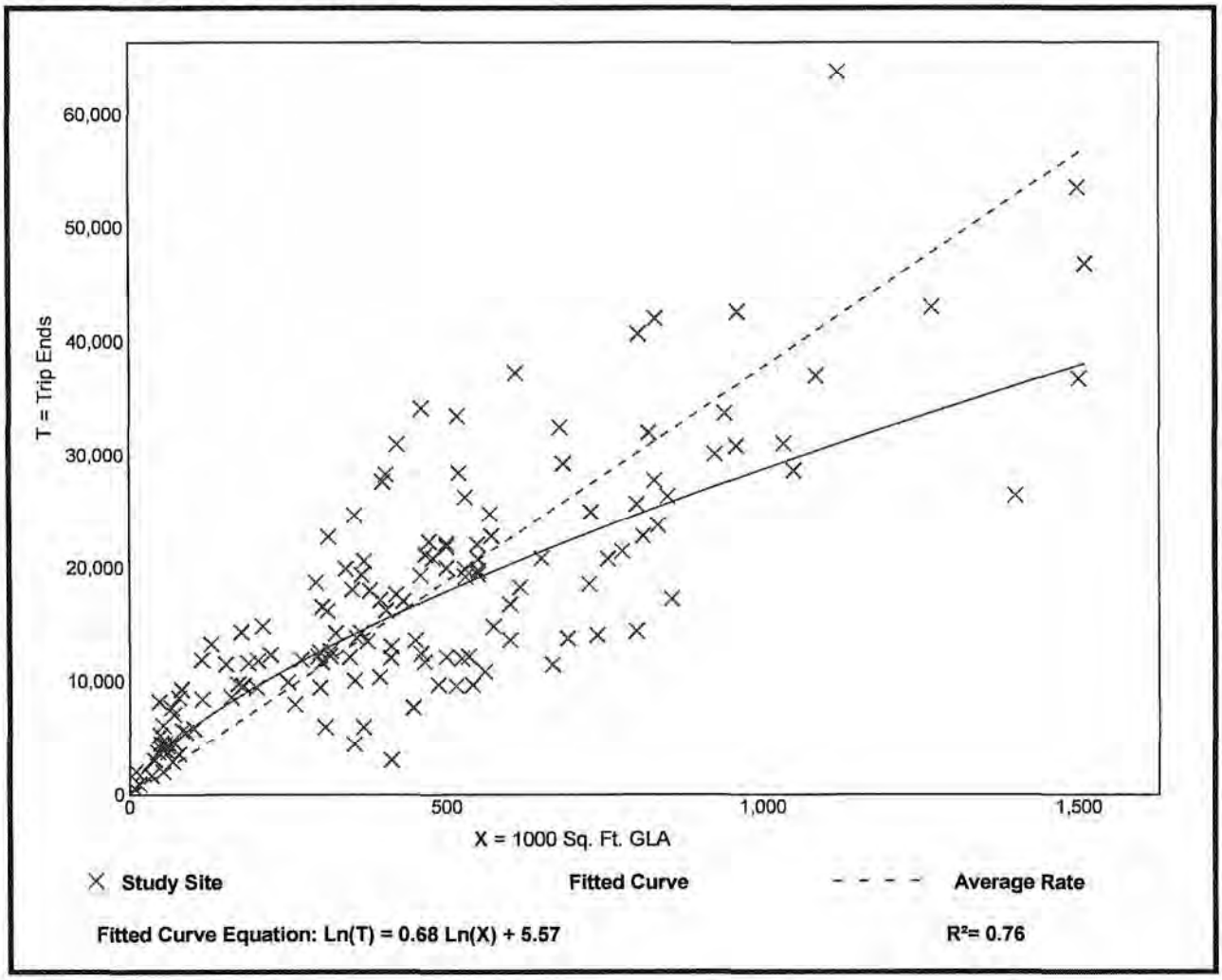
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

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



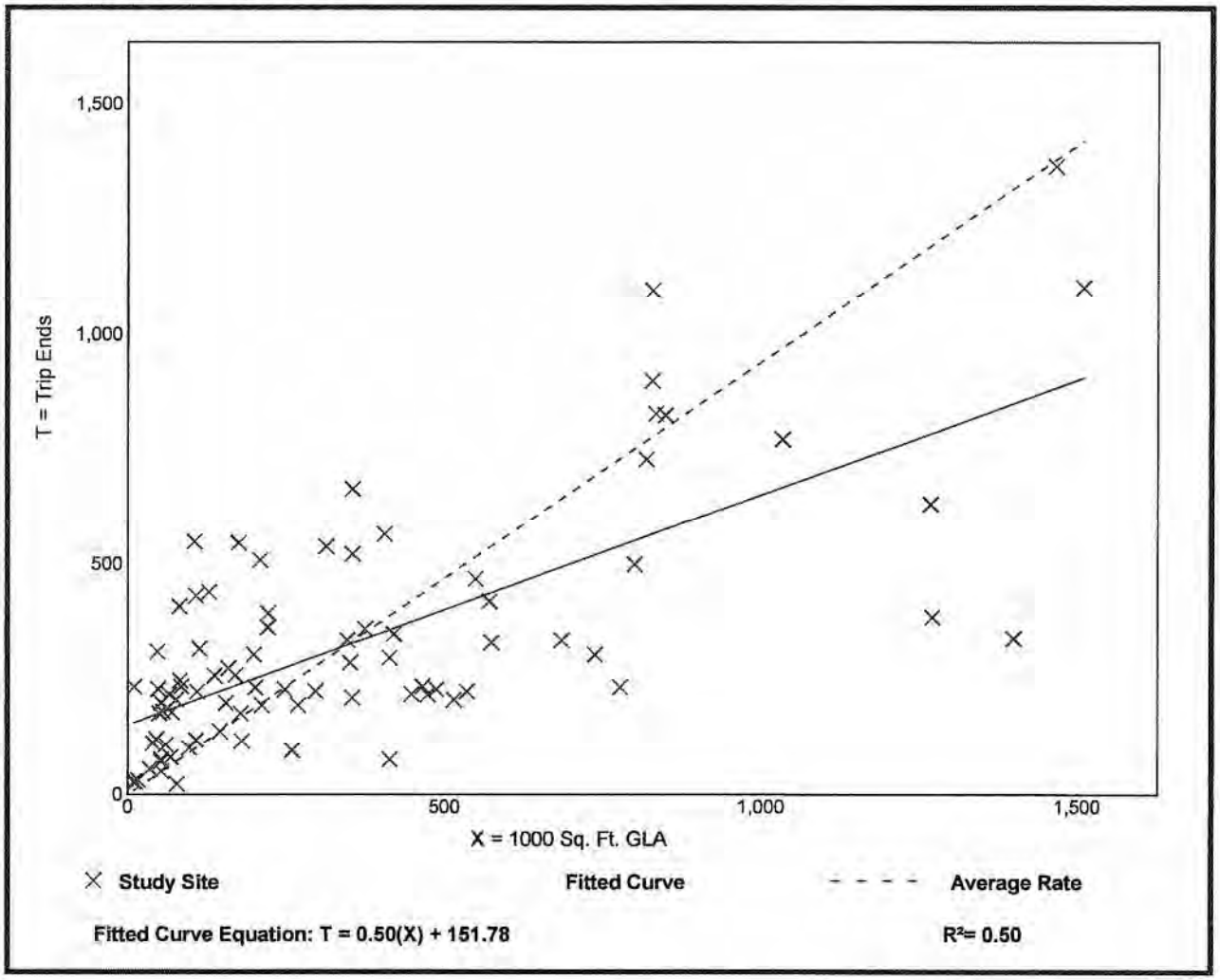
Shopping Center
(820)

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



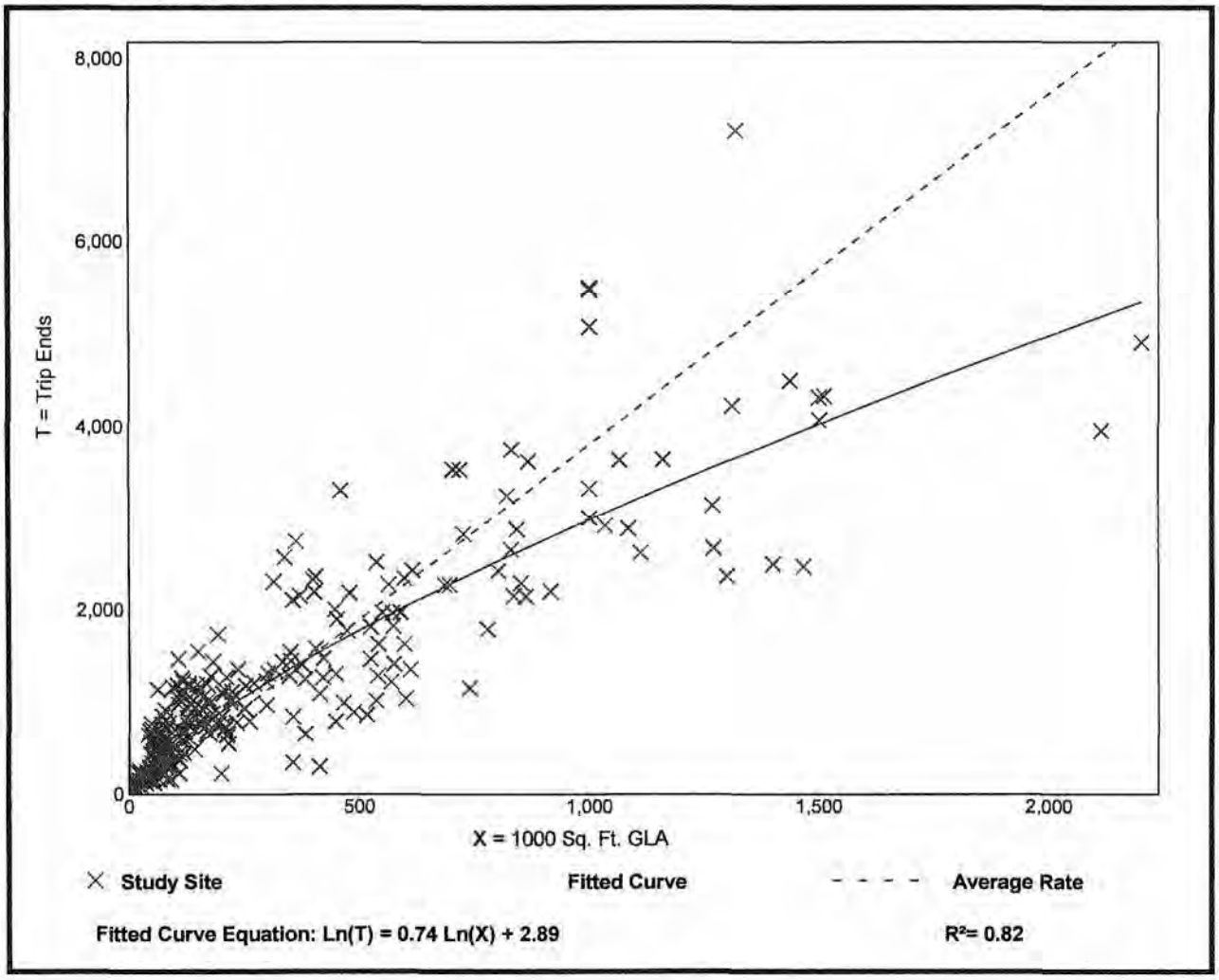
Shopping Center
(820)

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



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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 x (100 Dwelling Units)] – 40.86; T = 715.14 ≈ 716 Trips (For Even Number)

716 Trips x 0.50 (50%) = 358 Trips Enter/358 Trips Exit

For AM Peak Hour → 23% Enter/77% Exit

Ln(T) = [0.95 x Ln(100 Dwelling Units)] – 0.51; T = 47.70 ≈ 48 Trips

48 Trips x 0.23 (23%) = 11 Trips Enter

48 Trips x 0.77 (77%) = 37 Trips Exit

For PM Peak Hour → 63% Enter/37% Exit

Ln(T) = [0.89 x Ln(100 Dwelling Units)] – 0.02; T = 59.06 ≈ 59 Trips

59 Trips x 0.63 (63%) = 37 Trips Enter

59 Trips x 0.37 (37%) = 22 Trips Exit

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May 1, 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 x Ln(304.92 KSF)] + 5.57; T = 12,831.18 ≈ 12,832 Trips (For Even Number)

12,832 Trips x 0.50 (50%) = 6,416 Trips Enter/6,416 Trips Exit

For AM Peak Hour → 62% Enter/38% Exit

T = 0.94 x 304.92 KSF; T = 286.62 ≈ 287 Trips

Pass-by Trips = N/A

Primary Trips = 287 x 0.62 (62%) and 287 x 0.38 (38%) = 178 Trips Enter/109 Trips Exit

For PM Peak Hour → 48% Enter/52% Exit

Ln(T) = [0.74 x Ln(304.92 KSF)] + 2.89; T = 1,239.96 ≈ 1,240 Trips

Pass-by Trips = 0.34 (34%) x 1,240 Trips = 426 Trips

Pass-by Trips = 426 Trips x 0.50 (50%) = 213 Trips Enter/213 Trips Exit

Primary Trips = 1,240 – 426 = 814 Trips

Primary Trips = 814 x 0.48 (48%) and 814 x 0.52 (52%) = 391 Trips Enter/423 Trips Exit

APPENDIX F
2022/2023/2024/2034 BUILD TRAFFIC SCENARIO
CAPACITY ANALYSIS SUMMARY SHEETS

2022 BUILD

HCS7 Two-Way Stop-Control Report

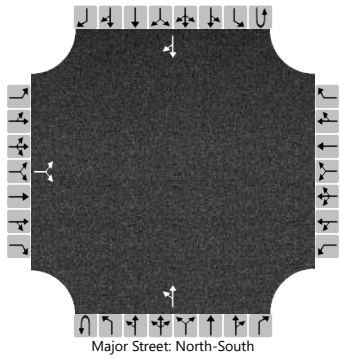
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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		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								1.9							
Approach LOS	B															

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HCS7 Two-Way Stop-Control Report

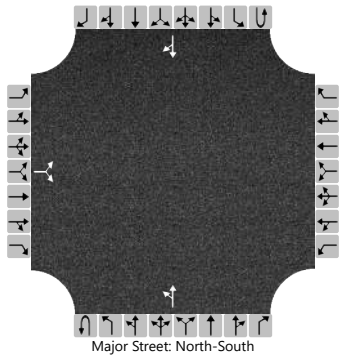
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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		37						65	269				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)			140							71						
Capacity, c (veh/h)			453							1295						
v/c Ratio			0.31							0.05						
95% Queue Length, Q_{95} (veh)			1.3							0.2						
Control Delay (s/veh)			16.5							7.9						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	16.5								2.0							
Approach LOS	C															

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HCS7 Two-Way Stop-Control Report

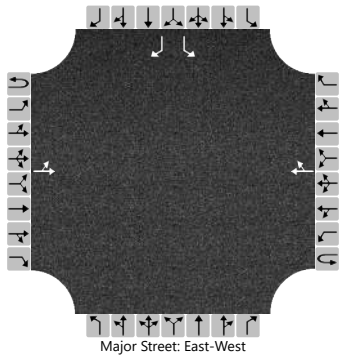
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	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		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			

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HCS7 Two-Way Stop-Control Report

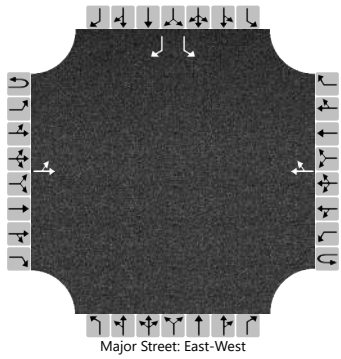
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	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		1	0	1
Configuration		LT						TR						L		R
Volume (veh/h)		27	326				215	15						8		16
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)		29												9		17
Capacity, c (veh/h)		1327												422		802
v/c Ratio		0.02												0.02		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)	0.8												11.0			
Approach LOS													B			

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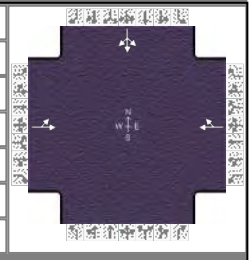
HCS7 Signalized Intersection Input Data

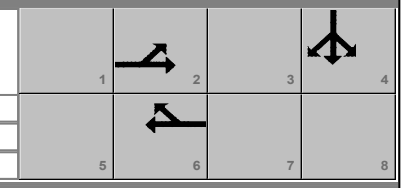
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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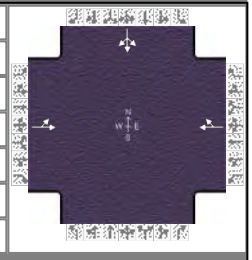
HCS7 Signalized Intersection Results Summary

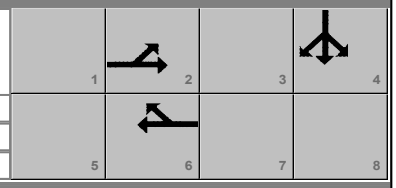
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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



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

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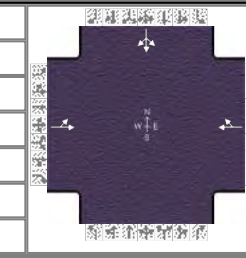
HCS7 Signalized Intersection Intermediate Values

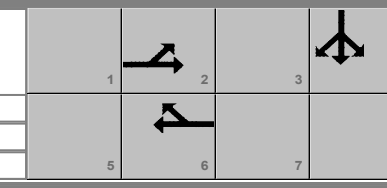
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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})	0.539	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_f), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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

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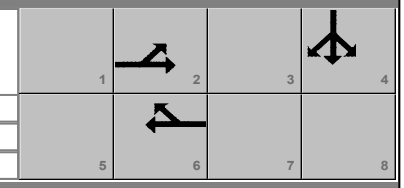
HCS7 Signalized Intersection Results Graphical Summary

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				

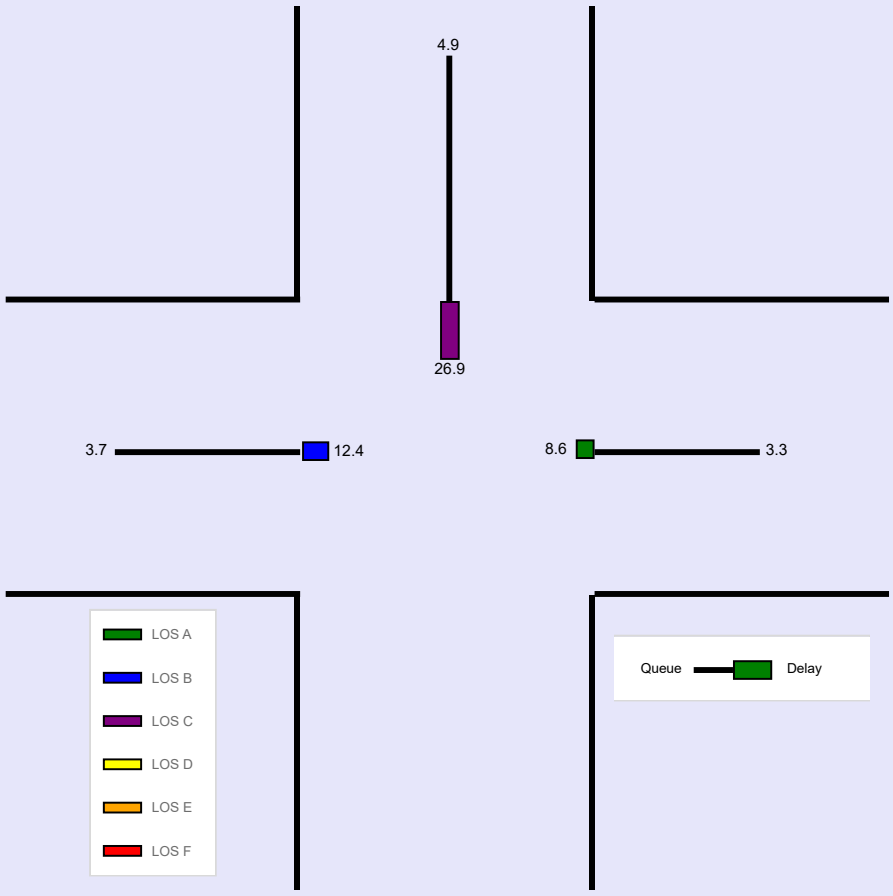
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	185	4			3	219				92	0	55

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
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)		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					



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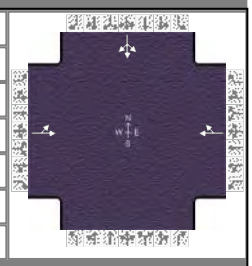
HCS7 Signalized Intersection Input Data

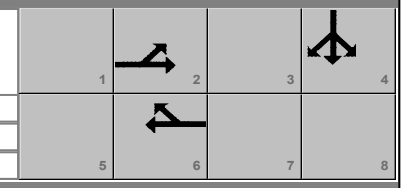
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	205				312	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



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	205				312	0	301
Initial Queue (Q_b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s_o), 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 (*Pg*), %		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 (*lt*), 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	

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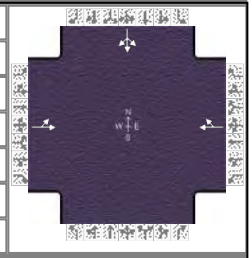
HCS7 Signalized Intersection Results Summary

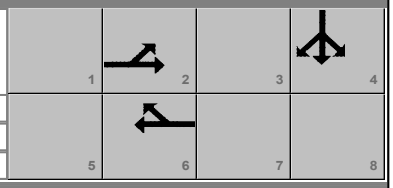
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	205				312	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



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		24.7		12.1				31.9
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			251						666	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		908			1638						1693	
Queue Service Time (g_s), s		12.5			10.1						29.9	
Cycle Queue Clearance Time (g_c), s		22.7			10.1						29.9	
Green Ratio (*g/C*)		0.38			0.38						0.49	
Capacity (*c*), veh/h		414			619						827	
Volume-to-Capacity Ratio (*X*)		0.511			0.406						0.805	
Back of Queue (*Q*), ft/ln (95 th percentile)		169.6			161.3						441	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.8			6.5						17.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Uniform Delay (d_1), s/veh		28.0			20.6						19.4	
Incremental Delay (d_2), s/veh		0.5			0.2						5.4	
Initial Queue Delay (d_3), s/veh		0.0			0.0						0.0	
Control Delay (*d*), s/veh		28.5			20.7						24.8	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	28.5	C		20.7	C		0.0			24.8	C	
Intersection Delay, s/veh / LOS	24.6						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	0.84	A	0.90	A			1.59	B

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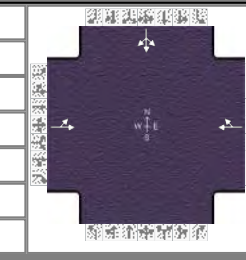
HCS7 Signalized Intersection Intermediate Values

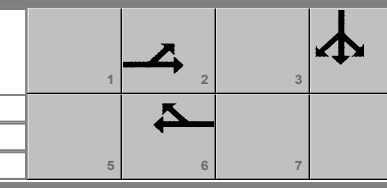
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	205				312	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



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})	0.478	0.478		1.000	0.862					0.898	0.898	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.478		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	717	191	0	0	184	1454				861	0	831
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		1146		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		12.5						
Time to First Blockage (g_f), s		0.5		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.41	-3.64		-3.64	1.10

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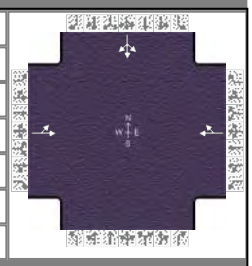
HCS7 Signalized Intersection Results Graphical Summary

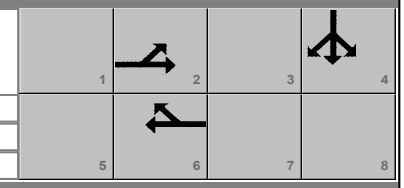
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



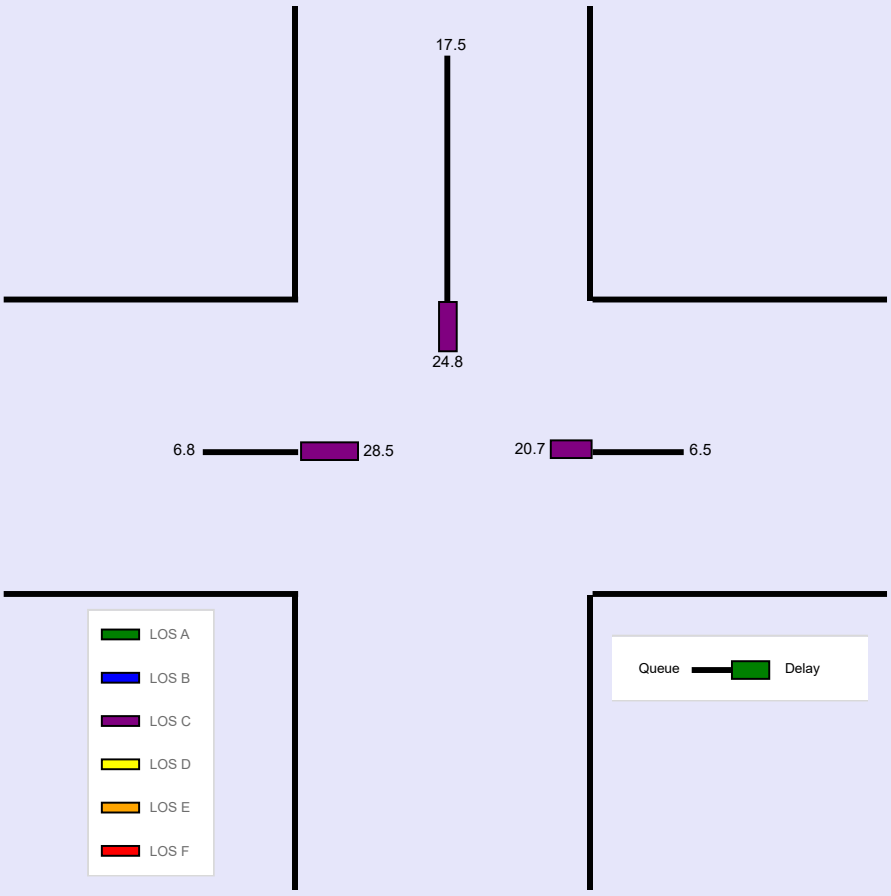
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	154	41			26	205				312	0	301

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)		169.6			161.3						441	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.8			6.5						17.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Control Delay (*d*), s/veh		28.5			20.7						24.8	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	28.5		C	20.7		C	0.0			24.8		C
Intersection Delay, s/veh / LOS	24.6						C					



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HCS7 Two-Way Stop-Control Report

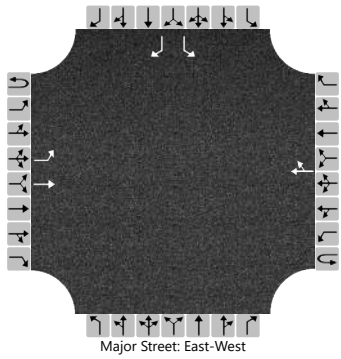
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	BUILD AM PEAK W/ IMP
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		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												663		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)	0.7												9.9			
Approach LOS													A			

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HCS7 Two-Way Stop-Control Report

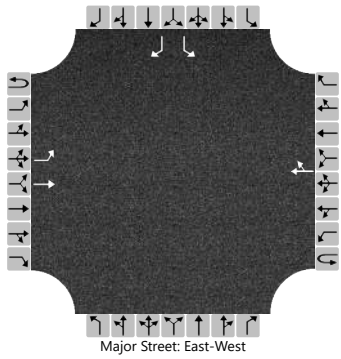
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2022
Time Analyzed	BUILD PM PEAK W/ IMP
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		27	326				215	15						8		16
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)		29												9		17
Capacity, c (veh/h)		1327												424		802
v/c Ratio		0.02												0.02		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)	0.6												10.9			
Approach LOS													B			

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2023 BUILD

HCS7 Two-Way Stop-Control Report

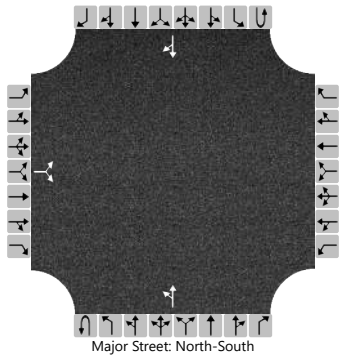
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2023
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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			0.23							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								2.3							
Approach LOS	B															

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HCS7 Two-Way Stop-Control Report

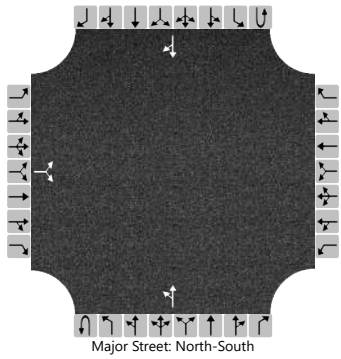
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2023
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			444							1280						
v/c Ratio			0.36							0.06						
95% Queue Length, Q_{95} (veh)			1.6							0.2						
Control Delay (s/veh)			17.5							8.0						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	17.5								2.1							
Approach LOS	C															

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HCS7 Two-Way Stop-Control Report

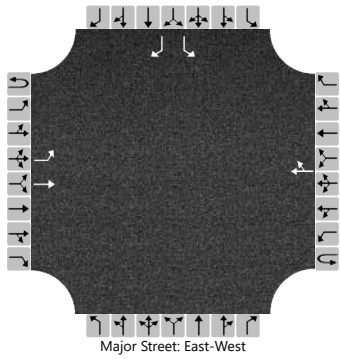
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2023
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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			

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HCS7 Two-Way Stop-Control Report

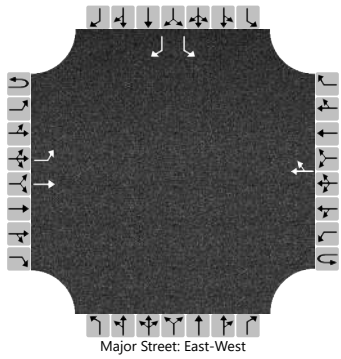
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2023
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		50	335				223	27						15		30
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)		54												16		33
Capacity, c (veh/h)		1303												376		786
v/c Ratio		0.04												0.04		0.04
95% Queue Length, Q_{95} (veh)		0.1												0.1		0.1
Control Delay (s/veh)		7.9												15.0		9.8
Level of Service (LOS)		A												C		A
Approach Delay (s/veh)	1.0												11.5			
Approach LOS													B			

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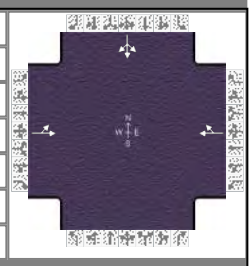
HCS7 Signalized Intersection Input Data

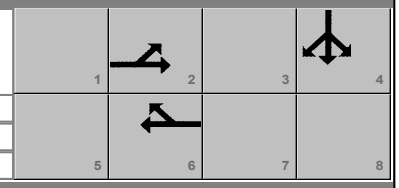
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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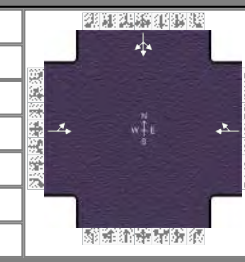
HCS7 Signalized Intersection Results Summary

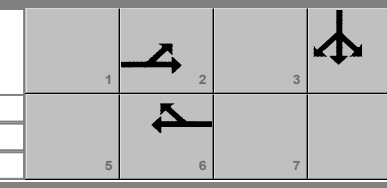
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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		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

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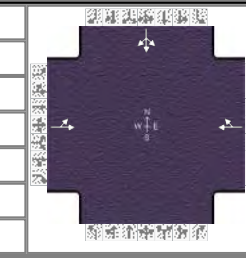
HCS7 Signalized Intersection Intermediate Values

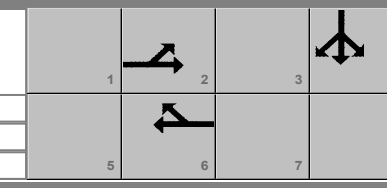
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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})	0.512	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_f), s		0.0		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.35	-3.64	0.45	-3.64		-3.64	0.28

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HCS7 Signalized Intersection Results Graphical Summary

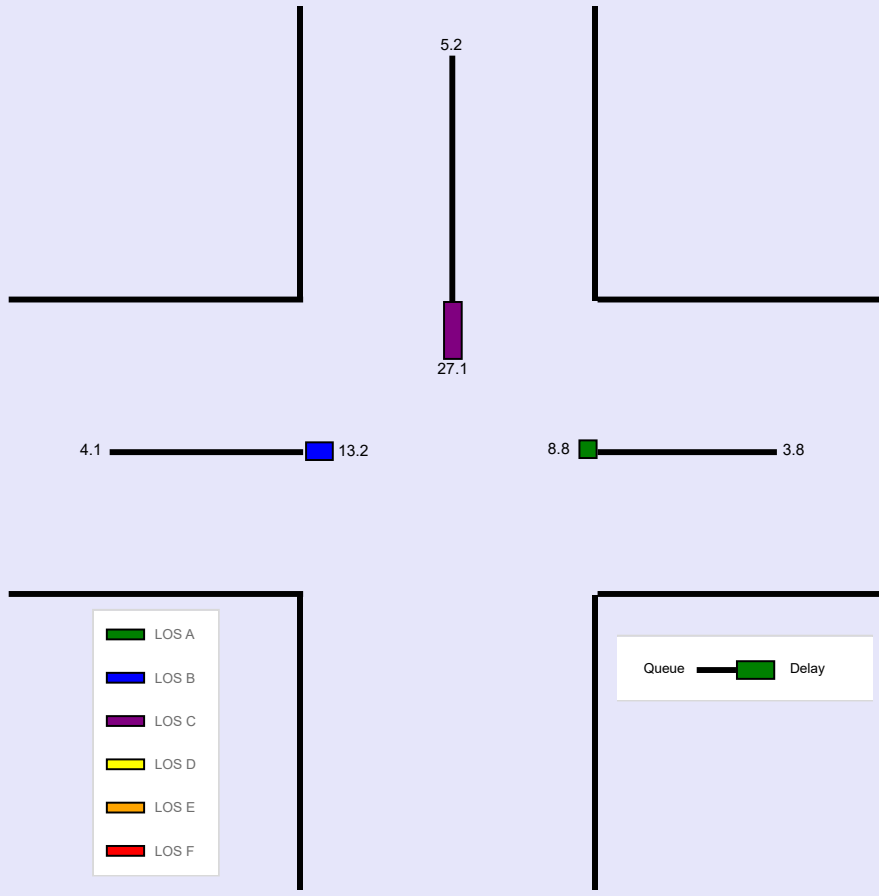
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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

							1	2	3	4
Green	54.0	24.0	0.0	0.0	0.0	0.0	5	6	7	8
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)		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					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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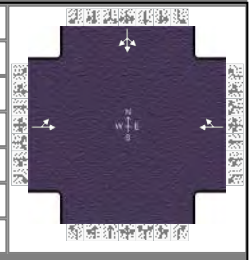
HCS7 Signalized Intersection Input Data

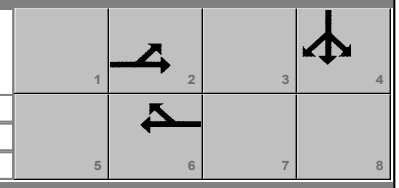
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	226				341	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



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	226				341	0	309
Initial Queue (Q_b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s_o), 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 (*Pg*), %		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 (*lt*), 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	

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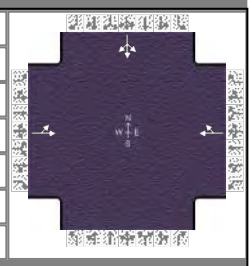
HCS7 Signalized Intersection Results Summary

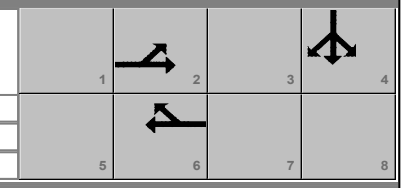
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	226				341	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		27.0		13.3				34.9
Green Extension Time (g_e), s		0.7		1.1				1.4
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.13		0.00				0.09

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			275						707	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		853			1637						1696	
Queue Service Time (g_s), s		13.7			11.3						32.9	
Cycle Queue Clearance Time (g_c), s		25.0			11.3						32.9	
Green Ratio (*g/C*)		0.38			0.38						0.49	
Capacity (*c*), veh/h		393			618						829	
Volume-to-Capacity Ratio (*X*)		0.561			0.445						0.852	
Back of Queue (*Q*), ft/ln (95 th percentile)		185.6			179.5						494.2	
Back of Queue (*Q*), veh/ln (95 th percentile)		7.4			7.2						19.6	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Uniform Delay (d_1), s/veh		29.3			20.9						20.2	
Incremental Delay (d_2), s/veh		1.1			0.2						8.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0						0.0	
Control Delay (*d*), s/veh		30.4			21.1						28.3	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	30.4	C		21.1	C		0.0			28.3	C	
Intersection Delay, s/veh / LOS	27.0						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

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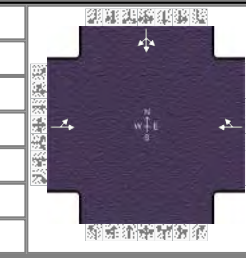
HCS7 Signalized Intersection Intermediate Values

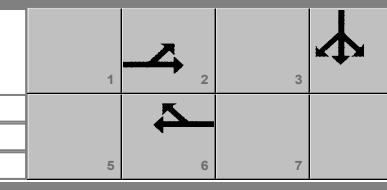
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2023 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	226				341	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})	0.449	0.449		1.000	0.861					0.899	0.899	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.449		0.000	0.861					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	668	185	0	0	175	1462				890	0	806
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)		0.10			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		1122		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		22.7		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		13.7						
Time to First Blockage (g_f), s		0.6		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.159
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	1.17

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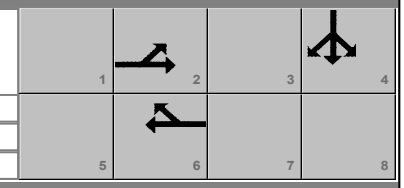
HCS7 Signalized Intersection Results Graphical Summary

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				

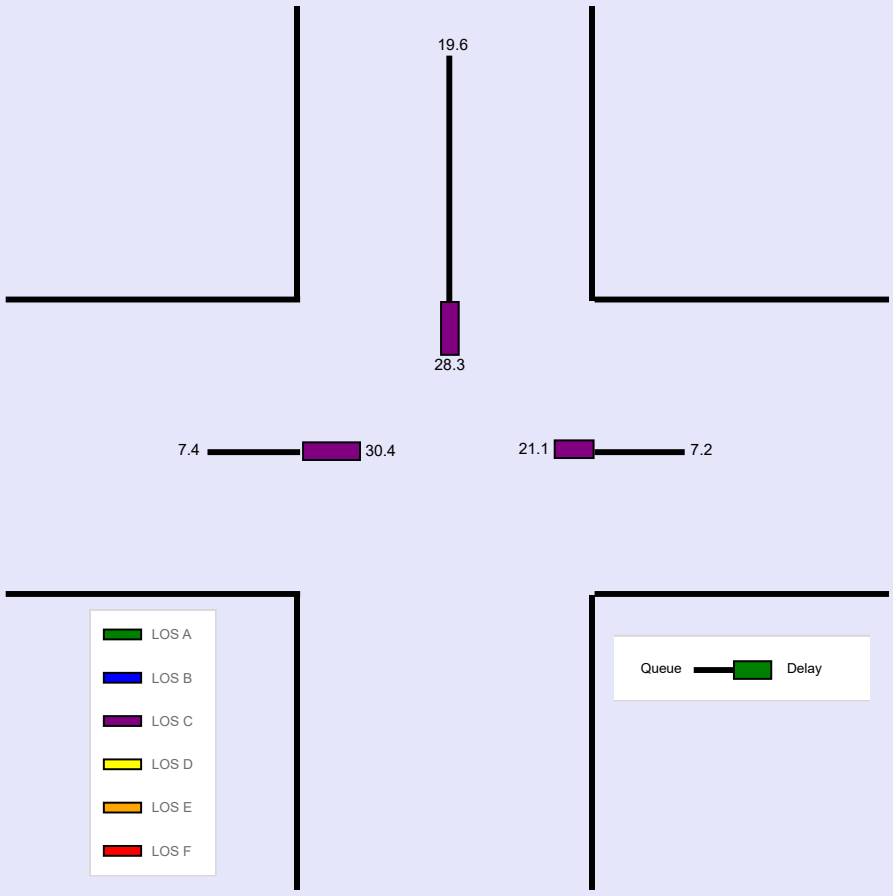
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	159	44			27	226				341	0	309

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)		185.6			179.5						494.2	
Back of Queue (*Q*), veh/ln (95 th percentile)		7.4			7.2						19.6	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Control Delay (*d*), s/veh		30.4			21.1						28.3	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	30.4		C	21.1		C	0.0			28.3		C
Intersection Delay, s/veh / LOS	27.0						C					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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2024 BUILD

HCS7 Two-Way Stop-Control Report

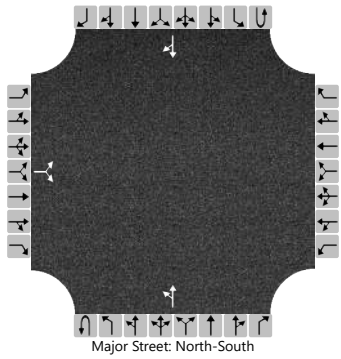
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2024
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			589							1209						
v/c Ratio			0.25							0.04						
95% Queue Length, Q_{95} (veh)			1.0							0.1						
Control Delay (s/veh)			13.2							8.1						
Level of Service (LOS)			B							A						
Approach Delay (s/veh)	13.2								2.8							
Approach LOS	B															

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HCS7 Two-Way Stop-Control Report

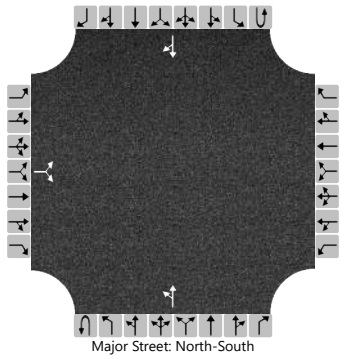
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2024
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		98		60						80	288				214	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)			172							87						
Capacity, c (veh/h)			432							1266						
v/c Ratio			0.40							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								2.3							
Approach LOS	C															

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HCS7 Two-Way Stop-Control Report

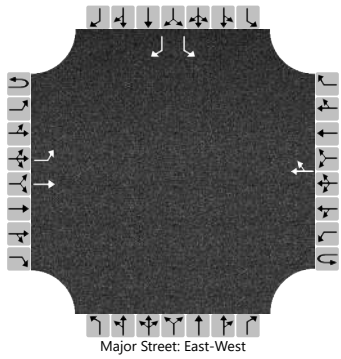
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2024
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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			

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HCS7 Two-Way Stop-Control Report

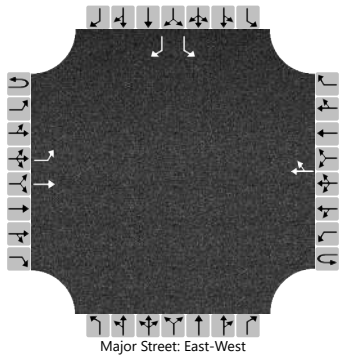
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2024
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		82	343				230	44						25		48
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)		89												27		52
Capacity, c (veh/h)		1275												321		770
v/c Ratio		0.07												0.08		0.07
95% Queue Length, Q_{95} (veh)		0.2												0.3		0.2
Control Delay (s/veh)		8.0												17.3		10.0
Level of Service (LOS)		A												C		B
Approach Delay (s/veh)	1.6												12.5			
Approach LOS													B			

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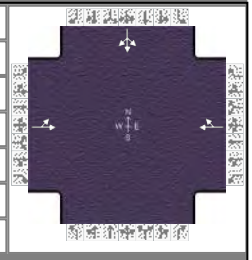
HCS7 Signalized Intersection Input Data

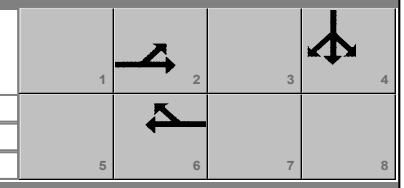
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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



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_o), 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 (*Pg*), %		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 (*lt*), 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	

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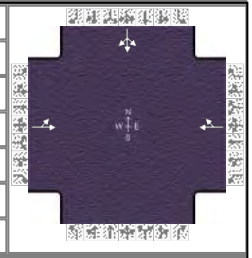
HCS7 Signalized Intersection Results Summary

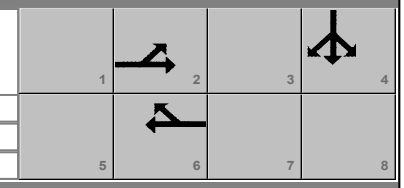
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
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
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		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		
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			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

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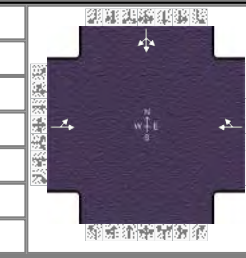
HCS7 Signalized Intersection Intermediate Values

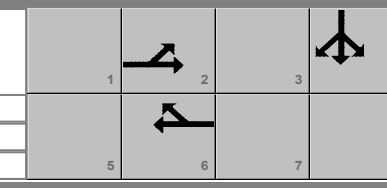
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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
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})	0.482	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_f), s		0.1		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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
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	0.36	-3.64	0.51	-3.64		-3.64	0.30

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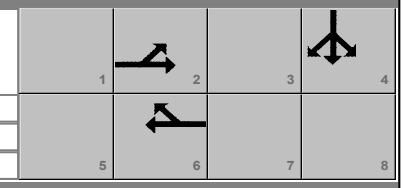
HCS7 Signalized Intersection Results Graphical Summary

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				

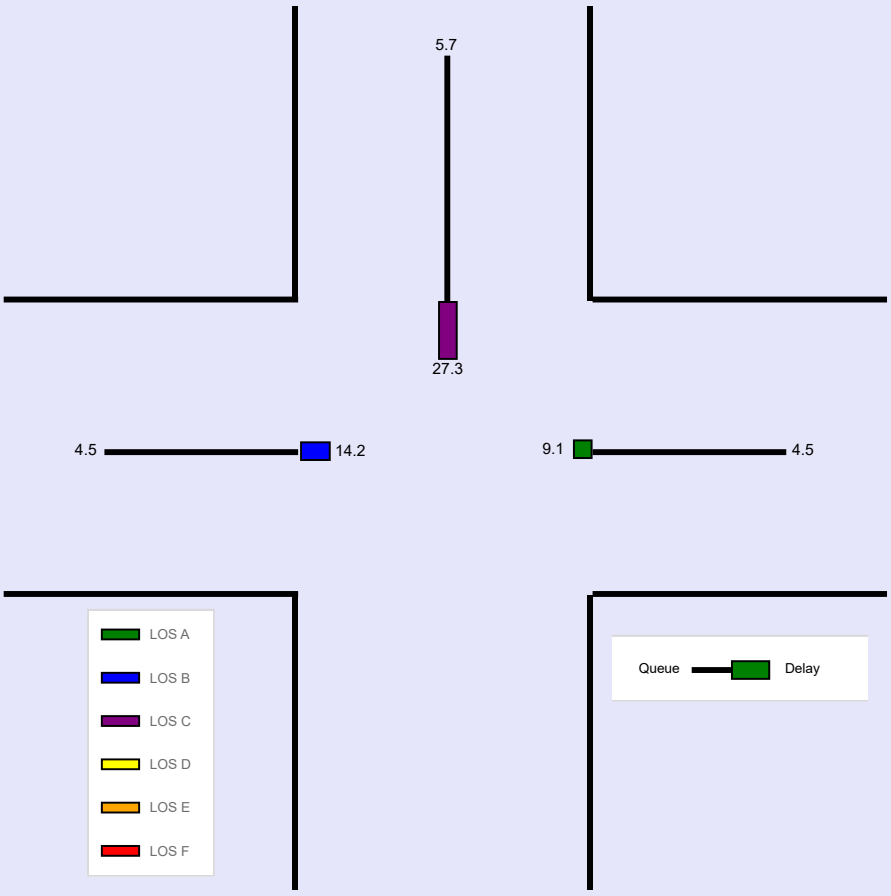
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197	6			7	279				112	0	58

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
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)		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					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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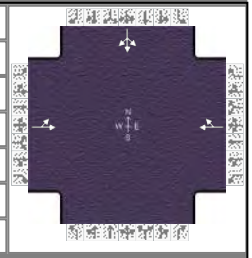
HCS7 Signalized Intersection Input Data

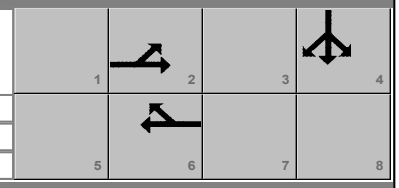
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	48			29	249				377	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



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	48			29	249				377	0	317
Initial Queue (Q_b), veh/h	0	0			0	0				0	0	0
Base Saturation Flow Rate (s_o), 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 (*Pg*), %		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 (*lt*), 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	

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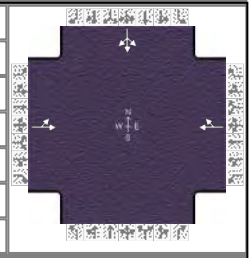
HCS7 Signalized Intersection Results Summary

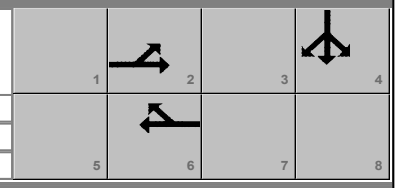
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	48			29	249				377	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		3.4		3.4				3.2
Queue Clearance Time (g_s), s		29.7		14.7				38.7
Green Extension Time (g_e), s		0.6		1.2				1.1
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.62		0.00				0.46

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		230			302						754	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		792			1636						1699	
Queue Service Time (g_s), s		15.0			12.7						36.7	
Cycle Queue Clearance Time (g_c), s		27.7			12.7						36.7	
Green Ratio (*g/C*)		0.38			0.38						0.49	
Capacity (*c*), veh/h		370			618						831	
Volume-to-Capacity Ratio (*X*)		0.623			0.489						0.908	
Back of Queue (*Q*), ft/ln (95 th percentile)		203			198.7						574.4	
Back of Queue (*Q*), veh/ln (95 th percentile)		8.1			7.9						22.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Uniform Delay (d_1), s/veh		30.9			21.4						21.1	
Incremental Delay (d_2), s/veh		2.4			0.2						13.4	
Initial Queue Delay (d_3), s/veh		0.0			0.0						0.0	
Control Delay (*d*), s/veh		33.3			21.6						34.6	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	33.3	C		21.6	C		0.0			34.6	C	
Intersection Delay, s/veh / LOS	31.3						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	0.87	A	0.99	A			1.73	B

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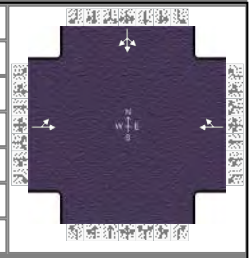
HCS7 Signalized Intersection Intermediate Values

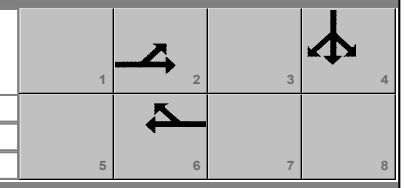
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	48			29	249				377	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})	0.417	0.417		1.000	0.861					0.901	0.901	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.417		0.000	0.861					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	612	179	0	0	171	1466				923	0	776
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)		0.15			0.04						0.42	

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		1094		1374				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		21.3		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		15.0						
Time to First Blockage (g_f), s		0.6		34.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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	0.159
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	0.38	-3.64	0.50	-3.64		-3.64	1.24

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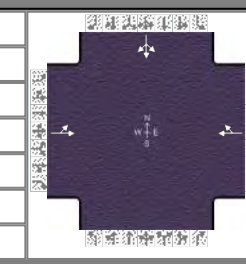
HCS7 Signalized Intersection Results Graphical Summary

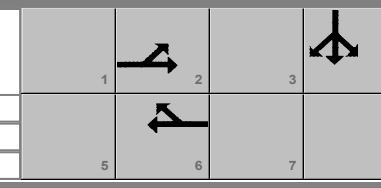
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2024 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



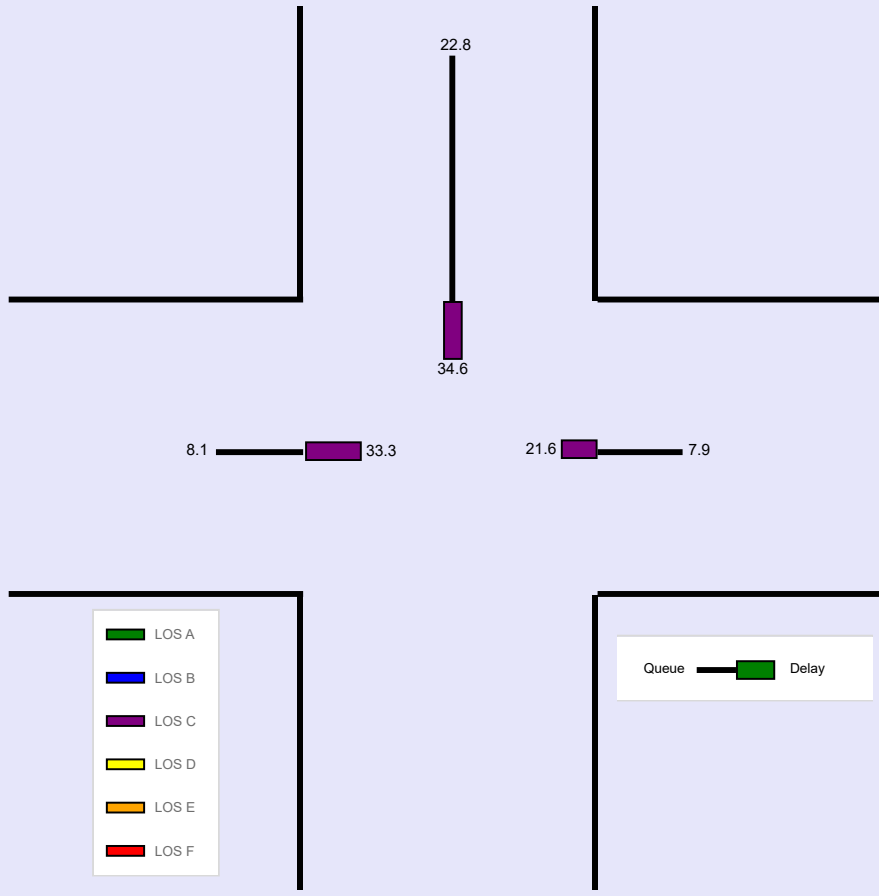
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	164	48			29	249				377	0	317

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)		203			198.7						574.4	
Back of Queue (*Q*), veh/ln (95 th percentile)		8.1			7.9						22.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00						0.00	
Control Delay (*d*), s/veh		33.3			21.6						34.6	
Level of Service (LOS)		C			C						C	
Approach Delay, s/veh / LOS	33.3		C	21.6		C	0.0			34.6		C
Intersection Delay, s/veh / LOS	31.3						C					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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2034 BUILD

HCS7 Two-Way Stop-Control Report

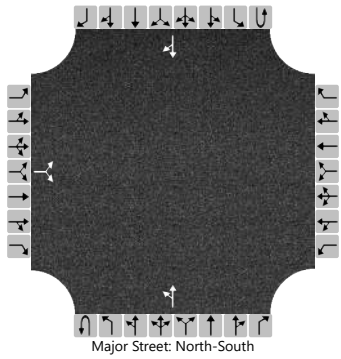
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		122		48						23	118				244	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)			523							1092						
v/c Ratio			0.35							0.02						
95% Queue Length, Q_{95} (veh)			1.6							0.1						
Control Delay (s/veh)			15.6							8.4						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	15.6								1.5							
Approach LOS	C															

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HCS7 Two-Way Stop-Control Report

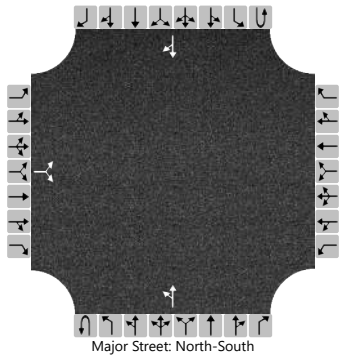
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	North-South
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	BUSEY & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	BUSEY RD
North/South Street	HILL/BUSEY
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	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)		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)			295							1150						
v/c Ratio			0.64							0.08						
95% Queue Length, Q_{95} (veh)			4.1							0.3						
Control Delay (s/veh)			36.6							8.4						
Level of Service (LOS)			E							A						
Approach Delay (s/veh)	36.6								2.2							
Approach LOS	E															

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HCS7 Two-Way Stop-Control Report

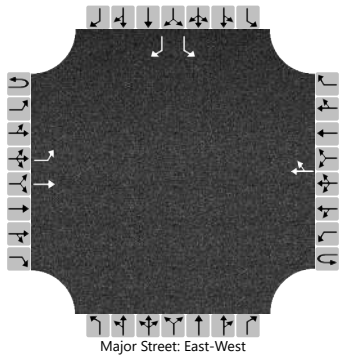
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	BUILD AM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		23	117				277	15						24		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)		25												26		50
Capacity, c (veh/h)		1254												533		736
v/c Ratio		0.02												0.05		0.07
95% Queue Length, Q_{95} (veh)		0.1												0.2		0.2
Control Delay (s/veh)		7.9												12.1		10.3
Level of Service (LOS)		A												B		B
Approach Delay (s/veh)	1.3												10.9			
Approach LOS													B			

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HCS7 Two-Way Stop-Control Report

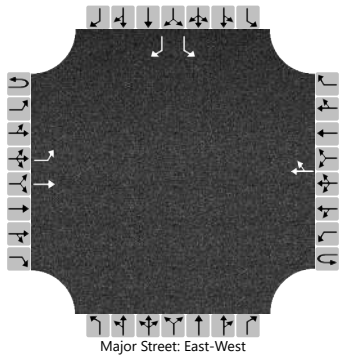
General Information

Analyst	SKG
Agency/Co.	CESO
Date Performed	1/15/2020
Analysis Year	2034
Time Analyzed	BUILD PM PEAK HOUR
Intersection Orientation	East-West
Project Description	GREENGATE RESIDENTIAL DEV. TIS

Site Information

Intersection	GREENGATE & HILL
Jurisdiction	CANAL WINCHESTER
East/West Street	HILL RD
North/South Street	GREENGATE BLVD
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
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)		66	435				300	40						33		48
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)		72												36		52
Capacity, c (veh/h)		1200												268		700
v/c Ratio		0.06												0.13		0.07
95% Queue Length, Q_{95} (veh)		0.2												0.5		0.2
Control Delay (s/veh)		8.2												20.5		10.6
Level of Service (LOS)		A												C		B
Approach Delay (s/veh)	1.1												14.6			
Approach LOS													B			

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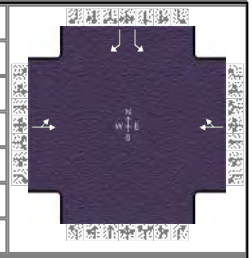
HCS7 Signalized Intersection Input Data

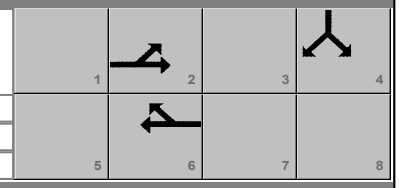
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	17			13	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
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	17			13	310				123		73
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}), %		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 (*Pg*), %		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 (*lt*), 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	

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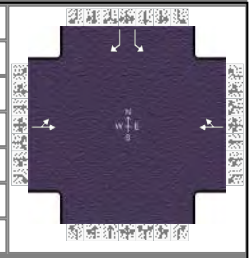
HCS7 Signalized Intersection Results Summary

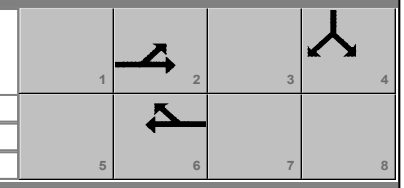
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	17			13	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
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		30.7		12.6				7.3
Green Extension Time (g_e), s		1.7		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		298			351					134		79
Adjusted Saturation Flow Rate (*s*), veh/h/ln		849			1544					1810		1610
Queue Service Time (g_s), s		18.1			10.6					5.3		3.4
Cycle Queue Clearance Time (g_c), s		28.7			10.6					5.3		3.4
Green Ratio (*g/C*)		0.60			0.60					0.27		0.27
Capacity (*c*), veh/h		587			927					483		429
Volume-to-Capacity Ratio (*X*)		0.507			0.379					0.277		0.185
Back of Queue (*Q*), ft/ln (95 th percentile)		178.3			139.1					99.5		57.5
Back of Queue (*Q*), veh/ln (95 th percentile)		7.0			5.3					4.0		2.3
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00					0.40		0.00
Uniform Delay (d_1), s/veh		16.6			9.3					26.1		25.5
Incremental Delay (d_2), s/veh		0.3			0.1					0.1		0.1
Initial Queue Delay (d_3), s/veh		0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh		16.9			9.4					26.2		25.5
Level of Service (LOS)		B			A					C		C
Approach Delay, s/veh / LOS	16.9	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	0.98	A	1.07	A				F

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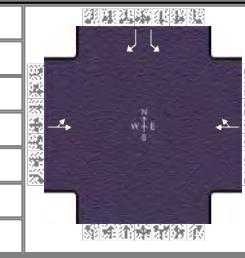
HCS7 Signalized Intersection Intermediate Values

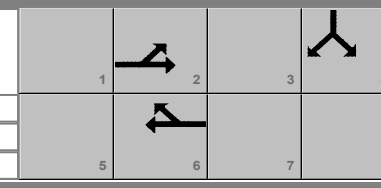
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	17			13	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
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})	0.458	0.458		1.000	0.853					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.458		0.000	0.853					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	797	53	0	0	62	1482				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)		0.05			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		1046		1416				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		18.1						
Time to First Blockage (g_f), s		0.1		54.0				0.0
Queue Service Time Before Blockage (g_{fs}), 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
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	0.49	-3.64	0.58	-3.64		-3.64	

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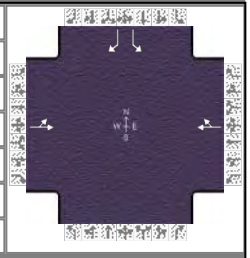
HCS7 Signalized Intersection Results Graphical Summary

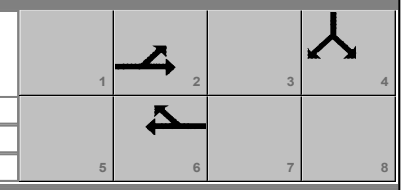
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	File Name	HILL & KINGS AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



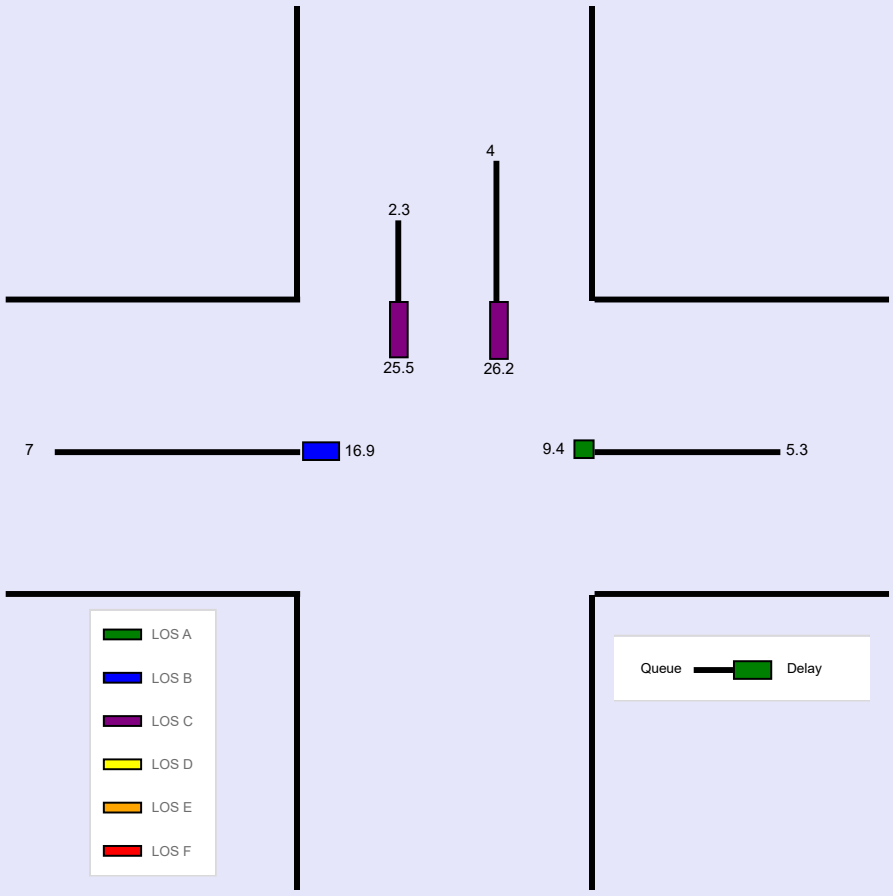
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	257	17			13	310				123		73

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
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)		178.3			139.1					99.5		57.5
Back of Queue (*Q*), veh/ln (95 th percentile)		7.0			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		16.9			9.4					26.2		25.5
Level of Service (LOS)		B			A					C		C
Approach Delay, s/veh / LOS	16.9		B	9.4		A	0.0			26.0		C
Intersection Delay, s/veh / LOS	16.1						B					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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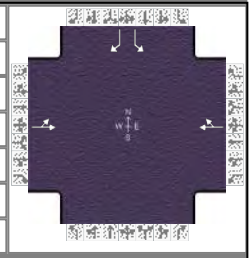
HCS7 Signalized Intersection Input Data

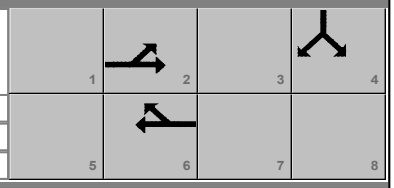
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	288				419		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	44.0	34.0	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



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	288				419		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 (*Pg*), %		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		44.0		44.0				34.0
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 (*lt*), 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	

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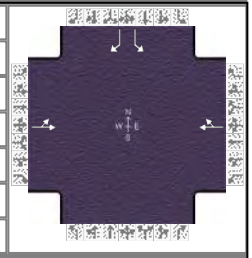
HCS7 Signalized Intersection Results Summary

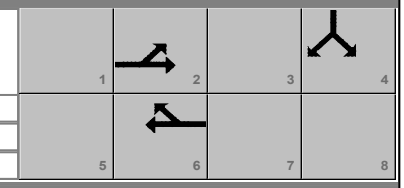
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	288				419		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	44.0	34.0	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				9.0
Phase Duration, s		50.0		50.0				40.0
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		40.1		15.6				22.7
Green Extension Time (g_e), s		0.9		1.8				1.7
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.83		0.00				0.06

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			378					455		435
Adjusted Saturation Flow Rate (*s*), veh/h/ln		826			1654					1810		1610
Queue Service Time (g_s), s		24.4			13.6					18.8		20.7
Cycle Queue Clearance Time (g_c), s		38.1			13.6					18.8		20.7
Green Ratio (*g/C*)		0.49			0.49					0.38		0.38
Capacity (*c*), veh/h		474			808					684		608
Volume-to-Capacity Ratio (*X*)		0.741			0.468					0.666		0.715
Back of Queue (*Q*), ft/ln (95 th percentile)		287.1			201.3					314.2		315.4
Back of Queue (*Q*), veh/ln (95 th percentile)		11.5			8.1					12.6		12.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00					1.26		0.00
Uniform Delay (d_1), s/veh		26.8			15.2					23.3		23.9
Incremental Delay (d_2), s/veh		5.4			0.2					2.0		3.4
Initial Queue Delay (d_3), s/veh		0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh		32.3			15.4					25.3		27.3
Level of Service (LOS)		C			B					C		C
Approach Delay, s/veh / LOS	32.3	C		15.4	B		0.0			26.3	C	
Intersection Delay, s/veh / LOS	25.0						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

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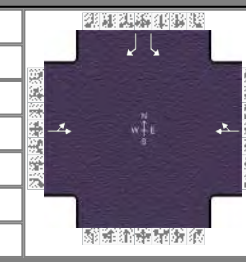
HCS7 Signalized Intersection Intermediate Values

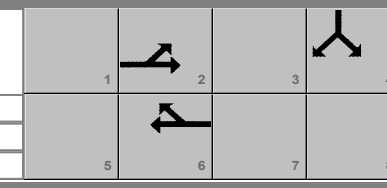
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	Mar 4, 2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	HILL RD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	HILL RD & KINGS CRO…	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	288				419		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	44.0	34.0	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})	0.435	0.435		1.000	0.870					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.435		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	617	210	0	0	285	1369				1810	0	1610
Proportion of Vehicles Arriving on Green (P)	0.49	0.49	0.00	0.00	0.49	0.49	0.00	0.00	0.00	0.38	0.00	0.38
Incremental Delay Factor (k)		0.26			0.04					0.19		0.24

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)		0.49		0.49				0.38
Permitted Saturation Flow Rate (s_p), veh/h/ln		1020		1328				1810
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0		1900				
Permitted Effective Green Time (g_p), s		44.0		0.0				0.0
Permitted Service Time (g_u), s		30.4		0.0				0.0
Permitted Queue Service Time (g_{ps}), s		24.4						
Time to First Blockage (g_f), s		0.7		44.0				0.0
Queue Service Time Before Blockage (g_{fs}), s		0.7						
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
Pedestrian F_s / F_{delay}	0.000	0.099	0.000	0.099	0.000	0.157	0.000	0.159
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	977.78	11.76	977.78	11.76		50.14		52.27
Bicycle F_w / F_v	-3.64	0.58	-3.64	0.62	-3.64		-3.64	

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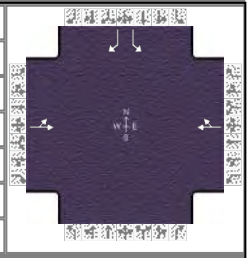
HCS7 Signalized Intersection Results Graphical Summary

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				

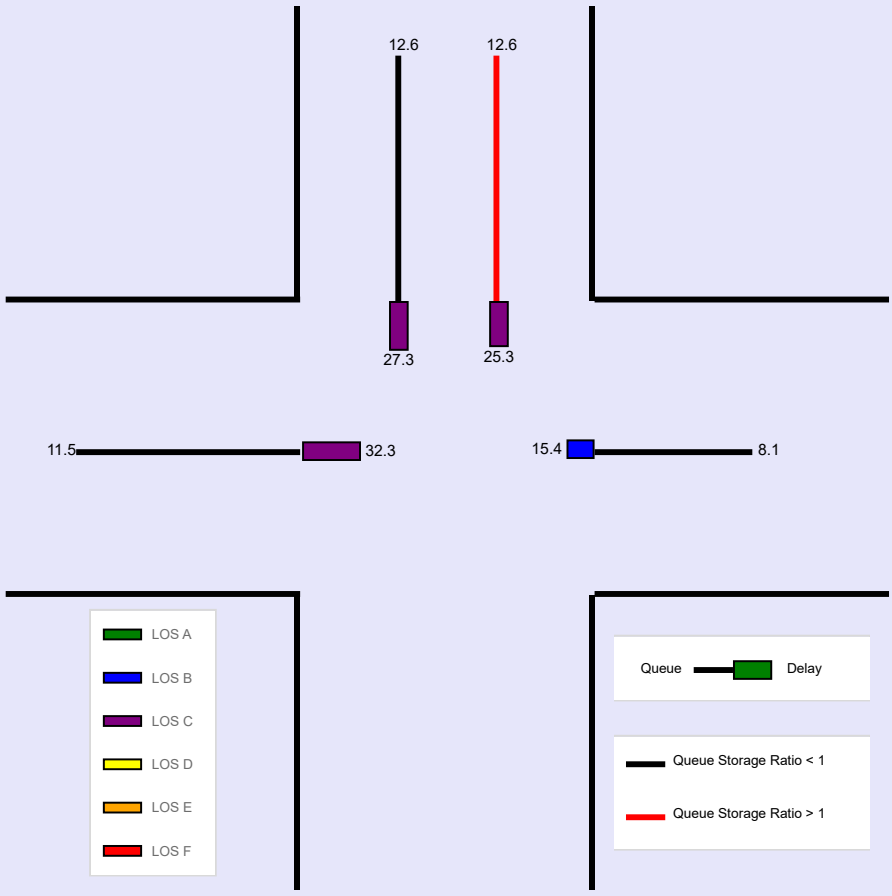


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	241	82			60	288				419		400

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	44.0	34.0	0.0	0.0	0.0	0.0	1	2	3	4
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				

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)		287.1			201.3					314.2		315.4
Back of Queue (*Q*), veh/ln (95 th percentile)		11.5			8.1					12.6		12.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00					1.26		0.00
Control Delay (*d*), s/veh		32.3			15.4					25.3		27.3
Level of Service (LOS)		C			B					C		C
Approach Delay, s/veh / LOS	32.3		C	15.4		B	0.0			26.3		C
Intersection Delay, s/veh / LOS	25.0						C					



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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

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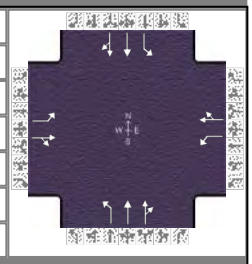
HCS7 Signalized Intersection Input Data

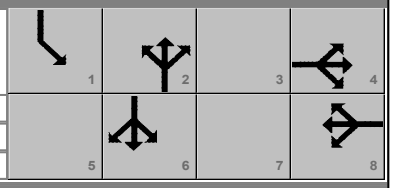
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	8	1	13	63	1	32	59	564	39	32	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	8	1	13	63	1	32	59	564	39	32	803	27
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), 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	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	
Turn Bay Length, ft	100	0		175	0		195	0		450	0	
Grade (*Pg*), %		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		38.0		38.0		46.0	16.0	62.0
Yellow Change Interval (*Y*), s		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
Minimum Green (G_{min}), s		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
Recall Mode		Off		Off		Min	Off	Min
Dual Entry		Yes		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	

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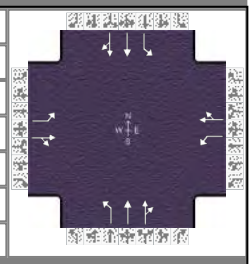
HCS7 Signalized Intersection Results Summary

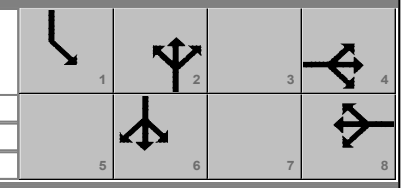
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	8	1	13	63	1	32	59	564	39	32	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		6.0		6.0		6.3	1.0	4.0
Phase Duration, s		38.0		38.0		46.0	16.0	62.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.4		3.4		0.0	3.0	0.0
Queue Clearance Time (g_s), s		4.1		6.2			2.9	
Green Extension Time (g_e), s		0.2		0.2		0.0	0.0	0.0
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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	9	15		68	36		64	331	324	35	454	448
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1079	1514		1420	1618		608	1826	1784	1810	1870	1849
Queue Service Time (g_s), s	0.6	0.7		3.5	1.5		7.1	13.3	13.3	0.9	14.1	14.1
Cycle Queue Clearance Time (g_c), s	2.1	0.7		4.2	1.5		7.1	13.3	13.3	0.9	14.1	14.1
Green Ratio (*g/C*)	0.32	0.32		0.32	0.32		0.40	0.40	0.40	0.52	0.56	0.56
Capacity (*c*), veh/h	401	484		517	518		315	730	714	464	1047	1035
Volume-to-Capacity Ratio (*X*)	0.022	0.031		0.133	0.069		0.203	0.453	0.454	0.075	0.433	0.433
Back of Queue (*Q*), ft/ln (95 th percentile)	8.1	12.1		53.3	26.9		49.6	250.3	236.8	15.6	239.5	233.7
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	0.5		2.1	1.1		1.9	9.6	9.5	0.6	9.4	9.3
Queue Storage Ratio (*RQ*) (95 th percentile)	0.08	0.00		0.30	0.00		0.25	0.00	0.00	0.03	0.00	0.00
Uniform Delay (d_1), s/veh	24.4	23.4		24.8	23.6		20.1	22.0	22.0	13.0	12.8	12.8
Incremental Delay (d_2), s/veh	0.0	0.0		0.0	0.0		1.5	2.0	2.1	0.0	1.3	1.3
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	24.4	23.4		24.8	23.7		21.6	24.0	24.1	13.0	14.1	14.1
Level of Service (LOS)	C	C		C	C		C	C	C	B	B	B
Approach Delay, s/veh / LOS	23.7	C		24.4	C		23.8	C		14.1	B	
Intersection Delay, s/veh / LOS	18.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.28	B	2.28	B	1.91	B	1.89	B
Bicycle LOS Score / LOS	0.53	A	0.66	A	1.08	A	1.26	A

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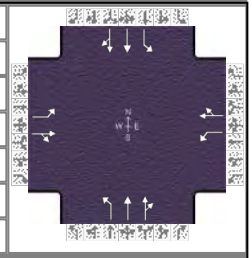
HCS7 Signalized Intersection Intermediate Values

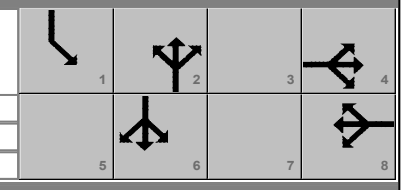
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	8	1	13	63	1	32	59	564	39	32	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	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	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.568	0.000		0.748	0.000		0.320	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.857	0.857		0.851	0.851		0.977	0.977		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	1079	108	1406	1420	49	1569	608	3377	233	1810	3598	121
Proportion of Vehicles Arriving on Green (P)	0.32	0.32	0.32	0.32	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
Green Ratio (g/C)		0.32		0.32		0.40	0.52	0.56
Permitted Saturation Flow Rate (s_p), veh/h/ln		1079		1420		608	790	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s		32.0		32.0		40.0	42.0	0.0
Permitted Service Time (g_u), s		30.5		31.3		40.0	26.7	0.0
Permitted Queue Service Time (g_{ps}), s		0.6		3.5		7.1	0.7	
Time to First Blockage (g_f), s		0.0		0.0		0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
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	1.557	0.000	1.557	0.000	1.198	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.126	0.000	0.126	0.000	0.116	0.000	0.091
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	640.00	23.12	640.00	23.12	800.00	18.00	1120.00	9.68
Bicycle F_w / F_v	-3.64	0.04	-3.64	0.17	-3.64	0.59	-3.64	0.77

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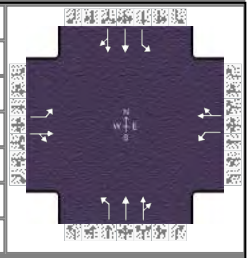
HCS7 Signalized Intersection Results Graphical Summary

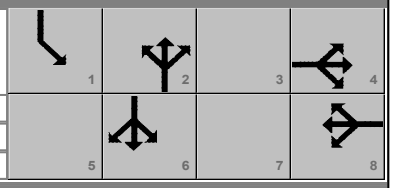
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	AM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	File Name	DILEY & HOWE AM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



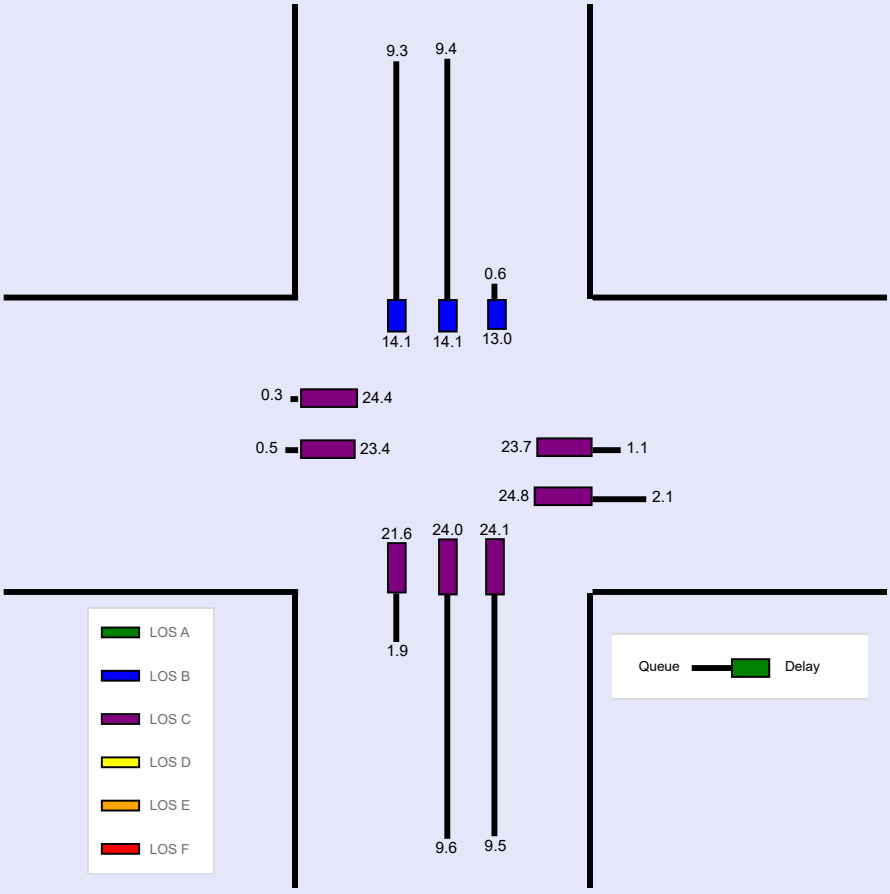
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	8	1	13	63	1	32	59	564	39	32	803	27

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	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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)	8.1	12.1		53.3	26.9		49.6	250.3	236.8	15.6	239.5	233.7
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	0.5		2.1	1.1		1.9	9.6	9.5	0.6	9.4	9.3
Queue Storage Ratio (*RQ*) (95 th percentile)	0.08	0.00		0.30	0.00		0.25	0.00	0.00	0.03	0.00	0.00
Control Delay (*d*), s/veh	24.4	23.4		24.8	23.7		21.6	24.0	24.1	13.0	14.1	14.1
Level of Service (LOS)	C	C		C	C		C	C	C	B	B	B
Approach Delay, s/veh / LOS	23.7	C		24.4	C		23.8	C		14.1	B	
Intersection Delay, s/veh / LOS	18.7						B					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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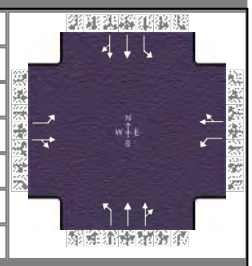
HCS7 Signalized Intersection Input Data

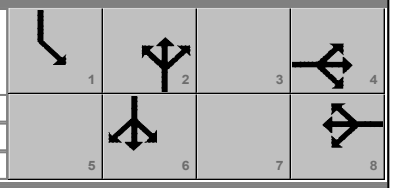
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	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	18	1	48	147	1	75	9	1124	136	117	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	18	1	48	147	1	75	9	1124	136	117	835	8
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), 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	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	
Turn Bay Length, ft	100	0		175	0		195	0		450	0	
Grade (*Pg*), %		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		32.0		32.0		52.0	16.0	68.0
Yellow Change Interval (*Y*), s		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
Minimum Green (G_{min}), s		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
Recall Mode		Off		Off		Min	Off	Min
Dual Entry		Yes		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	

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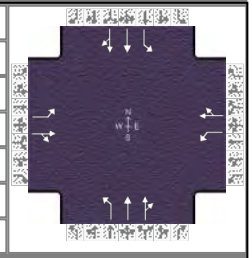
HCS7 Signalized Intersection Results Summary

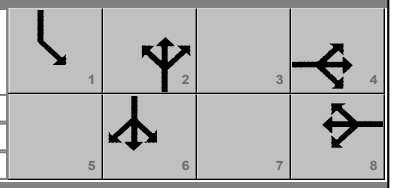
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	File Name	DILEY & HOWE PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	18	1	48	147	1	75	9	1124	136	117	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		6.0		6.0		6.3	1.0	4.0
Phase Duration, s		32.0		32.0		52.0	16.0	68.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.4		3.4		0.0	3.0	0.0
Queue Clearance Time (g_s), s		7.2		14.6			5.2	
Green Extension Time (g_e), s		0.6		0.5		0.0	0.1	0.0
Phase Call Probability		1.00		1.00			1.00	
Max Out Probability		0.00		0.00			0.10	

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	20	53		160	83		10	696	674	127	459	457
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1336	1615		1372	1613		619	1885	1814	1810	1885	1879
Queue Service Time (g_s), s	1.2	2.5		10.1	4.0		0.9	31.6	31.9	3.2	12.2	12.2
Cycle Queue Clearance Time (g_c), s	5.2	2.5		12.6	4.0		0.9	31.6	31.9	3.2	12.2	12.2
Green Ratio (*g/C*)	0.26	0.26		0.26	0.26		0.46	0.46	0.46	0.58	0.62	0.62
Capacity (*c*), veh/h	366	420		394	419		357	867	834	310	1169	1165
Volume-to-Capacity Ratio (*X*)	0.053	0.127		0.405	0.197		0.027	0.802	0.808	0.411	0.393	0.393
Back of Queue (*Q*), ft/ln (95 th percentile)	17.1	44.5		152.6	70.5		5.8	522.5	508.1	50.7	203	200.9
Back of Queue (*Q*), veh/ln (95 th percentile)	0.7	1.8		6.1	2.8		0.2	20.7	20.3	2.0	8.1	8.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17	0.00		0.87	0.00		0.03	0.00	0.00	0.11	0.00	0.00
Uniform Delay (d_1), s/veh	30.9	28.3		33.1	28.9		14.8	23.1	23.2	17.9	9.5	9.5
Incremental Delay (d_2), s/veh	0.0	0.0		0.2	0.1		0.1	7.8	8.3	0.3	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	30.9	28.4		33.4	28.9		15.0	30.9	31.5	18.2	10.5	10.5
Level of Service (LOS)	C	C		C	C		B	C	C	B	B	B
Approach Delay, s/veh / LOS	29.0	C		31.9	C		31.0	C		11.5	B	
Intersection Delay, s/veh / LOS	23.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.29	B	2.29	B	1.90	B	1.88	B
Bicycle LOS Score / LOS	0.61	A	0.89	A	1.63	B	1.35	A

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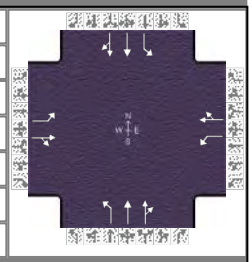
HCS7 Signalized Intersection Intermediate Values

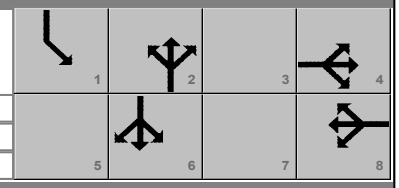
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	File Name	DILEY & HOWE PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	18	1	48	147	1	75	9	1124	136	117	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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	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	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.703	0.000		0.722	0.000		0.326	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.850	0.850		0.849	0.849		0.962	0.962		0.997	0.997
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	1336	33	1582	1372	21	1592	619	3301	398	1810	3728	36
Proportion of Vehicles Arriving on Green (P)	0.26	0.26	0.26	0.26	0.26	0.26	0.46	0.46	0.46	0.10	0.62	0.62
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
Green Ratio (g/C)		0.26		0.26		0.46	0.58	0.62
Permitted Saturation Flow Rate (s_p), veh/h/ln		1336		1372		619	403	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s		26.0		26.0		46.0	48.0	0.0
Permitted Service Time (g_u), s		22.0		23.5		46.0	14.1	0.0
Permitted Queue Service Time (g_{ps}), s		1.2		10.1		0.9	14.1	
Time to First Blockage (g_f), s		0.0		0.0		0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
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	1.557	0.000	1.557	0.000	1.198	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.133	0.000	0.133	0.000	0.107	0.000	0.079
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	520.00	27.38	520.00	27.38	920.00	14.58	1240.00	7.22
Bicycle F_w / F_v	-3.64	0.12	-3.64	0.40	-3.64	1.14	-3.64	0.86

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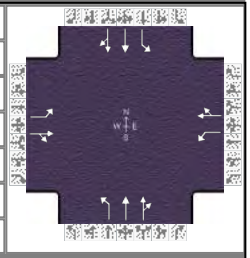
HCS7 Signalized Intersection Results Graphical Summary

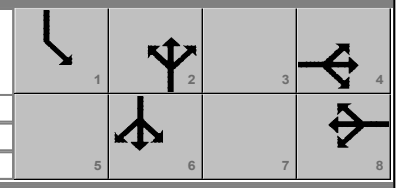
General Information				Intersection Information	
Agency	CESO			Duration, h	0.250
Analyst	SKG	Analysis Date	3/4/2020	Area Type	Other
Jurisdiction	CANAL WINCHESTER	Time Period	PM PEAK HOUR	PHF	0.92
Urban Street	DILEY ROAD	Analysis Year	2034 BUILD	Analysis Period	1> 7:00
Intersection	DILEY & HOWE/GREE…	File Name	DILEY & HOWE PM.xus		
Project Description	GREENGATE DEVELOPMENT TIS				



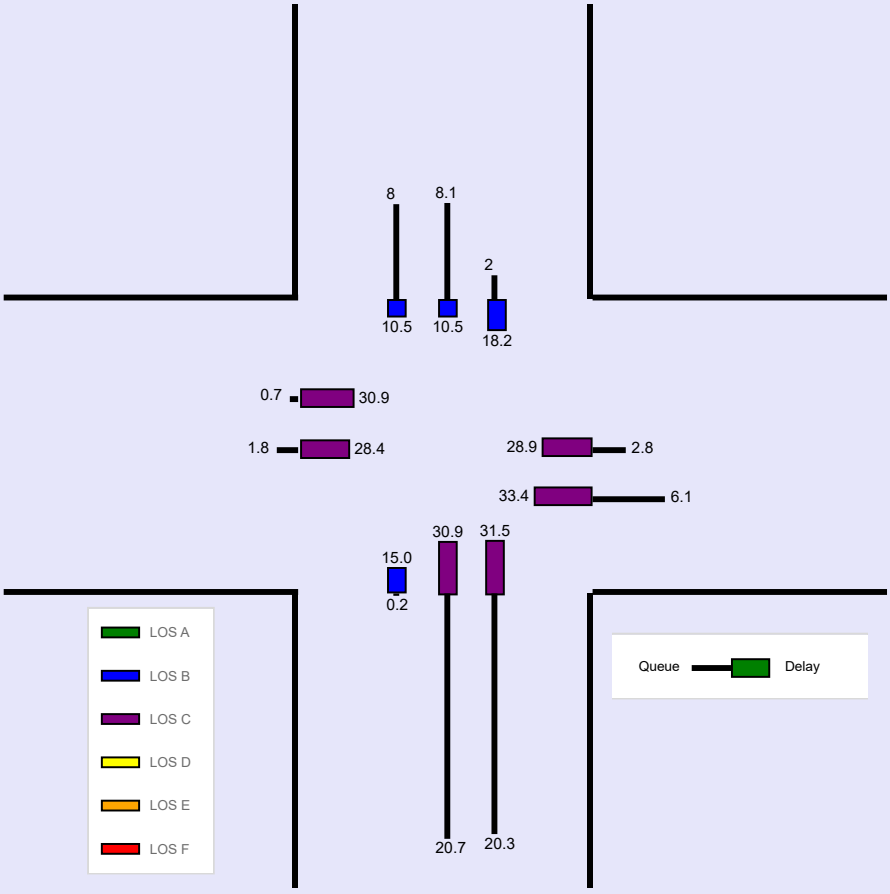
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	18	1	48	147	1	75	9	1124	136	117	835	8

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	46.0	26.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	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)	17.1	44.5		152.6	70.5		5.8	522.5	508.1	50.7	203	200.9
Back of Queue (*Q*), veh/ln (95 th percentile)	0.7	1.8		6.1	2.8		0.2	20.7	20.3	2.0	8.1	8.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17	0.00		0.87	0.00		0.03	0.00	0.00	0.11	0.00	0.00
Control Delay (*d*), s/veh	30.9	28.4		33.4	28.9		15.0	30.9	31.5	18.2	10.5	10.5
Level of Service (LOS)	C	C		C	C		B	C	C	B	B	B
Approach Delay, s/veh / LOS	29.0	C		31.9	C		31.0	C		11.5	B	
Intersection Delay, s/veh / LOS	23.6						C					



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--- Messages ---

No errors or warnings exist.

--- Comments ---

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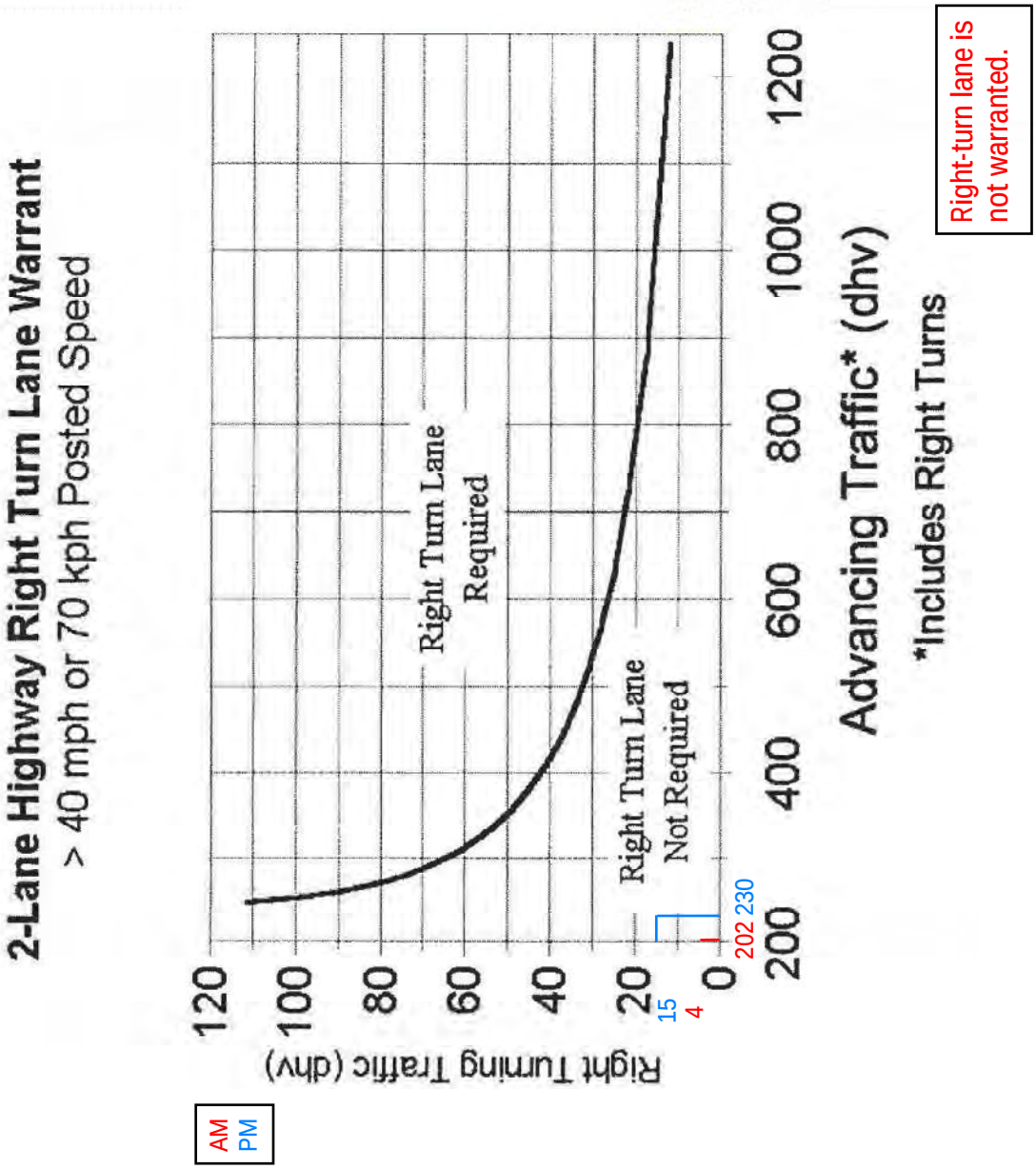
APPENDIX G
TURN LANE WARRANT FIGURES

Hill Road & Greengate Boulevard - WBR
2022 Build Scenario

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)	401-6bE
	REFERENCE SECTION 401.6.3



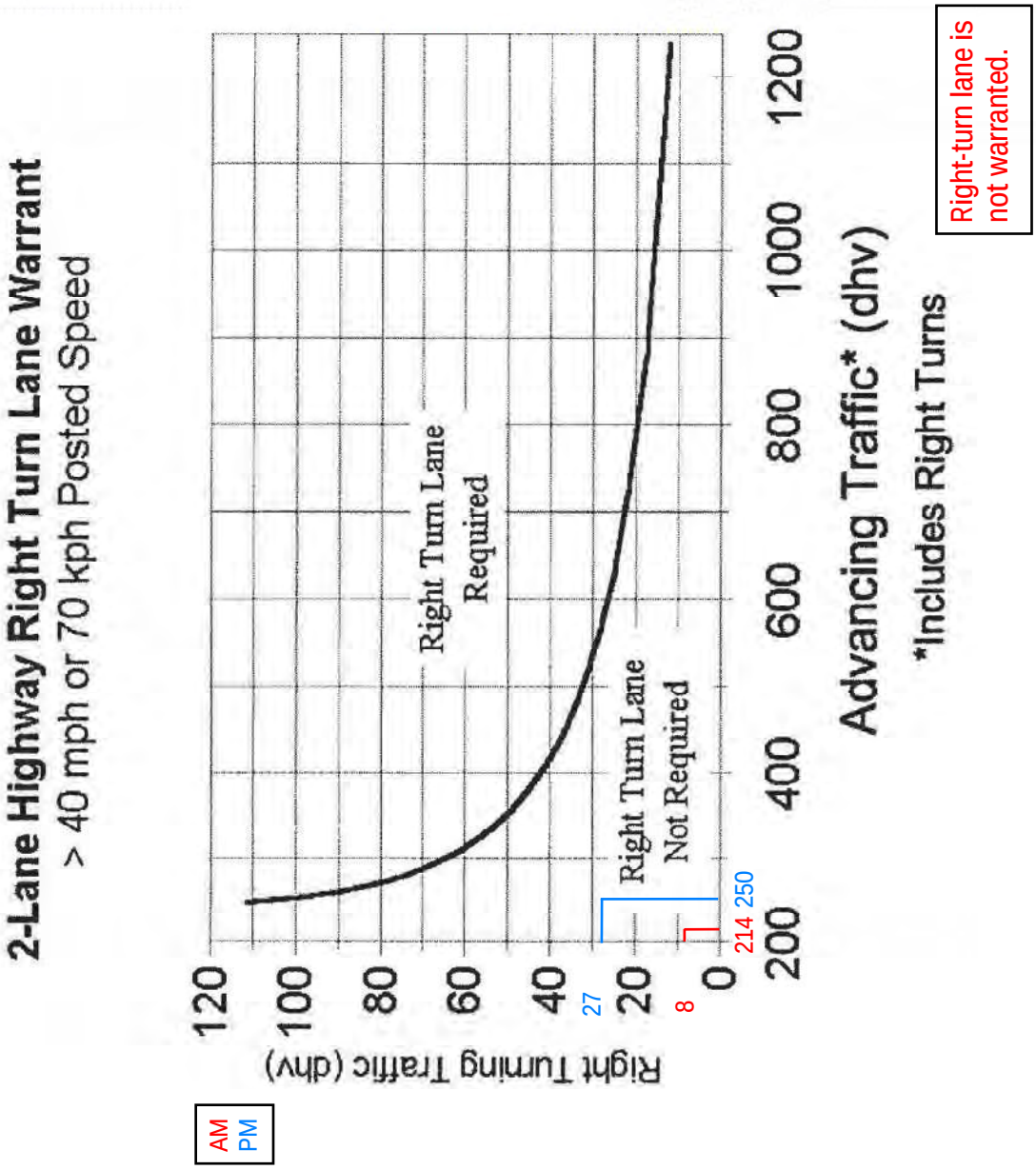
October 2004

Hill Road & Greengate Boulevard - WBR
2023 Build Scenario

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bE

REFERENCE SECTION 401.6.3



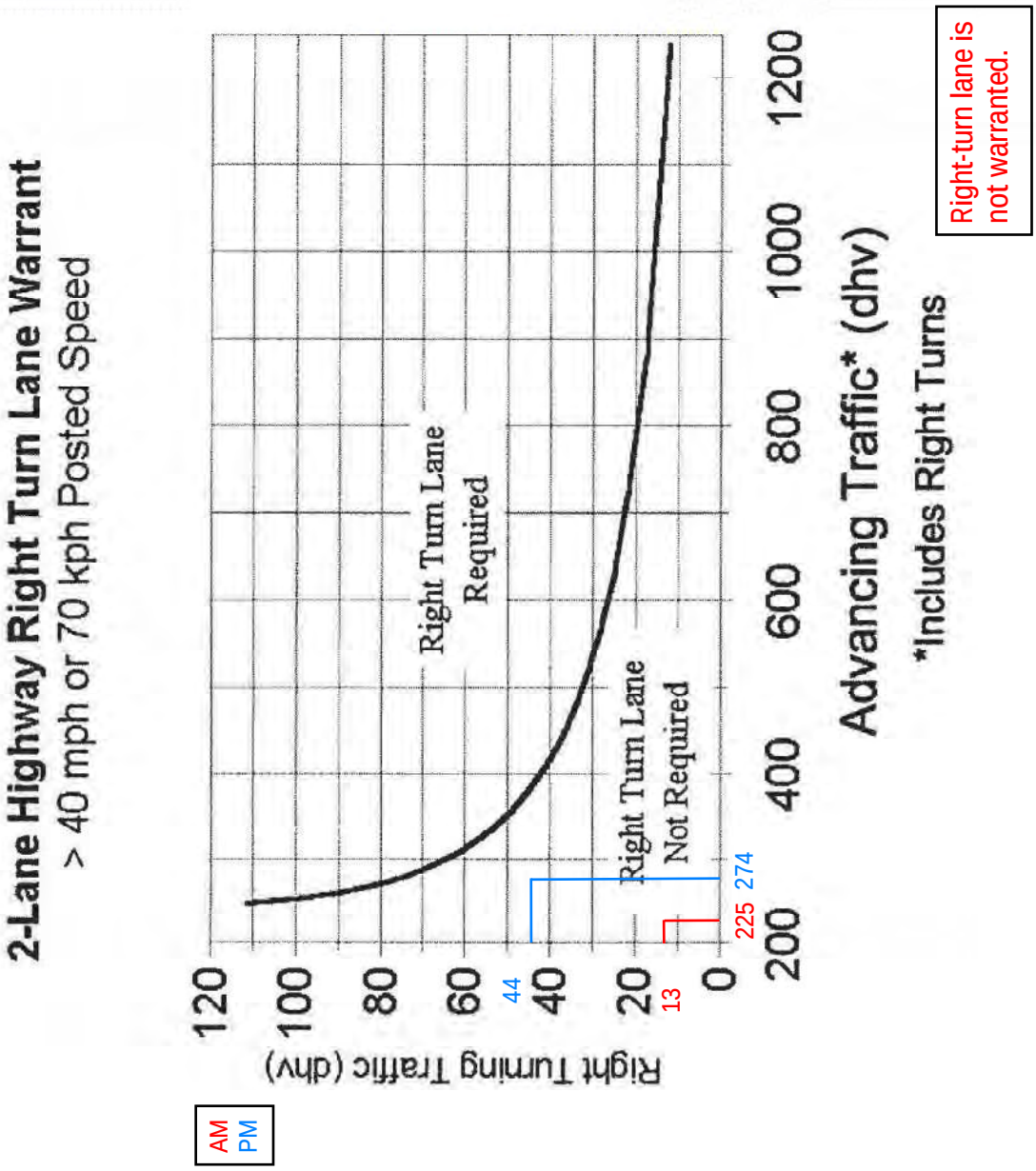
October 2004

Hill Road & Greengate Boulevard - WBR
2024 Build Scenario

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bE

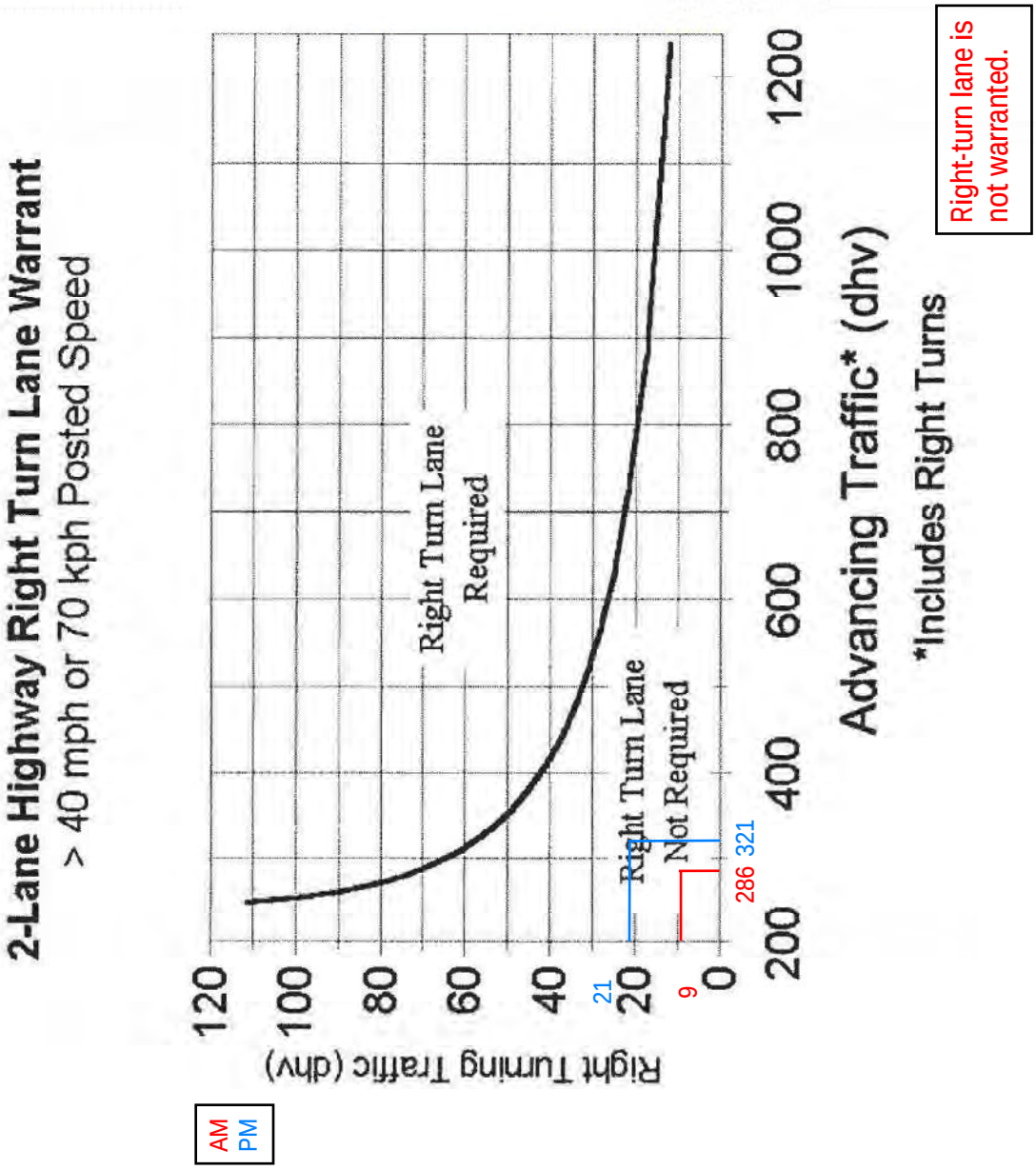
REFERENCE SECTION
401.6.3



October 2004

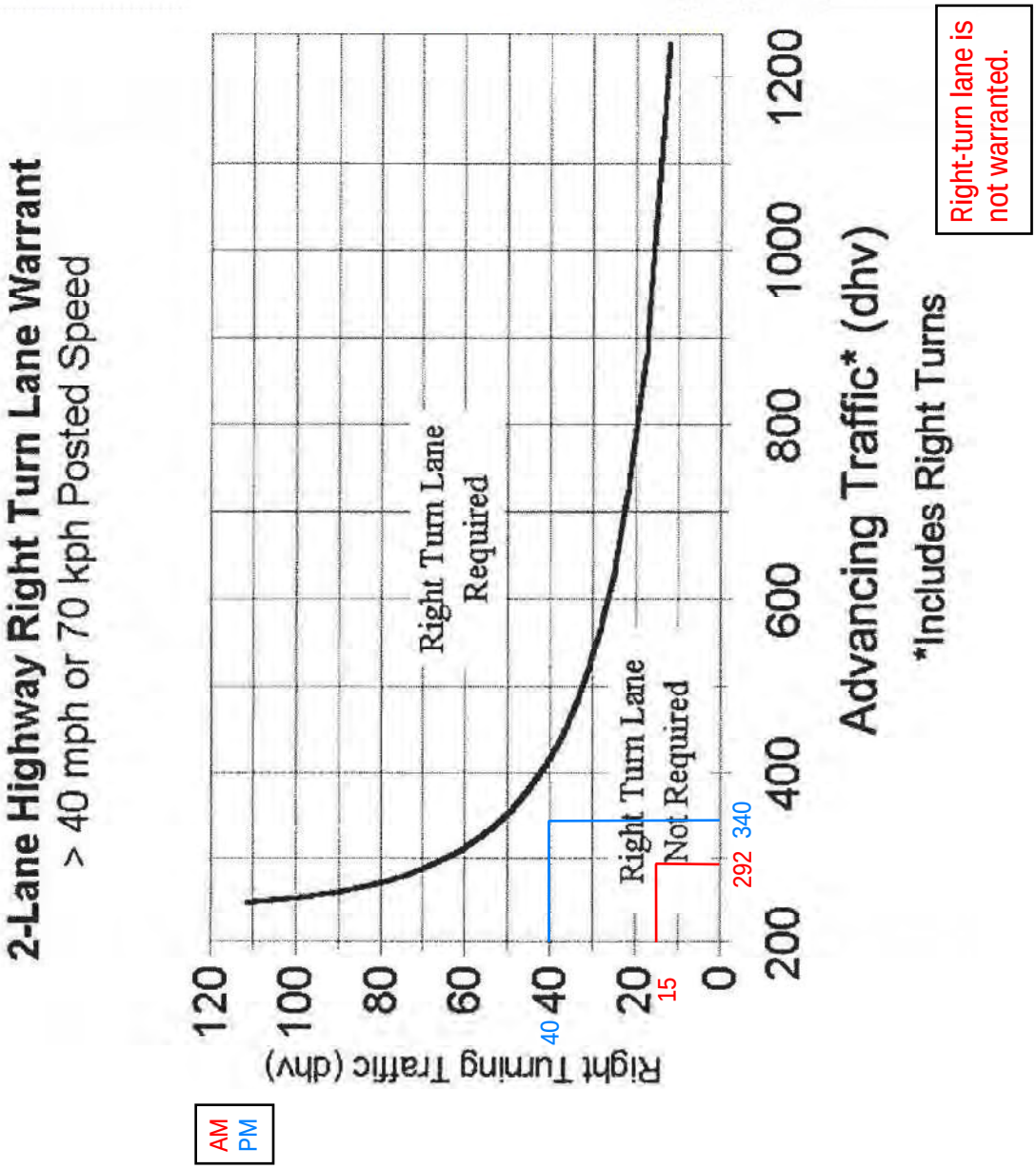
Hill Road & Greengate Boulevard - WBR
2034 No-Build Scenario

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)	401-6bE
	REFERENCE SECTION 401.6.3



Hill Road & Greengate Boulevard - WBR
2034 Build Scenario

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)	401-6bE
	REFERENCE SECTION 401.6.3



Right-turn lane is not warranted.

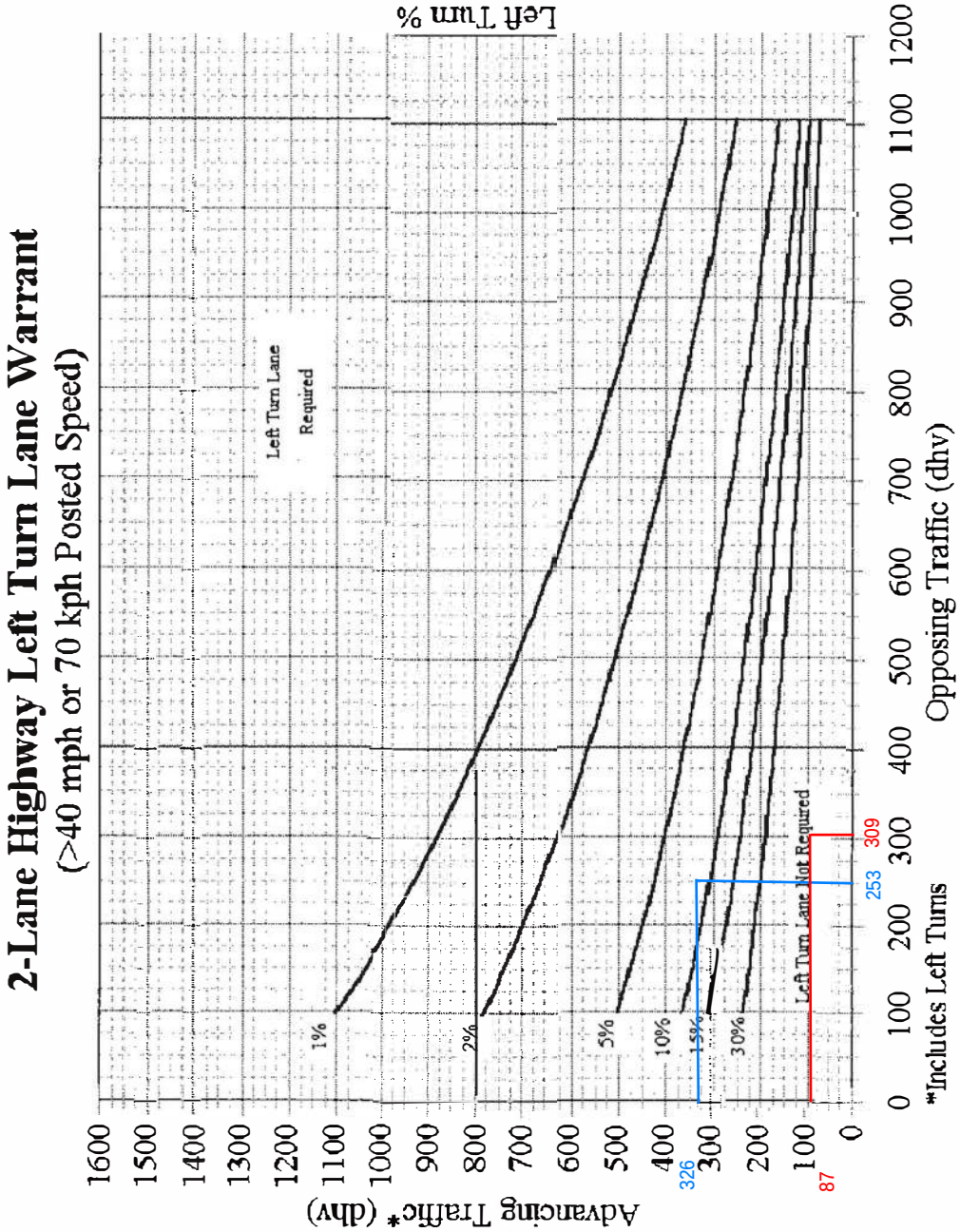
October 2004

Hill Road & Busey Road - NBL
2022 No-Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 15% LT
PM - 18% LT

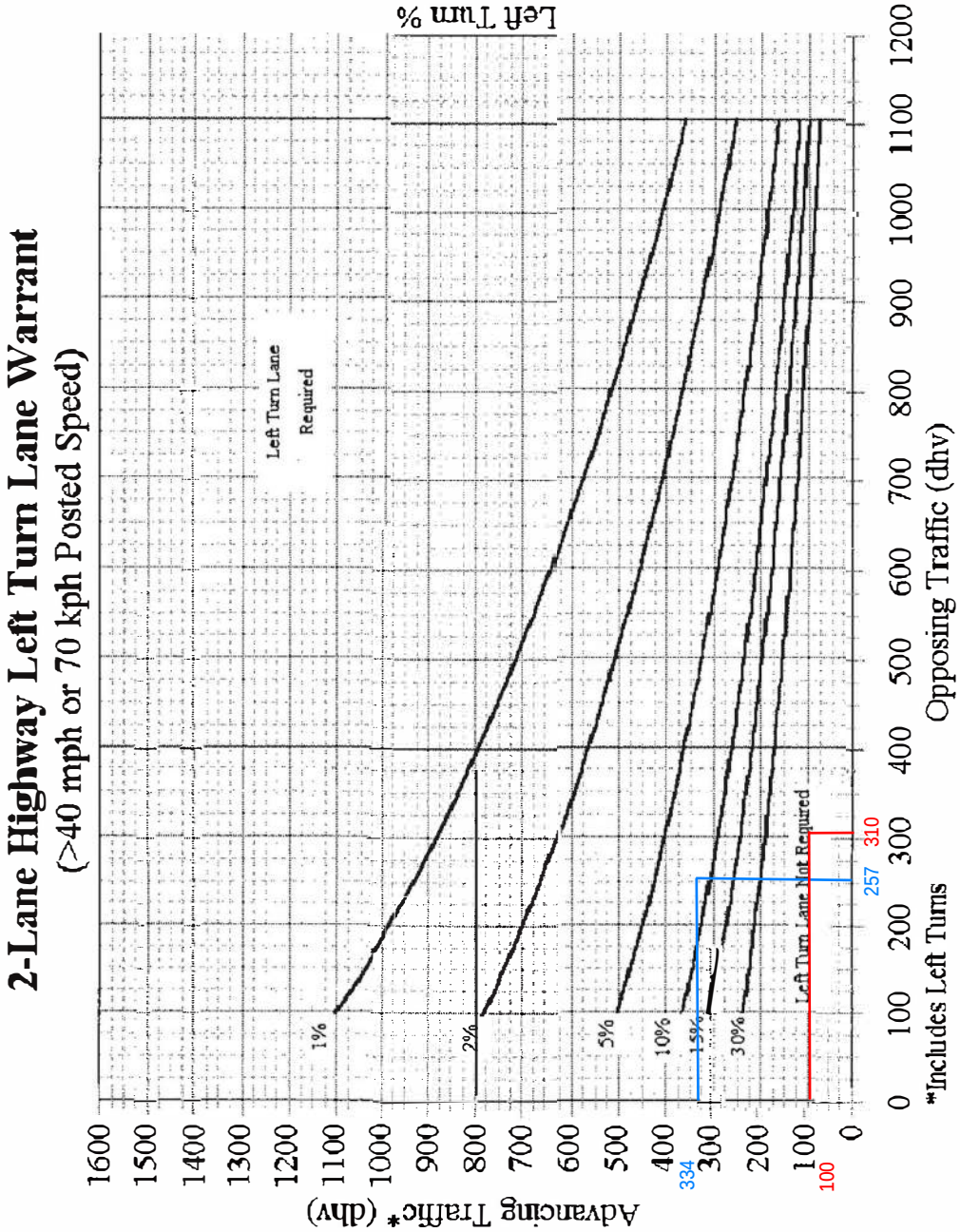
October 2004

Hill Road & Busey Road - NBL
2022 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 22% LT
PM - 19% LT

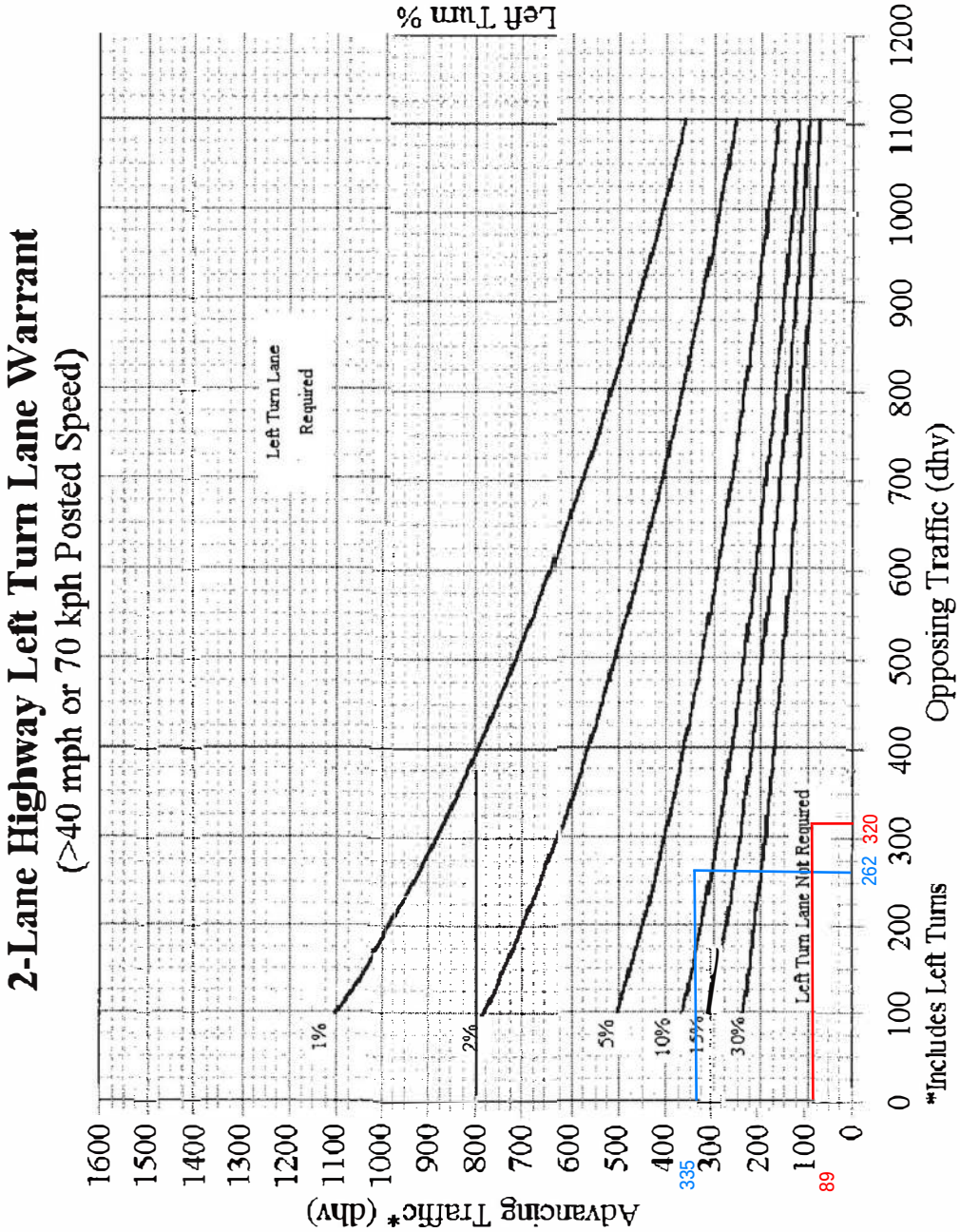
October 2004

Hill Road & Busey Road - NBL
2023 No-Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 15% LT
PM - 18% LT

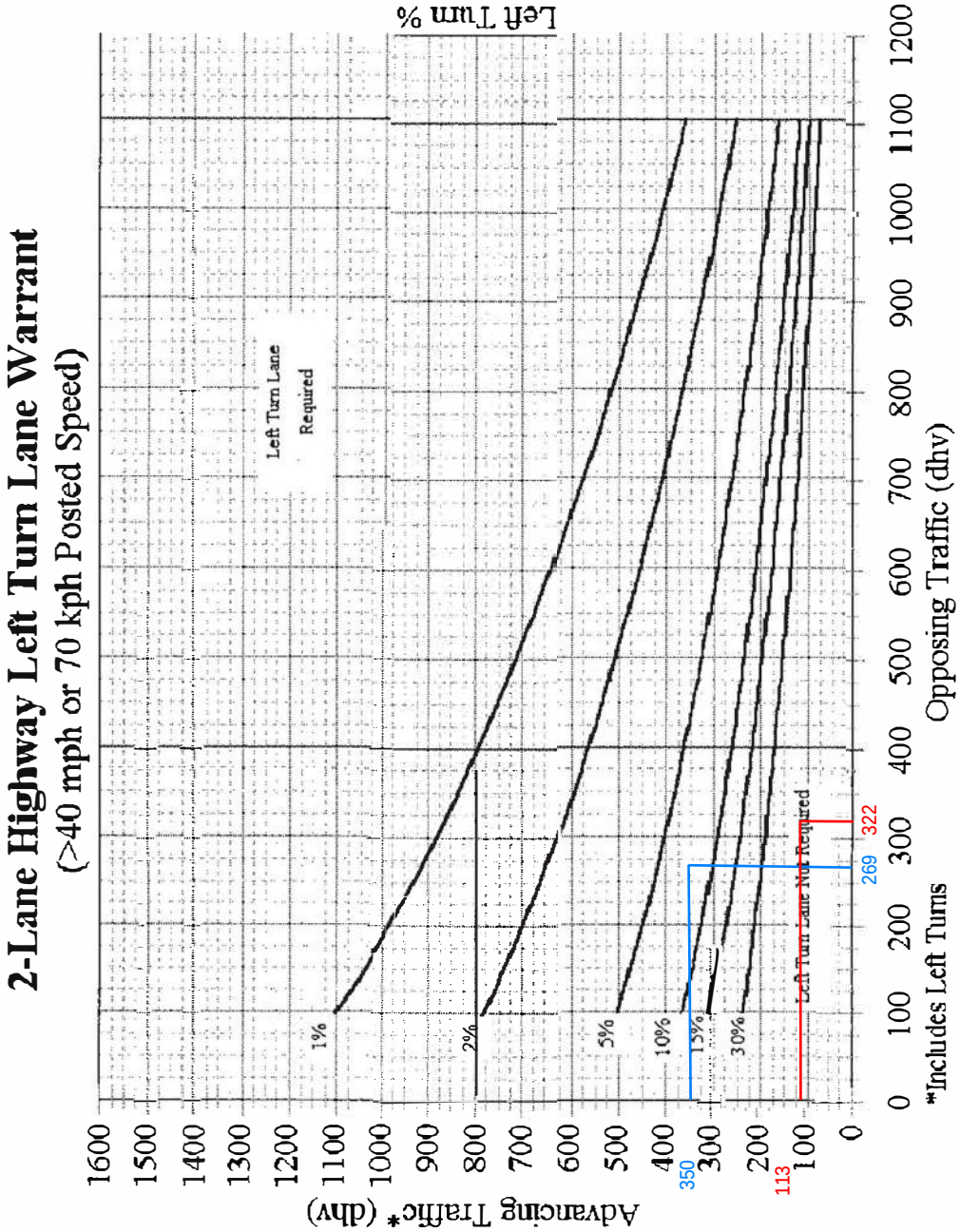
October 2004

Hill Road & Busey Road - NBL
2023 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 27% LT
PM - 20% LT

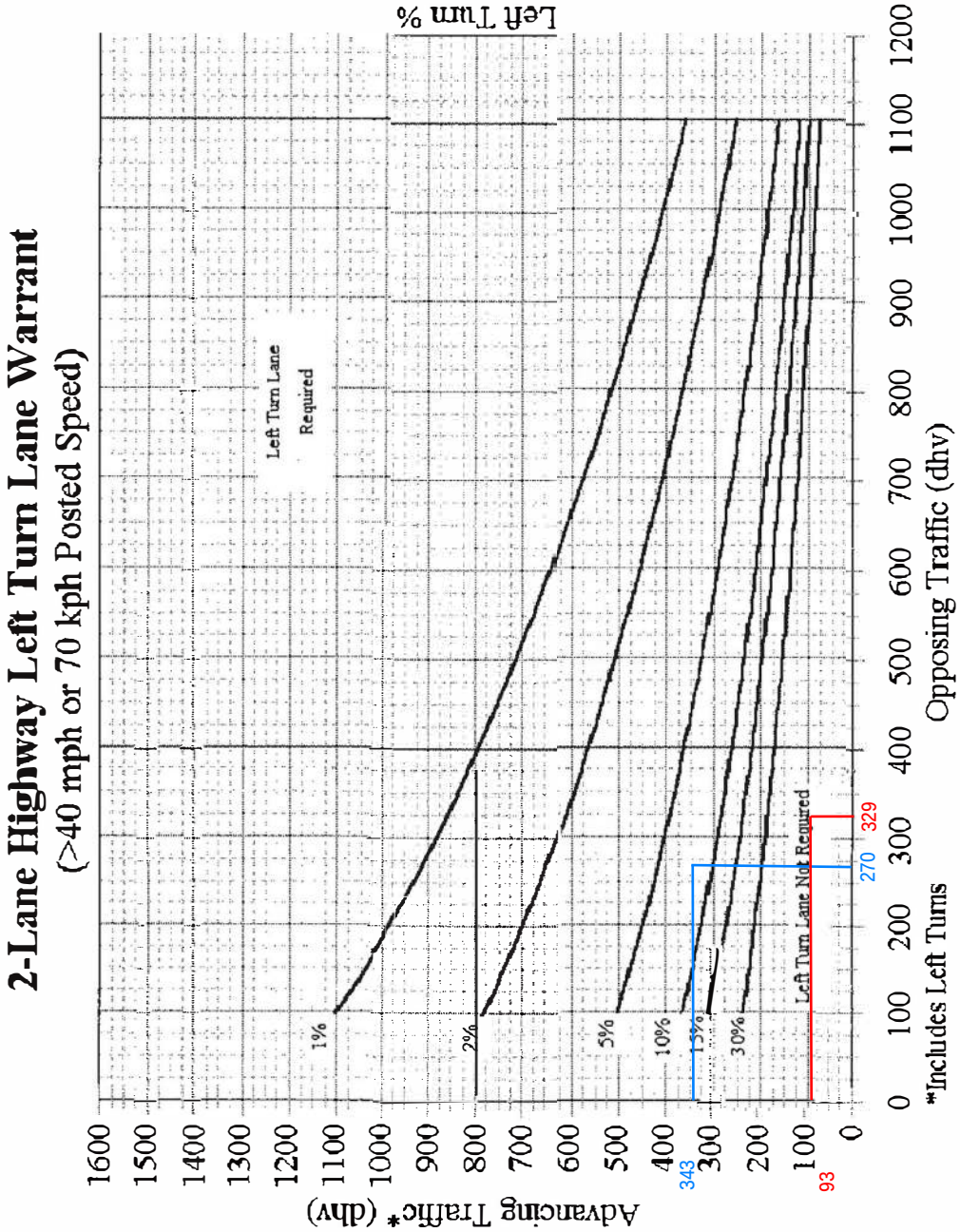
October 2004

Hill Road & Busey Road - NBL
2024 No-Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 15% LT
PM - 18% LT

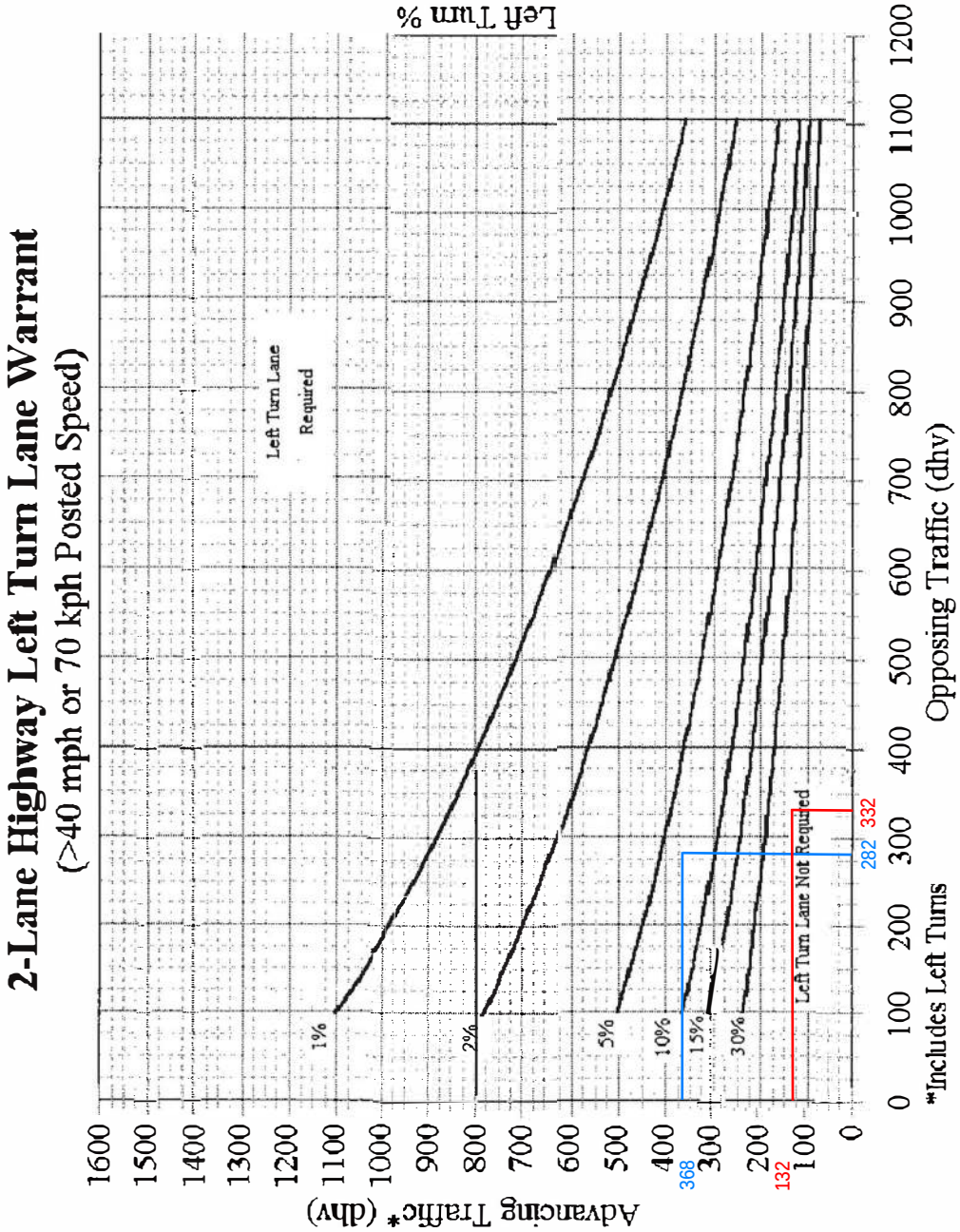
October 2004

Hill Road & Busey Road - NBL
2024 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 32% LT
PM - 22% LT

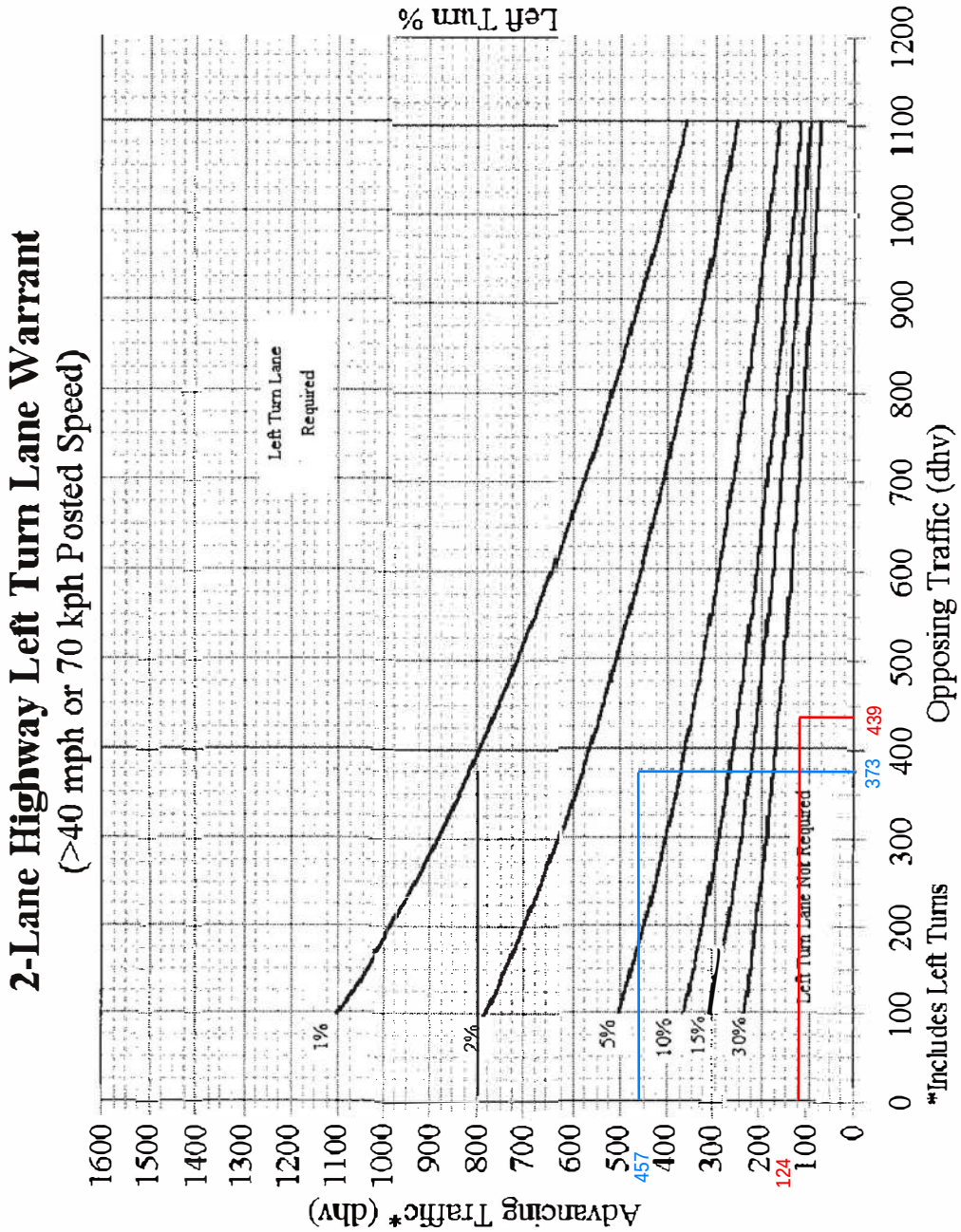
October 2004

Hill Road & Busey Road - NBL
2034 No-Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 14% LT
PM - 17% LT

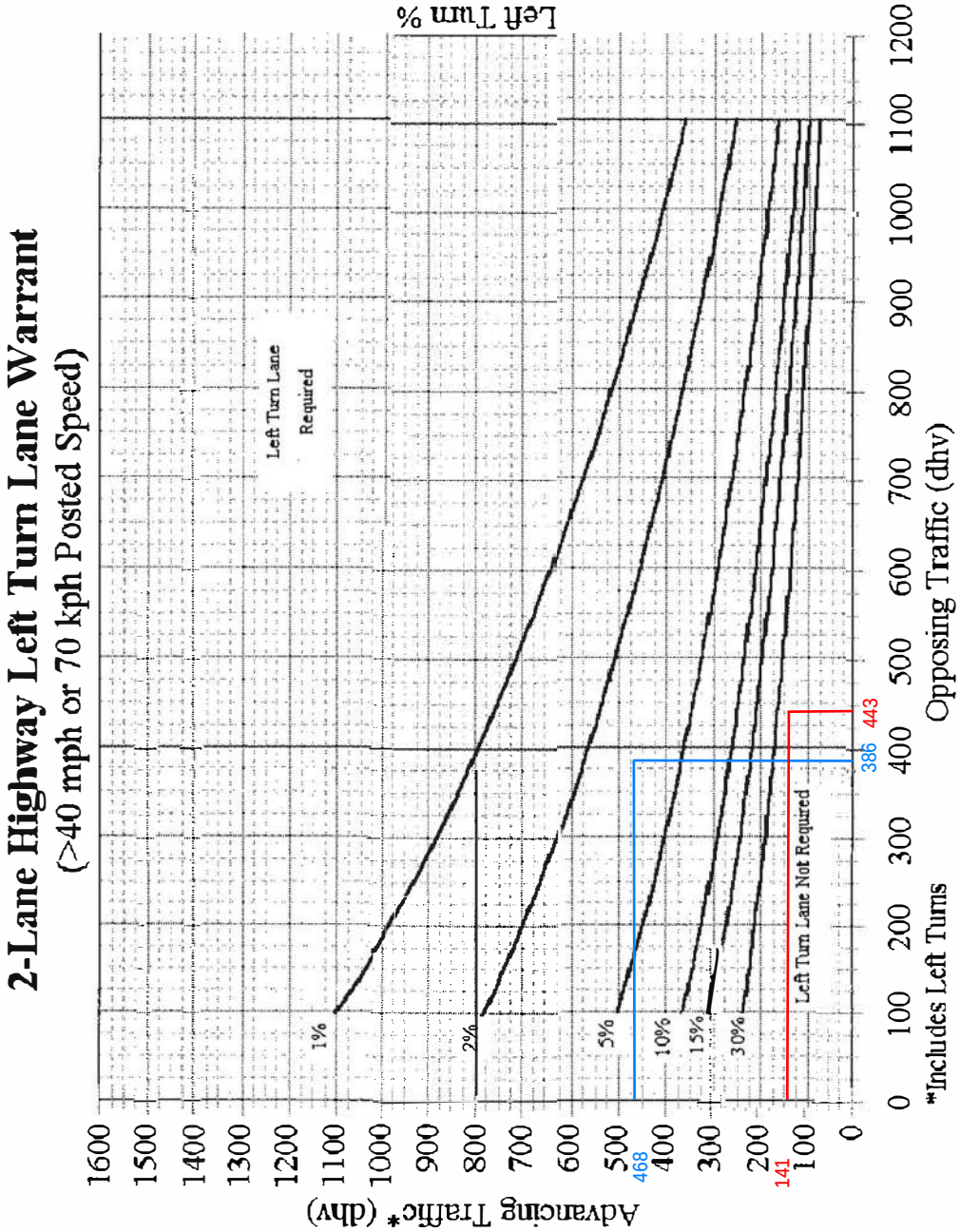
October 2004

Hill Road & Busey Road - NBL
2034 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 17% LT
PM - 16% LT

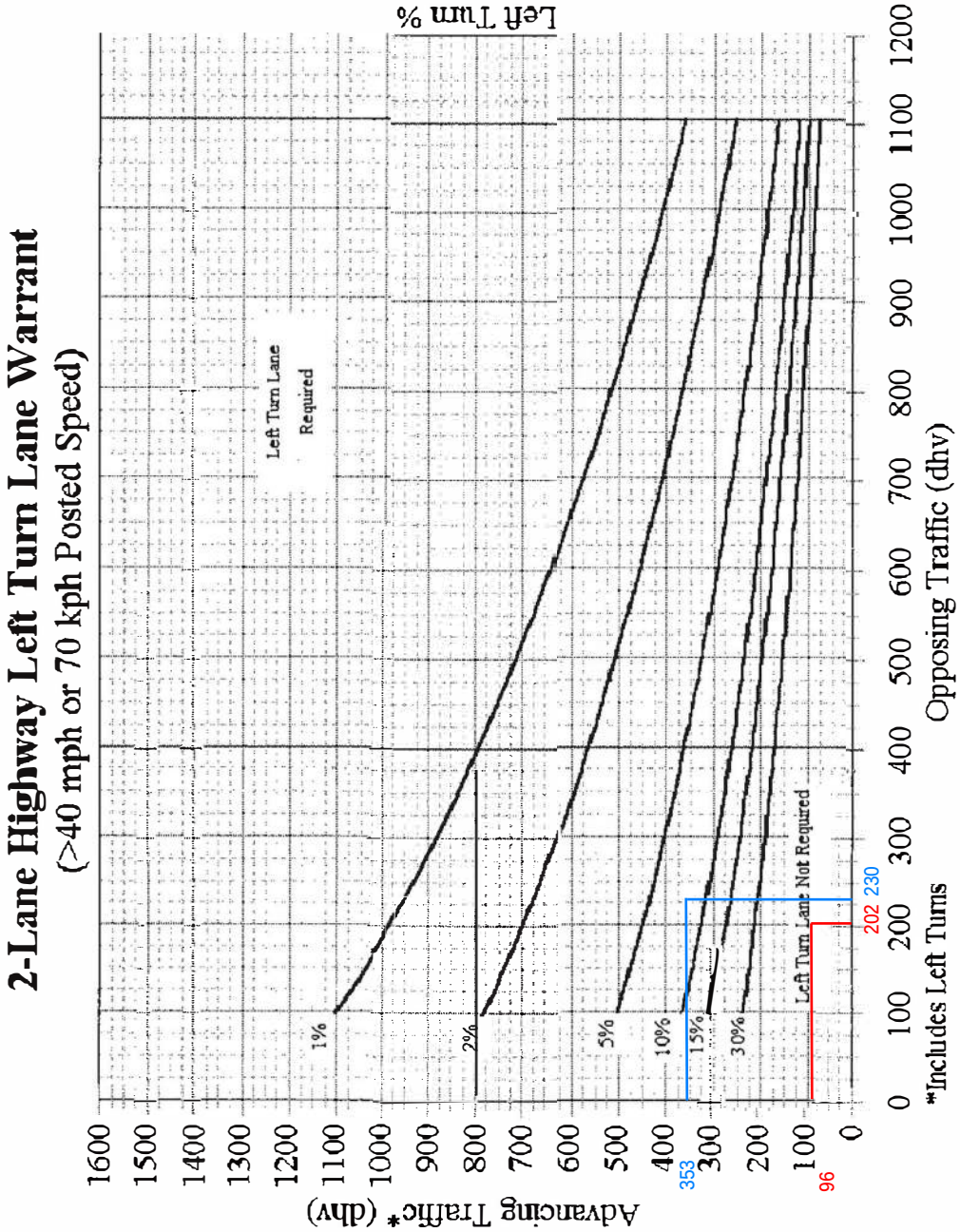
October 2004

Hill Road & Greengate Boulevard - EBL
2022 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 9% LT
PM - 8% LT

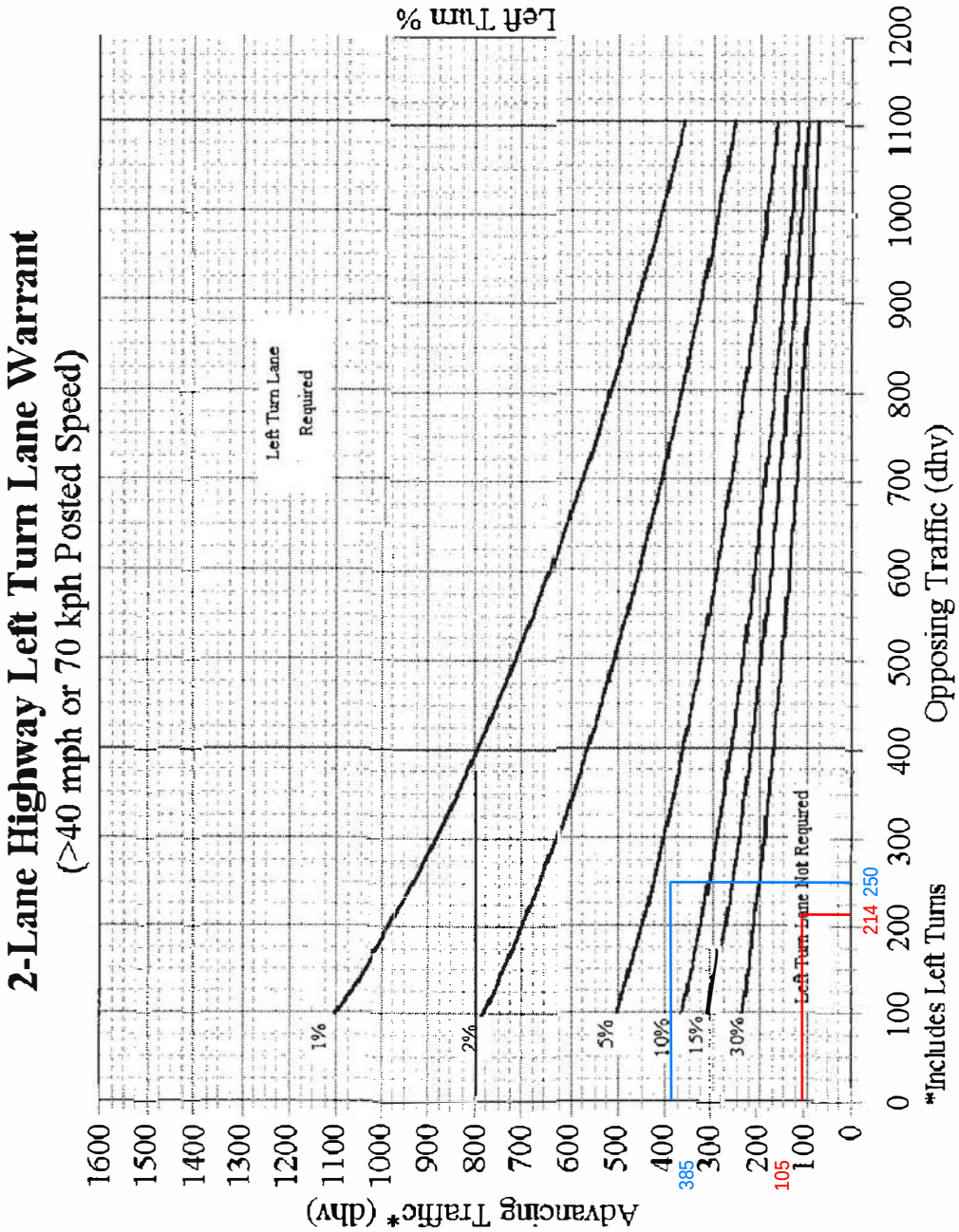
October 2004

Hill Road & Greengate Boulevard - EBL
2023 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 15% LT
PM - 13% LT

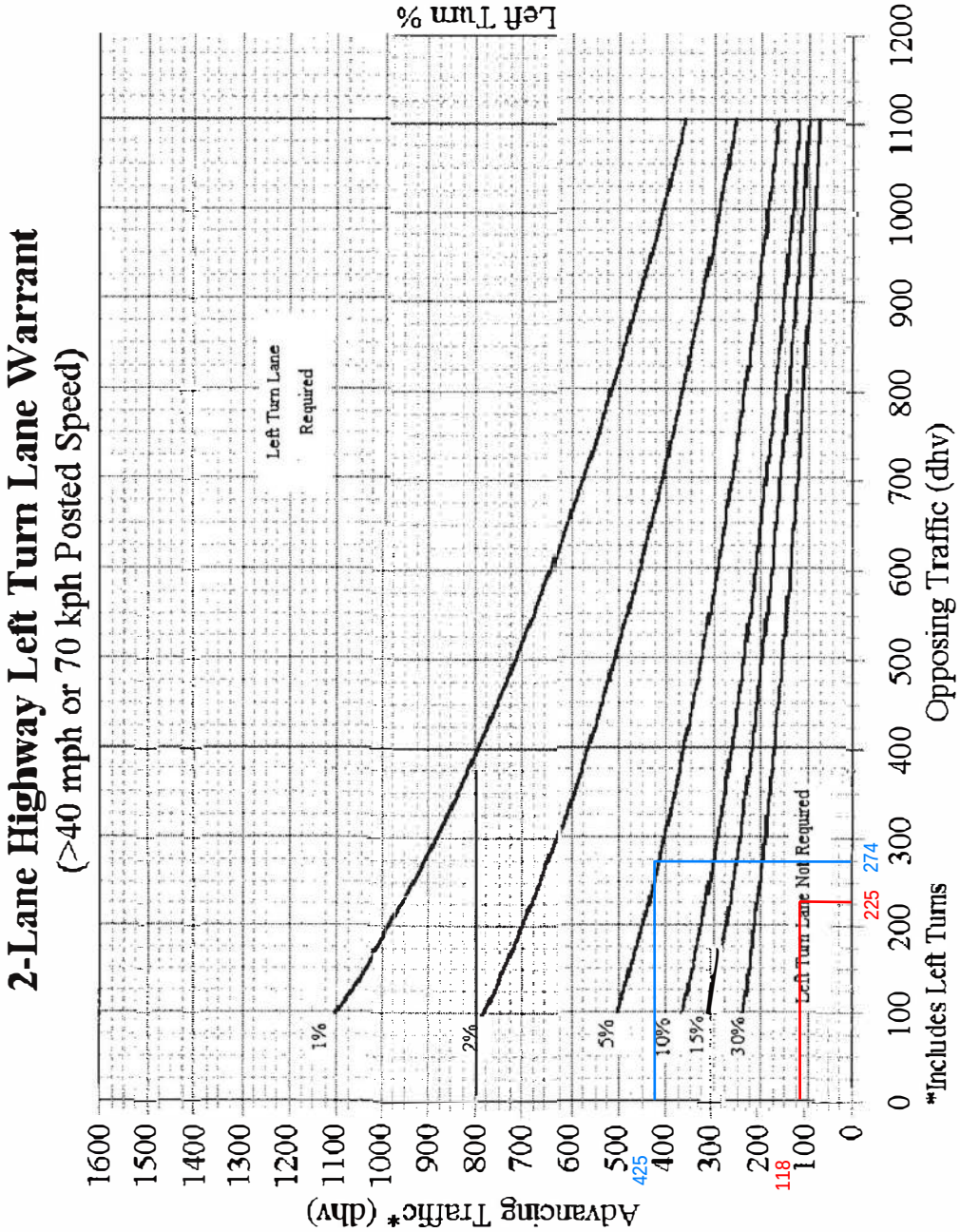
October 2004

Hill Road & Greengate Boulevard - EBL
2024 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 21% LT
PM - 19% LT

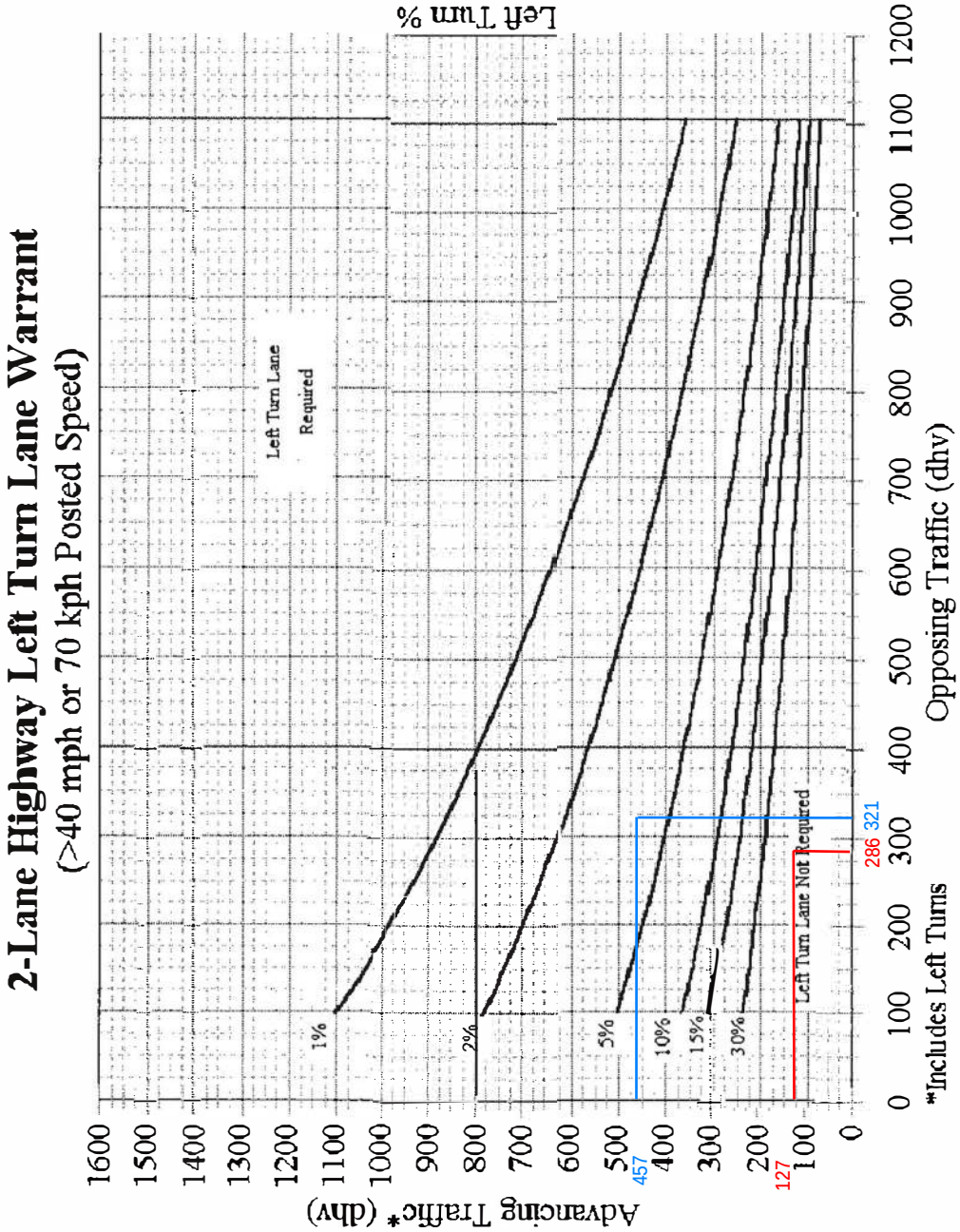
October 2004

Hill Road & Greengate Boulevard - EBL
2034 No-Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 5% LT
PM - 8% LT

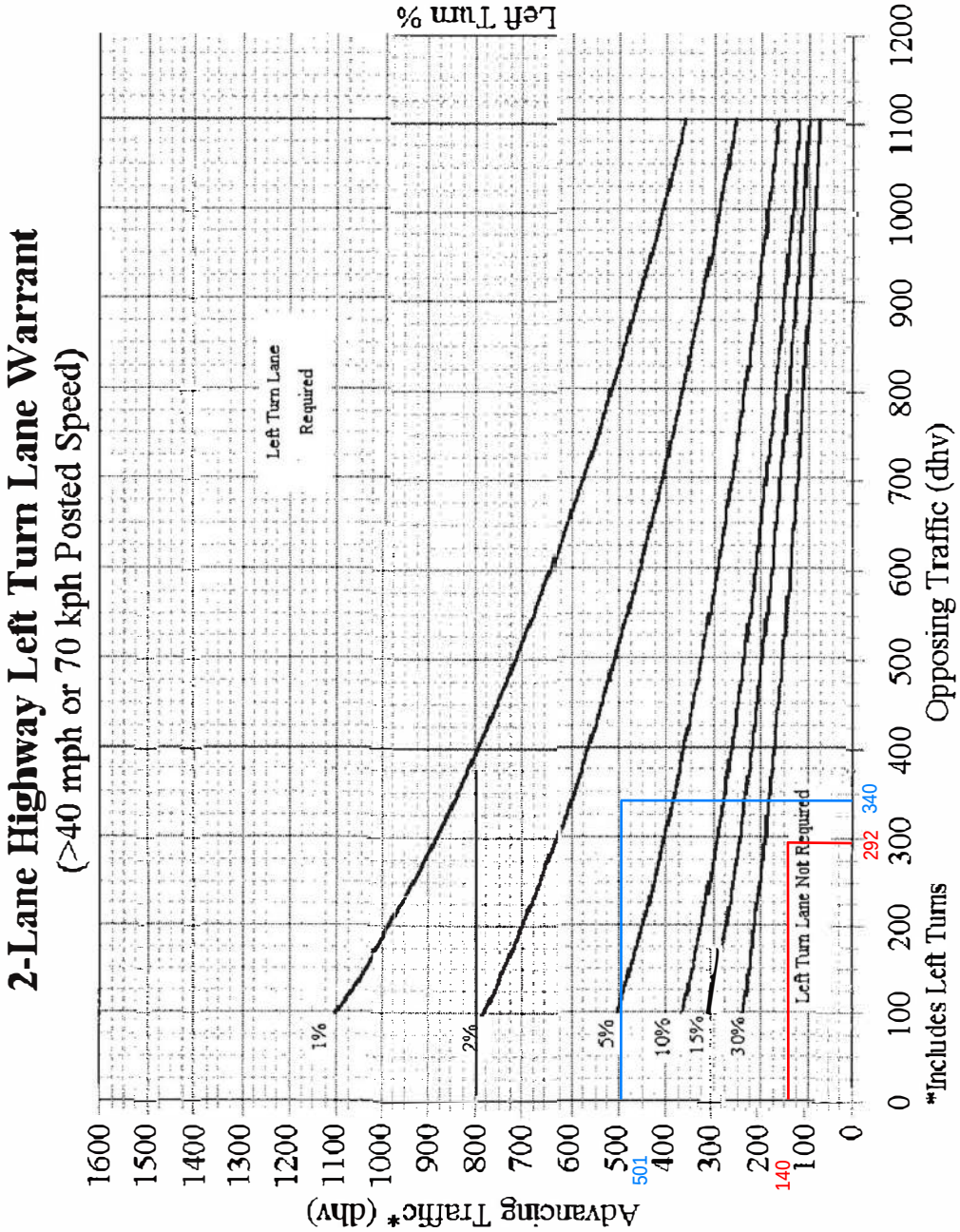
October 2004

Hill Road & Greengate Boulevard - EBL
2034 Build Scenario

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION 401.6.1



Left-turn lane is warranted in the PM Peak Hour.

AM - 16% LT
PM - 13% LT

October 2004

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

STORAGE LENGTH AT INTERSECTIONS

401-10

REFERENCE SECTIONS 401.6.1, 401.6.3

* 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

$$\text{* AVERAGE VEHICLES PER CYCLE} = \frac{\text{DHV (TURNING LANE)}}{\text{CYCLES/HOUR}}$$

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	HILL ROAD (EASTBOUND)				HILL ROAD (WESTBOUND)				N/A (NORTHBOUND)				KINGS CROSSING (SOUTHBOUND)			
BEGIN	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS
6AM	178	3	0	0	0	0	199	0	0	0	0	0	59	0	23	0
7AM	190	4	0	0	0	1	190	0	0	0	0	0	72	0	50	0
8AM	117	2	0	0	0	6	163	0	0	0	0	0	79	0	39	0
9AM	99	3	0	0	0	5	133	0	0	0	0	0	76	0	64	0
10AM	70	9	0	0	0	11	124	0	0	0	0	0	73	0	56	0
11AM	75	8	0	0	0	5	121	0	0	0	0	0	81	0	58	0
12PM	82	11	0	0	0	9	130	0	0	0	0	0	102	0	90	0
1PM	81	7	0	0	0	5	129	0	0	0	0	0	90	0	98	0
2PM	72	13	0	0	0	6	108	0	0	0	0	0	121	0	96	0
3PM	111	12	0	0	0	15	167	0	0	0	0	0	157	0	176	0
4PM	115	16	0	0	0	21	179	0	0	0	0	0	227	0	228	0
5PM	139	35	0	0	0	22	172	0	0	0	0	0	263	0	276	0

	EXISTING TRAFFIC VOLUMES - HILL ROAD MAJOR						
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	178	3	0	0	0	199	380
7:00 AM	190	4	0	0	1	190	385
8:00 AM	117	2	0	0	6	163	288
9:00 AM	99	3	0	0	5	133	240
10:00 AM	70	9	0	0	11	124	214
11:00 AM	75	8	0	0	5	121	209
12:00 PM	82	11	0	0	9	130	232
1:00 PM	81	7	0	0	5	129	222
2:00 PM	72	13	0	0	6	108	199
3:00 PM	111	12	0	0	15	167	305
4:00 PM	115	16	0	0	21	179	331
5:00 PM	139	35	0	0	22	172	368

	EXISTING TRAFFIC VOLUMES - KINGS CROSSING MINOR						
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approch.
6:00 AM				59	0	23	82
7:00 AM				72	0	50	122
8:00 AM				79	0	39	118
9:00 AM				76	0	64	140
10:00 AM				73	0	56	129
11:00 AM				81	0	58	139
12:00 PM				102	0	90	192
1:00 PM				90	0	98	188
2:00 PM				121	0	96	217
3:00 PM				157	0	176	333
4:00 PM				227	0	228	455
5:00 PM				263	0	276	539

	2022 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR N OF KINGS, 3.6%/YR S OF KINGS) MAJOR						
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	197	3	0	0	0	213	413
7:00 AM	211	4	0	0	1	203	419
8:00 AM	130	2	0	0	6	174	313
9:00 AM	110	3	0	0	5	142	261
10:00 AM	78	10	0	0	12	133	232
11:00 AM	83	9	0	0	5	129	227
12:00 PM	91	12	0	0	10	139	252
1:00 PM	90	8	0	0	5	138	241
2:00 PM	80	14	0	0	6	115	216
3:00 PM	123	13	0	0	16	179	331
4:00 PM	127	18	0	0	22	191	359
5:00 PM	154	39	0	0	24	184	400

	2022 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR) MINOR						
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approch.
6:00 AM				64	0	25	89
7:00 AM				78	0	55	133
8:00 AM				86	0	43	129
9:00 AM				83	0	70	153
10:00 AM				80	0	61	141
11:00 AM				88	0	63	152
12:00 PM				111	0	98	209
1:00 PM				98	0	107	205
2:00 PM				132	0	105	237
3:00 PM				171	0	192	363
4:00 PM				247	0	249	496
5:00 PM				287	0	301	588

	2023 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR N OF KINGS, 3.6%/YR S OF KINGS) MAJOR						
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	204	3	0	0	0	217	424
7:00 AM	217	5	0	0	1	207	431
8:00 AM	134	2	0	0	7	178	321
9:00 AM	113	3	0	0	5	145	267
10:00 AM	80	10	0	0	12	135	238
11:00 AM	86	9	0	0	5	132	233
12:00 PM	94	13	0	0	10	142	258
1:00 PM	93	8	0	0	5	141	247
2:00 PM	82	15	0	0	7	118	222
3:00 PM	127	14	0	0	16	182	339
4:00 PM	132	18	0	0	23	195	368
5:00 PM	159	40	0	0	24	188	411

	2023 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR) MINOR						
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approch.
6:00 AM				66	0	26	92
7:00 AM				81	0	56	137
8:00 AM				88	0	44	132
9:00 AM				85	0	72	157
10:00 AM				82	0	63	144
11:00 AM				91	0	65	156
12:00 PM				114	0	101	215
1:00 PM				101	0	110	211
2:00 PM				136	0	108	243
3:00 PM				176	0	197	373
4:00 PM				254	0	255	510
5:00 PM				295	0	309	604

	2024 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR N OF KINGS, 3.6%/YR S OF KINGS) MAJOR						
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	210	4	0	0	0	222	435
7:00 AM	224	5	0	0	1	212	442
8:00 AM	138	2	0	0	7	182	329
9:00 AM	117	4	0	0	6	148	274
10:00 AM	83	11	0	0	12	138	244
11:00 AM	89	9	0	0	6	135	238
12:00 PM	97	13	0	0	10	145	265
1:00 PM	96	8	0	0	6	144	253
2:00 PM	85	15	0	0	7	120	227
3:00 PM	131	14	0	0	17	186	348
4:00 PM	136	19	0	0	23	200	378
5:00 PM	164	41	0	0	25	192	422

	2024 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR) MINOR						
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approch.
6:00 AM				68	0	26	94
7:00 AM				83	0	58	140
8:00 AM				91	0	45	136
9:00 AM				87	0	74	161
10:00 AM				84	0	64	148
11:00 AM				93	0	67	160
12:00 PM				117	0	104	221
1:00 PM				104	0	113	216
2:00 PM				139	0	110	250
3:00 PM				181	0	202	383
4:00 PM				261	0	262	523
5:00 PM				302	0	317	620

	2034 NO-BUILD TRAFFIC VOLUMES - HILL ROAD (2.3%/YR N OF KINGS, 3.6%/YR S OF KINGS) MAJOR						
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	274	5	0	0	0	268	546
7:00 AM	293	6	0	0	1	256	556
8:00 AM	180	3	0	0	8	219	411
9:00 AM	152	5	0	0	7	179	343
10:00 AM	108	14	0	0	15	167	303
11:00 AM	116	12	0	0	7	163	297
12:00 PM	126	17	0	0	12	175	330
1:00 PM	125	11	0	0	7	174	316
2:00 PM	111	20	0	0	8	145	284
3:00 PM	171	18	0	0	20	225	434
4:00 PM	177	25	0	0	28	241	471
5:00 PM	214	54	0	0	30	231	529

	2034 NO-BUILD TRAFFIC VOLUMES - KINGS CROSSING (3%/YR) MINOR						
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approch.
6:00 AM				86	0	33	119
7:00 AM				104	0	73	177
8:00 AM				115	0	57	171
9:00 AM				110	0	93	203
10:00 AM				106	0	81	187
11:00 AM				117	0	84	202
12:00 PM				148	0	131	278
1:00 PM				131	0	142	273
2:00 PM				175	0	139	315
3:00 PM				228	0	255	483
4:00 PM				329	0	331	660
5:00 PM				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	55	133	41%	204	40%	0%	33
8:00 AM	43	129	33%	181	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 Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					340	340	680	340	340	0	0
6:00 AM	1.6%	5.9%	0.0%	0.0%	5	20	26	5	20	0	0
7:00 AM	3.2%	10.2%	0.0%	0.0%	11	35	46	11	35	0	0
8:00 AM	3.7%	8.6%	0.0%	0.0%	13	29	42	13	29	0	0
9:00 AM	3.2%	5.4%	0.0%	0.0%	11	18	29	11	18	0	0
10:00 AM	4.2%	5.4%	0.0%	0.0%	14	18	33	14	18	0	0
11:00 AM	5.4%	5.1%	0.0%	0.0%	18	17	36	18	17	0	0
12:00 PM	5.5%	5.6%	0.0%	0.0%	19	19	38	19	19	0	0
1:00 PM	6.0%	5.9%	0.0%	0.0%	20	20	40	20	20	0	0
2:00 PM	7.0%	6.2%	0.0%	0.0%	24	21	45	24	21	0	0
3:00 PM	8.5%	6.0%	0.0%	0.0%	29	20	49	29	20	0	0
4:00 PM	10.5%	7.5%	0.0%	0.0%	36	26	61	36	26	0	0
5:00 PM	10.3%	7.4%	0.0%	0.0%	35	25	60	35	25	0	0

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - PHASE 3 & 5 (53 DWELLING UNITS)

	PRIMARY Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					290	290	580	290	290	0	0
6:00 AM	1.6%	5.9%	0.0%	0.0%	5	17	22	5	17	0	0
7:00 AM	3.2%	10.2%	0.0%	0.0%	9	30	39	9	30	0	0
8:00 AM	3.7%	8.6%	0.0%	0.0%	11	25	36	11	25	0	0
9:00 AM	3.2%	5.4%	0.0%	0.0%	9	16	25	9	16	0	0
10:00 AM	4.2%	5.4%	0.0%	0.0%	12	16	28	12	16	0	0
11:00 AM	5.4%	5.1%	0.0%	0.0%	16	15	30	16	15	0	0
12:00 PM	5.5%	5.6%	0.0%	0.0%	16	16	32	16	16	0	0
1:00 PM	6.0%	5.9%	0.0%	0.0%	17	17	35	17	17	0	0
2:00 PM	7.0%	6.2%	0.0%	0.0%	20	18	38	20	18	0	0
3:00 PM	8.5%	6.0%	0.0%	0.0%	25	17	42	25	17	0	0
4:00 PM	10.5%	7.5%	0.0%	0.0%	30	22	52	30	22	0	0
5:00 PM	10.3%	7.4%	0.0%	0.0%	30	21	51	30	21	0	0

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - PHASE 4, 6, & 7 (75 DWELLING UNITS)

	PRIMARY Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					399	399	798	399	399	0	0
6:00 AM	1.6%	5.9%	0.0%	0.0%	6	24	30	6	24	0	0
7:00 AM	3.2%	10.2%	0.0%	0.0%	13	41	53	13	41	0	0
8:00 AM	3.7%	8.6%	0.0%	0.0%	15	34	49	15	34	0	0
9:00 AM	3.2%	5.4%	0.0%	0.0%	13	22	34	13	22	0	0
10:00 AM	4.2%	5.4%	0.0%	0.0%	17	22	38	17	22	0	0
11:00 AM	5.4%	5.1%	0.0%	0.0%	22	20	42	22	20	0	0
12:00 PM	5.5%	5.6%	0.0%	0.0%	22	22	44	22	22	0	0
1:00 PM	6.0%	5.9%	0.0%	0.0%	24	24	47	24	24	0	0
2:00 PM	7.0%	6.2%	0.0%	0.0%	28	25	53	28	25	0	0
3:00 PM	8.5%	6.0%	0.0%	0.0%	34	24	58	34	24	0	0
4:00 PM	10.5%	7.5%	0.0%	0.0%	42	30	72	42	30	0	0
5:00 PM	10.3%	7.4%	0.0%	0.0%	41	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	62	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 Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					358	358	716	358	358	0	0
6:00 AM	1.1%	5.8%	0.0%	0.0%	4	21	25	4	21	0	0
7:00 AM	2.6%	12.9%	0.0%	0.0%	9	46	55	9	46	0	0
8:00 AM	4.0%	9.1%	0.0%	0.0%	14	33	47	14	33	0	0
9:00 AM	3.9%	7.2%	0.0%	0.0%	14	26	40	14	26	0	0
10:00 AM	3.9%	4.7%	0.0%	0.0%	14	17	31	14	17	0	0
11:00 AM	4.9%	5.5%	0.0%	0.0%	18	20	37	18	20	0	0
12:00 PM	5.6%	5.4%	0.0%	0.0%	20	19	39	20	19	0	0
1:00 PM	4.8%	4.9%	0.0%	0.0%	17	18	35	17	18	0	0
2:00 PM	5.9%	6.0%	0.0%	0.0%	21	21	43	21	21	0	0
3:00 PM	8.3%	5.2%	0.0%	0.0%	30	19	48	30	19	0	0
4:00 PM	10.0%	5.1%	0.0%	0.0%	36	18	54	36	18	0	0
5:00 PM	11.4%	6.7%	0.0%	0.0%	41	24	65	41	24	0	0

SHOPPING CENTER (ITE LUC 820) - 309,240 SF

	PRIMARY Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					6416	6416	12832	4234	4234	2182	2182
6:00 AM	0.3%	0.2%	0.3%	0.2%	19	13	32	13	8	7	4
7:00 AM	1.4%	0.9%	1.4%	0.9%	90	58	148	59	38	31	20
8:00 AM	2.6%	1.5%	2.6%	1.5%	167	96	263	110	64	57	33
9:00 AM	4.7%	2.5%	4.7%	2.5%	302	160	462	199	106	103	55
10:00 AM	7.1%	4.1%	7.1%	4.1%	456	263	719	301	174	155	89
11:00 AM	9.7%	6.8%	9.7%	6.8%	622	436	1059	411	288	212	148
12:00 PM	10.6%	9.4%	10.6%	9.4%	680	603	1283	449	398	231	205
1:00 PM	9.2%	9.5%	9.2%	9.5%	590	610	1200	390	402	201	207
2:00 PM	8.9%	9.2%	8.9%	9.2%	571	590	1161	377	390	194	201
3:00 PM	8.5%	9.0%	8.5%	9.0%	545	577	1123	360	381	185	196
4:00 PM	8.9%	9.4%	8.9%	9.4%	571	603	1174	377	398	194	205
5:00 PM	9.2%	9.4%	9.2%	9.4%	590	603	1193	390	398	201	205

EXISTING RESIDENTIAL & PROPOSED COMMERCIAL DEVELOPMENT TRIPS

	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 - HILL ROAD MAJOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	197	4	0	0	1	225	427
7:00 AM	211	5	0	0	3	224	442
8:00 AM	130	3	0	0	8	192	332
9:00 AM	110	4	0	0	6	153	273
10:00 AM	78	11	0	0	13	144	244
11:00 AM	83	10	0	0	6	140	239
12:00 PM	91	13	0	0	11	150	265
1:00 PM	90	9	0	0	6	150	255
2:00 PM	80	16	0	0	7	128	231
3:00 PM	123	15	0	0	17	191	346
4:00 PM	127	20	0	0	24	207	377
5:00 PM	154	41	0	0	25	199	418

2022 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach
6:00 AM				68	0	25	93
7:00 AM				85	0	55	140
8:00 AM				94	0	43	136
9:00 AM				89	0	70	159
10:00 AM				88	0	61	149
11:00 AM				99	0	63	163
12:00 PM				122	0	98	221
1:00 PM				110	0	107	217
2:00 PM				146	0	105	251
3:00 PM				188	0	192	380
4:00 PM				269	0	249	517
5:00 PM				308	0	301	609

2023 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	204	4	0	0	2	240	449
7:00 AM	217	6	0	0	4	246	473
8:00 AM	134	3	0	0	9	211	357
9:00 AM	113	4	0	0	7	166	291
10:00 AM	80	12	0	0	14	156	261
11:00 AM	86	11	0	0	7	151	255
12:00 PM	94	14	0	0	12	163	283
1:00 PM	93	10	0	0	7	163	273
2:00 PM	82	17	0	0	9	141	249
3:00 PM	127	16	0	0	18	205	367
4:00 PM	132	22	0	0	25	224	402
5:00 PM	159	43	0	0	26	216	444

2023 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach
6:00 AM				72	0	26	98
7:00 AM				93	0	56	149
8:00 AM				102	0	44	146
9:00 AM				97	0	72	169
10:00 AM				98	0	63	160
11:00 AM				111	0	65	176
12:00 PM				135	0	101	236
1:00 PM				123	0	110	233
2:00 PM				162	0	108	270
3:00 PM				208	0	197	405
4:00 PM				294	0	255	549
5:00 PM				333	0	309	643

2024 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	210	4	0	0	3	258	476
7:00 AM	224	6	0	0	6	275	512
8:00 AM	138	4	0	0	11	235	388
9:00 AM	117	5	0	0	8	182	312
10:00 AM	83	13	0	0	15	172	282
11:00 AM	89	12	0	0	8	166	275
12:00 PM	97	16	0	0	13	180	305
1:00 PM	96	11	0	0	9	180	296
2:00 PM	85	19	0	0	10	159	272
3:00 PM	131	19	0	0	20	223	393
4:00 PM	136	24	0	0	27	246	433
5:00 PM	164	47	0	0	28	237	476

2024 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach
6:00 AM				78	0	26	104
7:00 AM				103	0	58	160
8:00 AM				114	0	45	159
9:00 AM				107	0	74	181
10:00 AM				110	0	64	174
11:00 AM				126	0	67	193
12:00 PM				151	0	104	255
1:00 PM				141	0	113	253
2:00 PM				182	0	110	293
3:00 PM				233	0	202	435
4:00 PM				326	0	262	588
5:00 PM				366	0	317	683

2034 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - HILL ROAD MAJOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	274	5	0	0	1	268	549
7:00 AM	293	10	0	0	6	256	563
8:00 AM	180	9	0	0	13	219	422
9:00 AM	152	15	0	0	13	179	360
10:00 AM	108	30	0	0	24	167	328
11:00 AM	116	34	0	0	22	163	334
12:00 PM	126	40	0	0	33	175	374
1:00 PM	125	31	0	0	28	174	357
2:00 PM	111	40	0	0	29	145	325
3:00 PM	171	38	0	0	40	225	474
4:00 PM	177	45	0	0	49	241	512
5:00 PM	214	75	0	0	51	231	572

2034 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - KINGS CROSSING MINOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach
6:00 AM				86	0	33	119
7:00 AM				104	0	73	177
8:00 AM				115	0	57	171
9:00 AM				110	0	93	203
10:00 AM				106	0	81	187
11:00 AM				117	0	84	202
12:00 PM				148	0	131	278
1:00 PM				131	0	142	273
2:00 PM				175	0	139	315
3:00 PM				228	0	255	483
4:00 PM				329	0	331	660
5:00 PM				381	0	400	782

2034 BUILD TRAFFIC VOLUMES - HILL ROAD MAJOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Both Approaches
6:00 AM	274	6	0	0	4	286	571
7:00 AM	293	11	0	0	11	287	602
8:00 AM	180	11	0	0	17	246	454
9:00 AM	152	17	0	0	16	196	381
10:00 AM	108	32	0	0	27	183	350
11:00 AM	116	37	0	0	25	178	355
12:00 PM	126	43	0	0	36	192	397
1:00 PM	125	34	0	0	31	192	381
2:00 PM	111	44	0	0	32	164	351
3:00 PM	171	42	0	0	43	243	500
4:00 PM	177	51	0	0	53	264	545
5:00 PM	214	81	0	0	54	254	603

2034 BUILD TRAFFIC VOLUMES - KINGS CROSSING MINOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Highest Vol. Approach
6:00 AM				90	0	33	124
7:00 AM				114	0	73	187
8:00 AM				126	0	57	183
9:00 AM				120	0	93	213
10:00 AM				119	0	81	200
11:00 AM				134	0	84	218
12:00 PM				165	0	131	295
1:00 PM				149	0	142	291
2:00 PM				197	0	139	336
3:00 PM				254	0	255	509
4:00 PM				362	0	331	692
5:00 PM				413	0	400	813

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	63	163	39%	146	40%	0%	38
12:00 PM	98	221	44%	161	40%	0%	59
1:00 PM	107	217	49%	156	40%	0%	64
2:00 PM	105	251	42%	136	40%	0%	63
3:00 PM	192	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	63	160	39%	170	40%	0%	38
11:00 AM	65	176	37%	158	40%	0%	39
12:00 PM	101	236	43%	175	40%	0%	60
1:00 PM	110	233	47%	170	40%	0%	66
2:00 PM	108	270	40%	150	40%	0%	65
3:00 PM	197	405	49%	223	40%	0%	118
4:00 PM	255	549	46%	249	40%	0%	153
5:00 PM	309	643	48%	242	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%	187	40%	0%	39
11:00 AM	67	193	35%	175	20%	0%	53
12:00 PM	104	255	41%	192	40%	0%	62
1:00 PM	113	253	45%	189	40%	0%	68
2:00 PM	110	293	38%	169	40%	0%	66
3:00 PM	202	435	46%	243	40%	0%	121
4:00 PM	262	588	45%	273	40%	0%	157
5:00 PM	317	683	46%	266	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%	261	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	84	202	42%	185	40%	0%	50
12:00 PM	131	278	47%	208	40%	0%	78
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%	265	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%	298	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	84	218	39%	203	40%	0%	50
12:00 PM	131	295	44%	228	40%	0%	78
1:00 PM	142	291	49%	222	40%	0%	85
2:00 PM	139	336	41%	196	40%	0%	84
3:00 PM	255	509	50%	286	40%	0%	153
4:00 PM	331	692	48%	317	40%	0%	198
5:00 PM	400	813	49%	309	40%	0%	240

DILEY ROAD & HOWE INDUSTRIAL PARKWAY - EXISTING TRAFFIC COUNTS (YEAR 2020)

TIME	HOWE INDUSTRIAL PKWY (EASTBOUND)				N/A (WESTBOUND)				DILEY ROAD (NORTHBOUND)				DILEY ROAD (SOUTHBOUND)			
BEGIN	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS	LEFT	THRU	RIGHT	PEDS
6AM	3	0	4	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

MAJOR

	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Both Approaches
6:00 AM	19	383	0	0	510	13	925
7:00 AM	43	450	0	0	668	21	1182
8:00 AM	33	383	0	0	619	22	1057
9:00 AM	13	321	0	0	476	4	814
10:00 AM	5	358	0	0	409	5	777
11:00 AM	16	402	0	0	441	12	871
12:00 PM	28	478	0	0	501	17	1024
1:00 PM	16	397	0	0	498	19	930
2:00 PM	19	540	0	0	505	8	1072
3:00 PM	13	676	0	0	604	6	1299
4:00 PM	10	750	0	0	702	5	1467
5:00 PM	8	879	0	0	694	7	1588

EXISTING TRAFFIC VOLUMES - HOWE INDUSTRIAL PKWY

MINOR

	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approch.
6:00 AM	3	0	4				7
7:00 AM	7	0	7				14
8:00 AM	6	0	21				27
9:00 AM	1	0	9				10
10:00 AM	10	0	10				20
11:00 AM	9	0	26				35
12:00 PM	11	0	24				35
1:00 PM	14	0	14				28
2:00 PM	14	0	18				32
3:00 PM	8	0	27				35
4:00 PM	18	0	34				52
5:00 PM	15	0	41				56

2034 NO-BUILD TRAFFIC VOLUMES - DILEY ROAD (1.3%/YR)

MAJOR

	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Both Approaches
6:00 AM	22	453	0	0	603	15	1093
7:00 AM	51	532	0	0	790	25	1397
8:00 AM	39	453	0	0	732	26	1249
9:00 AM	15	379	0	0	563	5	962
10:00 AM	6	423	0	0	483	6	918
11:00 AM	19	475	0	0	521	14	1030
12:00 PM	33	565	0	0	592	20	1210
1:00 PM	19	469	0	0	589	22	1099
2:00 PM	22	638	0	0	597	9	1267
3:00 PM	15	799	0	0	714	7	1535
4:00 PM	12	887	0	0	830	6	1734
5:00 PM	9	1039	0	0	820	8	1877

2034 NO-BUILD TRAFFIC VOLUMES - HOWE INDUSTRIAL PKWY (1.3%/YR)

MINOR

	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approch.
6:00 AM	4	0	5				8
7:00 AM	8	0	8				17
8:00 AM	7	0	25				32
9:00 AM	1	0	11				12
10:00 AM	12	0	12				24
11:00 AM	11	0	31				41
12:00 PM	13	0	28				41
1:00 PM	17	0	17				33
2:00 PM	17	0	21				38
3:00 PM	9	0	32				41
4:00 PM	21	0	40				61
5:00 PM	18	0	48				66

SINGLE FAMILY-DETACHED HOUSING (ITE LUC 210) - ALL PHASES (191 DWELLING UNITS)

	PRIMARY Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					1029	1029	2058	1029	1029	0	0
6:00 AM	1.6%	5.9%	0.0%	0.0%	16	61	77	16	61	0	0
7:00 AM	3.2%	10.2%	0.0%	0.0%	33	105	138	33	105	0	0
8:00 AM	3.7%	8.6%	0.0%	0.0%	38	88	127	38	88	0	0
9:00 AM	3.2%	5.4%	0.0%	0.0%	33	56	88	33	56	0	0
10:00 AM	4.2%	5.4%	0.0%	0.0%	43	56	99	43	56	0	0
11:00 AM	5.4%	5.1%	0.0%	0.0%	56	52	108	56	52	0	0
12:00 PM	5.5%	5.6%	0.0%	0.0%	57	58	114	57	58	0	0
1:00 PM	6.0%	5.9%	0.0%	0.0%	62	61	122	62	61	0	0
2:00 PM	7.0%	6.2%	0.0%	0.0%	72	64	136	72	64	0	0
3:00 PM	8.5%	6.0%	0.0%	0.0%	87	62	149	87	62	0	0
4:00 PM	10.5%	7.5%	0.0%	0.0%	108	77	185	108	77	0	0
5:00 PM	10.3%	7.4%	0.0%	0.0%	106	76	182	106	76	0	0

MULTIFAMILY HOUSING (LOW-RISE, ITE LUC 220) - 100 DWELLING UNITS

	PRIMARY Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					358	358	716	358	358	0	0
6:00 AM	1.1%	5.8%	0.0%	0.0%	4	21	25	4	21	0	0
7:00 AM	2.6%	12.9%	0.0%	0.0%	9	46	55	9	46	0	0
8:00 AM	4.0%	9.1%	0.0%	0.0%	14	33	47	14	33	0	0
9:00 AM	3.9%	7.2%	0.0%	0.0%	14	26	40	14	26	0	0
10:00 AM	3.9%	4.7%	0.0%	0.0%	14	17	31	14	17	0	0
11:00 AM	4.9%	5.5%	0.0%	0.0%	18	20	37	18	20	0	0
12:00 PM	5.6%	5.4%	0.0%	0.0%	20	19	39	20	19	0	0
1:00 PM	4.8%	4.9%	0.0%	0.0%	17	18	35	17	18	0	0
2:00 PM	5.9%	6.0%	0.0%	0.0%	21	21	43	21	21	0	0
3:00 PM	8.3%	5.2%	0.0%	0.0%	30	19	48	30	19	0	0
4:00 PM	10.0%	5.1%	0.0%	0.0%	36	18	54	36	18	0	0
5:00 PM	11.4%	6.7%	0.0%	0.0%	41	24	65	41	24	0	0

SHOPPING CENTER (ITE LUC 820) - 309,240 SF

	PRIMARY Hourly Percentage Distribution Inbound	PRIMARY Hourly Percentage Distribution Outbound	PASS-BY Hourly Percentage Distribution Inbound	PASS-BY Hourly Percentage Distribution Outbound	TOTAL TRIPS inbound	TOTAL TRIPS outbound	TOTAL TRIPS Total	PRIMARY TRIPS inbound	PRIMARY TRIPS outbound	PASS BY TRIPS inbound	PASS BY TRIPS outbound
					6416	6416	12832	4234	4234	2182	2182
6:00 AM	0.3%	0.2%	0.3%	0.2%	19	13	32	13	8	7	4
7:00 AM	1.4%	0.9%	1.4%	0.9%	90	58	148	59	38	31	20
8:00 AM	2.6%	1.5%	2.6%	1.5%	167	96	263	110	64	57	33
9:00 AM	4.7%	2.5%	4.7%	2.5%	302	160	462	199	106	103	55
10:00 AM	7.1%	4.1%	7.1%	4.1%	456	263	719	301	174	155	89
11:00 AM	9.7%	6.8%	9.7%	6.8%	622	436	1059	411	288	212	148
12:00 PM	10.6%	9.4%	10.6%	9.4%	680	603	1283	449	398	231	205
1:00 PM	9.2%	9.5%	9.2%	9.5%	590	610	1200	390	402	201	207
2:00 PM	8.9%	9.2%	8.9%	9.2%	571	590	1161	377	390	194	201
3:00 PM	8.5%	9.0%	8.5%	9.0%	545	577	1123	360	381	185	196
4:00 PM	8.9%	9.4%	8.9%	9.4%	571	603	1174	377	398	194	205
5:00 PM	9.2%	9.4%	9.2%	9.4%	590	603	1193	390	398	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	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	62	0	0
4:00 PM	108	77	0	0
5:00 PM	106	76	0	0

EXISTING RESIDENTIAL & PROPOSED COMMERCIAL DEVELOPMENT TRIPS

	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

2034 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - DILEY ROAD MAJOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Both Approaches
6:00 AM	22	458	4	3	604	15	1106
7:00 AM	51	547	15	14	793	25	1445
8:00 AM	39	474	28	26	737	26	1329
9:00 AM	15	411	48	45	571	5	1095
10:00 AM	6	468	72	67	495	6	1114
11:00 AM	19	542	98	92	537	14	1302
12:00 PM	33	648	107	100	609	20	1518
1:00 PM	19	549	93	87	603	22	1373
2:00 PM	22	716	91	85	612	9	1535
3:00 PM	15	876	88	82	729	7	1798
4:00 PM	12	967	93	87	846	6	2011
5:00 PM	9	1122	97	90	838	8	2164

2034 NO-BUILD TRAFFIC VOLUMES (WITH FUTURE DEVELOPMENT) - HOWE INDUSTRIAL PKWY/GREENGATE BLVD MINOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approach
6:00 AM	4	0	5	7	0	2	9
7:00 AM	8	0	8	20	0	8	28
8:00 AM	7	0	25	25	0	11	36
9:00 AM	1	0	11	36	0	17	52
10:00 AM	12	0	12	53	0	26	79
11:00 AM	11	0	31	87	0	42	129
12:00 PM	13	0	28	118	0	58	176
1:00 PM	17	0	17	119	0	58	178
2:00 PM	17	0	21	116	0	57	173
3:00 PM	9	0	32	113	0	55	169
4:00 PM	21	0	40	118	0	58	176
5:00 PM	18	0	48	119	0	58	177

2034 BUILD TRAFFIC VOLUMES - DILEY ROAD MAJOR STREET							
	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL Both Approaches
6:00 AM	22	458	8	7	604	15	1114
7:00 AM	51	547	25	21	793	25	1461
8:00 AM	39	474	39	33	737	26	1348
9:00 AM	15	411	58	52	571	5	1112
10:00 AM	6	468	85	76	495	6	1136
11:00 AM	19	542	115	103	537	14	1330
12:00 PM	33	648	124	112	609	20	1547
1:00 PM	19	549	112	99	603	22	1404
2:00 PM	22	716	112	99	612	9	1571
3:00 PM	15	876	114	100	729	7	1841
4:00 PM	12	967	125	108	846	6	2065
5:00 PM	9	1122	128	111	838	8	2217

2034 BUILD TRAFFIC VOLUMES - HOWE INDUSTRIAL PKWY/GREENGATE BLVD MINOR STREET							
	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL Highest Vol. Approach
6:00 AM	4	0	5	25	0	15	39
7:00 AM	8	0	8	52	0	29	81
8:00 AM	7	0	25	51	0	29	80
9:00 AM	1	0	11	52	0	28	80
10:00 AM	12	0	12	70	0	37	107
11:00 AM	11	0	31	102	0	53	155
12:00 PM	13	0	28	136	0	69	205
1:00 PM	17	0	17	137	0	70	208
2:00 PM	17	0	21	135	0	70	205
3:00 PM	9	0	32	132	0	68	200
4:00 PM	21	0	40	141	0	73	214
5:00 PM	18	0	48	142	0	73	215

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	2	9	27%	231	60%	0%	1
7:00 AM	8	28	29%	281	60%	0%	3
8:00 AM	11	36	31%	251	60%	0%	4
9:00 AM	17	52	32%	230	60%	0%	7
10:00 AM	26	79	33%	270	60%	0%	10
11:00 AM	42	129	33%	320	60%	0%	17
12:00 PM	58	176	33%	378	60%	0%	23
1:00 PM	58	178	33%	321	60%	0%	23
2:00 PM	57	173	33%	403	60%	5%	26
3:00 PM	55	169	33%	482	60%	5%	25
4:00 PM	58	176	33%	530	60%	10%	29
5:00 PM	58	177	33%	609	60%	15%	32

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	15	39	37%	233	60%	0%	6
7:00 AM	29	81	36%	286	60%	0%	12
8:00 AM	29	80	36%	256	60%	0%	11
9:00 AM	28	80	35%	234	60%	0%	11
10:00 AM	37	107	35%	277	60%	0%	15
11:00 AM	53	155	34%	329	60%	5%	24
12:00 PM	69	205	34%	386	60%	5%	31
1:00 PM	70	208	34%	330	60%	0%	28
2:00 PM	70	205	34%	414	60%	5%	31
3:00 PM	68	200	34%	495	60%	5%	30
4:00 PM	73	214	34%	546	60%	10%	37
5:00 PM	73	215	34%	625	60%	15%	40

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**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	Minor Road
HILL 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.

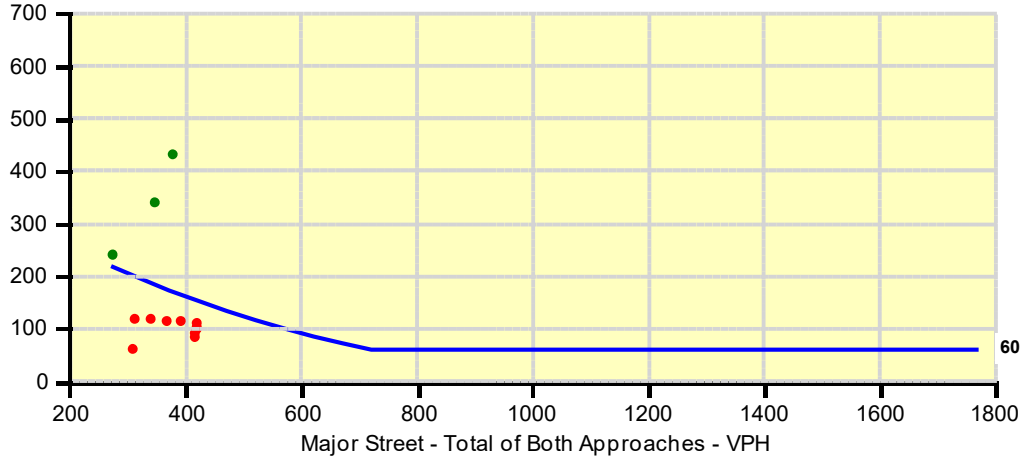
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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
							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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant 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.

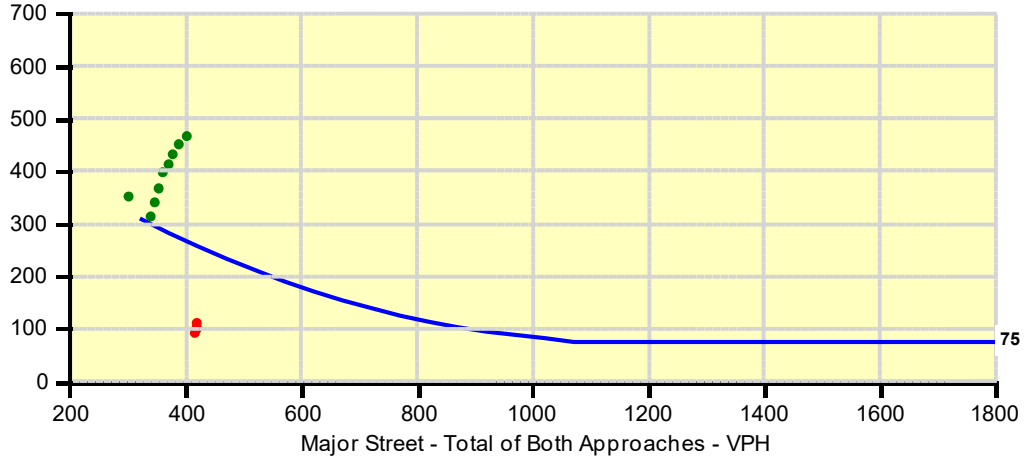
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	Minor Road
HILL 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.

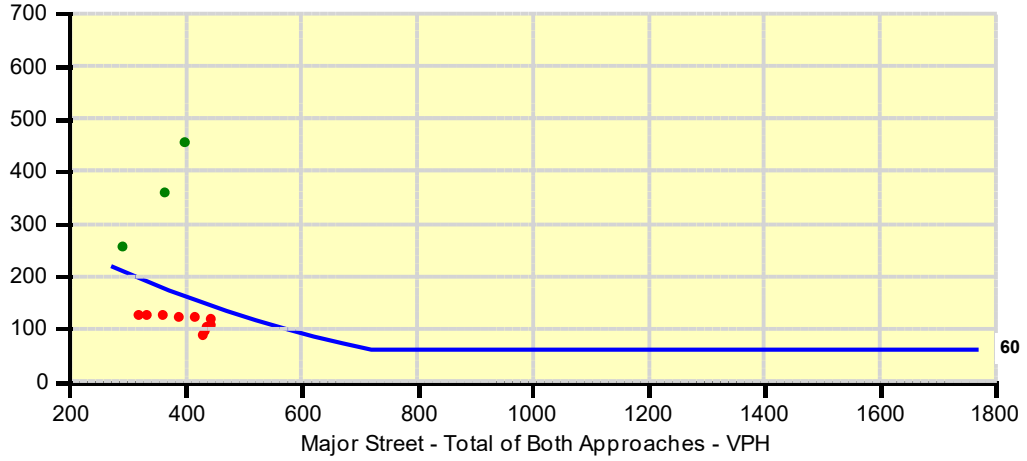
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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
							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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant 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.

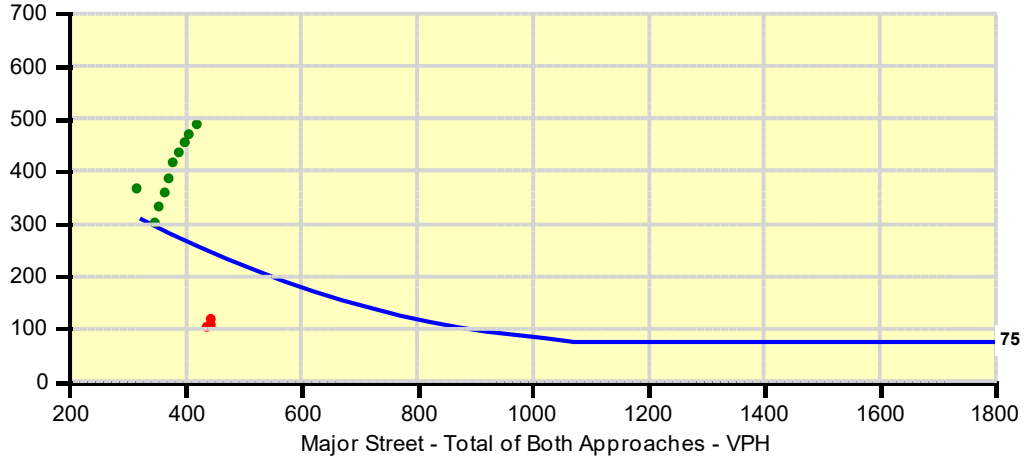
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	Minor Road
HILL 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.

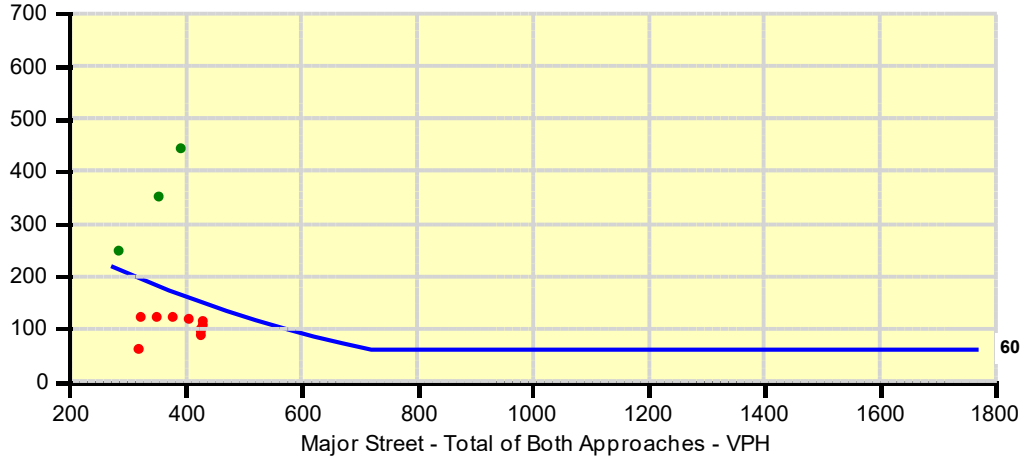
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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
							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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant Met?
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.

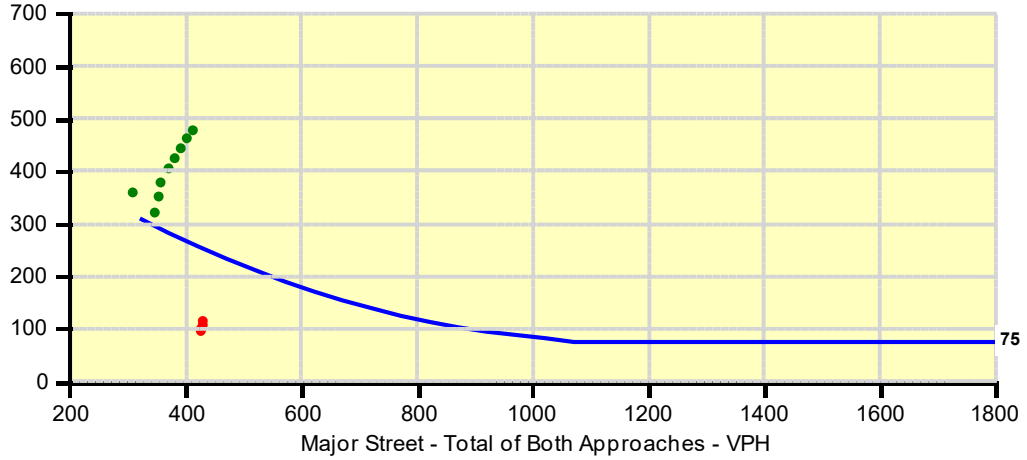
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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: 2,420

Minor Street Approaches

Southbound: KINGS CROSSING
Number of Lanes :1

Total Approach Volume: 2,685

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**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
06:30 - 07:30	216	+	248	=	464	0	109	Yes
17:00 - 18:00	202	+	242	=	444	0	518	Yes
07:30 - 08:30	181	+	234	=	415	0	135	Yes
16:00 - 17:00	154	+	249	=	403	0	447	Yes
15:00 - 16:00	143	+	223	=	366	0	326	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	+	204	=	339	0	304	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	+	186	=	309	0	279	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	195	No
14:15 - 15:15	111	+	168	=	279	0	253	No
12:15 - 13:15	105	+	172	=	277	0	193	No
09:30 - 10:30	105	+	171	=	276	0	138	No
12:30 - 13:30	102	+	172	=	274	0	191	No
11:45 - 12:45	106	+	167	=	273	0	182	No
13:00 - 14:00	103	+	170	=	273	0	189	No
12:45 - 13:45	99	+	172	=	271	0	189	No
09:45 - 10:45	99	+	170	=	269	0	137	No
11:30 - 12:30	103	+	164	=	267	0	171	No
13:15 - 14:15	102		165		267	0	199	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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	+	242	=	444	0	518	No
16:45 - 17:45	190	+	243	=	433	0	500	No
16:30 - 17:30	178	+	245	=	423	0	483	No
07:30 - 08:30	181	+	234	=	415	0	135	No
16:15 - 17:15	166	+	247	=	413	0	465	No
16:00 - 17:00	154	+	249	=	403	0	447	No
15:45 - 16:45	152	+	244	=	396	0	414	No
07:45 - 08:45	160	+	226	=	386	0	139	No
15:30 - 16:30	149	+	237	=	386	0	384	No
15:15 - 16:15	146	+	230	=	376	0	355	No
15:00 - 16:00	143	+	223	=	366	0	326	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	+	204	=	339	0	304	No
05:45 - 06:45	156	+	180	=	336	0	69	No
17:15 - 18:15	151	+	182	=	333	0	389	No
08:30 - 09:30	125	+	198	=	323	0	137	No
14:30 - 15:30	123	+	186	=	309	0	279	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	Minor Road
HILL 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	+	245	=	423	0	483	Yes
15:30 - 16:30	149	+	237	=	386	0	384	Yes
08:00 - 09:00	137	+	220	=	357	0	137	Yes
14:30 - 15:30	123	+	186	=	309	0	279	Yes
09:00 - 10:00	117	+	173	=	290	0	140	Yes
12:00 - 13:00	108	+	173	=	281	0	195	Yes
05:45 - 06:45	156	+	180	=	336	0	69	No
14:15 - 15:15	111	+	168	=	279	0	253	No
13:00 - 14:00	103	+	170	=	273	0	189	No
11:45 - 12:45	106		167		273	0	182	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	+	245	=	423	0	483	Yes
16:15 - 17:15	166	+	247	=	413	0	465	No
16:00 - 17:00	154	+	249	=	403	0	447	No
15:45 - 16:45	152	+	244	=	396	0	414	No
15:30 - 16:30	149	+	237	=	386	0	384	No
15:15 - 16:15	146	+	230	=	376	0	355	No
15:00 - 16:00	143	+	223	=	366	0	326	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		204		339	0	304	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.

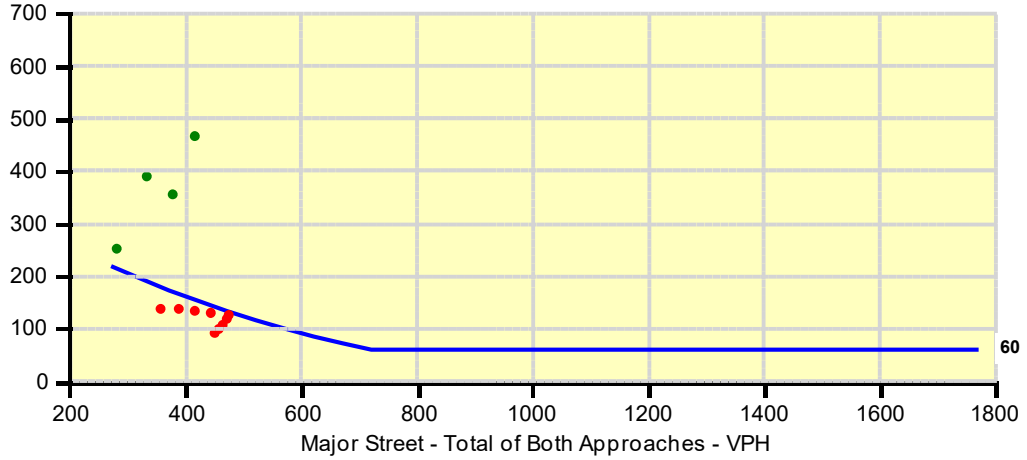
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
16:15 - 17:15	166	+	247	=	413	0	465	Yes
15:15 - 16:15	146	+	230	=	376	0	355	Yes
17:15 - 18:15	151	+	182	=	333	0	389	Yes
14:15 - 15:15	111	+	168	=	279	0	253	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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant Met?
17:00 - 18:00	962	Yes	0	-	---	518	-	Yes	Yes
16:45 - 17:45	933	Yes	0	-	---	500	-	Yes	Yes
16:30 - 17:30	906	Yes	0	-	---	483	-	Yes	Yes
16:15 - 17:15	878	Yes	0	-	---	465	-	Yes	Yes
16:00 - 17:00	850	Yes	0	-	---	447	-	Yes	Yes
15:45 - 16:45	810	Yes	0	-	---	414	-	Yes	Yes
15:30 - 16:30	770	Yes	0	-	---	384	-	Yes	Yes
15:15 - 16:15	731	Yes	0	-	---	355	-	Yes	Yes
17:15 - 18:15	722	Yes	0	-	---	389	-	Yes	Yes
15:00 - 16:00	692	Yes	0	-	---	326	-	Yes	Yes
14:45 - 15:45	643	No	0	-	---	304	-	Yes	No
07:00 - 08:00	600	No	0	-	---	127	-	Yes	No
14:30 - 15:30	588	No	0	-	---	279	-	Yes	No
06:45 - 07:45	588	No	0	-	---	117	-	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	532	No	0	-	---	253	-	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	482	No	0	-	---	260	-	Yes	No
08:15 - 09:15	477	No	0	-	---	137	-	Yes	No
14:00 - 15:00	476	No	0	-	---	227	-	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.

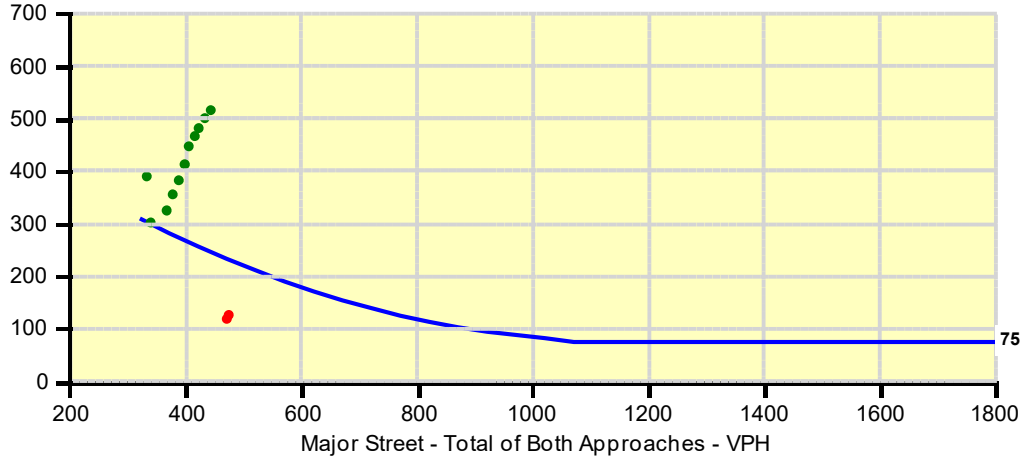
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
17:00 - 18:00	202	+	242	=	444	0	518	Yes
16:45 - 17:45	190	+	243	=	433	0	500	Yes
16:30 - 17:30	178	+	245	=	423	0	483	Yes
16:15 - 17:15	166	+	247	=	413	0	465	Yes
16:00 - 17:00	154	+	249	=	403	0	447	Yes
15:45 - 16:45	152	+	244	=	396	0	414	Yes
15:30 - 16:30	149	+	237	=	386	0	384	Yes
15:15 - 16:15	146	+	230	=	376	0	355	Yes
15:00 - 16:00	143	+	223	=	366	0	326	Yes
14:45 - 15:45	135	+	204	=	339	0	304	Yes
17:15 - 18:15	151	+	182	=	333	0	389	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**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	Minor Road
HILL 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.

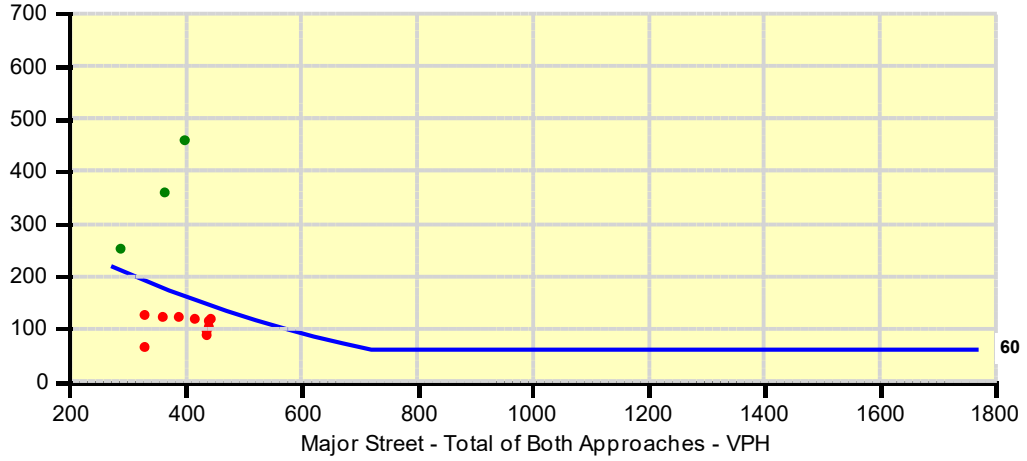
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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
							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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant Met?
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.

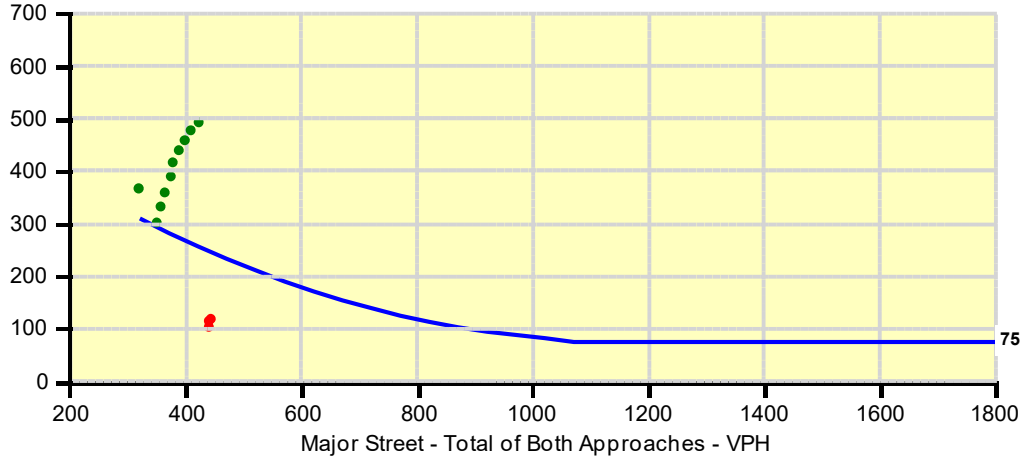
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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: 2,671

Minor Street Approaches

Southbound: KINGS CROSSING
Number of Lanes :1

Total Approach Volume: 2,929

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 = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **140 105**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	+	266	=	465	0	540	Yes
15:45 - 16:45	156	+	266	=	422	0	451	Yes
08:15 - 09:15	137	+	232	=	369	0	151	Yes
14:45 - 15:45	140	+	226	=	366	0	328	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	+	207	=	335	0	302	No
12:00 - 13:00	113	+	193	=	306	0	213	No
09:15 - 10:15	116	+	189	=	305	0	151	No
14:15 - 15:15	116	+	188	=	304	0	275	No
12:15 - 13:15	112	+	192	=	304	0	212	No
12:30 - 13:30	111	+	191	=	302	0	210	No
12:45 - 13:45	110	+	190	=	300	0	208	No
09:30 - 10:30	110	+	188	=	298	0	151	No
11:45 - 12:45	110	+	186	=	296	0	205	No
13:00 - 14:00	107	+	189	=	296	0	209	No
09:45 - 10:45	104	+	187	=	291	0	151	No
11:30 - 12:30	107	+	182	=	289	0	196	No
13:15 - 14:15	106	+	183	=	289	0	218	No
13:30 - 14:30	105	+	178	=	283	0	227	No
10:00 - 11:00	96	+	187	=	283	0	149	No
11:15 - 12:15	104	+	178	=	282	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 = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **70 52**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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
17:00 - 18:00	211	+	265	=	476	0	556	No
06:00 - 07:00	214	+	261	=	475	0	99	No
16:45 - 17:45	199	+	266	=	465	0	540	No
16:30 - 17:30	186	+	269	=	455	0	521	No
07:30 - 08:30	184	+	263	=	447	0	142	No
16:15 - 17:15	173	+	271	=	444	0	502	No
16:00 - 17:00	160	+	273	=	433	0	483	No
15:45 - 16:45	156	+	266	=	422	0	451	No
07:45 - 08:45	161	+	254	=	415	0	144	No
15:30 - 16:30	154	+	258	=	412	0	418	No
15:15 - 16:15	152	+	251	=	403	0	386	No
15:00 - 16:00	150	+	243	=	393	0	354	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	+	226	=	366	0	328	No
17:15 - 18:15	158	+	199	=	357	0	417	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	+	207	=	335	0	302	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 =	**Mixed**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**280**	**420**
Veh/Hr Minor NB =	**112**	**56**
Veh/Hr Minor SB =	**84**	**42**

Major Road	Minor Road
HILL 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	+	271	=	444	0	502	Yes
15:15 - 16:15	152	+	251	=	403	0	386	Yes
08:00 - 09:00	142	+	246	=	388	0	150	Yes
17:15 - 18:15	158	+	199	=	357	0	417	Yes
09:00 - 10:00	122	+	190	=	312	0	151	Yes
14:15 - 15:15	116	+	188	=	304	0	275	Yes
12:15 - 13:15	112	+	192	=	304	0	212	Yes
13:15 - 14:15	106	+	183	=	289	0	218	Yes
10:00 - 11:00	96	+	187	=	283	0	149	Yes
11:15 - 12:15	104		178		282	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
16:45 - 17:45	199	+	266	=	465	0	540	Yes
15:45 - 16:45	156	+	266	=	422	0	451	Yes
15:30 - 16:30	154	+	258	=	412	0	418	No
15:15 - 16:15	152	+	251	=	403	0	386	No
15:00 - 16:00	150	+	243	=	393	0	354	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	+	226	=	366	0	328	No
05:45 - 06:45	159	+	195	=	354	0	75	No
08:30 - 09:30	132		218		350	0	152	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.

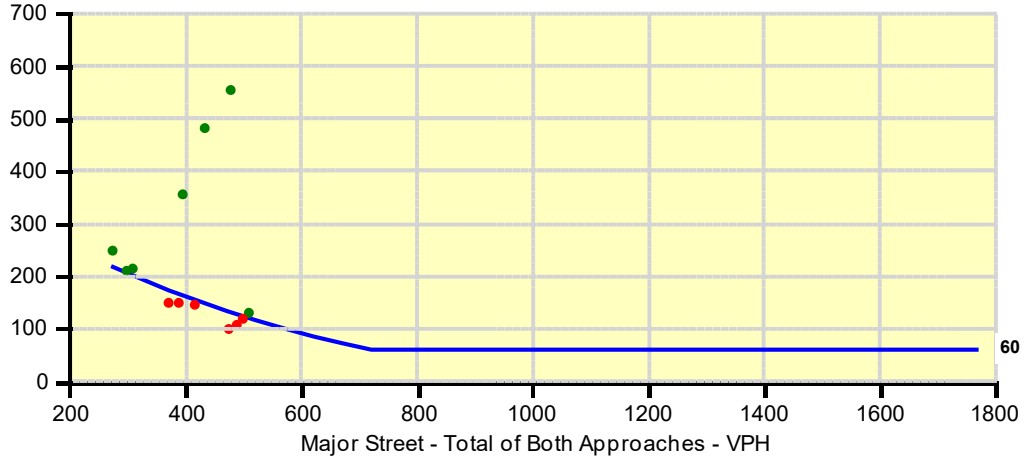
Summary

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 =	**Mixed**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
06:45 - 07:45	229	+	279	=	508	0	129	Yes
17:00 - 18:00	211	+	265	=	476	0	556	Yes
16:00 - 17:00	160	+	273	=	433	0	483	Yes
15:00 - 16:00	150	+	243	=	393	0	354	Yes
12:00 - 13:00	113	+	193	=	306	0	213	Yes
13:00 - 14:00	107	+	189	=	296	0	209	Yes
14:00 - 15:00	104	+	169	=	273	0	248	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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant Met?
17:00 - 18:00	1032	Yes	0	-	---	556	-	Yes	Yes
16:45 - 17:45	1005	Yes	0	-	---	540	-	Yes	Yes
16:30 - 17:30	976	Yes	0	-	---	521	-	Yes	Yes
16:15 - 17:15	946	Yes	0	-	---	502	-	Yes	Yes
16:00 - 17:00	916	Yes	0	-	---	483	-	Yes	Yes
15:45 - 16:45	873	Yes	0	-	---	451	-	Yes	Yes
15:30 - 16:30	830	Yes	0	-	---	418	-	Yes	Yes
15:15 - 16:15	789	Yes	0	-	---	386	-	Yes	Yes
17:15 - 18:15	774	Yes	0	-	---	417	-	Yes	Yes
15:00 - 16:00	747	Yes	0	-	---	354	-	Yes	Yes
14:45 - 15:45	694	Yes	0	-	---	328	-	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	637	No	0	-	---	302	-	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
14:15 - 15:15	579	No	0	-	---	275	-	Yes	No
06:00 - 07:00	574	No	0	-	---	99	-	No	No
07:45 - 08:45	559	No	0	-	---	144	-	Yes	No
08:00 - 09:00	538	No	0	-	---	150	-	Yes	No
14:00 - 15:00	521	No	0	-	---	248	-	Yes	No
08:15 - 09:15	520	No	0	-	---	151	-	Yes	No
12:00 - 13:00	519	No	0	-	---	213	-	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.

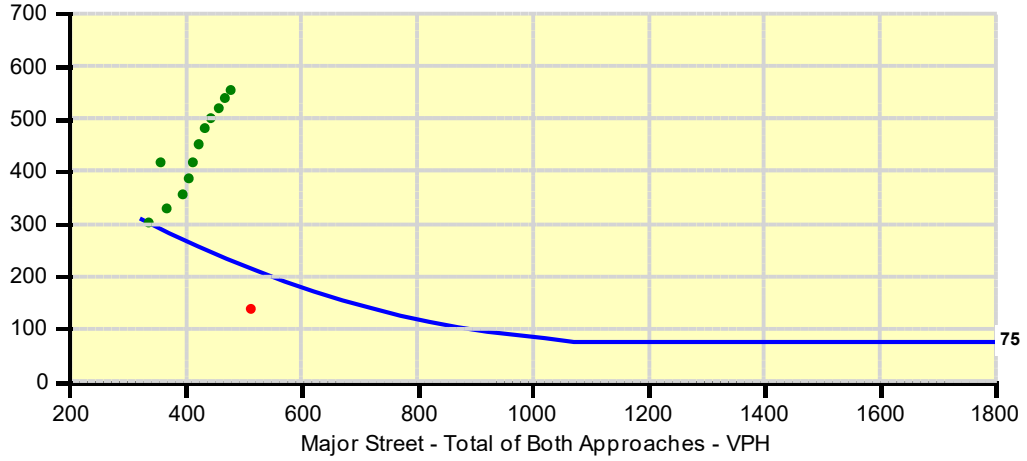
Summary

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 =	**Mixed**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
17:00 - 18:00	211	+	265	=	476	0	556	Yes
16:45 - 17:45	199	+	266	=	465	0	540	Yes
16:30 - 17:30	186	+	269	=	455	0	521	Yes
16:15 - 17:15	173	+	271	=	444	0	502	Yes
16:00 - 17:00	160	+	273	=	433	0	483	Yes
15:45 - 16:45	156	+	266	=	422	0	451	Yes
15:30 - 16:30	154	+	258	=	412	0	418	Yes
15:15 - 16:15	152	+	251	=	403	0	386	Yes
15:00 - 16:00	150	+	243	=	393	0	354	Yes
14:45 - 15:45	140	+	226	=	366	0	328	Yes
17:15 - 18:15	158	+	199	=	357	0	417	Yes
							302	Yes



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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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	Minor Road
HILL 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.

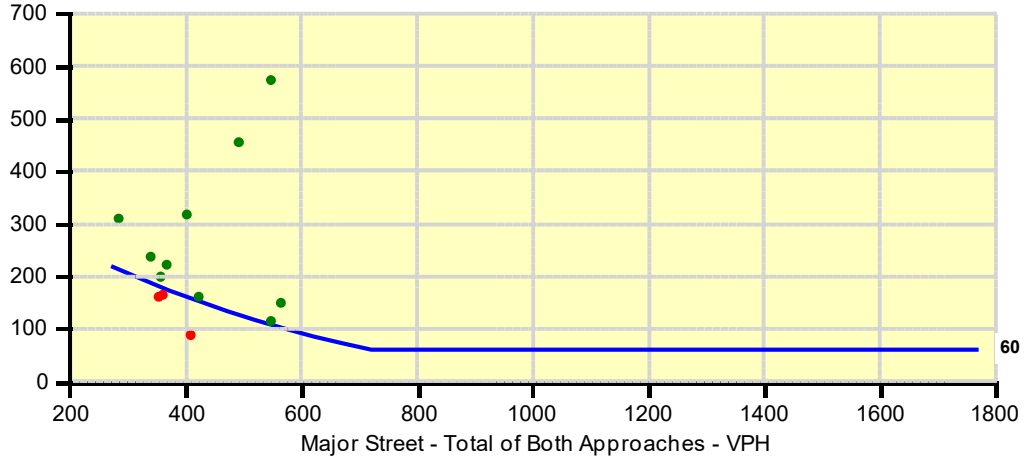
Summary

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**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant Met?
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.

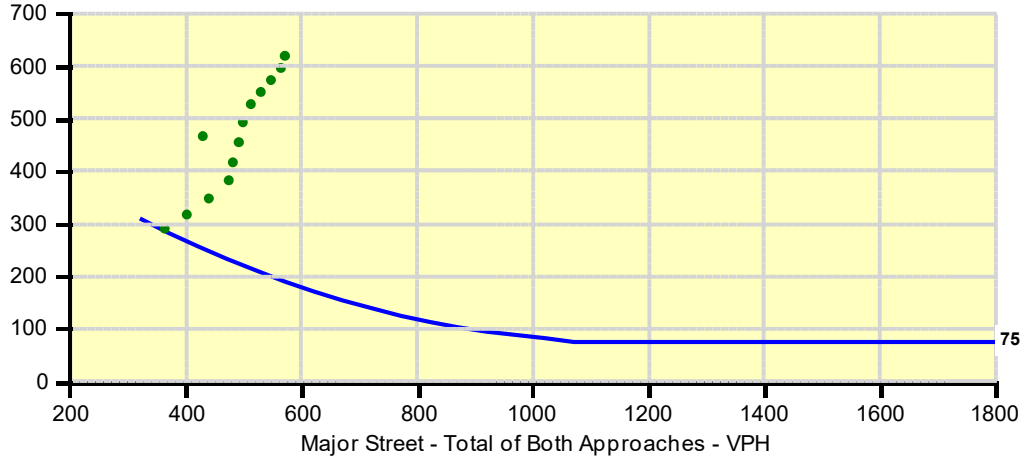
Summary

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**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
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: 3,034

Minor Street Approaches

Southbound: KINGS CROSSING
Number of Lanes :1

Total Approach Volume: 3,352

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 = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **140 105**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
17:00 - 18:00	295	+	308	=	603	0	653	Yes
07:00 - 08:00	304	+	298	=	602	0	158	Yes
06:00 - 07:00	280	+	290	=	570	0	117	Yes
16:00 - 17:00	228	+	317	=	545	0	560	Yes
15:00 - 16:00	213	+	286	=	499	0	407	Yes
08:00 - 09:00	191	+	263	=	454	0	171	Yes
12:00 - 13:00	169	+	228	=	397	0	243	Yes
13:00 - 14:00	159	+	223	=	382	0	234	Yes
09:00 - 10:00	169	+	212	=	381	0	176	Yes
11:00 - 12:00	153	+	203	=	356	0	184	Yes
14:00 - 15:00	155	+	196	=	351	0	281	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
04:15 - 05:15	0	+	0	=	0	0	0	No
03:30 - 04:30	0	+	0	=	0	0	0	No
04:00 - 05:00	0	+	0	=	0	0	0	No
04:45 - 05:45	0	+	0	=	0	0	0	No
05:00 - 06:00	0	+	0	=	0	0	0	No
04:30 - 05:30	0	+	0	=	0	0	0	No
03:45 - 04:45	0	+	0	=	0	0	0	No
23:00 - 00:00	0	+	0	=	0	0	0	No
23:15 - 00:15	0	+	0	=	0	0	0	No
23:30 - 00:30	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 = **Mixed**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **70 52**

	Major Road					Minor Road		
	HILL ROAD							
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
07:00 - 08:00	304	+	298	=	602	0	158	Yes
16:45 - 17:45	279	+	312	=	591	0	628	Yes
06:00 - 07:00	280	+	290	=	570	0	117	Yes
15:45 - 16:45	225	+	308	=	533	0	524	Yes
15:30 - 16:30	221	+	301	=	522	0	485	No
15:15 - 16:15	217	+	294	=	511	0	446	No
15:00 - 16:00	213	+	286	=	499	0	407	No
14:45 - 15:45	197	+	264	=	461	0	375	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	+	241	=	424	0	343	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	+	228	=	397	0	243	No
11:45 - 12:45	168	+	224	=	392	0	229	No
12:15 - 13:15	165	+	227	=	392	0	240	No
14:15 - 15:15	169	+	218	=	387	0	312	No
12:30 - 13:30	161	+	226	=	387	0	237	No
13:00 - 14:00	159	+	223	=	382	0	234	No
12:45 - 13:45	157	+	225	=	382	0	234	No
09:00 - 10:00	169	+	212	=	381	0	176	No
11:30 - 12:30	163	+	217	=	380	0	214	No
13:15 - 14:15	159	+	216	=	375	0	246	No
09:15 - 10:15	162		212		374	0	174	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 =	**Mixed**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**280**	**420**
Veh/Hr Minor NB =	**112**	**56**
Veh/Hr Minor SB =	**84**	**42**

Major Road	Minor Road
HILL 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	+	312	=	591	0	628	Yes
15:45 - 16:45	225	+	308	=	533	0	524	Yes
07:45 - 08:45	220	+	271	=	491	0	170	Yes
14:45 - 15:45	197	+	264	=	461	0	375	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	+	225	=	382	0	234	Yes
13:45 - 14:45	159	+	202	=	361	0	270	Yes
09:45 - 10:45	148	+	212	=	360	0	170	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	+	313	=	575	0	606	Yes
15:30 - 16:30	221	+	301	=	522	0	485	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	+	241	=	424	0	343	Yes
08:45 - 09:45	173	+	224	=	397	0	174	No
12:00 - 13:00	169	+	228	=	397	0	243	No
11:45 - 12:45	168	+	224	=	392	0	229	No
12:15 - 13:15	165	+	227	=	392	0	240	No
12:30 - 13:30	161	+	226	=	387	0	237	No
14:15 - 15:15	169		218		387	0	312	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.

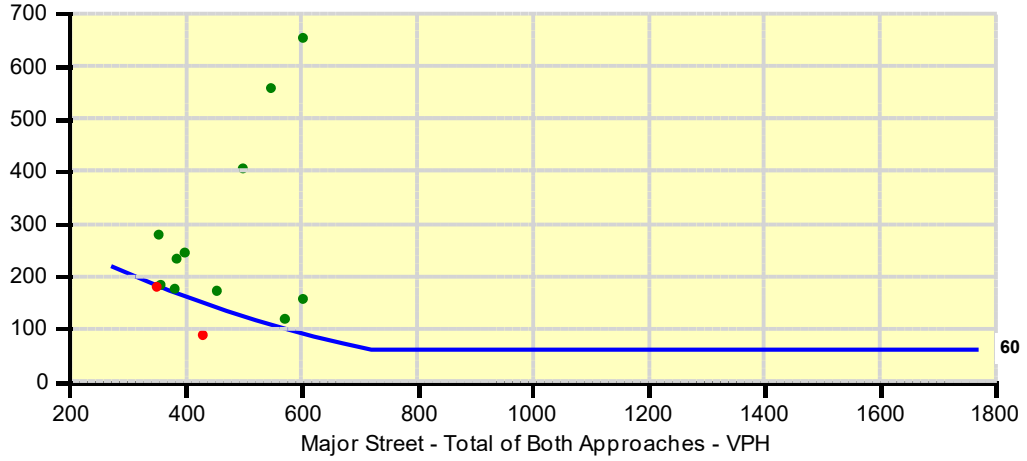
Summary

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 =	**Mixed**

	Major Road					Minor Road		
	HILL ROAD							
Time	**Major EB**	**+**	**Major WB**	**=**	**Total**	**Minor NB**	**Minor SB**	**Met?**
17:00 - 18:00	295	+	308	=	603	0	653	Yes
07:00 - 08:00	304	+	298	=	602	0	158	Yes
06:00 - 07:00	280	+	290	=	570	0	117	Yes
16:00 - 17:00	228	+	317	=	545	0	560	Yes
15:00 - 16:00	213	+	286	=	499	0	407	Yes
08:00 - 09:00	191	+	263	=	454	0	171	Yes
12:00 - 13:00	169	+	228	=	397	0	243	Yes
13:00 - 14:00	159	+	223	=	382	0	234	Yes
09:00 - 10:00	169	+	212	=	381	0	176	Yes
11:00 - 12:00	153	+	203	=	356	0	184	Yes
14:00 - 15:00	155	+	196	=	351	0	281	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**

Major Road	Minor Road
HILL ROAD	

Time	Total of All Approaches	Met?	Minor NB	Delay NB	Met?	Minor SB	Delay SB	Met?	Warrant Met?
17:00 - 18:00	1256	Yes	0	-	---	653	-	Yes	Yes
16:45 - 17:45	1219	Yes	0	-	---	628	-	Yes	Yes
16:30 - 17:30	1181	Yes	0	-	---	606	-	Yes	Yes
16:15 - 17:15	1143	Yes	0	-	---	583	-	Yes	Yes
16:00 - 17:00	1105	Yes	0	-	---	560	-	Yes	Yes
15:45 - 16:45	1057	Yes	0	-	---	524	-	Yes	Yes
15:30 - 16:30	1007	Yes	0	-	---	485	-	Yes	Yes
15:15 - 16:15	957	Yes	0	-	---	446	-	Yes	Yes
17:15 - 18:15	942	Yes	0	-	---	490	-	Yes	Yes
15:00 - 16:00	906	Yes	0	-	---	407	-	Yes	Yes
14:45 - 15:45	836	Yes	0	-	---	375	-	Yes	Yes
14:30 - 15:30	767	Yes	0	-	---	343	-	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	699	Yes	0	-	---	312	-	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	640	No	0	-	---	243	-	Yes	No
14:00 - 15:00	632	No	0	-	---	281	-	Yes	No
12:15 - 13:15	632	No	0	-	---	240	-	Yes	No
13:45 - 14:45	631	No	0	-	---	270	-	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.

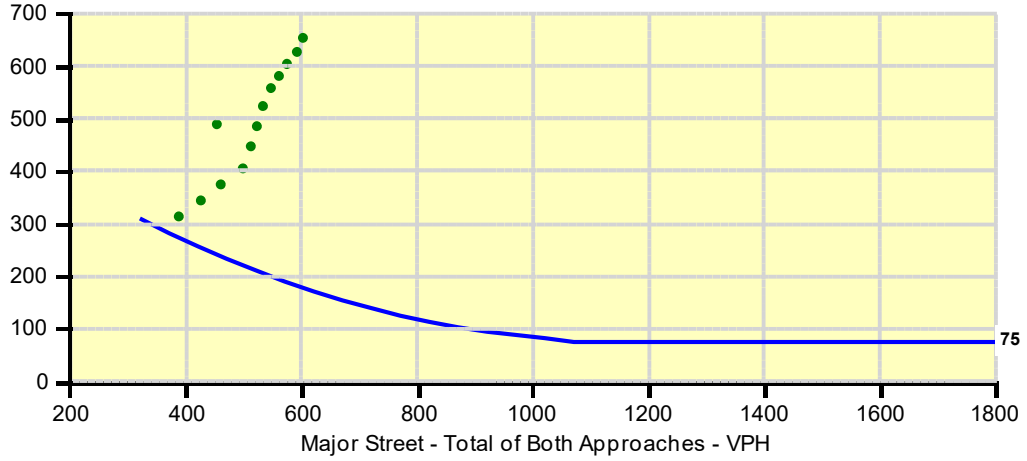
Summary

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 =	**Mixed**

	Major Road HILL ROAD					Minor Road		
Time	Major EB	+	Major WB	=	Total	Minor NB	Minor SB	Met?
17:00 - 18:00	295	+	308	=	603	0	653	Yes
16:45 - 17:45	279	+	312	=	591	0	628	Yes
16:30 - 17:30	262	+	313	=	575	0	606	Yes
16:15 - 17:15	245	+	315	=	560	0	583	Yes
16:00 - 17:00	228	+	317	=	545	0	560	Yes
15:45 - 16:45	225	+	308	=	533	0	524	Yes
15:30 - 16:30	221	+	301	=	522	0	485	Yes
15:15 - 16:15	217	+	294	=	511	0	446	Yes
15:00 - 16:00	213	+	286	=	499	0	407	Yes
14:45 - 15:45	197	+	264	=	461	0	375	Yes
17:15 - 18:15	221	+	231	=	452	0	490	Yes
							343	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: 8,874

Southbound: DILEY ROAD
Number of Lanes :2+

Total Approach Volume: 8,915

Minor Street Approaches

Eastbound: HOWE INDUSTRIAL PKWY
Number of Lanes :1

Total Approach Volume: 428

Westbound: GREENGATE BLVD
Number of Lanes :2+

Total Approach Volume: 1,143

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied
Required volumes reached for 5 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Satisfied
Required volumes reached for 8 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied
Required 1A volumes reached for 7 hours, 8 are needed
Required 1B volumes reached for 8 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 (3) 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

Only 5 one hour periods meet minimums.
Warrant is NOT 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	1110	+	937	=	2047	63	149	Yes
15:15 - 16:15	1002	+	850	=	1852	47	142	Yes
14:00 - 15:00	829	+	706	=	1535	39	143	Yes
12:00 - 13:00	788	+	729	=	1517	42	142	Yes
13:00 - 14:00	661	+	712	=	1373	35	143	Yes
15:00 - 16:00	979	+	818	=	1797	42	139	No
17:15 - 18:15	922	+	702	=	1624	51	114	No
11:45 - 12:45	755	+	706	=	1461	40	135	No
07:00 - 08:00	613	+	832	=	1445	17	24	No
07:15 - 08:15	594	+	820	=	1414	21	25	No
11:30 - 12:30	723	+	685	=	1408	41	125	No
07:30 - 08:30	575	+	808	=	1383	25	26	No
06:45 - 07:45	583	+	778	=	1361	16	21	No
11:15 - 12:15	691	+	664	=	1355	42	115	No
07:45 - 08:45	556	+	796	=	1352	29	27	No
08:00 - 09:00	541	+	789	=	1330	33	30	No
11:00 - 12:00	659	+	643	=	1302	43	105	No
06:30 - 07:30	550	+	726	=	1276	14	17	No
08:15 - 09:15	525	+	748	=	1273	28	34	No
10:45 - 11:45	630	+	622	=	1252	40	97	No
08:30 - 09:30	509	+	707	=	1216	23	38	No
10:30 - 11:30	602	+	604	=	1206	35	86	No
06:15 - 07:15	517	+	674	=	1191	12	13	No
10:15 - 11:15	574	+	586	=	1160	30	75	No
08:45 - 09:45	493		666		1159	18	42	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

8 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	1110	+	937	=	2047	63	149	Yes
15:15 - 16:15	1002	+	850	=	1852	47	142	Yes
17:15 - 18:15	922	+	702	=	1624	51	114	Yes
14:15 - 15:15	866	+	734	=	1600	40	142	Yes
12:15 - 13:15	756	+	726	=	1482	40	142	Yes
13:15 - 14:15	704	+	709	=	1413	36	142	Yes
11:15 - 12:15	691	+	664	=	1355	42	115	Yes
10:15 - 11:15	574	+	586	=	1160	30	75	Yes
07:00 - 08:00	613	+	832	=	1445	17	24	No
07:15 - 08:15	594	+	820	=	1414	21	25	No
07:30 - 08:30	575	+	808	=	1383	25	26	No
06:45 - 07:45	583	+	778	=	1361	16	21	No
07:45 - 08:45	556	+	796	=	1352	29	27	No
08:00 - 09:00	541	+	789	=	1330	33	30	No
06:30 - 07:30	550	+	726	=	1276	14	17	No
08:15 - 09:15	525	+	748	=	1273	28	34	No
08:30 - 09:30	509	+	707	=	1216	23	38	No
06:15 - 07:15	517	+	674	=	1191	12	13	No
08:45 - 09:45	493	+	666	=	1159	18	42	No
10:00 - 11:00	546	+	568	=	1114	25	64	No
09:45 - 10:45	528	+	585	=	1113	22	56	No
09:30 - 10:30	510	+	597	=	1107	19	52	No
06:00 - 07:00	484	+	622	=	1106	10	9	No
09:15 - 10:15	492	+	609	=	1101	16	48	No
09:00 - 10:00	474		621		1095	13	44	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

Only 7 hours meet 1A minimums.
8 hours meet 1B minimums.
Warrant is NOT 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?
16:15 - 17:15	1110	+	937	=	2047	63	149	Yes
15:15 - 16:15	1002	+	850	=	1852	47	142	Yes
17:15 - 18:15	922	+	702	=	1624	51	114	Yes
14:15 - 15:15	866	+	734	=	1600	40	142	Yes
12:15 - 13:15	756	+	726	=	1482	40	142	Yes
13:15 - 14:15	704	+	709	=	1413	36	142	Yes
11:15 - 12:15	691	+	664	=	1355	42	115	Yes
07:00 - 08:00	613	+	832	=	1445	17	24	No
07:15 - 08:15	594	+	820	=	1414	21	25	No
07:30 - 08:30	575	+	808	=	1383	25	26	No
06:45 - 07:45	583	+	778	=	1361	16	21	No
07:45 - 08:45	556		796		1352	29	27	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:45 - 17:45	1186	+	933	=	2119	65	151	Yes
15:45 - 16:45	1048	+	914	=	1962	57	148	Yes
14:45 - 15:45	940	+	790	=	1730	42	140	Yes
13:45 - 14:45	790	+	703	=	1493	38	140	Yes
11:45 - 12:45	755	+	706	=	1461	40	135	Yes
12:45 - 13:45	692	+	720	=	1412	36	142	Yes
10:45 - 11:45	630	+	622	=	1252	40	97	Yes
09:45 - 10:45	528	+	585	=	1113	22	56	Yes
07:00 - 08:00	613	+	832	=	1445	17	24	No
07:15 - 08:15	594	+	820	=	1414	21	25	No
07:30 - 08:30	575	+	808	=	1383	25	26	No
06:45 - 07:45	583		778		1361	16	21	No

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.

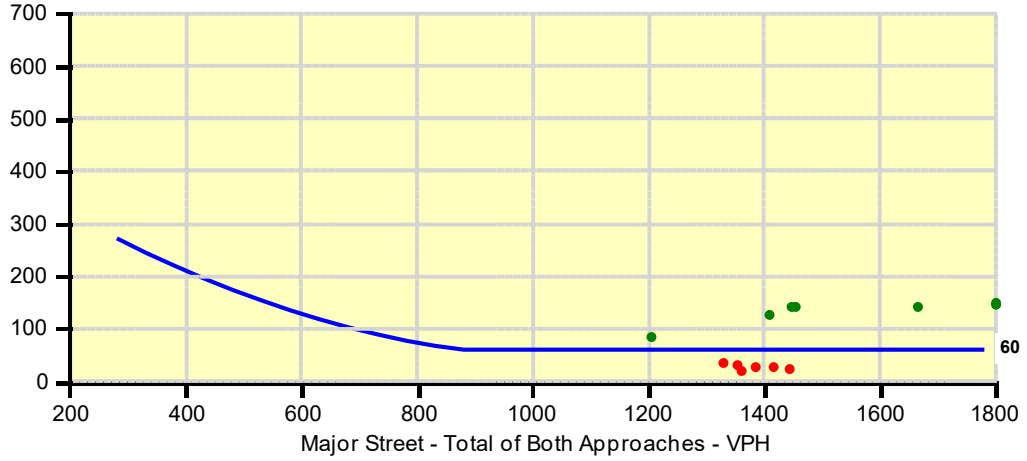
Summary

7 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:30 - 17:30	1148	+	935	=	2083	64	150	Yes
15:30 - 16:30	1025	+	882	=	1907	52	145	Yes
14:30 - 15:30	903	+	762	=	1665	41	141	Yes
13:30 - 14:30	747	+	706	=	1453	37	141	Yes
12:30 - 13:30	724	+	723	=	1447	38	142	Yes
11:30 - 12:30	723	+	685	=	1408	41	125	Yes
10:30 - 11:30	602	+	604	=	1206	35	86	Yes
07:00 - 08:00	613	+	832	=	1445	17	24	No
07:15 - 08:15	594	+	820	=	1414	21	25	No
07:30 - 08:30	575	+	808	=	1383	25	26	No
06:45 - 07:45	583	+	778	=	1361	16	21	No
							27	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**

Major Road
DILEY ROAD

Minor Road
HOWE INDUSTRIAL PKWY

Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
17:00 - 18:00	2383	Yes	67	-	---	152	-	Yes	Yes
16:45 - 17:45	2335	Yes	65	-	---	151	-	Yes	Yes
16:30 - 17:30	2297	Yes	64	-	---	150	-	Yes	Yes
16:15 - 17:15	2259	Yes	63	-	---	149	-	No	No
16:00 - 17:00	2221	Yes	62	-	---	148	-	No	No
15:45 - 16:45	2167	Yes	57	-	---	148	-	No	No
15:30 - 16:30	2104	Yes	52	-	---	145	-	No	No
15:15 - 16:15	2041	Yes	47	-	---	142	-	No	No
15:00 - 16:00	1978	Yes	42	-	---	139	-	No	No
14:45 - 15:45	1912	Yes	42	-	---	140	-	No	No
14:30 - 15:30	1847	Yes	41	-	---	141	-	No	No
17:15 - 18:15	1789	Yes	51	-	---	114	-	No	No
14:15 - 15:15	1782	Yes	40	-	---	142	-	No	No
14:00 - 15:00	1717	Yes	39	-	---	143	-	No	No
12:00 - 13:00	1701	Yes	42	-	---	142	-	No	No
13:45 - 14:45	1671	Yes	38	-	---	140	-	No	No
12:15 - 13:15	1664	Yes	40	-	---	142	-	No	No
11:45 - 12:45	1636	Yes	40	-	---	135	-	No	No
13:30 - 14:30	1631	Yes	37	-	---	141	-	No	No
12:30 - 13:30	1627	Yes	38	-	---	142	-	No	No
13:15 - 14:15	1591	Yes	36	-	---	142	-	No	No
12:45 - 13:45	1590	Yes	36	-	---	142	-	No	No
11:30 - 12:30	1574	Yes	41	-	---	125	-	No	No
13:00 - 14:00	1551	Yes	35	-	---	143	-	No	No
11:15 - 12:15	1512	Yes	42	-	---	115	-	No	No

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.

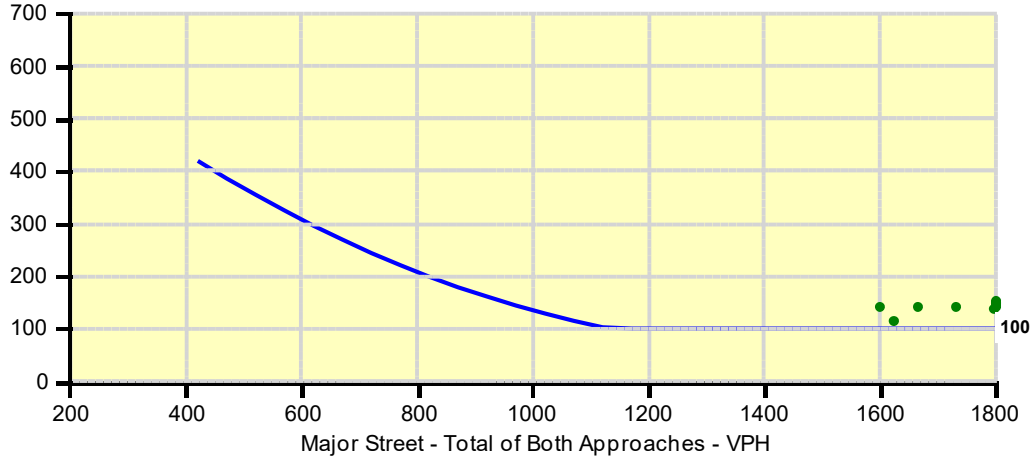
Summary

26 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
17:00 - 18:00	1228	+	936	=	2164	67	152	Yes
16:45 - 17:45	1186	+	933	=	2119	65	151	Yes
16:30 - 17:30	1148	+	935	=	2083	64	150	Yes
16:15 - 17:15	1110	+	937	=	2047	63	149	Yes
16:00 - 17:00	1072	+	939	=	2011	62	148	Yes
15:45 - 16:45	1048	+	914	=	1962	57	148	Yes
15:30 - 16:30	1025	+	882	=	1907	52	145	Yes
15:15 - 16:15	1002	+	850	=	1852	47	142	Yes
15:00 - 16:00	979	+	818	=	1797	42	139	Yes
14:45 - 15:45	940	+	790	=	1730	42	140	Yes
14:30 - 15:30	903	+	762	=	1665	41	141	Yes
							114	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: 9,085

Southbound: DILEY ROAD
Number of Lanes :2+

Total Approach Volume: 9,058

Minor Street Approaches

Eastbound: HOWE INDUSTRIAL PKWY
Number of Lanes :1

Total Approach Volume: 428

Westbound: GREENGATE BLVD
Number of Lanes :2+

Total Approach Volume: 1,463

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....Satisfied

Warrant 1A - Minimum Vehicular Volume.....Not Satisfied
Required volumes reached for 6 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....Satisfied
Required volumes reached for 9 hours, 8 are needed

Warrant 1C - Combination of Warrants.....Not Satisfied
Required 1A volumes reached for 7 hours, 8 are needed
Required 1B volumes reached for 11 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....Satisfied
Number of hours (8) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour.....Satisfied

Warrant 3A - Peak Hour Delay.....Satisfied
Number of one hour periods (22) 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

Only 6 one hour periods meet minimums.
Warrant is NOT 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:30 - 17:30	1180	+	958	=	2138	64	183	Yes
15:30 - 16:30	1055	+	900	=	1955	52	169	Yes
14:30 - 15:30	926	+	778	=	1704	41	165	Yes
13:30 - 14:30	766	+	720	=	1486	37	168	Yes
12:30 - 13:30	743	+	735	=	1478	38	166	Yes
11:30 - 12:30	738	+	696	=	1434	41	147	Yes
07:00 - 08:00	623	+	839	=	1462	17	65	No
07:15 - 08:15	605	+	828	=	1433	21	65	No
07:30 - 08:30	587	+	817	=	1404	25	65	No
11:15 - 12:15	707	+	675	=	1382	42	137	No
07:45 - 08:45	569	+	806	=	1375	29	65	No
06:45 - 07:45	590	+	782	=	1372	16	56	No
08:00 - 09:00	552	+	796	=	1348	33	63	No
11:00 - 12:00	676	+	654	=	1330	43	127	No
08:15 - 09:15	535	+	755	=	1290	28	63	No
06:30 - 07:30	556	+	730	=	1286	14	48	No
10:45 - 11:45	649	+	634	=	1283	40	116	No
10:30 - 11:30	619	+	615	=	1234	35	106	No
08:30 - 09:30	518	+	714	=	1232	23	63	No
06:15 - 07:15	522	+	678	=	1200	12	40	No
10:15 - 11:15	589	+	596	=	1185	30	96	No
08:45 - 09:45	501	+	673	=	1174	18	63	No
10:00 - 11:00	559	+	577	=	1136	25	86	No
09:45 - 10:45	541	+	592	=	1133	22	82	No
09:30 - 10:30	522		604		1126	19	76	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

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 = **630**

Veh/Hr Minor = **52 70**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	1142	+	959	=	2101	63	181	Yes
15:15 - 16:15	1030	+	868	=	1898	47	166	Yes
17:15 - 18:15	945	+	717	=	1662	51	137	Yes
14:15 - 15:15	888	+	749	=	1637	40	166	Yes
12:15 - 13:15	774	+	738	=	1512	40	167	Yes
13:15 - 14:15	723	+	722	=	1445	36	167	Yes
11:15 - 12:15	707	+	675	=	1382	42	137	Yes
10:15 - 11:15	589	+	596	=	1185	30	96	Yes
09:15 - 10:15	503	+	616	=	1119	16	70	Yes
07:00 - 08:00	623	+	839	=	1462	17	65	No
07:15 - 08:15	605	+	828	=	1433	21	65	No
07:30 - 08:30	587	+	817	=	1404	25	65	No
07:45 - 08:45	569	+	806	=	1375	29	65	No
06:45 - 07:45	590	+	782	=	1372	16	56	No
08:00 - 09:00	552	+	796	=	1348	33	63	No
08:15 - 09:15	535	+	755	=	1290	28	63	No
06:30 - 07:30	556	+	730	=	1286	14	48	No
08:30 - 09:30	518	+	714	=	1232	23	63	No
06:15 - 07:15	522	+	678	=	1200	12	40	No
08:45 - 09:45	501	+	673	=	1174	18	63	No
06:00 - 07:00	488	+	626	=	1114	10	32	No
09:00 - 10:00	484	+	628	=	1112	13	64	No
05:45 - 06:45	366	+	471	=	837	6	24	No
05:30 - 06:30	244	+	314	=	558	4	16	No
05:15 - 06:15	122		157		279	2	8	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

Only 7 hours meet 1A minimums.
11 hours meet 1B minimums.
Warrant is NOT 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	1218	+	957	=	2175	65	185	Yes
15:45 - 16:45	1080	+	932	=	2012	57	172	Yes
14:45 - 15:45	964	+	807	=	1771	42	164	Yes
13:45 - 14:45	809	+	718	=	1527	38	169	Yes
11:45 - 12:45	769	+	717	=	1486	40	157	Yes
12:45 - 13:45	712	+	732	=	1444	36	165	Yes
10:45 - 11:45	649	+	634	=	1283	40	116	Yes
07:00 - 08:00	623	+	839	=	1462	17	65	No
07:15 - 08:15	605	+	828	=	1433	21	65	No
07:30 - 08:30	587	+	817	=	1404	25	65	No
07:45 - 08:45	569	+	806	=	1375	29	65	No
06:45 - 07:45	590		782		1372	16	56	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:45 - 17:45	1218	+	957	=	2175	65	185	Yes
15:45 - 16:45	1080	+	932	=	2012	57	172	Yes
14:45 - 15:45	964	+	807	=	1771	42	164	Yes
13:45 - 14:45	809	+	718	=	1527	38	169	Yes
11:45 - 12:45	769	+	717	=	1486	40	157	Yes
12:45 - 13:45	712	+	732	=	1444	36	165	Yes
07:45 - 08:45	569	+	806	=	1375	29	65	Yes
06:45 - 07:45	590	+	782	=	1372	16	56	Yes
10:45 - 11:45	649	+	634	=	1283	40	116	Yes
08:45 - 09:45	501	+	673	=	1174	18	63	Yes
09:45 - 10:45	541	+	592	=	1133	22	82	Yes
06:30 - 07:30	556		730		1286	14	48	No

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.

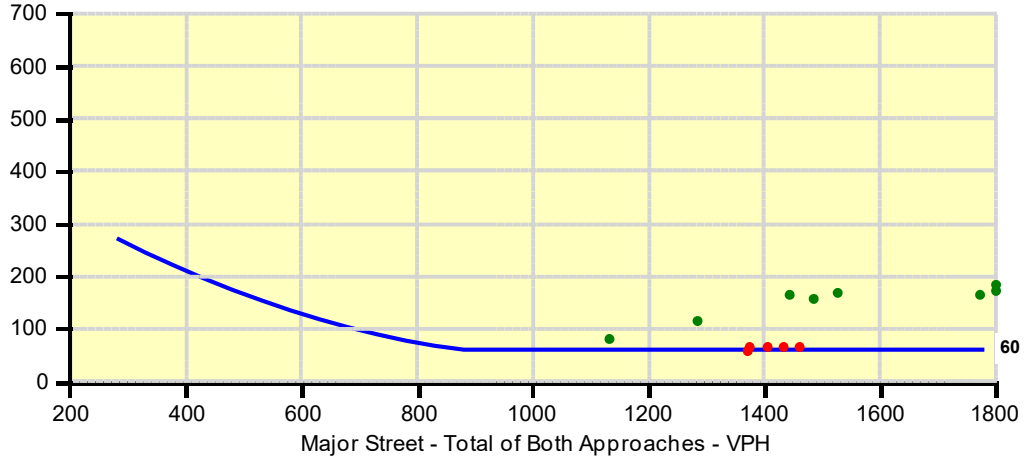
Summary

8 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:45 - 17:45	1218	+	957	=	2175	65	185	Yes
15:45 - 16:45	1080	+	932	=	2012	57	172	Yes
14:45 - 15:45	964	+	807	=	1771	42	164	Yes
13:45 - 14:45	809	+	718	=	1527	38	169	Yes
11:45 - 12:45	769	+	717	=	1486	40	157	Yes
12:45 - 13:45	712	+	732	=	1444	36	165	Yes
10:45 - 11:45	649	+	634	=	1283	40	116	Yes
09:45 - 10:45	541	+	592	=	1133	22	82	Yes
07:00 - 08:00	623	+	839	=	1462	17	65	No
07:15 - 08:15	605	+	828	=	1433	21	65	No
07:30 - 08:30	587	+	817	=	1404	25	65	No
							65	No



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**

Major Road	Minor Road
DILEY ROAD	HOWE INDUSTRIAL PKWY

Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
17:00 - 18:00	2466	Yes	67	-	---	183	-	Yes	Yes
16:45 - 17:45	2425	Yes	65	-	---	185	-	Yes	Yes
16:30 - 17:30	2385	Yes	64	-	---	183	-	Yes	Yes
16:15 - 17:15	2345	Yes	63	-	---	181	-	Yes	Yes
16:00 - 17:00	2305	Yes	62	-	---	179	-	Yes	Yes
15:45 - 16:45	2241	Yes	57	-	---	172	-	Yes	Yes
15:30 - 16:30	2176	Yes	52	-	---	169	-	Yes	Yes
15:15 - 16:15	2111	Yes	47	-	---	166	-	Yes	Yes
15:00 - 16:00	2046	Yes	42	-	---	163	-	Yes	Yes
14:45 - 15:45	1977	Yes	42	-	---	164	-	Yes	Yes
14:30 - 15:30	1910	Yes	41	-	---	165	-	Yes	Yes
14:15 - 15:15	1843	Yes	40	-	---	166	-	Yes	Yes
14:00 - 15:00	1776	Yes	39	-	---	167	-	Yes	Yes
12:00 - 13:00	1756	Yes	42	-	---	168	-	Yes	Yes
13:45 - 14:45	1734	Yes	38	-	---	169	-	Yes	Yes
12:15 - 13:15	1719	Yes	40	-	---	167	-	Yes	Yes
13:30 - 14:30	1691	Yes	37	-	---	168	-	Yes	Yes
11:45 - 12:45	1683	Yes	40	-	---	157	-	Yes	Yes
12:30 - 13:30	1682	Yes	38	-	---	166	-	Yes	Yes
13:15 - 14:15	1648	Yes	36	-	---	167	-	Yes	Yes
12:45 - 13:45	1645	Yes	36	-	---	165	-	Yes	Yes
13:00 - 14:00	1605	Yes	35	-	---	166	-	Yes	Yes
17:15 - 18:15	1850	Yes	51	-	---	137	-	No	No
11:30 - 12:30	1622	Yes	41	-	---	147	-	No	No
11:15 - 12:15	1561	Yes	42	-	---	137	-	No	No

CESO, Inc.
GREENGATE DEVELOPMENT
2034 BUILD

Study Name: DILEY & HOWE - 2034 BUILD

Study Date : 3/3/2020

Warrant 3B - Peak Hour Volumes

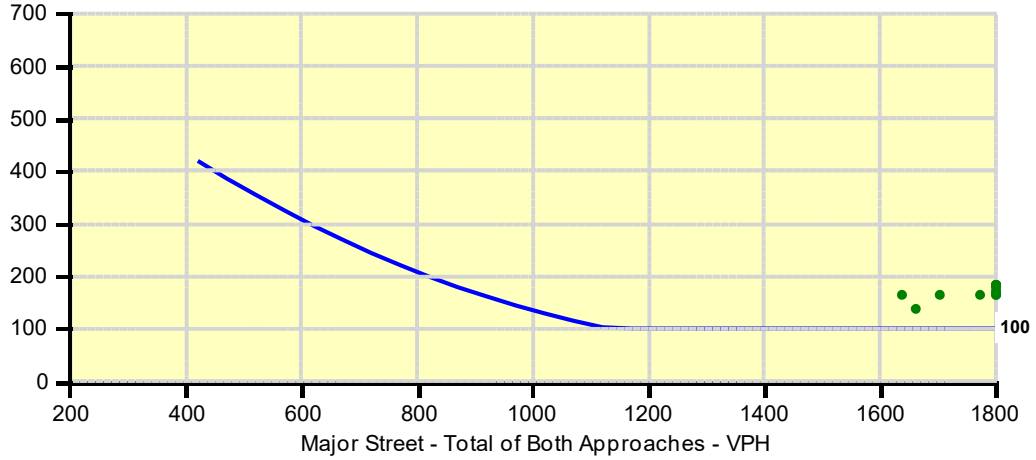
Description

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

28 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**

	Major Road DILEY ROAD					Minor Road HOWE INDUSTRIAL PKWY		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
17:00 - 18:00	1259	+	957	=	2216	67	183	Yes
16:45 - 17:45	1218	+	957	=	2175	65	185	Yes
16:30 - 17:30	1180	+	958	=	2138	64	183	Yes
16:15 - 17:15	1142	+	959	=	2101	63	181	Yes
16:00 - 17:00	1104	+	960	=	2064	62	179	Yes
15:45 - 16:45	1080	+	932	=	2012	57	172	Yes
15:30 - 16:30	1055	+	900	=	1955	52	169	Yes
15:15 - 16:15	1030	+	868	=	1898	47	166	Yes
15:00 - 16:00	1005	+	836	=	1841	42	163	Yes
14:45 - 15:45	964	+	807	=	1771	42	164	Yes
14:30 - 15:30	926	+	778	=	1704	41	165	Yes
							137	Yes