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То:	Mike Love, Delaware County Engineers Office; John Piccin, Delaware County Engineers Office; Perry Morgan, Stantec; Joe Looby, Stantec	From:	Doug Iles, Stabled 4 2017 Delaware county engineer
	(to all via email)		Columbus, Ohio

#### Reference: Casto North Site Traffic Study

This memorandum summarizes traffic analysis required by the Delaware County Engineers Office for the proposed North Casto Site. The required analyses, study years (2018 and 2028) and other requirements are discussed in the approved memo of understanding (MOU) attached.

The attached site plan shows the proposed development is to include 90 single-family dwelling units. As such a traffic impact study is not required. Only analyses of the site driveway will be required. All of the site traffic will access the site via existing Olivero Drive.

#### Trip Generation & Site Trip Assignment

The trip generation is based on the *ITE Trip Generation Manual*, 9<sup>th</sup> Edition for land use 210 Single-Family Detached Housing and is summarized in the table below.

Trip Generation ITE 210: Single-	Table Family Detached	Housing (90 units	5)	
	A	M	P	M
	In	Out	In	Out
ITE 210	18	55	60	36

Trips are assigned to be split 75% to/from the south and 25% to/from the north, based on the turning movement count. See the attached figure showing site and total trips.

NOTE: OLIVERO DRIVE WILL BE NON-LOADED AS Shown IN this TIS. The exhibit for Zoning shows Lots fronting Olivero DRIVE. @ IF Zoning documents defler Signifiantly From TIS, then TIS Will need to be updated (Le. TIS shows two roads connecting to the northern properties but Zoning exhibit only shows DNE)



June 23, 2017 Mike Love, Delaware County Engineers Office; John Piccin, Delaware County Engineers Office; Perry Morgan, Stantec; Joe Looby, Stantec Page 2 of 3

#### Reference: Casto North Site Traffic Study

#### Background Traffic Volumes

Stantec collected AM and PM peak hour turning movement counts May 17, 2017, attached. Background traffic volumes are based on a 3% growth rate from the October 2012 *Traffic Impact Study For The Diersing Yarnell And Vinmar North Sites* study. A straight line 3% growth rate is applied to the 2017 turning movement counts (Figure 1) to obtain the 2018 and 2028 background volumes (Figure 2 & 3).

To account for trips discussed in the 2012 study but not constructed at the time the turn counts were taken the difference between the volumes in the 2012 study and the turn counts is added to the background traffic (Figures 4-6). Site trips are shown in Figure 7. Total trips, existing plus background are shown in Figures 8 & 9.

#### Internal Roadway ADT

For internal site roadway ADT it is assumed that undeveloped land north of the site and south of Lewis Center Road is developed, as residential, with a density similar to the site. This area is shown shaded in cyan on the attached figure. The area is approximately 1.27 times the size of the proposed site with 90 units, which results in 114 additional units, using the ITE trip generation rate this would produce 1085 weekday trips.

Per Delaware County Engineers Office instruction, the distribution of those trips assumes Lewis Center Road will not be connected for through traffic between North State Street (SR 3) and Old 3C. The attached figure shows the estimated ADT volumes on the site streets.



June 23, 2017

Mike Love, Delaware County Engineers Office; John Piccin, Delaware County Engineers Office; Perry Morgan, Stantec; Joe Looby, Stantec Page 3 of 3

#### Reference: Casto North Site Traffic Study

#### Analysis Results

The following analyses are at the site driveway, include all full build site trips year 2028 total traffic.

- Stop control capacity analysis
  - LOS B for both AM & PM peak hour
- Signal warrant
  - A traffic signal warrant was not evaluated for this intersection. The volumes indicate a traffic signal is not warranted.
- Southbound right turn lane warrant
  - Southbound right turn lane not warranted
- Northbound left turn lane length
  - The calculated turn lane length is 175 feet, the same length recommended in the October 2012 *Traffic Impact Study For the Diersing Yarnell and Vinmar North Sites*.

If you have any questions please feel free to contact me.

### STANTEC CONSULTING SERVICES INC.

Douglas Iles, PE Senior Traffic Engineer Phone: (614) 643-4373 Doug.lles@stantec.com

Attachment: Approved MOU, Figures, Analyses

# List of Figures

- 1- Year 2017 Turn Count Volumes
- 2- 2018 Background Volumes (1.03\*Year 2017 Count)
- 3- 2028 Background Volumes (1.33\*Year 2017 Count)
- 4- AM Site Trips From 2012 Study
- 5- PM Site Trips From 2012 Study
- 6- Volumes to Add From 2012 Study (Figure 4 or 5 minus Figure 1)
- 7- Site Trips
- 8- 2018 Total (Background+Site+2012 Study Trips)
- 9- 2028 Total (Background+Site+2012 Study Trips)



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Fig 4



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Fig 7



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## **Meeting Notes**

Project: Casto North Site (1734-09307) Purpose: Traffic Study Memo Of Understanding

Stantec

Date:May 11, 2017 (Rev 6/9/17)Place/Time:Via telephone, 10:00 AMNext Meeting:NAAttendees:Mike Love- Delaware County<br/>Doug Iles- Stantec ConsultingAbsentees:NADistribution:to attendees and John Piccin, Delaware County; Perry Morgan,<br/>Stantec; Joe Looby, Stantec (via e-mail)

Approved willing

This memorandum summarizes a conversation with the Delaware County Engineers Office to discuss traffic study requirements for the proposed North Casto Site, site plan attached. Key points are summarized below.

The site plan shows the proposed development is for 90 single family dwelling units. As such a traffic impact study is not required. Only analyses of the site driveway will be required. All of the site traffic will access the site via existing Olivero Drive.

Trip Generation will be based on ITE Trip Generation Manual, 9th Edition.

For internal site roadway ADT Stantec will assume the undeveloped land north of the site and south of Lewis Center Road is developed, as residential, with density similar to the site. Also, assume Lewis Center Road will not be connected for through traffic between North State Street (SR 3) and Old 3C. An exhibit will be prepared showing the estimated ADT volumes on the site streets.

The following is the existing roadway classification and posted speed limits:

- Old 3C Highway, Major Collector, 45 MPH
- Olivero Drive, Minor Collector, 35 MPH

A peak hour turning movement count will be done at the intersection of Old 3C & Olivero Drive. Based on this count, attached, trips are assumed to be split 75% to/from the south and 25% to/from the north. Background traffic will also include traffic development discussed in the Diersing Yarnell & Vinmar TIS dated 12/19/12. The growth rate from this study will also be used.

One Team. Infinite Solutions.

Page 2 of 2

Casto North Site

The following analyses will be done for the site driveway, using the existing traffic volume and site traffic (total traffic) for the opening year 2018 and design year 2028, build and no build condition, as required.

- Stop control capacity analysis
- Signal warrant (as needed, 8 hour volumes will be estimated based on 4-hour count)
- Southbound right turn lane warrant (length if warranted)
- Northbound left turn lane length (compare existing to length required for full build)

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

STANTEC CONSULTING SERVICES INC.

Douglas K. Iles, PE Senior Traffic Engineer doug.iles@stantec.com

Attachments: Site plan, others as discussed.

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05:30 PM '	0	31	0	0	31	0	0	0	0	0	0	60	4	0	64	0	0	0	0	0	5
05:45 PM	2	24	0	0	26	0	0	0	0	0	0	33	3	0	99	n	0	F	0	4	80
Total	4	112	0	0	116	o	0	0	o	0	0	210	σ	a	219	10	0	N	0	12	34
and Total	7	192	0	0	199	0	0	0	0	0	0	359	18	0	377	15	0	ų	0	20	596
Apprch %	3.5	96.5	0	0		D	0	0	0		0	95.2	4.8	0		22	0	25	0		
Total %	12	32.2	o	0	33,4	0	0	o	0	0	0	60.2	ŝ	0	63.3	2.5	0	0.8	0	3.4	
			JEPIC										JE PIU				c	in orall			
		Ē	Tom Nor	ţ.			E.	rom Eas	tt.			H	om Sout	£			<b>〕</b> 正	om Wes			
Start Time	Right	Thru	Left	Peds :	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds ,	App. Total	Right	Thru	Left	Peds	App. Total	Int. Tota
Hour Analysi Hour for Entit	s From C	04:00 PM ection Be	I to 05:4: igins at 0	5 PM - P	eak 1 of 1						1								P	1	
05:00 PM -	+	28	0	0	29	0	0	0	0	0	0	48	2	0	20	4	0	-	0	10	õ
05:15 PM	-	29	0	0	30	0	0	0	0	0	0	49	0	0	49	m	0	0	0	e	8
05:30 PM	0	31	0	0	31	0	0	0	0	0	0	09	4	0	64	0	0	0	0	0	ö
05:45 PM	2	24	0	0	26	0	0	0	0	0	0	33	m	0	26	3	0	-	0	4	8
al Volume	4	112	0	0	116	0	0	0	0	0	0	210	6	0	219	10	0	2	0	12	34
App. Total	3.4	96.6	0	0		0	0	0	0		o	95.9	4.1	0	1.200	83.3	0	16.7	0		
HHH	-500	903	000	000	935	000	000	000	000	000	000	.875	.563	000	.855	.625	000	.500	000.	.600	16.

Stantec Consulting 1500 Lakeshore Dr Suite 100 Columbus, Ohio 43123 Design With Community In Mind

Stantec Consulting	1500 Lakeshore Dr Suite 100	Columbus, Ohio 43123	Design With Community In Mind

Doug W 5/17/17

File Name : Old3C\_Olivero\_PM Site Code : 1B Start Date : 5/17/2017 Page No : 1

			Old 3C									Ĩ	Old 3C				C	livero L	1		
		Ľ.	rom Nor	th			μĨ	rom Eas	Ţ			Ĕ	om Sout	th			Ē	rom We	st		
Start Time	Right	Thru	Left	Preds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	•	0	0			0	0	0	-	64
04:15 PM	0	2	0	0	N	0	0	0	0	0	0	10	~	0	2	0	0	0	0	0	o
04:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	N	4
04;45 PM	0	2	0	0	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24
Total	0	ø	0	0	9	0	0	0	0	0	0	9	2	0	60	m	0	0	o	en.	17
05:00 PM	0	2	0	0	2	0	0	0	0	Q	0	0	0	0	0	0	0	-	0	+	3
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	-	0	0	-	+	0	-	0	2	5
05:30 PM	0	-	0	0	Ŧ	a	0	0	0	0	0	0	-	0	-	0	0	0	0	0	0
BREAK								Ĭ	1	1	1				1	1					
Total	0	3	ō	0	m	0	0	a	0	0	0	-	-	0	4	-	0	0	o	3	0
Grand Total	0	თ	0	0	σ	0	0	0	0	0	0	7	e	0	10	4	0	2	0	w	25
Approh %	0	100	0	0		0	0	0	0		0	02	30	0		66.7	0	33.3	0		
Total %	0	36	0	0	36	0	0	a	0	0	0	28	12	0	40	16	0	~	0	24	

		30	Old 3C	Old 3C
From East	From East	North From East	From North	From North
t Thru Left P	pp.Total Right Thru Left F	eft Peds App Total Right Thru Left F	Thru Left Peds App Total Right Thru Left F	ru Left Peds App Total Right Thru Left F
	k 1 of 1	5:45 PM - Peak 1 of 1 at 04:15 PM	00 PM to 05:45 PM - Peak 1 of 1 tion Begins at 04:15 PM	PM to 05:45 PM - Peak 1 of 1 1 Begins at 04:15 PM
0 0 0	2 0 0 0	0 0 2 0 0 0	2 0 0 2 0 0 0	2 0 0 2 0 0 0
0 0	2 0 0 0	0 0 2 0 0 0	2 0 0 2 0 0 0	2 0 0 2 0 0 0
0 0	2 0 0 0	0 0 2 0 0 0	2 0 0 2 0 0 0	2 0 0 2 0 0
0 0	2 0 0 0	0 0 2 0 0 0	2 0 0 2 0 0 0	2 0 0 2 0 0 0
0 0	8 0 0	0 0 8 0 0	8 0 0 8 0 0 0	8 0 0 8 0 0 0
0 0	0 0 0	0 0 0 0 0	100 0 0 0 0 0	0 0 0 0 0 0
000 000 000	000 000 000 000	000 000 1.00 000 000 000	1.00 .000 000 1.00 .000 .000	000 000 1.00 000 000 000



CASTO NORTH TURN COMMES

5/17/17



Checked by:



October 2004

	HCS 2010 Two-Way Stop C	ontrol Summary R	eport
General Information		Site Information	
Analyst	doug iles	Intersection	Old 3C & Olivero Drive
Agency/Co.	stantec	Jurisdiction	
Date Performed	5/26/2017	East/West Street	Olivero Drive
Analysis Year	2028	North/South Street	Old 3C
Time Analyzed	AM TOTAL	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Casto North 1734-09307		
Lanes			



## Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	Т					TR
Volume (veh/h)		25		83						28	141				201	17
Percent Heavy Vehicles		10		3						10						
Proportion Time Blocked																
Right Turn Channelized		N	lo			Ν	lo			Ν	lo			Ν	lo	
Median Type								Undi	vided							
Median Storage																
Delay, Queue Length, and	Leve	of Se	ervice													
Flow Rate (veh/h)		27		90						30						
Capacity		547		809						1286						

Capacity	547		809			1286				
v/c Ratio	0.05		0.11			0.02				
95% Queue Length	0.2		0.4			0.1				
Control Delay (s/veh)	11.9		10.0			7.9				
Level of Service (LOS)	В		В			А				
Approach Delay (s/veh)	10	).4				1	.3			
Approach LOS		В								

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	HCS 2010 Two-Way Stop C	Control Summary R	eport
General Information		Site Information	
Analyst	doug iles	Intersection	Old 3C & Olivero Drive
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Date Performed	5/26/2017	East/West Street	Olivero Drive
Analysis Year	2028	North/South Street	Old 3C
Time Analyzed	PM TOTAL	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Casto North 1734-09307		
Lanes			



## Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	Т					TR
Volume (veh/h)		16		54						56	281				153	27
Percent Heavy Vehicles		4		4						4						
Proportion Time Blocked																
Right Turn Channelized		N	lo			Ν	lo			Ν	ю			Ν	10	
Median Type								Undi	vided							
Median Storage																
Delay, Queue Length, and	Leve	l of Se	rvice													
Flow Rate (veh/h)		17		59						61						
Capacity		435		857						1364						
v/c Ratio		0.04		0.07						0.04						

Capacity	435		857			1364				
v/c Ratio	0.04		0.07			0.04				
95% Queue Length	0.1		0.2			0.1				
Control Delay (s/veh)	13.6		9.5			7.8				
Level of Service (LOS)	В		А			А				
Approach Delay (s/veh)	10	).4				1	.3			
Approach LOS	I	В								

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Analysis	Cycle		Design	# of L	anes	Analysis	Thru Lane	Turn Lane	Calculated	Thru		Required
Year	(Secs.)	Wow	(mph)	Thru	Turn	Period	ЛНО	DHV	(FT)	Backup (FT)	BIOCKED	(FT)
				0	<del>,</del>	AM	0	25	100	#DIV/0!	#DIV/0!	
_		EBL	L	0	-	PM	0	16	100	#DIV/0!	#DIV/0I	# UIV/U:
_			C۶	C	۲	AM	0	83	150	#DIV/0	#DIV/0i	
_		YOJ		>	_	PM	0	54	100	#DIV/0	#DIV/0	# UIV/UI
_		10/01		C	C	AM	0	0	N/A	N/A	N/A	V I V
_		VVDL	36	>	>	PM	0	0	N/A	N/A	N/A	A/N
			CC	C	C	AM	0	0	N/A	N/A	N/A	V I V
2028	( ``	NDN		D	0	PM	0	0	N/A	N/A	N/A	N/A
Troffio	00			~	۲	AM	141	28	175	200	N/A	1 7 E
		INDL	J L	-	_	PM	281	56	175	250	N/A	C/I
_			5 0	~	C	AM	141	0	N/A	N/A	N/A	
_		NDN		-	>	PM	281	0	N/A	N/A	N/A	N/A
_				~	C	AM	218	0	N/A	N/A	N/A	N / N
_		JDL	J E	-	>	PM	180	0	N/A	N/A	N/A	N/A
_			5 C	~	C	AM	201	17	N/A	N/A	N/A	V I V
_		NGC		-	>	PM	153	27	N/A	N/A	N/A	

INTERSECTION - Olivero Drive & Old 3C