

Memo



To: Plainfield Plan Commission
From: Scott Singleton, Director of Transportation
cc: Tim Belcher, Executive Director of Development Services
Andrew Klinger, Town Manager
Date: January 31, 2023
Re: PUD-22-117, PP-22-118, FDP-22-119
Transportation Comments on PUD Re-Zone

This area was previously reviewed as part of rezone request PUD-13-003. A preliminary traffic review at that time was offered to confirm the trip generation for the updated zoning (previously GC) would reduce the expected trip counts. Compared to the assumptions made in 2013, the proposed development further reduces the traffic generation as the amount of commercial development is significantly reduced. The included table, Figure 1, from the petitioner compares the 2013 assumptions vs. the proposed plan to identify the reduction.

Trip Generation Comparison (2013 vs. Present Site Plan)			
<i>Double Creek - Plainfield, Indiana</i>			
2013 Site Plan*			
Proposed Land Uses	Appoximate Size	PM Peak Hour	Weekday
Commercial	115,000 SF	658	7437
Medical related	75,000 SF	225	2710
Apartments	240 Dwelling Units	150	1578
Senior Living	18.2 acres	41	495
Totals		1074	12220
Present Site Plan**			
Proposed Land Uses	Appoximate Size	PM Peak Hour	Weekday
Commercial	8,000 SF	66	568
Apartments	740 Dwelling Units	359	4894
Totals		425	5462

Figure 1

Since 2013, the Town completed roadway improvements to expand and realign Raceway Road to its expected full capacity from US-40 to Bradford Road. Further, an update to the Town's Thoroughfare Plan indicates Bradford Road as a Minor Collector with supporting local street connections providing connectivity to CR 1050 E (See Figure 2). The proposed site plan addresses both of these key requirements from the Town's planning documents.

Figure 2



The commercial lot at the northwest corner of Main Street and Raceway Road is proposed with 1 single drive entrance to Raceway Road. The drive shall include one entry lane and two exit lanes. This is an existing cut that was built as part of the Town's Raceway Road Relocation project and was placed at an agreeable distance from the nearby traffic signal based upon a queue analysis that was performed at that time. The PUD text would allow for a drive-thru window to be constructed at this site. The proposed site is laid out to allow for approximately 2-lanes of 7 vehicles (14 total) to extend east from the proposed menu board location. This appears to represent sufficient queuing for most drive-thru applications. An adjacent lane allows for vehicles to circulate and bypass the drive-thru as needed.

The development at the southwest corner of Raceway Road and Bradford Road represents the most significant traffic considerations for the site. As noted above, Bradford Road was identified by the Thoroughfare Plan as a Minor Collector. Proposed construction of a new public N/S roadway,

TollGates Road, makes it desirable to include a left turn lane on Bradford while also seeking to keep the EB through traffic traveling along the same lane where is already shifts at Thornbro Drive, one of the street entries to Bentwood neighborhood on the north. Thus, the intent is to match the south curbline at that location and carry it to align with the existing curb at the intersection with Raceway Road.



A short, EB right turn lane is also expected for the intersection with TollGates Road, given the offset that exists between it and Thornbro Drive.

All of these improvements are expected to get constructed as a widening of the existing pavement, which was recently improved through an FDR treatment back in 2020.

Lastly, this quadrant proposed the construction of two, local public streets (TollGates Road and Plank Road) that will exist as potential future connections to CR 1050 E (or Earlham Lane) as other development may occur. Until these connections get extended, the petitioner has agreed that the apartment complex will be responsible for snow removal.

Overall, the proposed development is laid out with sensible points of ingress and egress and generally consistent with all previous traffic analysis and planning that has been performed for this area.

Historical Documents Referenced Above and Supporting this Memo include:

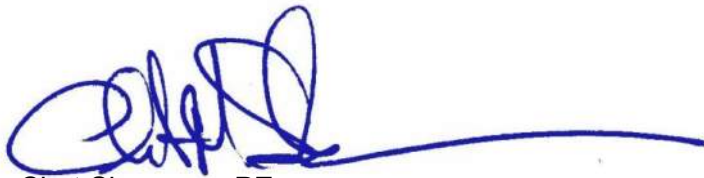
- *2013 Double Creek Re-Zone Preliminary Traffic Analysis*
- *Petitioner Trip Generation Comparison*
- *2014 Double Creek Detailed Traffic Analysis with Signal Warrant*
- *Queue Length Signal Analysis*
- *Drive-Thru Queuing Sketch*

December 11, 2013

Subject: Double Creek -- Proposed Land Use and Zoning

Preliminary traffic engineering review was performed for the proposed Double Creek development situated on the northwest quadrant of US 40 and Raceway Road. Current zoning for this property is General Commercial. The proposed zoning (multi family, senior living, neighborhood retail and office district) results in a lesser intensity regarding future traffic volumes. Final traffic engineering analysis shall be performed based on ultimate zoning and site plan development.

Respectfully,

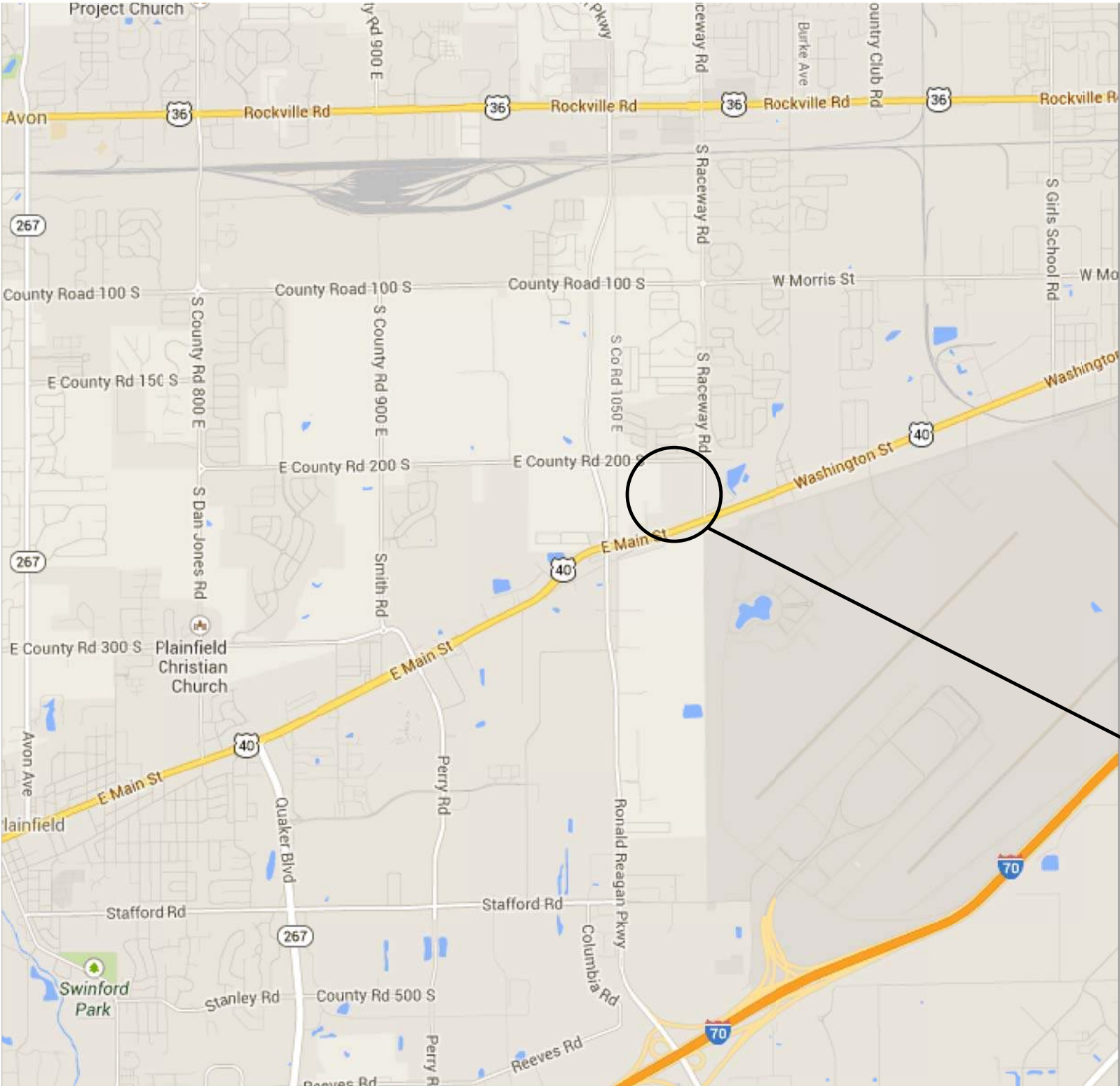
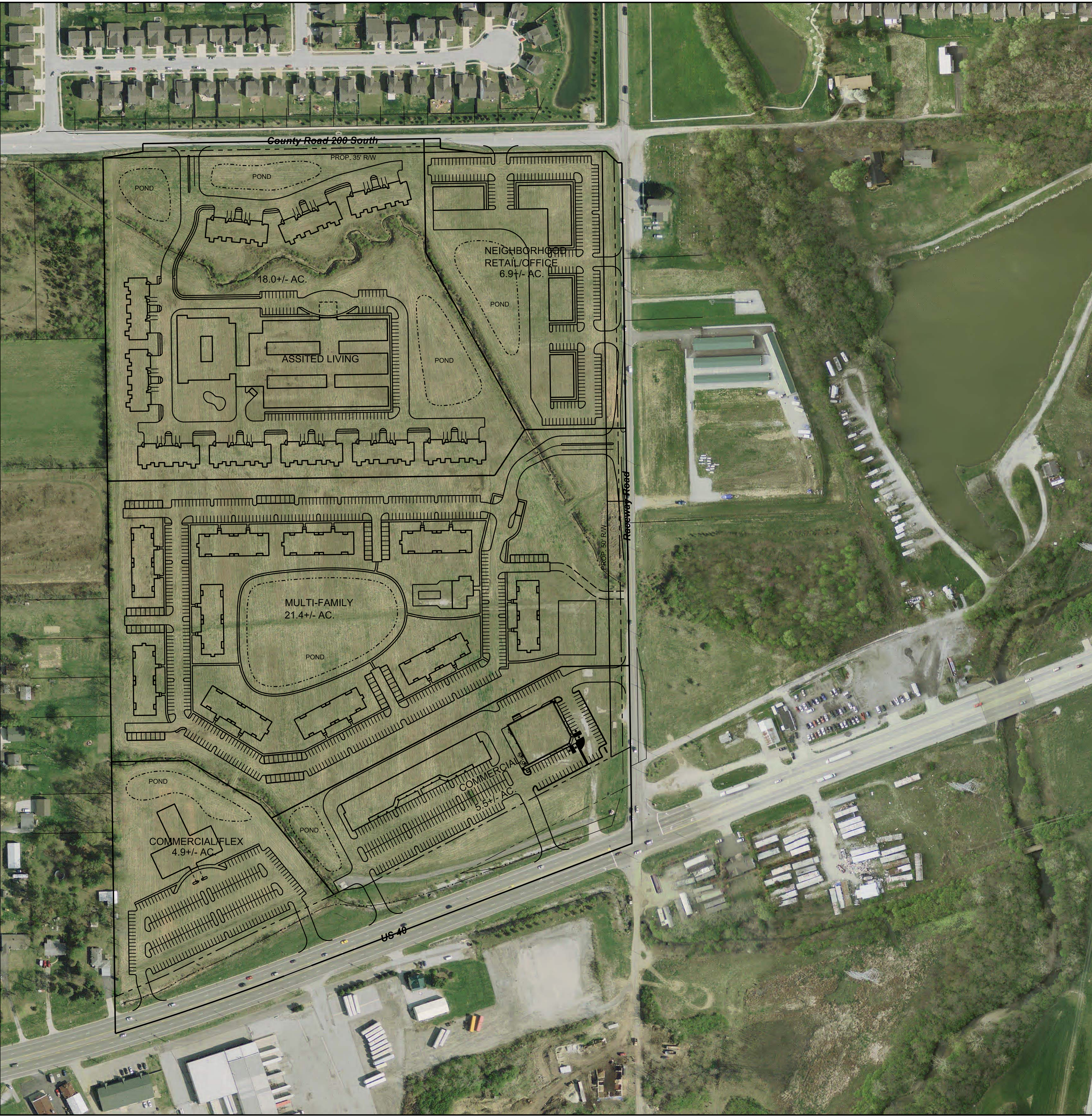


Chet Skwarcan, PE

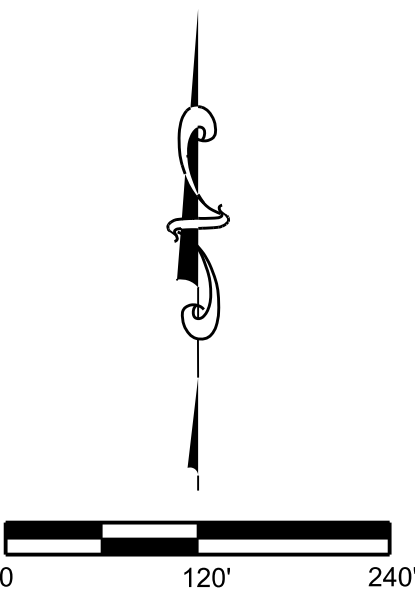
TRAFFIC ENGINEERING, INC.

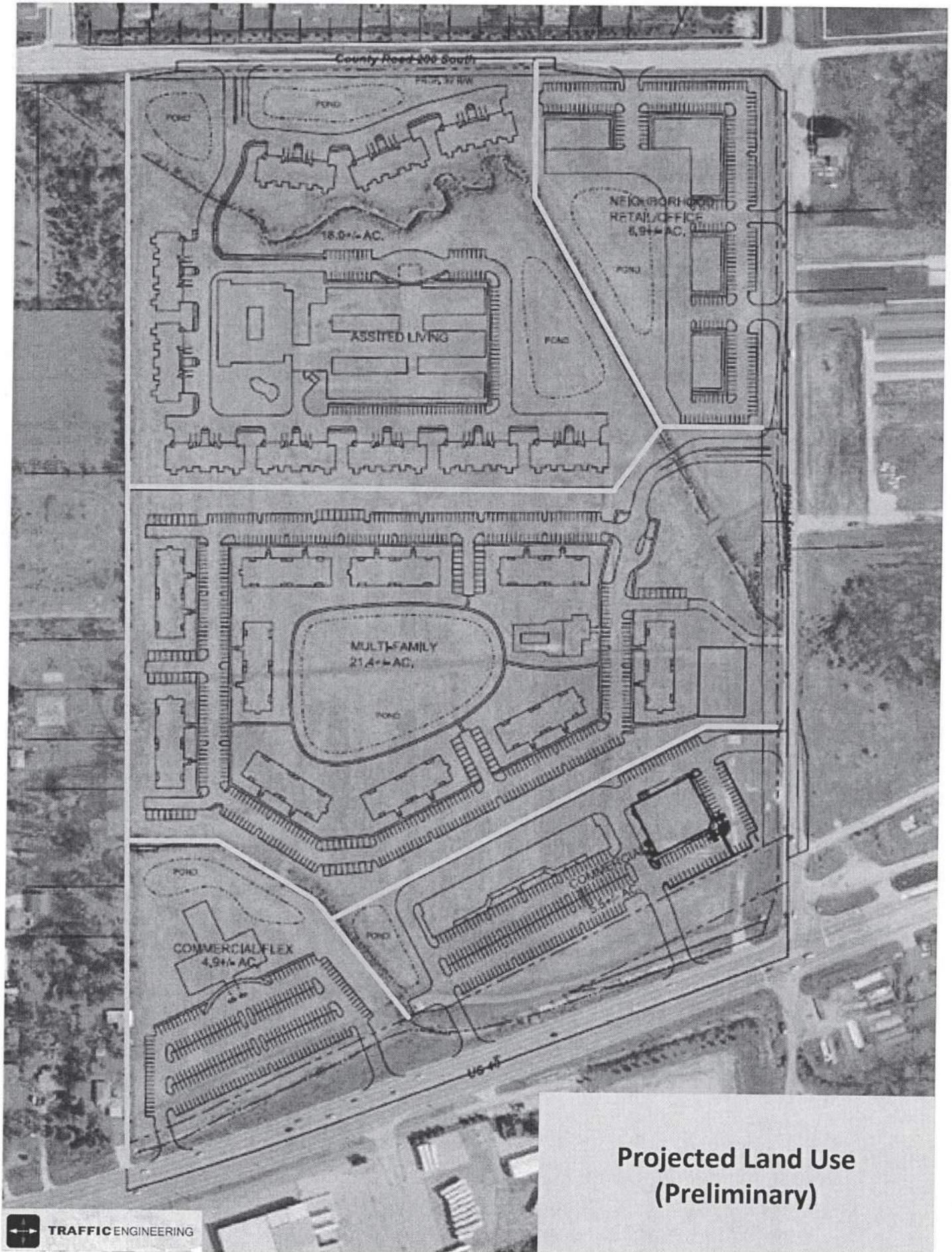
DOUBLE CREEK

CONCEPT PLAN

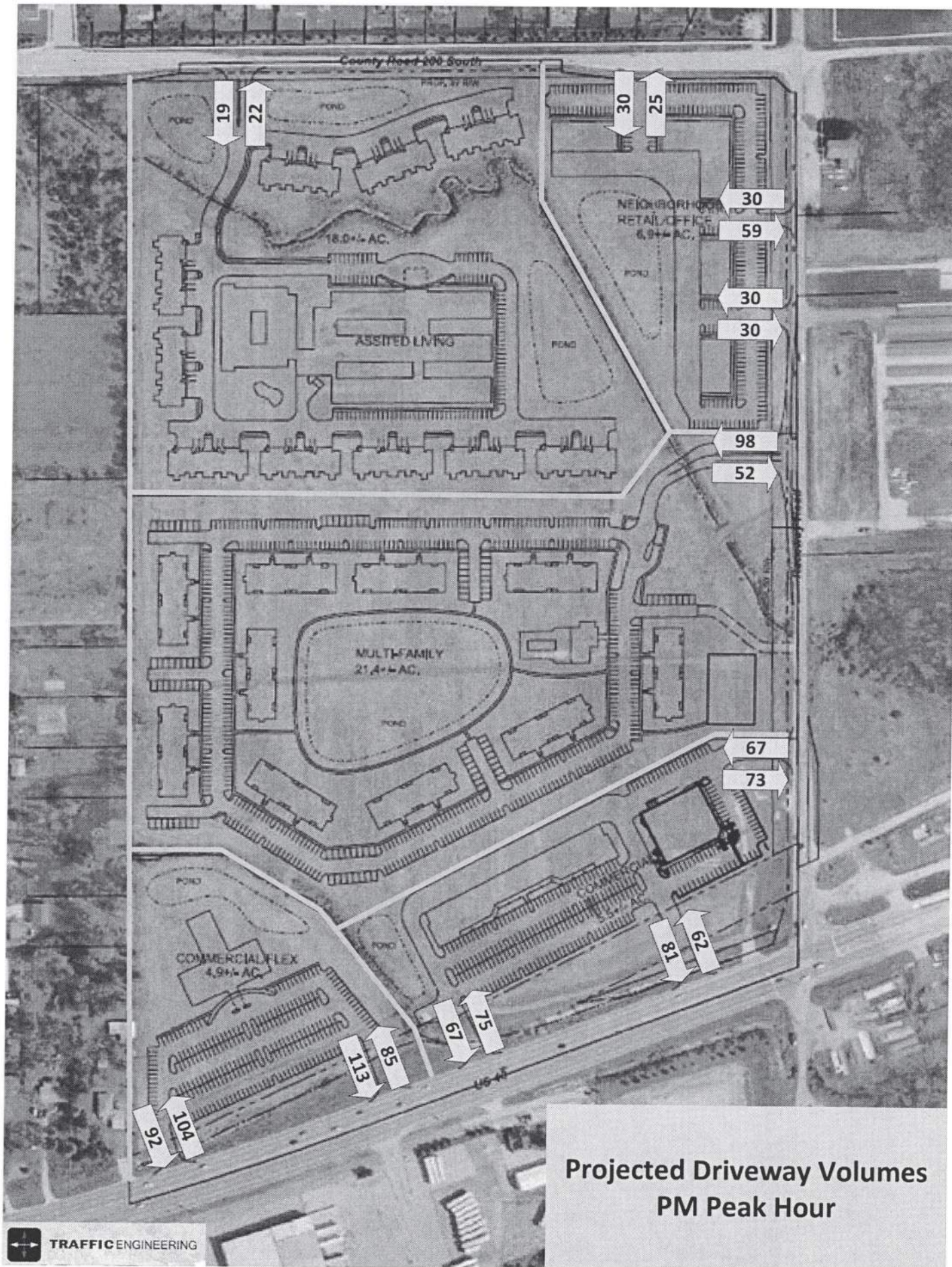


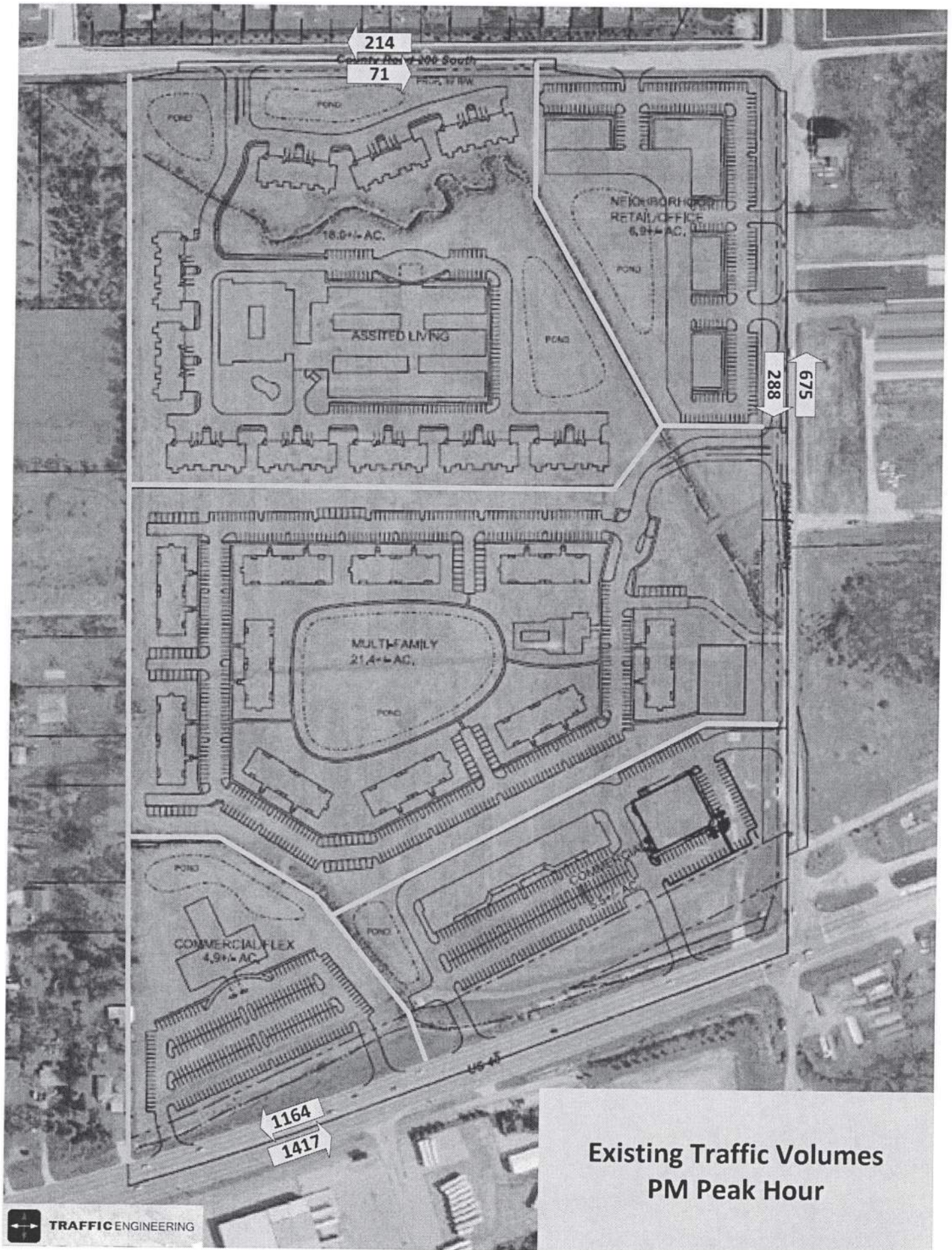
LOCATION MAP
NO SCALE

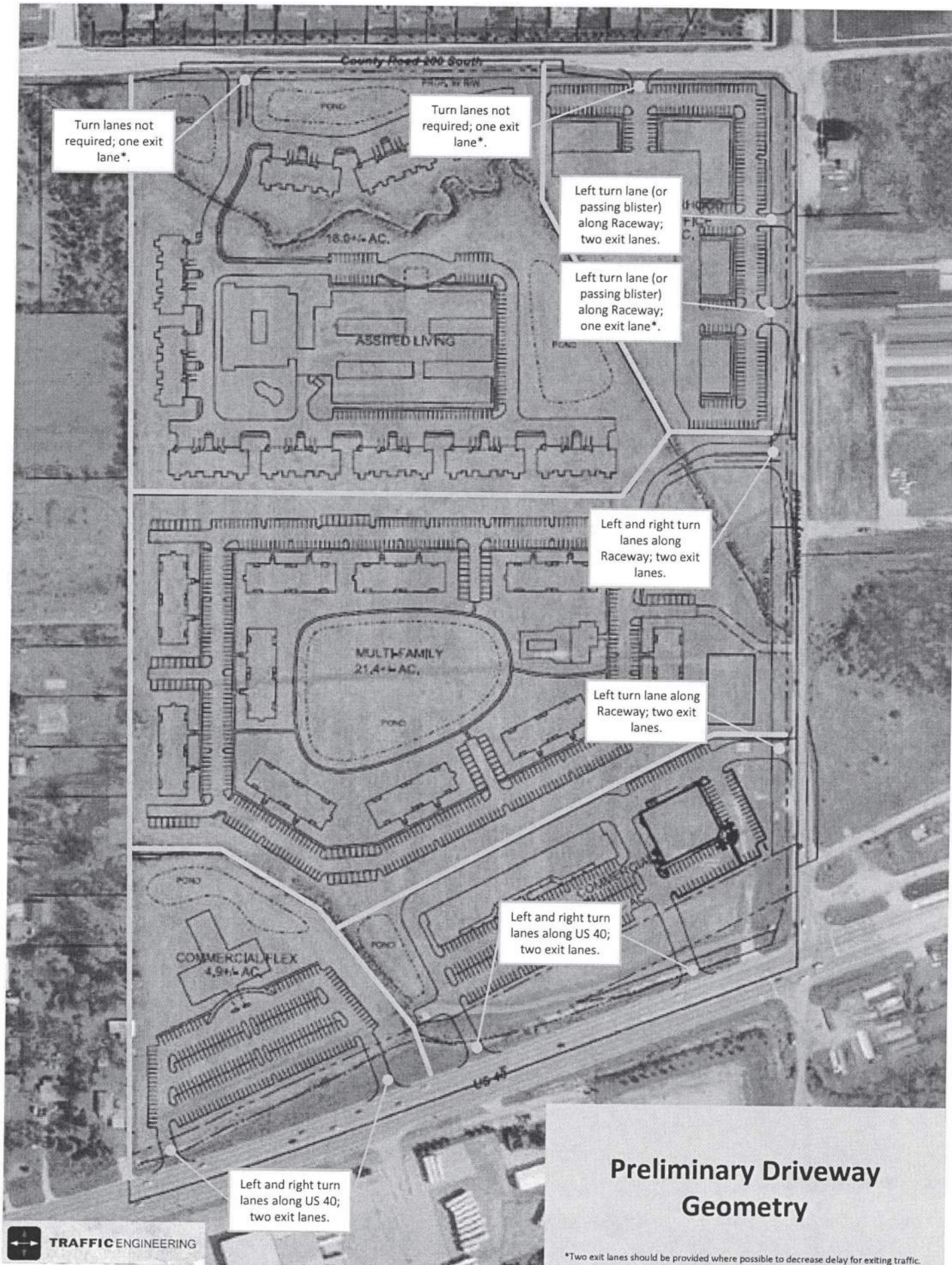




**Projected Land Use
(Preliminary)**







Preliminary Driveway Geometry

*Two exit lanes should be provided where possible to decrease delay for exiting traffic.

Trip Generation Comparison (2013 vs. Present Site Plan)

Double Creek - Plainfield, Indiana

2013 Site Plan*

Proposed Land Uses	Appoximate Size	PM Peak Hour	Weekday
Commercial	115,000 SF	658	7437
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Present Site Plan**

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Commercial	8,000 SF	66	568
Apartments	740 Dwelling Units	359	4894
Totals		425	5462

*ITE Trip Generation Manual, 9th Edition

**ITE Trip Generation Manual, 11th Edition

Traffic



Traffic Engineering Report

Double Creek Flats Apartments Plainfield, Indiana

PREPARED BY:

CHET SKWARCAN, PE
TRAFFIC ENGINEERING, INC.
PO BOX 555
DANVILLE, INDIANA 46122

JULY 9, 2014 (REVISED AUGUST 28, 2014)

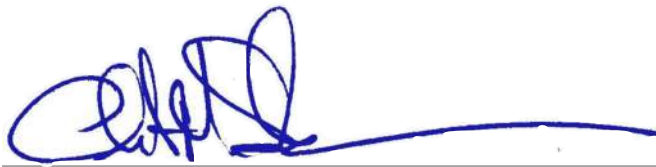
Executive Summary

The proposed development consists of 240 apartment units with a single access driveway on to the north side of US 40 approximately 1000 feet west of Raceway Road in Plainfield, Indiana. A secondary "emergency access only" driveway is provided with access on to Raceway Road.

For the proposed driveway, it is recommended a westbound right turn lane be constructed. Additionally, it is recommended the driveway include two exit lanes to facilitate left and right turning traffic exiting onto US 40. The existing center lane on US 40 can accommodate eastbound traffic turning left in to the development. A traffic signal is not warranted for this development.

Certification

I certify this Traffic Analysis has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.



Chet M. Skwarcian, P.E.
Indiana Registration 20785
Traffic Engineering, Inc.
PO Box 555
Danville, Indiana 46122
cms@trafficengineering.com

August 28, 2014

Date



Project Description

The proposed development consists of 240 units of apartment-type land use. Primary access is proposed along the north side of US 40 with a secondary, “emergency access only” onto Raceway Road as illustrated below. Note that Raceway Road is being considered for future realignment as indicated by the dashed line:



The proposed driveway location is offset from an existing driveway along the south side of US 40. This existing driveway is low volume and provides access to approximately 16 vehicles entering and 4 vehicles exiting during the AM peak hour and 10 vehicles entering and 14 vehicles exiting during the PM peak hour.

Existing Traffic in Vicinity of Site

As part of this analysis, traffic data was collected to supplement historical traffic data in this area (see appendix). The existing traffic volume on US 40 is 28,500 vehicles per day. The posted speed limit in this area is 45 mph. US 40 is a 5-lane section with paved shoulders and a 2-way left turn lane.



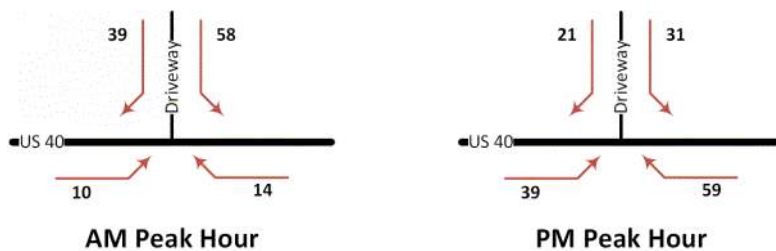
Site Traffic

Based on historical data for similar size and type land use¹, the following traffic can be expected entering and exiting the site during peak hour conditions:

	Entering	Exiting
AM Peak Hour	24	97
PM Peak Hour	98	52

Distribution of Site Traffic

Based on the nature of the land use and existing traffic patterns in this area, 60% of site traffic is expected to be to/from the east. Resulting peak hour turning movements are illustrated below:



¹ Institute of Transportation Engineers, Trip Generation Manual, 9th Edition

Net Traffic Volumes

The tables below summarize AM and PM peak hour traffic volumes for the primary driveway²:

AM PEAK HOUR	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing Traffic					1221						781	
Site Traffic	39		58	14								10
Net Traffic	39		58	14	1221						781	10

PM PEAK HOUR	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing Traffic					1054						1395	
Site Traffic	21		31	59								39
Net Traffic	21		31	59	1054						1395	39

Driveway Geometry

Based on projected peak hour volumes, the proposed driveway was analyzed for the following geometrical requirements:

Westbound Right Turn Lane — the projected peak hour volume turning right into the site from US 40 is 59 vehicles. For conditions associated with this site, a right turn lane should be considered when the peak hour right turn volume exceeds 45 vehicles (see appendix). The projected peak hour right turn volume is 59 vehicles. Therefore, a right turn lane should be included. The length of this lane is comprised of a 100-ft taper plus a 430-ft deceleration lane. Because right turning traffic entering the site is free-flowing, there is no need to consider additional length for vehicle queuing.

Eastbound Left Turn Lane — the projected peak hour volume turning left into the site from US 40 is 39 vehicles. There is an existing 2-way left turn lane in this area that can accommodate left turning traffic entering the site — no modification required.

Number of Exit Lanes — for conditions associated with this site, two separate exit lanes (i.e., dedicated left and right turn lanes) should be considered when mainline volumes exceed 600 vehicles per hour. The existing mainline volume is 2400 vehicles per hour, therefore, two separate exit lanes should be included. Based on level of service analysis, exit lanes should be a minimum of 125-ft in length to accommodate five exiting vehicles (95% queue length — see appendix)) during the AM peak hour.

Traffic Signal — a traffic signal is not warranted for the proposed driveway (see appendix).

² Existing volumes along US 40 were increased 0.5% per year for a 5-year period (to represent full build-out development period).

Appendix

- Existing Traffic Volumes
- Driveway Geometry
- Level of Service Analysis
- Traffic Signal Warrant

Existing Traffic Volumes US 40 Near Proposed Primary Driveway

Westbound

Start Time	Tue 19-Nov-13	Wed 20-Nov-13
12:00 AM	169	131
01:00	79	87
02:00	141	146
03:00	90	82
04:00	218	197
05:00	462	485
06:00	865	856
07:00	1186	1196
08:00	847	871
09:00	627	595
10:00	583	566
11:00	680	676
12:00 PM	917	817
01:00	891	827
02:00	934	962
03:00	1110	999
04:00	1028	1028
05:00	1017	999
06:00	754	817
07:00	545	523
08:00	408	437
09:00	342	360
10:00	310	354
11:00	227	225
Day Total	14430	14236

Eastbound

Start Time	Tue 19-Nov-13	Wed 20-Nov-13
12:00 AM	112	119
01:00	60	69
02:00	76	65
03:00	105	106
04:00	322	338
05:00	460	431
06:00	638	637
07:00	808	716
08:00	767	670
09:00	663	582
10:00	561	626
11:00	775	786
12:00 PM	855	803
01:00	775	787
02:00	894	885
03:00	1154	1161
04:00	1319	1300
05:00	1368	1353
06:00	810	931
07:00	552	508
08:00	441	453
09:00	307	342
10:00	256	268
11:00	166	171
Day Total	14244	14107

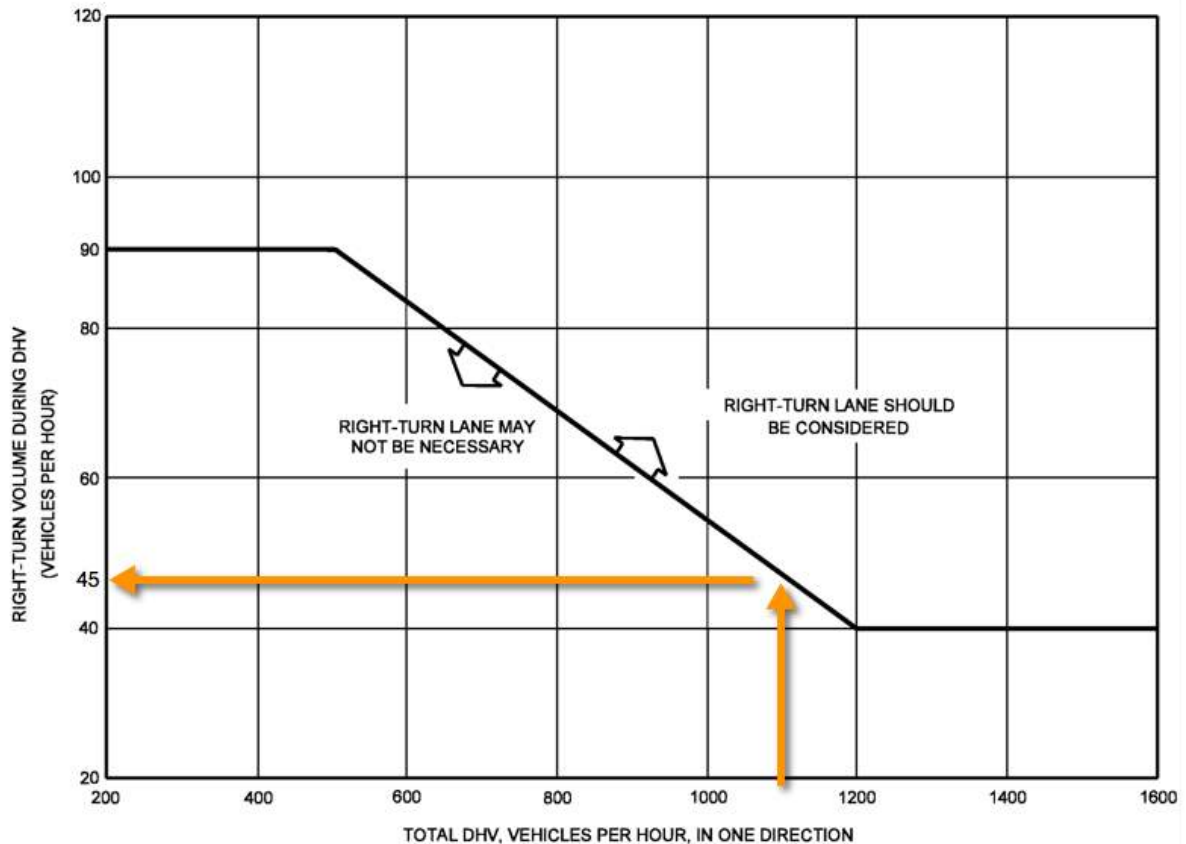
Existing Traffic Volumes

Raceway Road Near Proposed Emergency Access

Start Time	Tue		Wed	
	Northbou	Southbou	Northbou	Southbou
12:00 AM	57	15	41	15
01:00	21	13	21	12
02:00	33	21	33	15
03:00	23	23	28	28
04:00	44	95	57	100
05:00	64	195	61	177
06:00	118	407	111	410
07:00	121	629	136	611
08:00	112	361	124	341
09:00	119	226	116	217
10:00	120	187	119	180
11:00	146	216	162	173
12:00 PM	217	231	187	226
01:00	203	232	155	257
02:00	240	272	220	263
03:00	410	270	377	270
04:00	574	265	553	263
05:00	628	288	618	255
06:00	319	175	348	219
07:00	193	144	205	130
08:00	149	122	162	116
09:00	136	110	123	83
10:00	100	84	115	67
11:00	69	53	82	64
Lane Day	4216	4634	4154	4492
	8850		8646	

Driveway Geometry — Right Turn Lane

For conditions associated with this site, a right turn lane should be considered when peak hour right turn volume excess 45 vehicles. The projected peak hour right turn volume is 59 vehicles. Therefore, a right turn lane should be included.

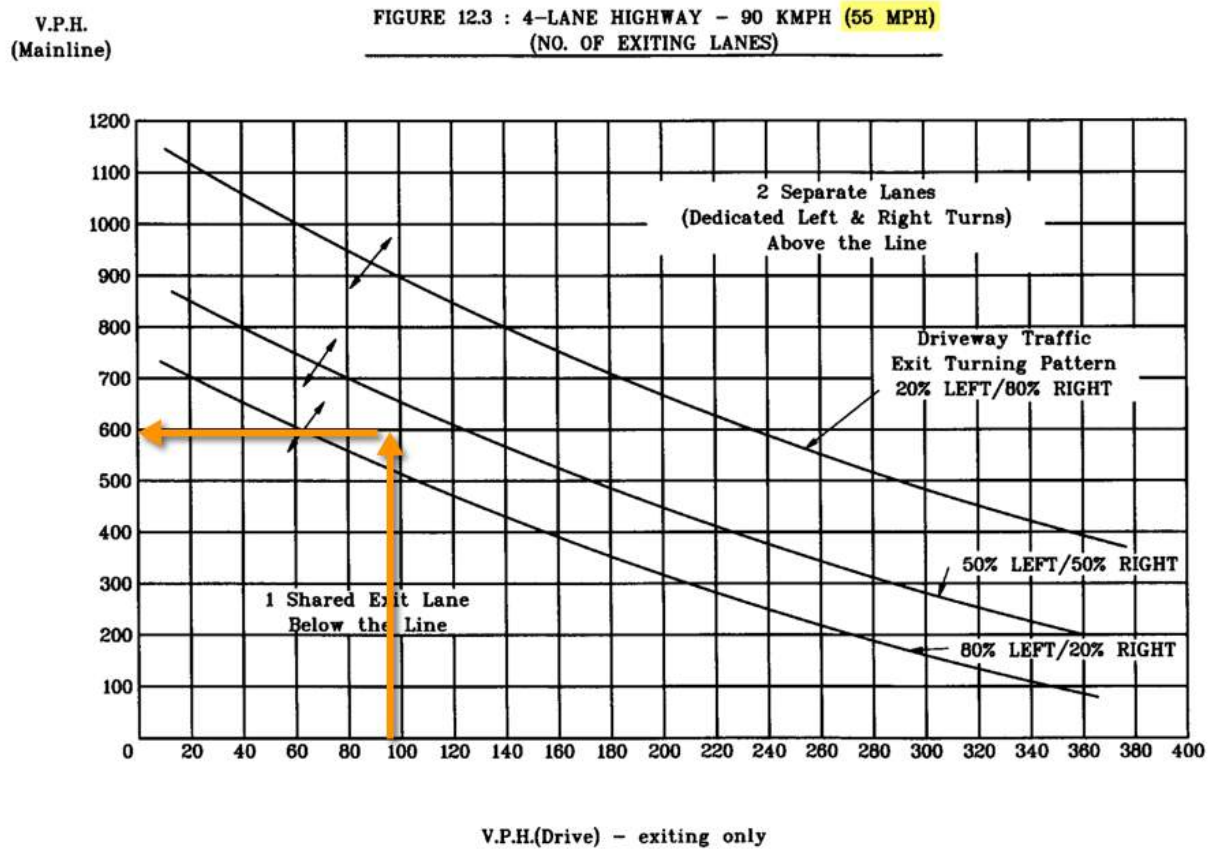


GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTION ON 4-LANE HIGHWAYS

Figure 46-4B

Driveway Geometry — Number of Exit Lanes

For conditions associated with this site, two separate exit lanes (i.e., dedicated left and right turn lanes) should be considered when mainline volumes exceed 600 vehicles per hour. The existing mainline volume is almost 2000 vehicles per hour, therefore, two separate exit lanes should be included.



Level of Service Analysis — AM Peak Hour

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst:
 Agency/Co.:
 Date Performed: 7/9/2014
 Analysis Time Period:
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year:
 Project ID:
 East/West Street:
 North/South Street:
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments								
Major Street:	Approach Movement	Eastbound			Westbound			
		1	2	3	4	5	6	
		L	T	R	L	T	R	
Volume		10	762			1191	14	
Peak-Hour Factor, PHF		0.90	0.90			0.90	0.90	
Hourly Flow Rate, HFR		11	846			1323	15	
Percent Heavy Vehicles		0	--	--		--	--	
Median Type/Storage		Undivided			/			
RT Channelized?					No			
Lanes		1	2			2	1	
Configuration		L	T			T	R	
Upstream Signal?		No			No			
Minor Street:	Approach Movement	Northbound			Southbound			
		7	8	9	10	11	12	
		L	T	R	L	T	R	
Volume					58		39	
Peak Hour Factor, PHF					0.90		0.90	
Hourly Flow Rate, HFR					64		43	
Percent Heavy Vehicles					0		0	
Percent Grade (%)		0			0			
Flared Approach: Exists?/Storage					/			
Lanes					1		1	
Configuration					L		R	
Delay, Queue Length, and Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L					L		R
v (vph)	11					64		43
C(m) (vph)	522					74		465
v/c	0.02					0.86		0.09
95% queue length	0.06					4.31		0.30
Control Delay	12.0					164.2		13.5
LOS	B					F		B
Approach Delay							103.6	
Approach LOS							F	

Level of Service Analysis — PM Peak Hour

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst:
 Agency/Co.:
 Date Performed: 7/9/2014
 Analysis Time Period:
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year:
 Project ID:
 East/West Street:
 North/South Street:
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments								
Major Street:	Approach Movement	Eastbound			Westbound			
		1	2	3	4	5	6	
		L	T	R	L	T	R	
Volume		39	1361			1028	59	
Peak-Hour Factor, PHF		0.90	0.90			0.90	0.90	
Hourly Flow Rate, HFR		43	1512			1142	65	
Percent Heavy Vehicles		0	--	--		--	--	
Median Type/Storage		Undivided			/			
RT Channelized?							No	
Lanes		1	2			2	1	
Configuration		L	T			T	R	
Upstream Signal?		No			No			
Minor Street:	Approach Movement	Northbound			Southbound			
		7	8	9	10	11	12	
		L	T	R	L	T	R	
Volume					31		21	
Peak Hour Factor, PHF					0.90		0.90	
Hourly Flow Rate, HFR					34		23	
Percent Heavy Vehicles					0		0	
Percent Grade (%)		0			0			
Flared Approach: Exists?/Storage					/			
Lanes					1		1	
Configuration					L		R	
Delay, Queue Length, and Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L					L		R
v (vph)	43					34		23
C(m) (vph)	585					51		524
v/c	0.07					0.67		0.04
95% queue length	0.24					2.66		0.14
Control Delay	11.6					164.3		12.2
LOS	B					F		B
Approach Delay							102.9	
Approach LOS							F	

Traffic Signal Warrant

Traffic signals may be installed based on average daily traffic volumes, providing the volumes meet prescribed minimum levels as noted in Condition A1 or Condition B1 of TABLE 4C-2 (see below). For this location, the major street volume is currently 28,674. Applying a 0.5% annual growth rate for a 5 year period (to allow for build-out) results in a projected 24-hour volume of 29,398. Because US 40 is a 4-lane facility, the minimum daily thresholds are 10,000 (Condition A1) or 15,000 (Condition A2).

Based on trip generation data³, the daily driveway volume exiting on to US 40 is projected to be 789. Because the driveway includes two exit lanes, the minimum daily threshold is 6,000 (Condition A1) or 3,100 (Condition A2). The proposed driveway does not satisfy traffic signal warrant criteria.

Table 4C-2, Eight-Hour Vehicular Volume (ADT Equivalent)

Condition A1—Minimum Vehicular Volume (ADT Equivalent)

Number of lanes for moving traffic on each approach		Equivalent Average Daily Traffic Volumes Approaching From Both Directions On:	
Major Street	Minor Street	Major Street	Minor Street
1	1	8,300	4,600
2 or more	1	10,000	4,600
2 or more	2 or more	10,000	6,000
1	2 or more	8,300	6,000

Condition B1—Interruption of Continuous Traffic (ADT Equivalent)

Number of lanes for moving traffic on each approach		Equivalent Average Daily Traffic Volumes Approaching From Both Directions On:	
Major Street	Minor Street	Major Street	Minor Street
1	1	12,500	2,300
2 or more	1	15,000	2,300
2 or more	2 or more	15,000	3,100
1	2 or more	12,500	3,100

³ Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, Land Use #220

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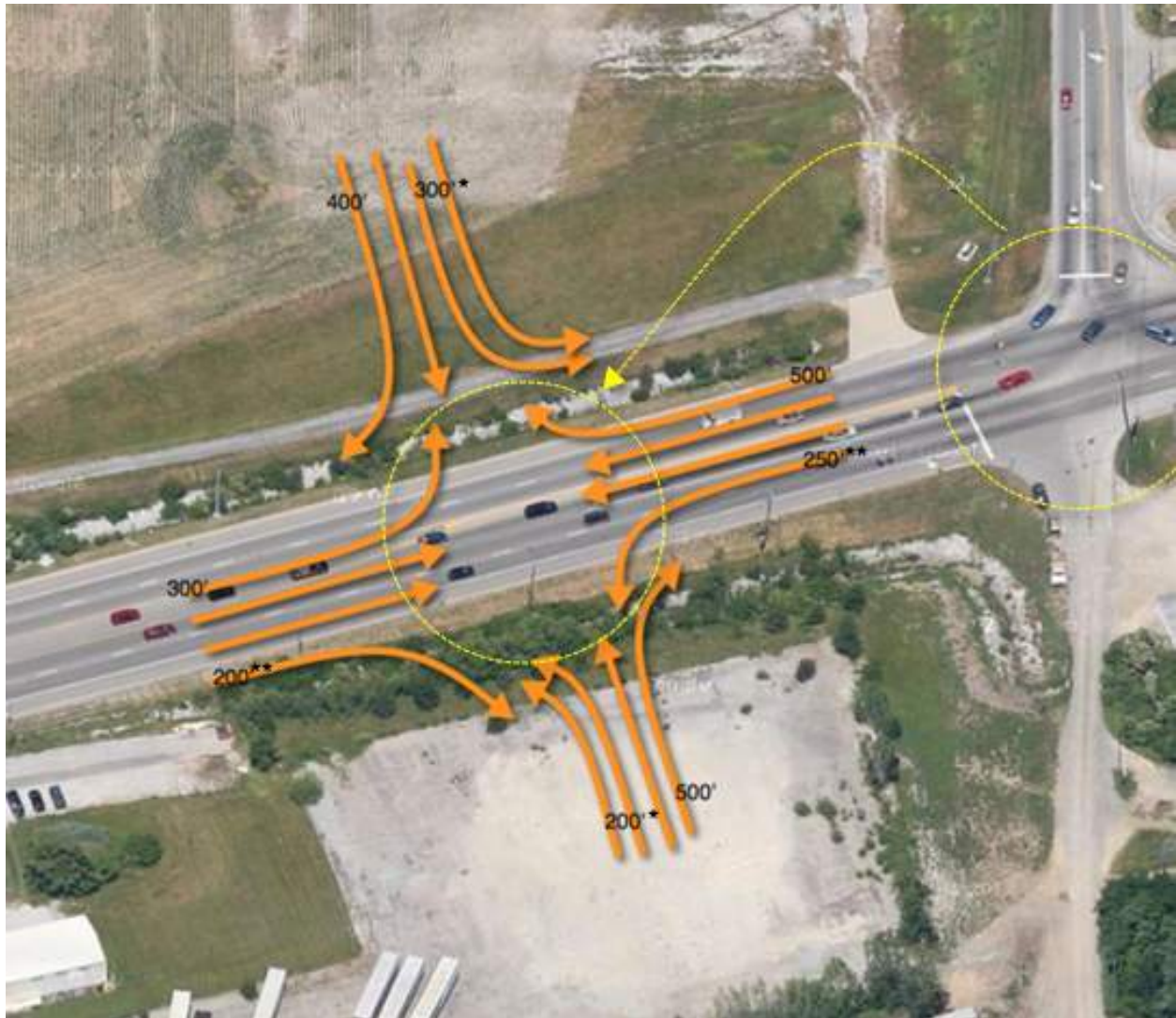
US 40 at Raceway Road
Plainfield, Indiana

In addition to *existing* traffic at this [proposed to be relocated] intersection, consideration was made for traffic *growth* resulting from nearby developments *and the redistribution* of intersection traffic associated with the potential/future addition of a south approach. The table below summarizes the expected peak hour volumes:

AM Peak Hour (6/14)	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL	
Existing (all vehicles)	160	0	395	49	630	0	1	0	0	0	1192	63	
Trucks				1	66						64		
%Trucks	0%	0%	0%	2%	10%	0%	0%	0%	0%	0%	5%	0%	
PHF	0.76	0.00	0.93	0.78	0.88	0.00	0.25	0.00	0.00	0.00	0.96	0.83	0.93
Existing plus Background Growth	177	0	436	54	696	0	1	0	0	0	1317	70	
Future Development	80		140	100		200	90		60	280		160	
Adjustments		50						50					
Net Future AM	257	50	576	154	696	200	91	50	60	280	1317	230	3961
PM Peak Hour (6/14)	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL	
Existing (all vehicles)	154	1	95	531	1304	1	0	0	4	1	968	156	
Trucks	1	0	0	0	32	0	0	0	0	0	41	0	
%Trucks	1%	0%	0%	0%	2%	0%	0%	0%	0%	0%	4%	0%	
PHF	0.82	0.25	0.82	0.94	0.90	0.25	0.00	0.00	0.33	0.25	0.93	0.83	0.95
Existing plus Background Growth	170	1	105	587	1441	1	0	0	4	1	1070	172	
Future Development	200		160	200		90	170		240	70		120	
Adjustments		50						50					
Net Future PM	370	51	265	787	1441	91	170	50	244	71	1070	292	4902

Level of Service analysis (attached) was used to guide recommended queue lengths and geometry for the relocated intersection. Note that right turn lanes along US 40 utilize the existing shoulder (the existing shoulder section matches mainline section) and in that sense, there exists flexibility regarding queue length and capacity. Note also the left turn lanes along US 40 are “adjustable” in that US 40 is presently a 5-lane section with an existing two-way left turn lane. That being said, the following queue lengths are recommended to accommodate the relocated construction of this intersection and the expected peak hour traffic volumes:

Recommended Queue lengths for Relocated Intersection



* Dual left turn lanes shorten minor street queue and provide maximum green time for mainline.

** Turn lane not required for initial construction phase.

Level of Service Analysis - AM Peak Hour

Lane Group	Width/ Lanes	g/C		SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
Max	Avg									

N Approach 47.5 D

RT	12/1			1599	351	286	0.814	48.1	D	277 ft
TH	12/1	0.212	0.219	1881	413	56	0.135	31.3	C	49 ft
LT	24/2	0.209	0.206	3479	720	640	0.889	48.7	*D	305 ft

S Approach 41.8 D+

RT	12/1			1524	310	101	0.326	34.1	C	96 ft
TH	12/1	0.050	0.055	1881	104	56	0.540	48.9	*D	64 ft
LT	24/2	0.047	0.042	3315	140	67	0.477	47.5	D	38 ft

E Approach 15.8 B

RT	12/1	0.027	0.615	1599	1318	171	0.130	1.7	A	15 ft
TH	24/2	0.632	0.615	3478	2147	773	0.360	9.4	A	159 ft
LT	12/1	0.207	0.147	1740	258	222	0.862	48.6	*D	225 ft

W Approach 41.2 D+

RT	12/1	0.027	0.427	1524	718	311	0.433	17.6	B	188 ft
TH	24/2	0.388	0.427	3478	1493	1463	0.980	46.6	*D	655 ft
LT	12/1	0.388	0.427	597	329	256	0.779	38.8	D+	250 ft

Level of Service Analysis - PM Peak Hour

Lane Group	Width/ Lanes	g/C		SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
		Max	Avg							
N Approach								61.3	E+	
RT	12/1	0.025	0.062	1599	424	411	0.970	72.9	E	474 ft
TH	12/1	0.052	0.062	1881	117	57	0.487	47.7	D	65 ft
LT	24/2	0.131	0.106	3479	370	294	0.794	47.9	*D	157 ft
S Approach								241.5	F	
RT	12/1			1524	90	189	2.095	576.6	F	622 ft
TH	12/1	0.051	0.059	1881	111	56	0.503	48.2	*D	64 ft
LT	24/2	0.130	0.103	3315	343	271	0.791	47.7	D	151 ft
E Approach								38.7	D+	
RT	12/1	0.025	0.474	1599	931	874	0.939	36.3	D+	682 ft
TH	24/2	0.407	0.474	3478	1654	1601	0.968	41.2	*D+	688 ft
LT	12/1	0.407	0.474	427	273	101	0.370	18.8	B	73 ft
W Approach								14.2	B+	
RT	12/1	0.025	0.715	1524	1251	79	0.063	1.7	A	8 ft
TH	24/2	0.718	0.715	3478	2496	1189	0.476	6.3	A	184 ft
LT	12/1	0.278	0.202	1792	363	324	0.892	46.4	*D	305 ft

Approximately 7 vehicles @ 20' can stack without impeding the entry drive.

