EPRPC EPR, P,C. "ENGINEERING & PLANNING RESOURCES"
902 E JEFFERSON ST, STE 101, CHARLOTTESVILLE, VA 22901

MEMORANDUM

TO: BOB ARNETTE	FROM: CHARLES SMITH, PE
ORGANIZATION:	DATE: January 31, 2025
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
RE: MANNING ROAD PROPERTY TRAFFIC MEMO	YOUR REFERENCE NUMBE R:

☐ URGENT X FOR YOUR USE ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

PURPOSE

There have been several revisions to the traffic study related to this proposed development. This memorandum supersedes all previous studies and serves as a stand-alone evaluation of the proposed development.

BACKGROUND

The Manning Road development is a proposed residential development on Manning Road south of Route 58 / Holland Road. The conceptual plan provided by Coastal Virginia Developers (Coastal) is provided by others. The site plan identifies a development with 300 single family units. Access will be provided via two access locations on Manning Road. The northern access will be a full access with exclusive right and left turn lanes. The southern access will be a rightin / right-out access with an exclusive right turn lane.

Trips to and from the proposed site will traverse through the Holland Road and Manning Road intersection. The Holland Road corridor improvement project is almost complete. The project improves the corridor to include a third through lane in each direction. In addition, the Manning Road intersection also includes additional turn lane improvements and traffic signalization.

TRIP GENERATION

The trip generation potential of the proposed development was determined using data published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* (11th Edition).

TABLE 1 Site Generated Traffic (Vehicles Per Day and Vehicles Per Hour)

USE	ITE Code	ADT	AM PEAK		PM PEAK	
			IN	OUT	IN	OUT
300 Single Family Detached	210	2772	51	151	176	103

Source: ITE Trip Generation Manual 10th Edition

INTERSECTION CAPACITY ANALYSIS – HOLLAND ROAD AND MANNING ROAD

Although the intersection is being significantly improved and the proposed development is projected to generate only a small percentage of the current Holland Road volume, an intersection capacity analysis was conducted to evaluate the intersection operations.

Volumes

With the Holland Road project, Northbrooke Avenue is realigned to align with Manning Road creating a standard four leg intersection. In addition, since Northbrooke Avenue serves the same Oak Ridge neighborhood as Grove Avenue, the signal at Grove Avenue will shift to the new Manning Road / Northbrooke Avenue intersection.

Current traffic volume data for the existing Manning Road intersection were not available. City staff provided September 6, 2022 turning movement counts for the Holland Road and Grove Avenue intersection. As the Grove Avenue signal shifts to the new Manning Road / Northbrooke Avenue intersection, it was agreed that shifting these traffic volumes to the new intersection was a reasonable assumption. For the Manning Road approach, a typical ten percent peak hour factor (k factor) was applied to the Manning Road ADT of 1,600 vehicles per day (vpd) resulting in a peak hour volume of 160 vehicles per hour (vph). The volumes were then assigned to the intersection utilizing the same distribution as the site trips.

The methodology and assumptions result in an existing intersection traffic volume. These existing 2022 volumes were then adjusted up to the year 2028 utilizing the same background growth rate (2.5% per year) utilized in previous traffic studies. The development trips were then assigned to the intersection to determine year 2028 build traffic volumes (using the same distribution percentages as the previous studies). The existing volumes, no build 2028 volumes, site trips and build year 2028 volumes are illustrated in Figures 1 – 4, respectively.

Analysis

Capacity analysis was conducted for the future (signalized) intersection of Holland Road and Manning Road / Northbrooke Avenue. Delay and level of service (LOS) are summarized in Table 2 below. The intersection is expected to operate at LOS C during both peak periods. With the Holland Road improvement project, there is adequate capacity. The HCM based Synchro worksheets are provided in Appendix B.

TABLE 2
Holland Road and Manning Road / Northbrooke Avenue
Delay (sec/veh) and LOS

	2028 Build	
	AM	PM
Holland EB Left	68.8 E	78.3 E
Holland EB Thru	33.0 C	32.0 C
Holland EB Right	16.7 B	20.8 C
Holland WB Left	49.6 D	51.4 D
Holland WB Thru	19.2 B	19.6 B
Holland WB Right	0.0 A	0.0 A
Manning NB Left-Thru	20.0 C	24.7 C
Manning Br NB Right	22.5 C	28.4 C
Northbrooke SB Left-Thru	25.3 C	30.3 C
Northbrooke SB Right	0.0 A	0.0 A
Intersection	26.7 C	27.1 C

SUMMARY

Access

Access will be provided via two access locations on Manning Road. One access is right-in / rightout access with an exclusive right turn lane. The other access is will be a full access with exclusive right and left turn lanes.

Other Improvements

In addition, the proposed concept includes additional improvements to Manning Road. The developer will improve the vertical curve near the site access locations and provide exclusive left and right turn lanes for the existing intersection across from the site.

Intersection Capacity

With the Holland Road improvement project, there is adequate capacity at the realigned signalized intersection of Holland Road and Northbrooke Avenue / Manning Road.

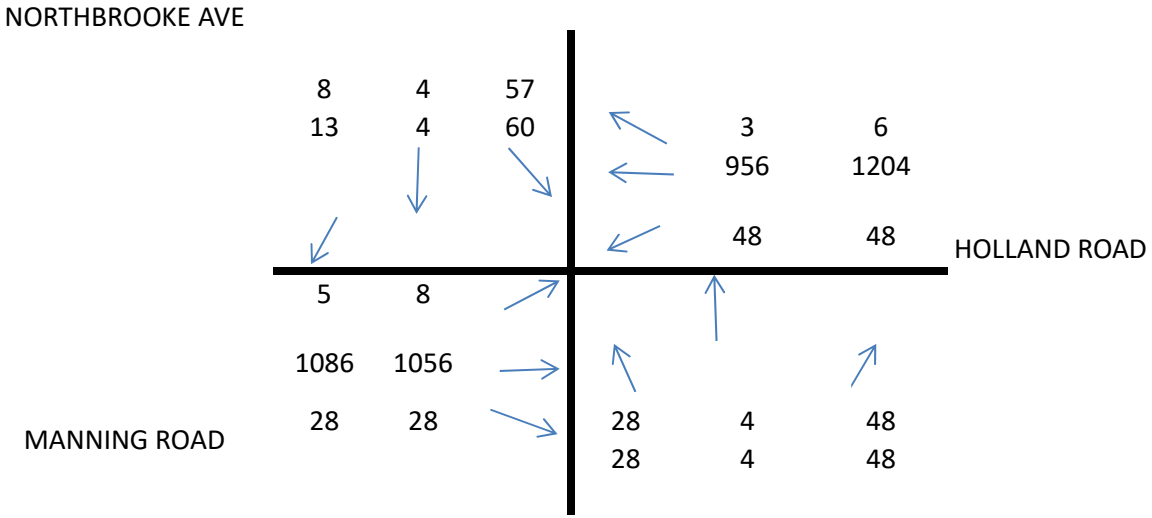
END OF MEMORANDUM

Enclosed
Figures 1 – 4
Appendix A – HCM Based Synchro Worksheets

FIGURE 1

VOLUMES
EXISTING 2022
PEAK HOUR

The Holland Rd and Northbrooke Ave volumes were derived from a Holland Rd and Grove Ave count provided by the city (see report for explanation).



Manning Road Approach Assumptions
1600 ADT from VDOT database
10% Peak hour factor
160 Peak hour volume for Manning Road
These volumes distributed using the same percentages as the site trips.
This peak hour typically applies to the PM peak hour.
For the worst case scenario, the same peak hour was also applied to the AM peak hour.

NO BUILD 2028
PEAK HOUR

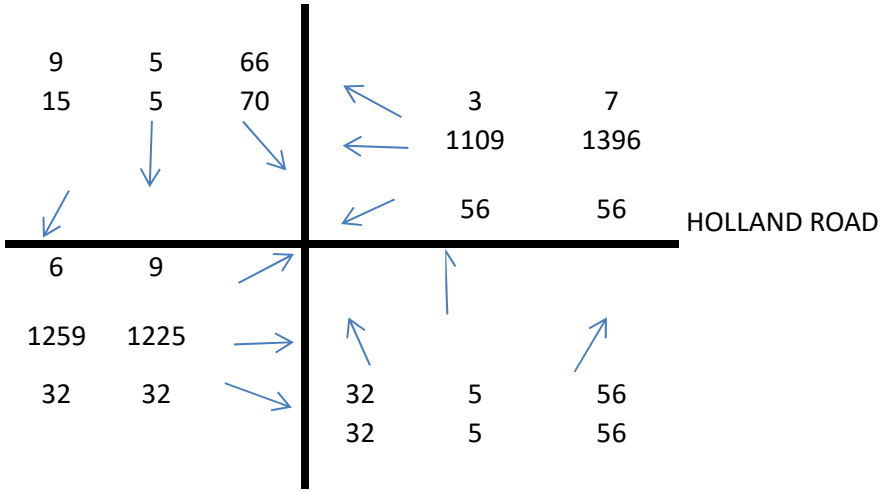
BACKGROUND GROWTH INCREASE

LEGEND
123 456 →
PM AM
(closest to the arrow is AM)

FIGURE 2

VOLUMES

Per year 2.5% #
of years 6
Rate 1.16



SITE TRIPS

PEAK HOUR

	AM		PM	
	In	Out	In	Out
300 SF Houses LU 210	51	151	176	103

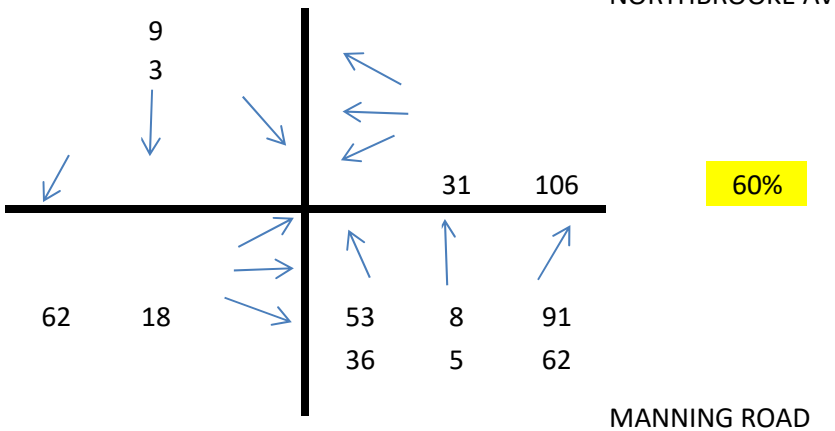
5%

LEGEND
123 456 →
PM AM
(closest to the arrow is AM)

↑

FIGURE 3

VOLUMES



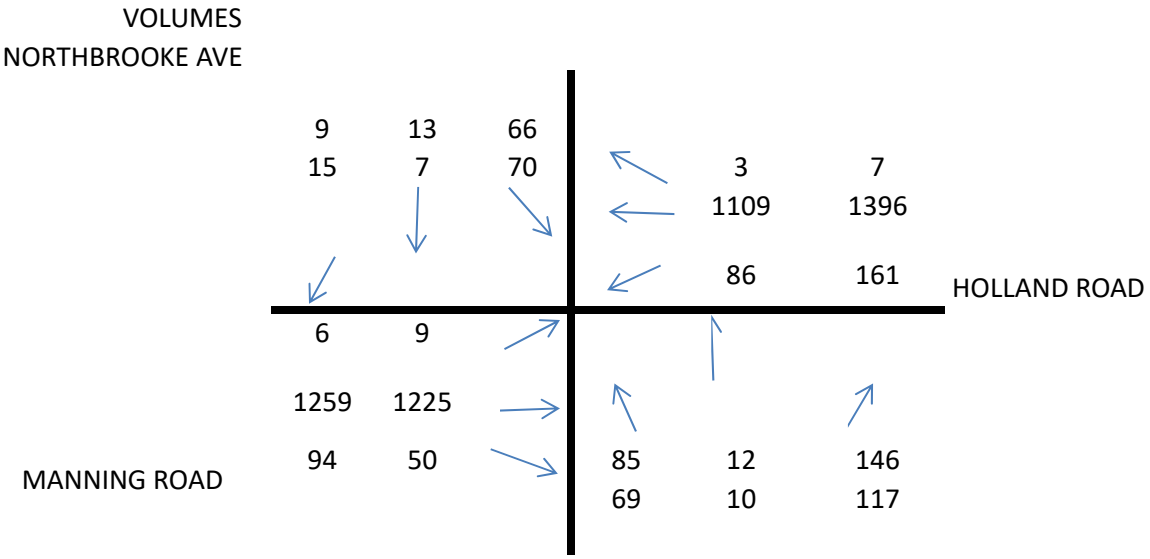
SITE

Distribution %

BUILD 2028
PEAK HOUR

LEGEND
123 456
PM AM
(closest to the arrow is AM)

FIGURE 4



LEGEND

123 456 →

PM AM

(closest to the arrow is AM)

↑

Appendix A
HCM Based
Synchro Worksheets

HCM 6th Signalized Intersection Summary
5: Manning/Northbrooke & Holland 01/16/2025

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1225	50	86	1109	3	85	12	146	70	7	15
Future Volume (veh/h)	9	1225	50	86	1109	3	85	12	146	70	7	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1322	1648	1544	1559	1604	996	1781	1559	1737	1011	1604	596
Adj Flow Rate, veh/h	10	1361	56	92	1192	0	106	15	182	106	11	0
Peak Hour Factor	0.90	0.90	0.90	0.93	0.93	0.93	0.80	0.80	0.80	0.66	0.66	0.66
Percent Heavy Veh, %	39	17	24	23	20	61	8	23	11	60	20	88
Cap, veh/h	16	1470	428	111	1704		437	55	439	321	28	
Arrive On Green	0.01	0.33	0.33	0.08	0.39	0.00	0.30	0.30	0.30	0.30	0.30	0.00
Sat Flow, veh/h	1259	4499	1309	1485	4378	844	1142	183	1472	748	94	505
Grp Volume(v), veh/h	10	1361	56	92	1192	0	121	0	182	117	0	0
Grp Sat Flow(s),veh/h/ln	1259	1500	1309	1485	1459	844	1325	0	1472	841	0	505
Q Serve(g_s), s	0.6	20.4	2.1	4.3	16.0	0.0	0.0	0.0	6.9	6.4	0.0	0.0
Cycle Q Clear(g_c), s	0.6	20.4	2.1	4.3	16.0	0.0	4.5	0.0	6.9	10.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.88		1.00	0.91		1.00
Lane Grp Cap(c), veh/h	16	1470	428	111	1704		492	0	439	349	0	
V/C Ratio(X)	0.63	0.93	0.13	0.83	0.70		0.25	0.00	0.41	0.34	0.00	
Avail Cap(c_a), veh/h	126	1478	430	170	1704		492	0	439	349	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	34.4	22.7	16.6	31.9	17.9	0.0	18.8	0.0	19.7	22.7	0.0	0.0
Incr Delay (d2), s/veh	34.4	10.2	0.1	17.7	1.3	0.0	1.2	0.0	2.9	2.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	7.3	0.5	1.9	4.5	0.0	1.6	0.0	2.3	1.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.8	33.0	16.7	49.6	19.2	0.0	20.0	0.0	22.5	25.3	0.0	0.0
LnGrp LOS	E	C	B	D	B		C	A	C	C	A	
Approach Vol, veh/h		1427			1284			303			117	
Approach Delay, s/veh		32.6			21.4			21.5			25.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	27.9	12.3	29.9	27.9	7.9	34.2
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0

Max Green Setting (Gmax), s	18.0	8.0	23.0		18.0	7.0	24.0					
Max Q Clear Time (g_c+I1), s	8.9	6.3	22.4		12.9	2.6	18.0					
Green Ext Time (p_c), s	0.9	0.0	0.4		0.2	0.0	3.5					

Intersection Summary	
HCM 6th Ctrl Delay	26.7
HCM 6th LOS	C

Notes
Unsignalized Delay for [WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
5: Manning/Northbrooke & Holland

01/16/2025

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1259	94	161	1396	7	69	10	117	66	13	9
Future Volume (veh/h)	6	1259	94	161	1396	7	69	10	117	66	13	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1470	1752	1856	1752	1767	996	1693	1900	1589	1441	1530	1381
Adj Flow Rate, veh/h	7	1431	107	171	1485	0	97	14	165	92	18	0
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.71	0.71	0.71	0.72	0.72	0.72
Percent Heavy Veh, %	29	10	3	10	9	61	14	0	21	31	25	35
Cap, veh/h	12	1656	545	205	2219		470	63	401	290	49	
Arrive On Green	0.01	0.35	0.35	0.12	0.46	0.00	0.30	0.30	0.30	0.30	0.30	0.00
Sat Flow, veh/h	1400	4782	1572	1668	4823	844	1327	212	1346	726	164	1171
Grp Volume(v), veh/h	7	1431	107	171	1485	0	111	0	165	110	0	0
Grp Sat Flow(s),veh/h/ln	1400	1594	1572	1668	1608	844	1539	0	1346	890	0	1171
Q Serve(g_s), s	0.4	25.1	4.3	9.0	21.6	0.0	0.0	0.0	8.8	7.3	0.0	0.0
Cycle Q Clear(g_c), s	0.4	25.1	4.3	9.0	21.6	0.0	4.6	0.0	8.8	11.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.87		1.00	0.84		1.00
Lane Grp Cap(c), veh/h	12	1656	545	205	2219		533	0	401	338	0	
V/C Ratio(X)	0.56	0.86	0.20	0.84	0.67		0.21	0.00	0.41	0.33	0.00	
Avail Cap(c_a), veh/h	78	1754	577	297	2358		533	0	401	338	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00

Uniform Delay (d), s/veh	44.4	27.4	20.6	38.6	19.0	0.0	23.8	0.0	25.3	27.8	0.0	0.0
Incr Delay (d2), s/veh	33.9	4.6	0.2	12.8	0.7	0.0	0.9	0.0	3.1	2.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	9.1	1.4	4.1	6.9	0.0	1.9	0.0	2.9	2.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.3	32.0	20.8	51.4	19.6	0.0	24.7	0.0	28.4	30.3	0.0	0.0
LnGrp LOS	E	C	C	D	B		C	A	C	C	A	
Approach Vol, veh/h		1545			1656			276			110	
Approach Delay, s/veh		31.4			22.9			26.9			30.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	33.8	18.0	38.2	33.8	7.8	48.4
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	20.0	16.0	33.0	20.0	5.0	44.0
Max Q Clear Time (g_c+I1), s	10.8	11.0	27.1	13.9	2.4	23.6
Green Ext Time (p_c), s	0.8	0.2	4.1	0.2	0.0	9.7

Intersection Summary	
HCM 6th Ctrl Delay	27.1
HCM 6th LOS	C

Notes

Unsignalized Delay for [WBR, SBR] is excluded from calculations of the approach delay and intersection delay.