32nd Street and Main Street Intersection Improvements

PUBLIC INFORMATION MEETING

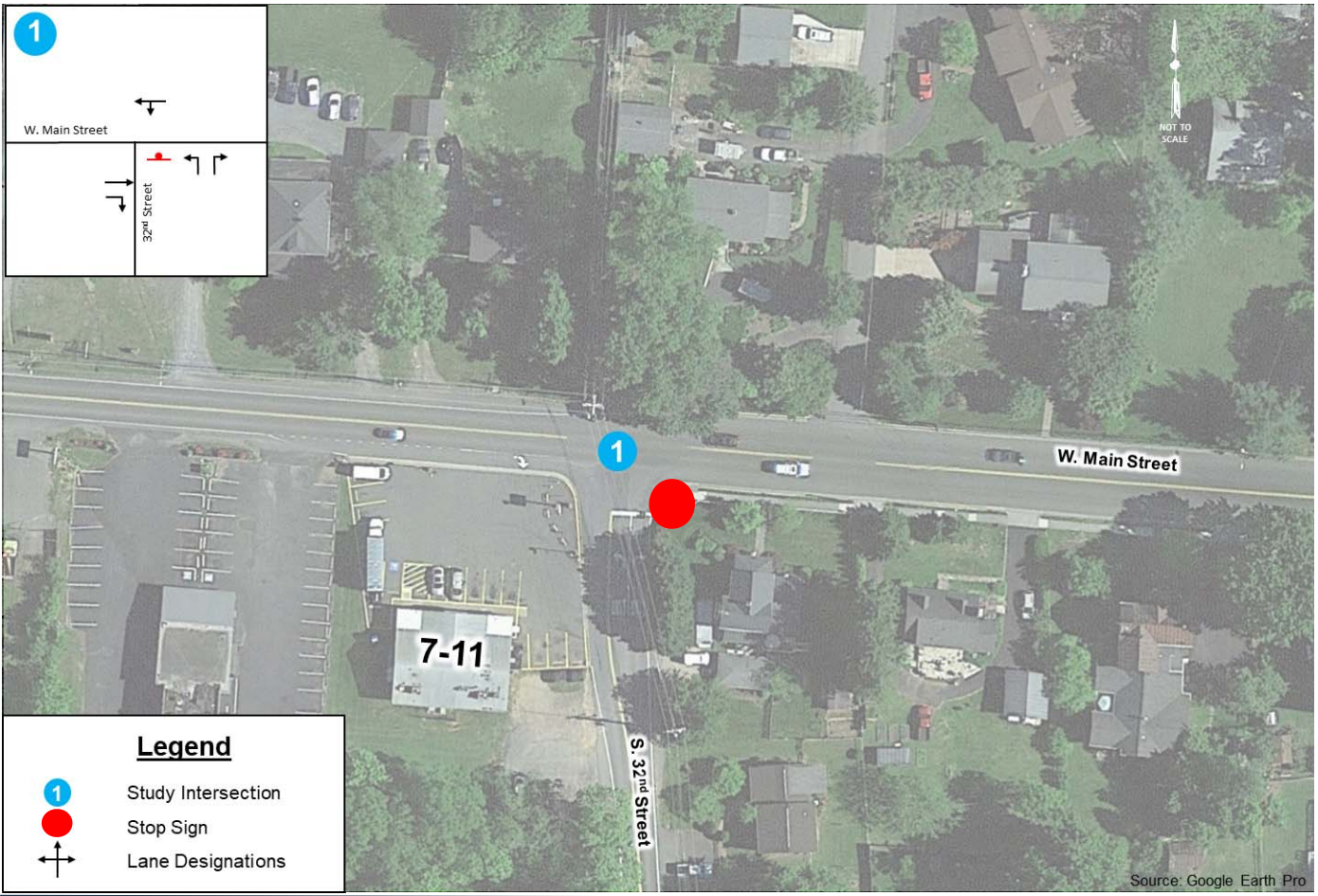
FEBRUARY 27, 2020

Town of Purcellville Virginia

Main Street & 32nd Street Intersection Improvements

- Background
- Proposed Concepts
- Recommendations

Town of Purcellville Virginia



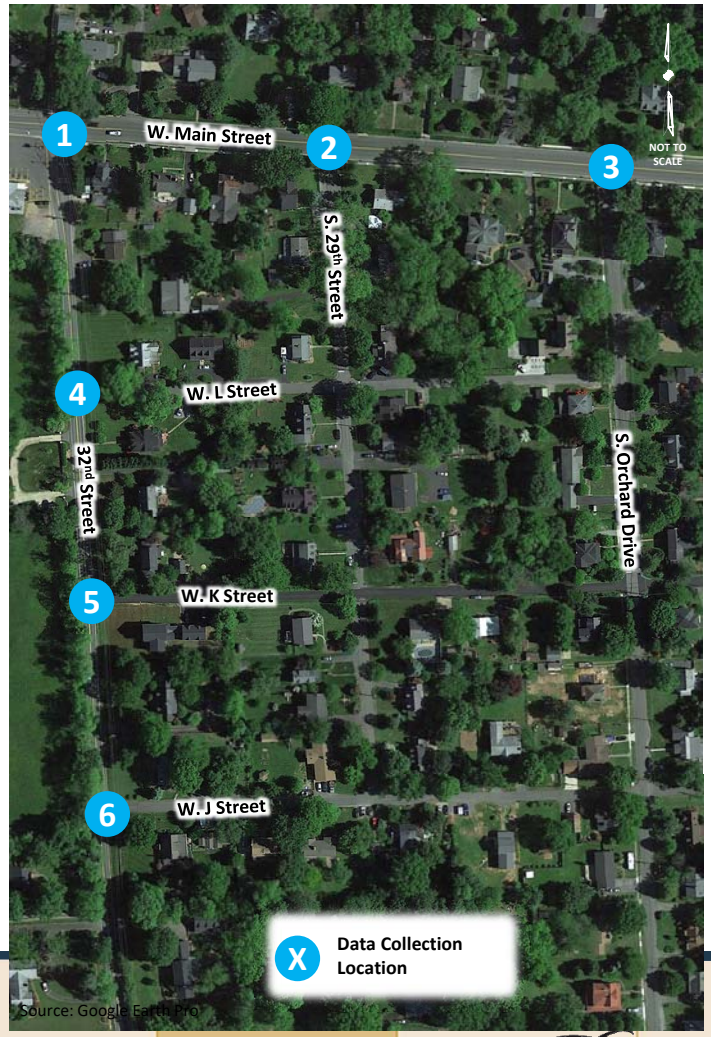
- Citizens and Council have been seeking improvements
- Town received VDOT and NVTA funding – initiated study and design
- Main Street is a VDOT owned roadway – improvements require VDOT approval
- Town Council Meeting held on 12/10/2019

Background

Town of Purcellville Virginia

Existing Conditions

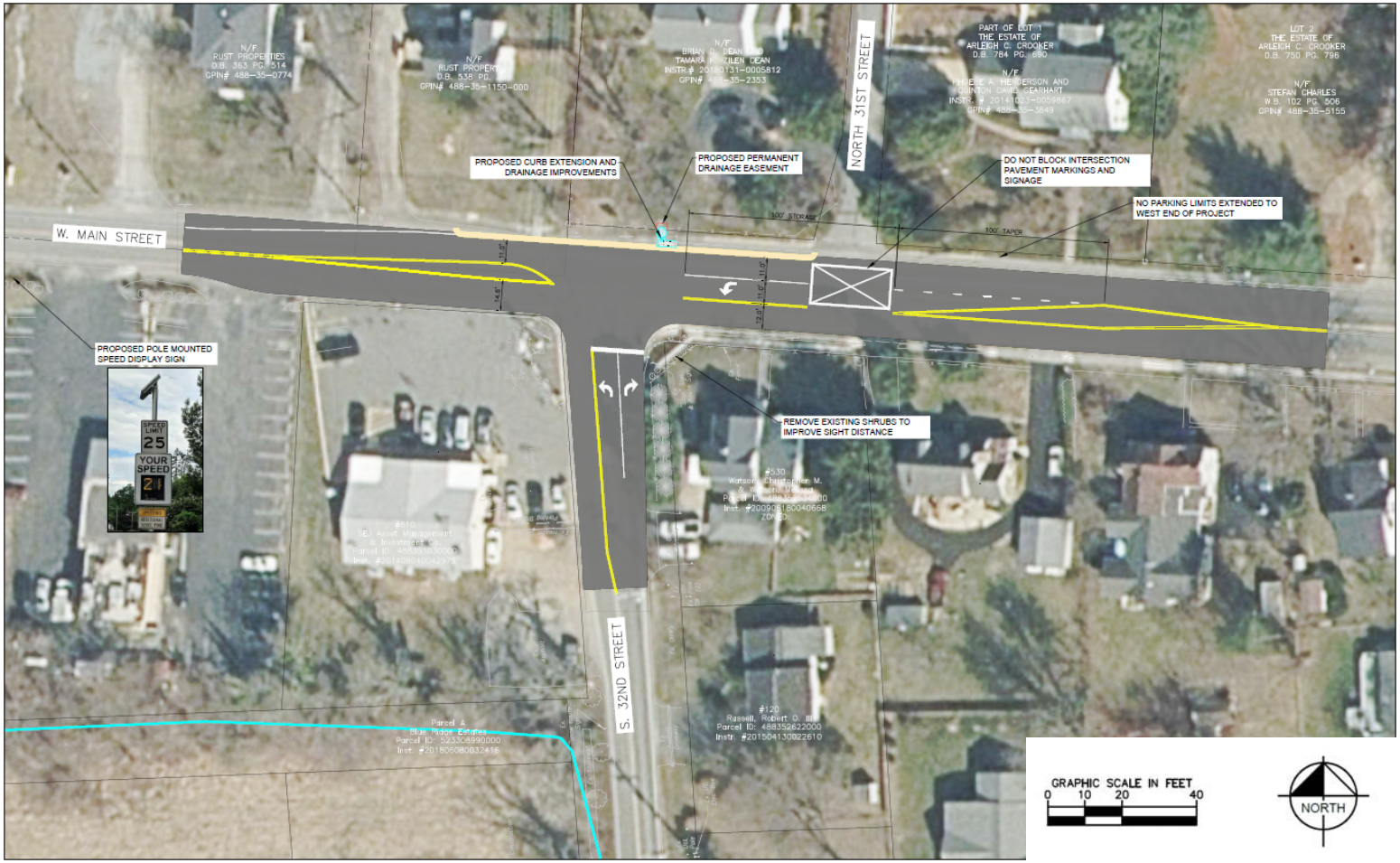
- Two reported crashes (rear end) during the three-year time period (2016 -2018) – near misses were observed
- Traffic peak periods:
  - Weekday 7:30-8:30 AM and 4:30-5:30 PM
  - Saturday 11:15 AM -12:15 PM
- Cut Through Traffic Review
  - Observations
  - Traffic data collected
- Other Issues
  - No westbound left-turn lane
  - Difficult to turn from 32nd Street onto Main Street
  - Few pedestrian facilities and non-ADA compliant
  - Parked trucks block street
  - Presence of utilities and limited right-of-way



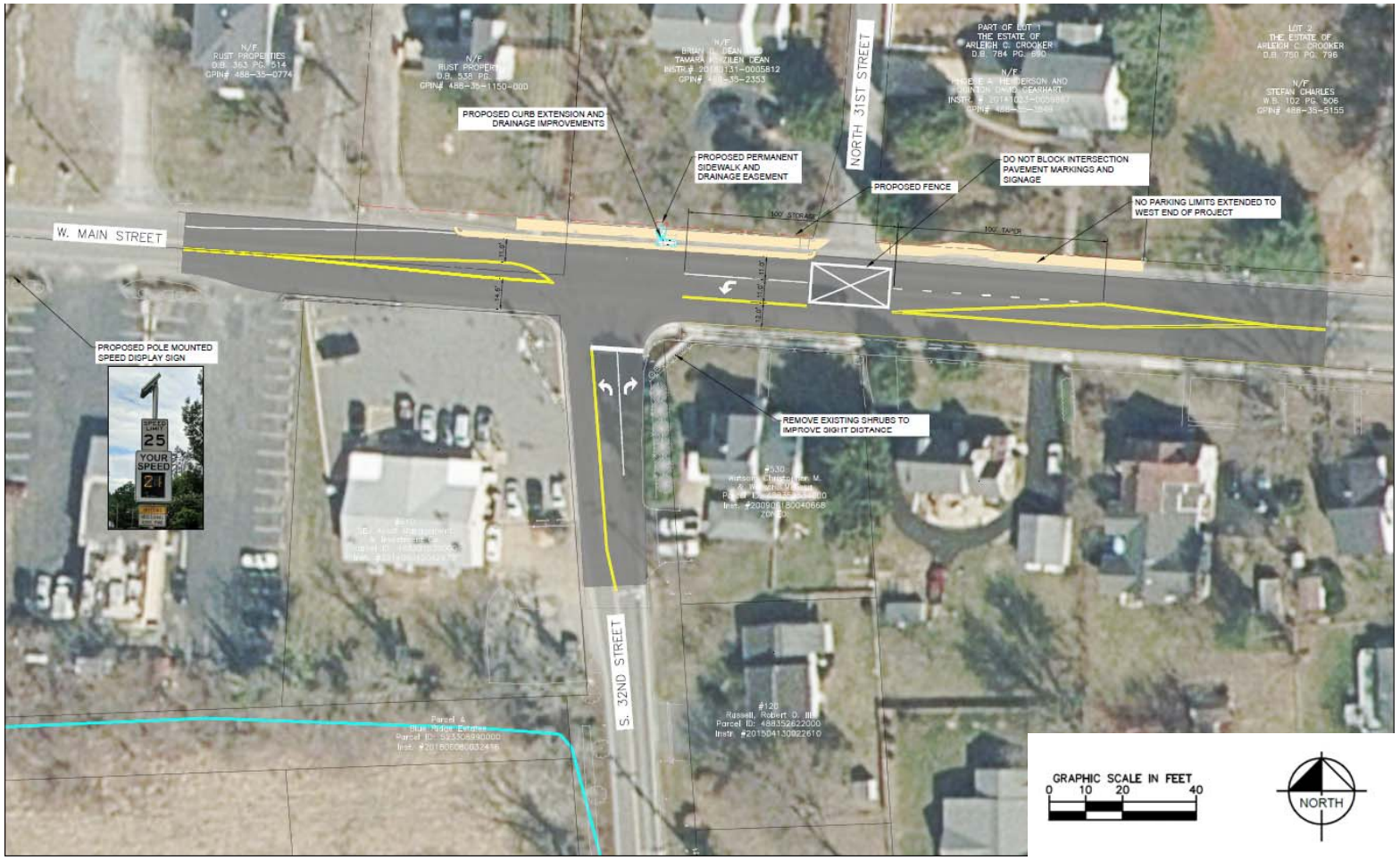
Background

Town of Purcellville Virginia

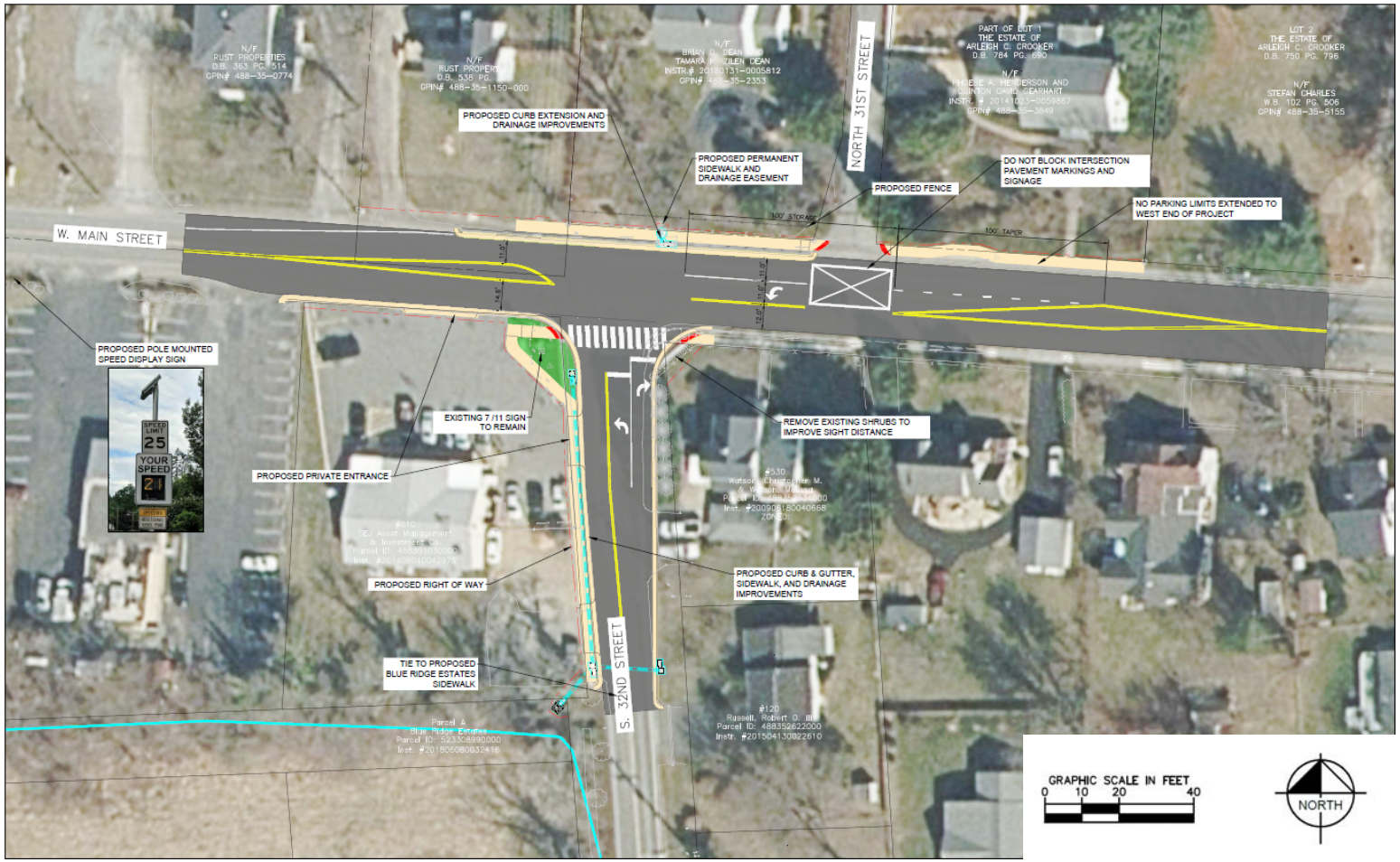
Concept 1A – Westbound Left-Turn Lane



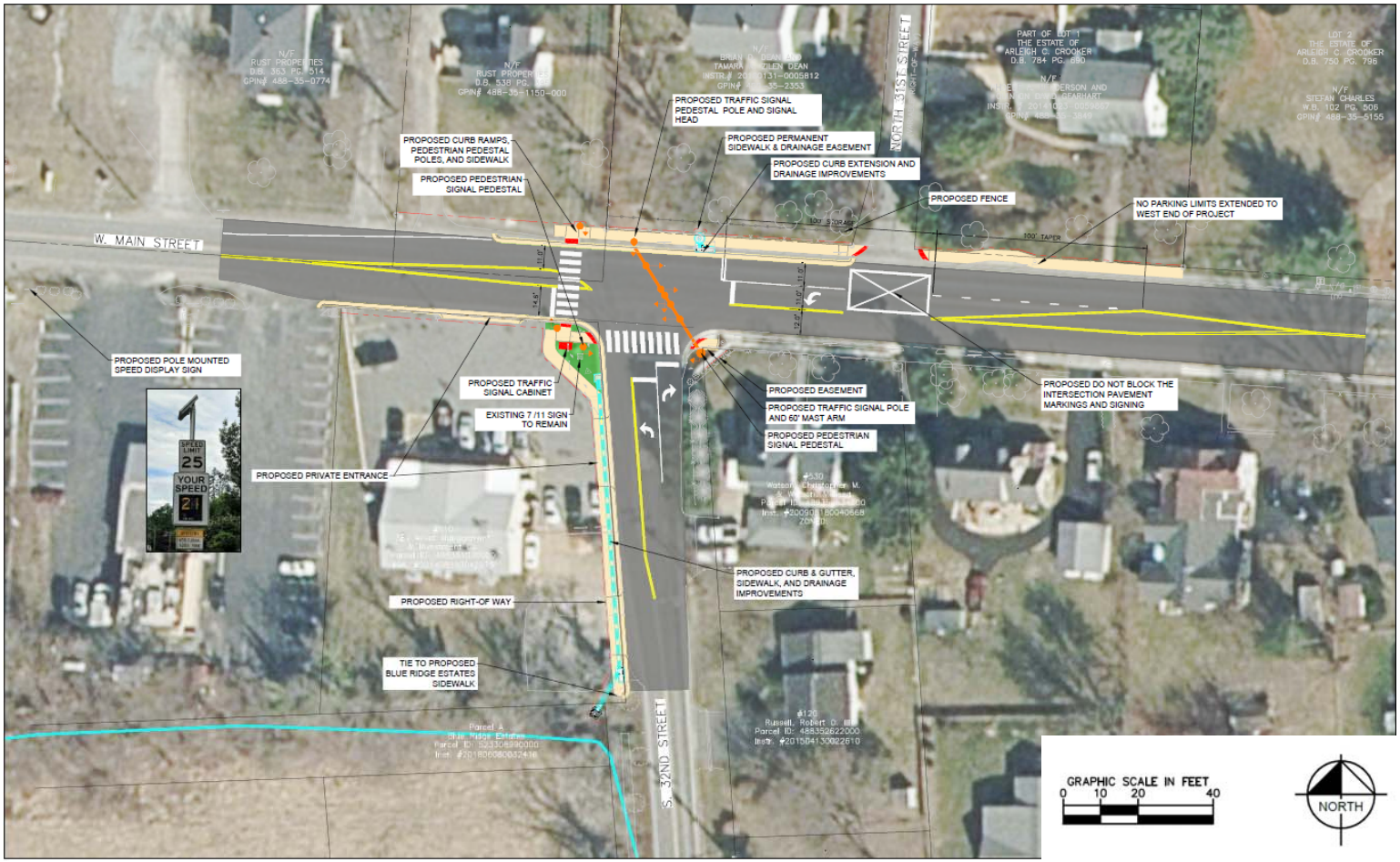
Concept 1B – Westbound Left-Turn Lane with Sidewalk



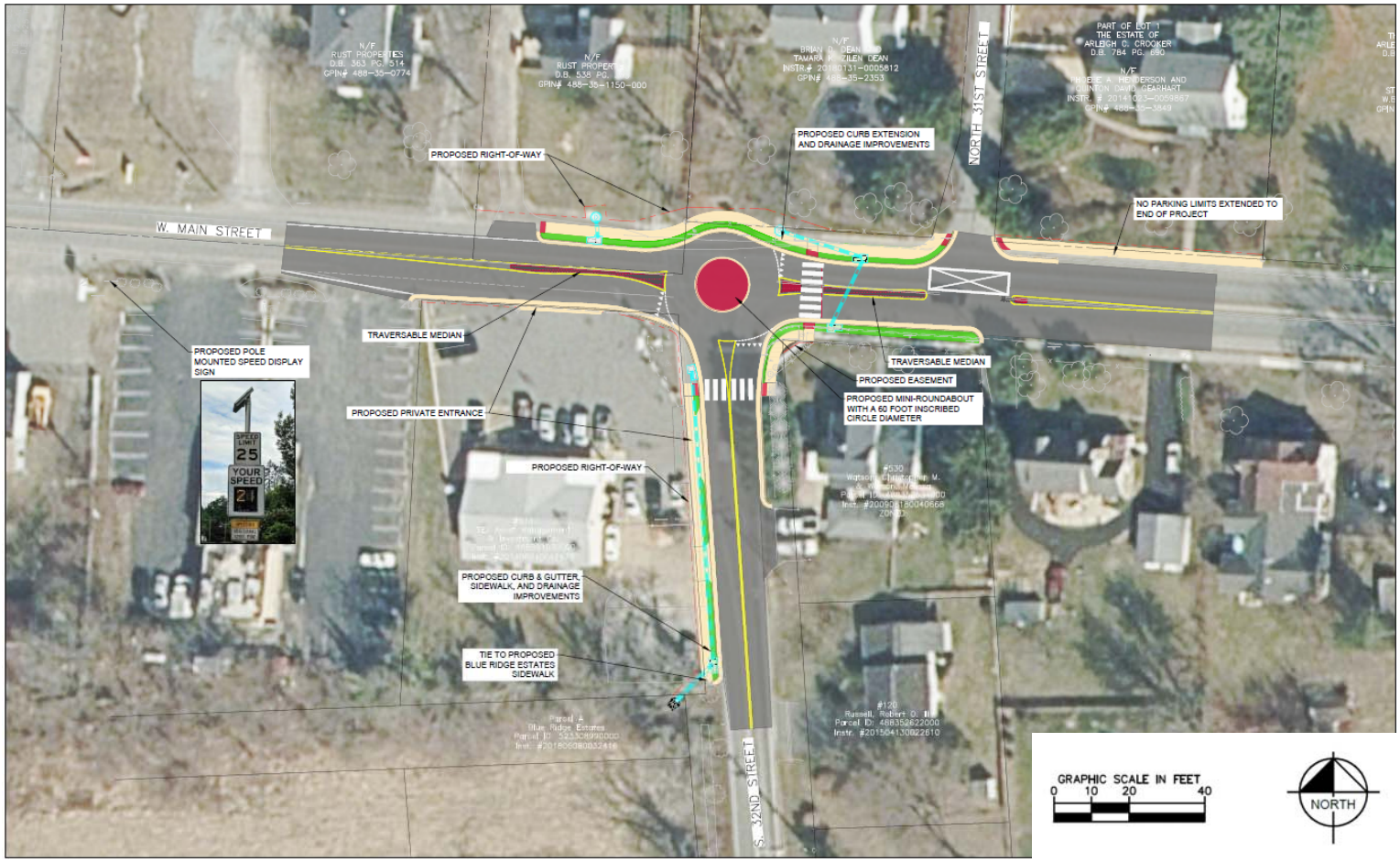
Concept 1C – Turn Lane with Sidewalk Improvements



Concept 2 – Signalization with Westbound Left-Turn Lane



Concept 3 – Mini-Roundabout



Signal Warrant Analysis Results

Signal Warrant Analysis Results							
Analysis Period	**Warrant 1: Eight-Hour Vehicular Volume**	**Warrant 2: Four-Hour Vehicular Volume**	**Warrant 3: Peak Hour Vehicular Volume**	**Warrant 4: Pedestrian Volume**	**Warrant 6: Coordinated Signal System**	**Warrant 7: Crash Experience**	**Warrant 8: Roadway Network**
Weekday	**Satisfied**	Not Satisfied	**Satisfied**	Not Satisfied	Not Satisfied	Not Satisfied	**Satisfied**
Saturday	**Satisfied**	**Satisfied**	Not Satisfied	Not Satisfied			

- The Signal Justification Report (SJR) was submitted to VDOT for review on 11/4/2019

Town of Purcellville Virginia

Measures of Effectiveness

- Qualitative assessment of each alternative in comparison with the No Build condition.

MOE	No Build	Concepts				
		1A – Westbound Left-Turn Lane	1B – Westbound Left-Turn Lane with Sidewalk	1C – Turn Lane with Sidewalk Improvements	2 – Signalization with Westbound Left-Turn Lane	3 – Mini Roundabout
Safety	POOR	FAIR	FAIR	FAIR	GOOD	GOOD
Traffic Operations	POOR	POOR	POOR	FAIR	GOOD	FAIR
Neighborhood Cut-Through Traffic Impacts	N/A	NONE/LOW	NONE/LOW	NONE/LOW	NONE/LOW	NONE/LOW
Property Impacts	N/A	NONE/LOW	MEDIUM	HIGH	HIGH	HIGH
Implementation	N/A	NONE/LOW	LOW	MEDIUM	MEDIUM	HIGH
Cost	N/A	LOW	LOW	MEDIUM	HIGH	HIGH

Town of Purcellville Virginia

Town Staff notes that Concept 2 is the preferred option due to improved safety and operations, no/minimal utility conflicts, and lower property impacts as compared to Concept 3. However, Concepts 1A, 1B, or 1C could be implemented as a phased approach to the traffic signal proposed with Concept 2

Next Steps

- VDOT review and approval of the Signal Justification Report (SJR)
- Complete engineering design of improvements
- VDOT review and permitting
- Construct improvements

Town of Purcellville Virginia

Backup slides

MOE	No Build	Concepts				
		1 – Short-Term Improvements (Westbound Left-Turn Lane)	1B – Westbound Left-Turn Lane with Sidewalk	1C – Turn Lane with Sidewalk Improvements	2 – Signalization with Westbound Left-Turn Lane	3 – Mini Roundabout
Safety	**POOR** • Maintains sight distance issue on the southeast corner • Maintains undefined and large width private driveways in southwest corner • Maintains single lane westbound approach, without a striped left-turn lane (but some vehicles use existing pavement width to bypass vehicles waiting to turn left)	**FAIR** • Provides additional westbound left-turn lane to separate left- and through traffic • Removes sight distance issues on the southeast corner by trimming vegetation • Adds minor curb extension along the north side of Main Street to such that the utility pole is subject to adequate lateral offset, rather than clear zone	**FAIR** • Provides additional westbound left-turn lane to separate left- and through traffic • Removes sight distance issues on the southeast corner by trimming vegetation • Adds minor curb extension along the north side of Main Street to such that the utility pole is subject to adequate lateral offset, rather than clear zone • Adds new sidewalk along Main Street	**FAIR** • Provides additional westbound left-turn lane to separate left- and through traffic • Removes sight distance issues on the southeast corner by trimming vegetation • Adds minor curb extension along the north side of Main Street to such that the utility pole is subject to adequate lateral offset, rather than clear zone • Increases northbound left turn lane storage length • Adds new sidewalk along Main Street	**GOOD** • Adds signal control to all movements • Provides additional westbound left-turn lane • Removes sight distance issues on the southeast corner by trimming vegetation • Adds new sidewalk along Main Street and new Main Street crosswalk	**GOOD** • Reduces vehicle speeds approaching intersection • Removes all left-turn conflicts and all approaches are yield controlled • Removes existing sight distance issues • Adds new sidewalk along Main Street and new Main Street crosswalk
Traffic Operations	**POOR** • The northbound 32nd Street left turn movement operates at LOS F during the PM peak hour and LOS D during AM peak and SAT peak hour. • Maintains single lane westbound approach, without a striped left-turn lane (but some vehicles use existing pavement width to bypass vehicles waiting to turn left) • V/C Ratio for all movements is less than 1	**POOR** • Similar to No Build conditions, except the northbound left-turn movement improves from LOS F to E	**POOR** • Similar to No Build conditions, except the northbound left-turn movement improves from LOS F to E	**FAIR** • Similar to No Build conditions, except the northbound left-turn movement improves from LOS F to E • Lengthened northbound left-turn storage length	**GOOD** • Maintains overall intersection LOS A and all movements are LOS B or better • V/C ratio for both the eastbound through movement during the AM peak period and the westbound through movement during the PM peak period increase to 0.80 but are still less than 1. • Queuing in the eastbound through movements increase to ~250 feet in the AM peak hour and westbound through movement to ~250 feet in the PM peak hour.	**FAIR** • Overall intersection worsens to LOS C for AM and PM peak hours • The northbound 32nd Street improves to a LOS A, but the westbound direction on Main Street worsens to a LOS C during the PM peak hour and LOS B during the SAT peak hour. • Queuing in the eastbound through movement is ~250 feet during the AM peak and westbound through movement during the PM peak hour is ~300 feet
Neighborhood Cut-Through Traffic Impacts	**N/A** • No impacts	**NONE/LOW** • No/minimal anticipated impact	**NONE/LOW** • No/minimal anticipated impact	**NONE/LOW** • No/minimal anticipated impact	**NONE/LOW** • No/minimal anticipated impact	**NONE/LOW** • No/minimal anticipated impact
Property Impacts	**N/A** • No ROW impacts	**NONE/LOW** • Primarily signing and striping of existing pavement • No property impacts are anticipated.	**MEDIUM** • 3 properties (North of Main Street), ~3,000 SF • Permanent or temporary easements will likely be necessary on north side of the intersection for the proposed sidewalk	**HIGH** • 6 properties (southwest, southeast, and northeast corners), ~6,750 SF • Permanent or temporary easements will likely be necessary on the southeast corner and north side of the intersection for the proposed future signal poles and equipment • Right-of way or permanent easement will be necessary on the western side of 32nd Street for the proposed sidewalk, curb ramp, and on the north side of Main Street for the sidewalk	**HIGH** • 6 properties (southwest, southeast, and northeast corners), ~6,750 SF • Permanent or temporary easements will likely be necessary on the southeast corner and north side of the intersection for the proposed signal poles and equipment • Right-of way or permanent easement will be necessary on the western side of 32nd Street for the proposed sidewalk, curb ramp, and signal cabinet, and on the north side of Main Street for the sidewalk	**HIGH** • 7 properties (northwest, northeast, southwest, southeast corners), ~8,500 SF • Right-of way or permanent easement will be necessary on the western side of 32nd Street for the proposed sidewalk, curb ramp, and signal cabinet and on the north side of Main Street for the sidewalk • Storm water easements for proposed culverts/inlets will be necessary
Implementation	**N/A** • No construction impacts	**NONE/LOW** • Minor disruption to existing traffic • Primarily signing and striping of existing pavement • No utility relocations are anticipated	**LOW** • Minor disruption to existing traffic for sidewalk construction • Primarily signing and striping of existing pavement • No utility relocations are anticipated	**MEDIUM** • Moderate disruption to existing traffic for the installation of curb/gutter, drainage improvements, sidewalk, and pedestrian improvements	**MEDIUM** • Moderate disruption to existing traffic for the installation of signal equipment, sidewalk, and pedestrian improvements • Potential underground electrical relocation in southwest corner for signal equipment	**HIGH** • High disruption to existing traffic as roundabout would require a more detailed phasing and TMP/MOT
Cost	**N/A** • No cost	**LOW** • $467,000 (PE/RW/CN estimate) • Minimal cost with and restriping of the existing roadway	**LOW** • $758,000 (PE/RW/CN estimate) • Minimal cost with and restriping of the existing roadway and northern sidewalk	**MEDIUM** • $1,203,000 (PE/RW/CN estimate) • Additional cost due to sidewalk, curb and gutter, and drainage improvements along the west side of 32nd Street	**HIGH** • $1,862,000 (PE/RW/CN estimate) • Signal equipment will add new operations, energy, and maintenance costs	**HIGH** • $1,937,000 (PE/RW/CN estimate) • Due to the amount of utility, right-of-way, and drainage work this project will have a higher cost

Traffic Operational Analysis

Approach	Movement	Existing								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	D (28.3)	13	0.15	F (51.1)	58	0.49	D (30.6)	30	0.30
	NBR	C (17.5)	28	0.27	B (12.0)	15	0.16	B (12.9)	18	0.18
Eastbound (W. Main Street)	EBT	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
	EBR	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
Westbound (W. Main Street)	WBLT	A (2.4)	8	0.10	A (0.7)	5	0.06	A (1.0)	5	0.06
	Overall	A (2.6)			A (3.7)			A (2.8)		

Approach	Movement	Unsignalized Intersection with Short-Term Improvements (WB Left-Turn Lane)								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	D (28.9)	12.5	0.15	E (48.9)	55	0.48	D (30.6)	30	0.30
	NBR	C (18.2)	27.5	0.28	B (12.1)	15	0.16	B (13.2)	17.5	0.19
Eastbound (W. Main Street)	EBT	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
	EBR	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
Westbound (W. Main Street)	WBL	B (10.2)	7.5	0.10	A (8.5)	5	0.06	A (8.8)	5	0.06
	WBT	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
	Overall	A (2.7)			A (3.6)			A (2.9)		

Traffic Operational Analysis

Approach	Movement	Existing								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	D (28.3)	13	0.15	F (51.1)	58	0.49	D (30.6)	30	0.30
	NBR	C (17.5)	28	0.27	B (12.0)	15	0.16	B (12.9)	18	0.18
Eastbound (W. Main Street)	EBT	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
	EBR	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
Westbound (W. Main Street)	WBLT	A (2.4)	8	0.10	A (0.7)	5	0.06	A (1.0)	5	0.06
	Overall	A (2.6)			A (3.7)			A (2.8)		

Approach	Movement	Signalization								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	B (11.5)	25	0.10	B (13.4)	51	0.25	B (10.9)	36	0.19
	NBR	B (13.2)	34	0.44	B (14.4)	33	0.40	B (11.8)	27	0.37
Eastbound (W. Main Street)	EBT	A (7.5)	217	0.80	A (4.7)	94	0.41	A (5.7)	119	0.55
	EBR	A (3.6)	8	0.07	A (3.5)	6	0.03	A (3.9)	8	0.06
Westbound (W. Main Street)	WBLT	A (5.3)	77	0.48	A (7.4)	295	0.77	A (5.9)	148	0.57
	Overall	A (7.3)			A (7.3)			A (6.4)		

Analysis Summary

Town of Purcellville Virginia

Traffic Operational Analysis

Approach	Movement	Existing								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	D (28.3)	13	0.15	F (51.1)	58	0.49	D (30.6)	30	0.30
	NBR	C (17.5)	28	0.27	B (12.0)	15	0.16	B (12.9)	18	0.18
Eastbound (W. Main Street)	EBT	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
	EBR	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
Westbound (W. Main Street)	WBLT	A (2.4)	8	0.10	A (0.7)	5	0.06	A (1.0)	5	0.06
	Overall	A (2.6)			A (3.7)			A (2.8)		

Approach	Movement	Signalization with WB Left Turn Lane								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	B (13.3)	25	0.10	B (12.0)	50	0.23	B (10.9)	32	0.19
	NBR	B (15.3)	34	0.46	B (12.8)	32	0.38	B (11.8)	25	0.37
Eastbound (W. Main Street)	EBT	A (7.3)	248	0.80	A (5.2)	101	0.48	A (6.0)	132	0.61
	EBR	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
Westbound (W. Main Street)	WBL	B (12.8)	28	0.24	A (7.1)	19	0.12	A (8.4)	19	0.13
	WBT	A (3.8)	50	0.25	A (7.7)	240	0.80	A (5.6)	118	0.54
	Overall	A (7.7)			A (7.5)			A (6.6)		

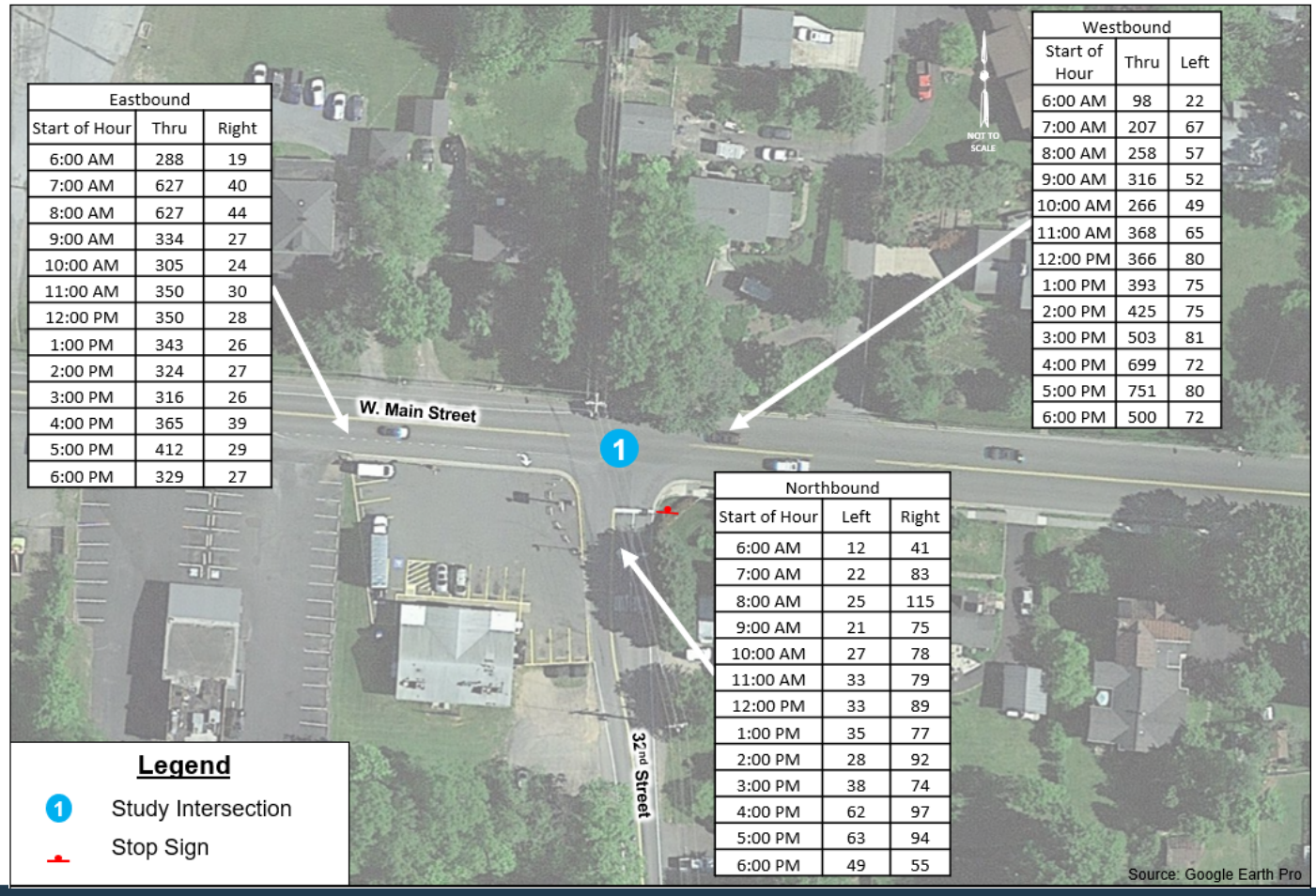
Traffic Operational Analysis

Approach	Movement	Existing								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NBL	D (28.3)	13	0.15	F (51.1)	58	0.49	D (30.6)	30	0.30
	NBR	C (17.5)	28	0.27	B (12.0)	15	0.16	B (12.9)	18	0.18
Eastbound (W. Main Street)	EBT	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
	EBR	A (0.0)	0	-	A (0.0)	0	-	A (0.0)	0	-
Westbound (W. Main Street)	WBLT	A (2.4)	8	0.10	A (0.7)	5	0.06	A (1.0)	5	0.06
	Overall	A (2.6)			A (3.7)			A (2.8)		

Approach	Movement	Roundabout								
		AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio	LOS (Delay)	Queue (ft)	V/C Ratio
Northbound (S. 32nd Street)	NB	B (11.2)	24	0.27	A (7.8)	23	0.24	A (8.3)	23	0.24
Eastbound (W. Main Street)	EB	C (22.9)	249	0.84	A (8.5)	62	0.45	A (9.8)	84	0.53
Westbound (W. Main Street)	WB	A (6.9)	39	0.33	C (21.7)	291	0.83	B (10.1)	92	0.54
	Overall	C (17.6)			C (16.0)			A (9.7)		

2019 Existing Weekday Hourly Traffic Volumes

- Thirteen-hour turning movement counts (TMCs) were collected from 6 AM to 7 PM on a typical non-holiday weekday (Tuesday, May 14, 2019)



Eastbound		
Start of Hour	Thru	Right
6:00 AM	288	19
7:00 AM	627	40
8:00 AM	627	44
9:00 AM	334	27
10:00 AM	305	24
11:00 AM	350	30
12:00 PM	350	28
1:00 PM	343	26
2:00 PM	324	27
3:00 PM	316	26
4:00 PM	365	39
5:00 PM	412	29
6:00 PM	329	27

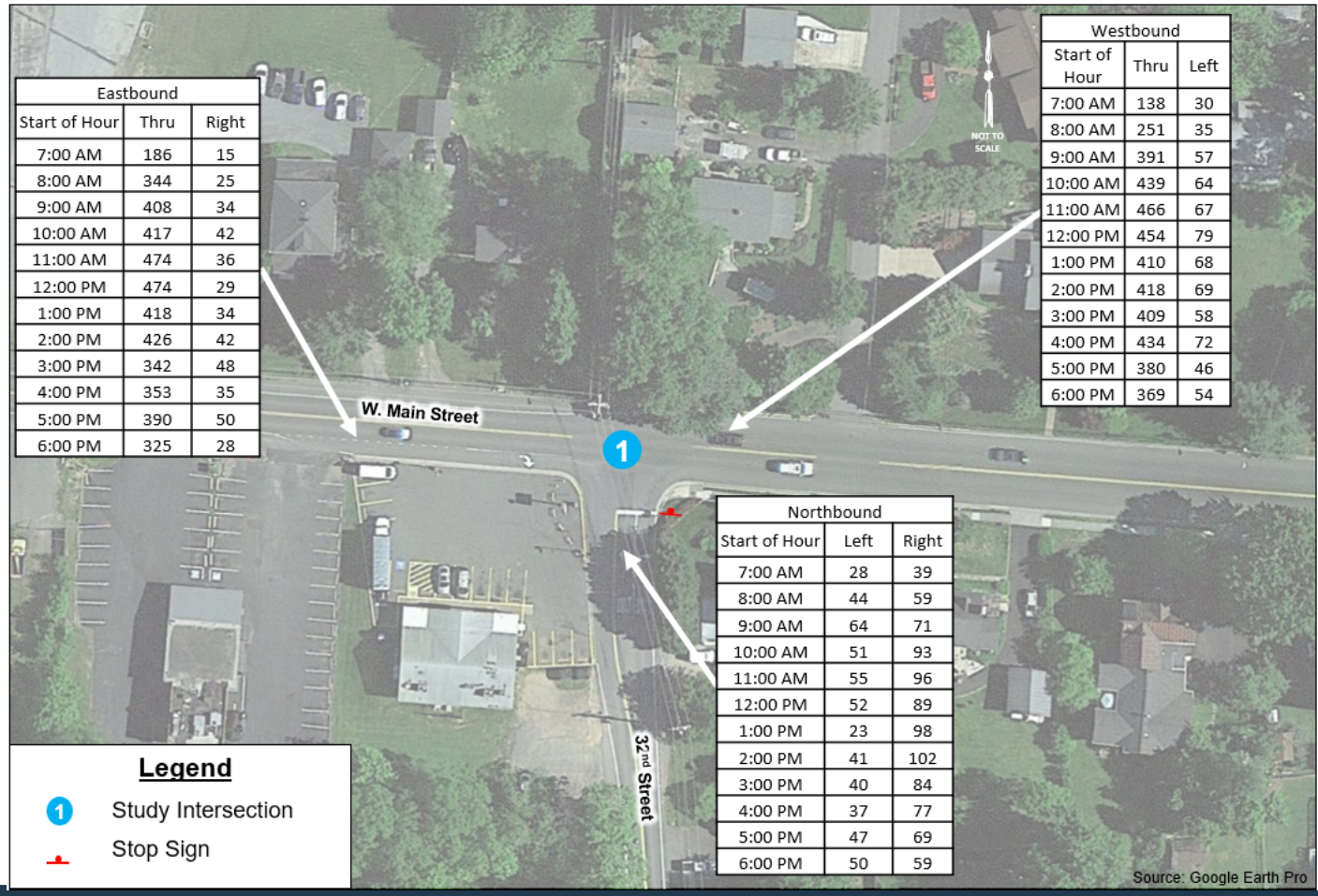
Westbound		
Start of Hour	Thru	Left
6:00 AM	98	22
7:00 AM	207	67
8:00 AM	258	57
9:00 AM	316	52
10:00 AM	266	49
11:00 AM	368	65
12:00 PM	366	80
1:00 PM	393	75
2:00 PM	425	75
3:00 PM	503	81
4:00 PM	699	72
5:00 PM	751	80
6:00 PM	500	72

Northbound		
Start of Hour	Left	Right
6:00 AM	12	41
7:00 AM	22	83
8:00 AM	25	115
9:00 AM	21	75
10:00 AM	27	78
11:00 AM	33	79
12:00 PM	33	89
1:00 PM	35	77
2:00 PM	28	92
3:00 PM	38	74
4:00 PM	62	97
5:00 PM	63	94
6:00 PM	49	55

Town of Purcellville Virginia

2019 Existing Saturday Hourly Traffic Volumes

- Twelve-hour TMCs were collected from 7 AM to 7 PM on a typical non-holiday Saturday (Saturday, May 18, 2019)

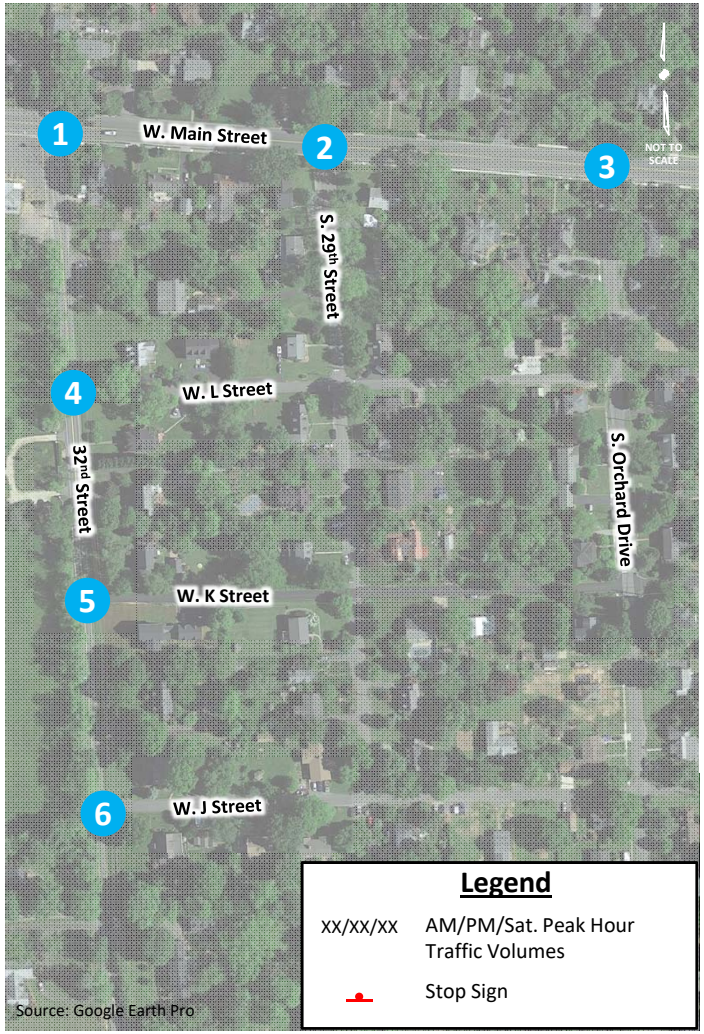


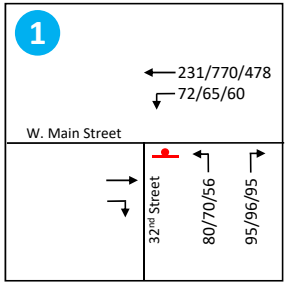
Eastbound		
Start of Hour	Thru	Right
7:00 AM	186	15
8:00 AM	344	25
9:00 AM	408	34
10:00 AM	417	42
11:00 AM	474	36
12:00 PM	474	29
1:00 PM	418	34
2:00 PM	426	42
3:00 PM	342	48
4:00 PM	353	35
5:00 PM	390	50
6:00 PM	325	28

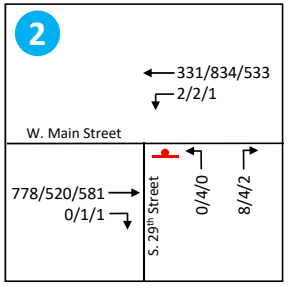
Westbound		
Start of Hour	Thru	Left
7:00 AM	138	30
8:00 AM	251	35
9:00 AM	391	57
10:00 AM	439	64
11:00 AM	466	67
12:00 PM	454	79
1:00 PM	410	68
2:00 PM	418	69
3:00 PM	409	58
4:00 PM	434	72
5:00 PM	380	46
6:00 PM	369	54

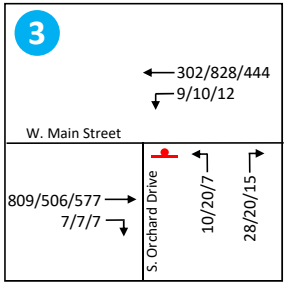
Northbound		
Start of Hour	Left	Right
7:00 AM	28	39
8:00 AM	44	59
9:00 AM	64	71
10:00 AM	51	93
11:00 AM	55	96
12:00 PM	52	89
1:00 PM	23	98
2:00 PM	41	102
3:00 PM	40	84
4:00 PM	37	77
5:00 PM	47	69
6:00 PM	50	59

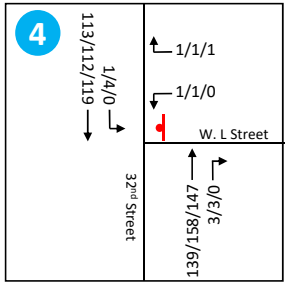
Town of Purcellville Virginia

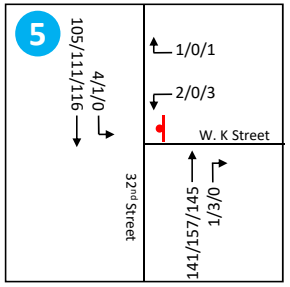

1
W. Main Street
2
3
NOT TO SCALE
S. 29th Street
4
W. L Street
32nd Street
S. Orchard Drive
5
W. K Street
6
W. J Street
Legend
XX/XX/XX
AM/PM/Sat. Peak Hour Traffic Volumes
Stop Sign
Source: Google Earth Pro


1
231/770/478
72/65/60
W. Main Street
32nd Street
80/70/56
95/96/95


2
331/834/533
2/2/1
W. Main Street
778/520/581
0/1/1
S. 29th Street
0/4/0
8/4/2


3
302/828/444
9/10/12
W. Main Street
809/506/577
7/7/7
S. Orchard Drive
10/20/7
28/20/15


4
1/1/1
1/1/0
W. L Street
1/4/0
113/112/119
32nd Street
139/158/147
3/3/0


5
1/0/1
2/0/3
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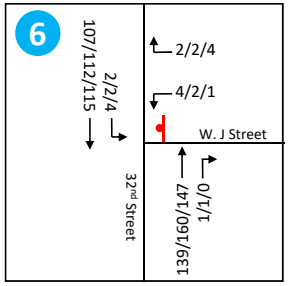
4/1/0
105/111/116
32nd Street
141/157/145
1/3/0


6
2/2/4
4/2/1
W. J Street
2/2/4
107/112/115
32nd Street
139/160/147
1/1/0