GEOTECHNICAL ENGINEERING STUDY

PROPOSED APARTMENTS
10410 OLD PRESTON HIGHWAY
LOUISVILLE, KENTUCKY

ASHER PROJECT NO. 21-077

Prepared For:

Mr. Brent Hackworth
brent@highgates.com

Prepared By:

Asher Engineering, Inc.
1021 South Floyd Street
Louisville, Kentucky 40203

July 13, 2021

Asher Engineering, Inc.
Environmental & Engineering Consulting

July 13, 2021

Mr. Brent Hackworth
brent@highgates.com

Re: Geotechnical Engineering Study
Proposed Apartments
10410 Old Preston Highway
Louisville, Kentucky

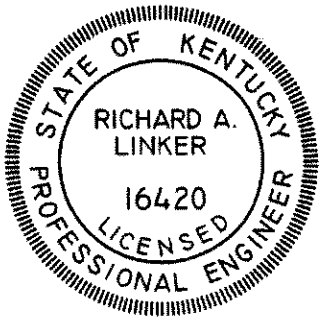
Dear Brent,

Asher Engineering has completed a Geotechnical Engineering Study for the referenced project. This report contains the findings of our subsurface exploration, geotechnical recommendations to aid design of foundations and floor slabs, and construction recommendations with regard to site work, fill placement, and foundation installation and inspection.

We appreciate the opportunity to be of service to you on this project. If we can be of further assistance, or if you have any questions regarding this report, please contact our office.

Sincerely,

Richard A. Linker, P. E.



1021 S. Floyd Street • Louisville, Kentucky 40203 • Office: (502) 589-0073 asherinc@aol.com

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1.0 PROJECT INFORMATION

The project site is located at 10410 Old Preston Highway, in Louisville, Ky.
The site is an open grass-covered flat rectangular shaped tract with scattered mature trees. A review of historical aerial photographs (Appendix) revealed that the property is previously undeveloped land with some large tilled gardens but no full crop coverage. .

Proposed for construction are 3-story, slab on grade apartment buildings. Asphalt paved parking and access drives will be provided throughout.

2.0 SUBSURFACE EXPLORATION

The subsurface conditions were explored by conducting 9 test pits across the site. The test pits were consistent with about 12 in. topsoil layer underlain by moist, firm, brown silty clay soil down to limestone bedrock. A summary of each test pit is included in the Appendix. The depth to refusal at each test pit is summarized below.

Test Pit	Depth to Refusal, Ft.
1	1.5
2	2.6
3	8 ft. no rock encountered
4	7
5	6.3
6	5.5
7	4.0
8	6.9
9	7.0

No water was noted in the test pits . The limestone bedrock can weather resulting in an irregular surface and elevation differenced over short horizontal distances.

3.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

The following design and construction recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions.

3.1 Site Development

We recommend an 8 to 12 in. stripping depth be used. Thicker topsoil/rich soil will be encountered in areas that were once tilled gardens, while other areas will have a less thick topsoil layer.

The silty clay soils on site are suitable for support of the new bldgs and roads, and are suitable for use as structural fill.

It is likely that Limestone bedrock will be encountered in utility trenches and bldg pad / footing excavations. The limestone cannot be ripped with an excavator, and will have to be blasted or hoe rammed.

3.2 Shallow Foundations and Floor Slabs

Footings bearing on firm natural soil, or engineered fill placed over firm soil may be proportioned using a net allowable bearing capacity of 3400 psf. Footings can bear on firm natural soil or bedrock. A Site Classification B should be used for seismic design. Wall footings should be at least 16 in. wide and column footings should be at least 24 in. wide to provide an adequate factor of safety for bearing capacity. All exterior footings and footings in unheated areas must bear at least 24 in. below final exterior grade for frost protection. Interior footings can bear at nominal depths below the floor.

Footing excavations that extend to bedrock do not have to be over-excavated to provide a 'cushion' of soil or crushed stone between the bottom of footing and bedrock. Footings can be poured directly on bedrock even if footing elevations in other portions of the bldg encounter clay soil. However, rock will have to be removed such that the entire footing design thickness and footing design depth can be provided.

The building subgrades should be inspected and approved by the geotechnical engineer prior to the placement of grade raise fill or the stone subbase. The slab should be supported on a 4-in. layer of KY Dense Graded Aggregate (DGA) compacted to 98 percent of the standard Proctor (ASTM D-698).

3.4 Below Grade Walls

Below grade walls should be designed to provide drainage to relieve hydrostatic pressure. A clean, free draining granular fill (KY No. 57 stone) should be used to backfill against below grade walls. The backfill zone should be drained using a perforated pipe at the base of the wall. An Equivalent Hydrostatic Pressure (EHP) of 50 pcf may be used to design below grade walls. A unit weight of 130 pcf should be used for the granular backfill.

3.5 Pavements

New pavement areas should be inspected by the geotechnical engineer to determine the suitability of the subgrade and to provide recommendations for stabilization if necessary. Assuming proper subgrade preparation, a California Bearing Ratio (CBR) value of 5 is recommended. This value applies for both undisturbed soil and the stone subbase that is stable under a proofroll, and for soil that is recompacted to at least 95 percent of the standard Proctor maximum dry density.

The following asphalt pavement section is recommended for areas that will be limited to automobiles and light trucks:

Automobile and Light Truck Areas	1.0 in. asphalt concrete surface 2.0 in. asphalt concrete base 4.0 in. KY DGA limestone 4.0 in. 4-Minus or Surge limestone

Areas that may experience heavier loading conditions should be provided with the following pavement section.

Heavy Truck Areas	1.0 in. asphalt concrete surface 3.0 in. asphalt concrete base 4.0 in. KY DGA 6.0 in 4-Minus or Surge limestone

4.0 CONSTRUCTION RECOMMENDATIONS

Variations in subsurface conditions should be expected during construction. It is therefore recommended that the geotechnical engineer be retained by the Owner to review the soils-related phases of the project and to correlate the test data with the soil conditions that are encountered during construction.

4.1 Subgrade Preparation

Prior to construction or the placement of new engineered fill or stone subbase, the exposed subgrade should be evaluated by the project geotechnical engineer. The existing subgrade should be carefully inspected by proofrolling with a loaded dump truck prior to the placement of fill to identify soft areas. Any soft areas identified by the proofroll would be undercut and stabilized with crushed stone. The contractor should exercise discretion when selecting equipment sizes and also control surface water while the subgrade soils are exposed. The severity of this potential problem depends to a great extent on the weather conditions during construction.

4.2 Engineered Fill

Engineered fill should be placed on a prepared subgrade that has been inspected and approved by the project geotechnical engineer. The inspection would include proofrolling of the exposed subgrade with a loaded pan or other suitable rubber-tired piece of equipment. If unsuitable material is disclosed, an appropriate remedial measure would be recommended by the geotechnical engineer at that time. Engineered fill placement and compaction operations should be monitored by the geotechnical engineer or his representative. Field density tests should be performed on each lift as necessary to insure that the specified compaction is being achieved. Soil fill placed in the proposed building area should be compacted to at least 98 percent of the standard Proctor maximum dry density (ASTM D-698). Fill placed in the paved areas should be compacted to 95 percent, and fill placed in green areas to 90 percent.

4.3 Foundation Excavations

All foundation excavations should be evaluated by the geotechnical engineer or his representative to insure adequate foundation support. All concrete for foundations should be poured the same day the excavation is made.

Appendix

Historical Aerial Photographs

Summary of Test Pits

High Gates	**Proposed Apartments** **10410 Old Preston Highway** **Louisville, Kentucky**	**Asher Engineering, Inc.** **Project No.: 21-077** **Photo Date June 2020**

High Gates	**Proposed Apartments** **10410 Old Preston Highway** **Louisville, Kentucky**	**Asher Engineering, Inc.** **Project No.: 21-077** **Photo Date March 1993**

10410 Old Preston Hwy.
High Gates
21-077

Test Pit #1

0" to 7" Topsoil with roots
7" to 18" Silty Clay; moist; firm; brown; silty
18" Limestone; shelf rock; Possible Karst Activity Near-By
Refusal at 1 ft. 6 in.

Test Pit #2

0" to 4" Topsoil with heavy roots
4" to 31" Silty Clay; moist; firm; brown; silty with trace rock fragments and roots
31" Limestone; Surface Rock Outcrop
Refusal at 2 ft. 7 in.

Test Pit #3

0" to 10" Topsoil with roots to 18"
10" to 36" Silty Clay; moist; firm; brown; silty
36" to 96" Silty Clay; moist; firm; red brown
Terminated at 8 ft.

Test Pit #4

0" to 14" Topsoil with heavy roots
14" to 36" Silty Clay; moist; firm; brown; silty
36" to 84" Silty Clay; moist; firm; red brown with gray
84" Limestone
Refusal at 7 ft.

Test Pit #5

0" to 4" Topsoil (minimal)
4" to 36" Silty Clay; very moist; firm; brown; very silty
36" to 76" Silty Clay; moist; firm; red brown
76" Limestone; Karst Activity Near-By
Refusal at 6 ft. 4 in.

Test Pit #6

0" to 12" Topsoil with roots
12" to 36" Silty Clay; very moist; firm; brown; very silty
36" to 66" Silty Clay; moist; firm; red brown with gray; trace limestone floater at 4 ft.
66" Limestone
Refusal at 5 ft. 6 in.

Test Pit #7

0" to 10" Topsoil with roots
10" to 24" Silty Clay; very moist; firm; brown; silty
24" to 48" Silty Clay; moist; firm; red brown with gray
48" Limestone
Refusal at 4 ft.

Test Pit #8

0" to 10" Topsoil with roots
10" to 30" Silty Clay; dry/moist; firm; tan brown; silty with trace roots
30" to 82" Silty Clay; moist; firm; red brown
82" Limestone
Refusal at 6 ft. 10 in.

Test Pit #9

0" to 12" Topsoil with roots
12" to 84" Silty Clay; moist; firm; red brown; silty
Terminated at 7 ft.

Asher Engineering, Inc.

Environmental & Engineering Consulting

January 15, 2022

Mr. Brent Hackworth
brent@highgates.com

Re: Proposed Old Preston Highway Apartments
10410 and 10414 Old Preston Hwy

On January 15, 2022 Asher Engineering visited the referenced site to interview the residents and inspect the backyards of seven neighboring properties for possible karst activity and sinkholes. The properties visited were: 4600, 4602, 4604, and 4606 Walden Dr., and 10310, 10400, 10412 Old Preston Highway. We spoke with residents at 4600, 4604, and 4606 Walden Drive. No one was available for interview at the other properties at the time of our site visit.

Inspection of the depressed areas at the neighboring properties confirmed these areas are indeed sinkholes. We noted that the sinkholes at the backyards at 4602, 4604, and 4606 Walden Drive, and the sinkholes at 10310 and 10400 Old Preston Highway extend into the subject site. We also noted a sinkhole on the subject site just south of 4602 Walden Drive.

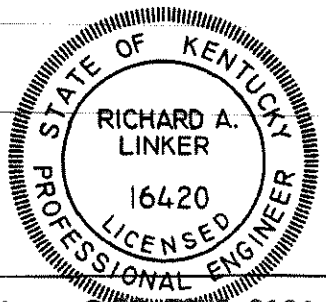
Sinkholes are formed by the dissolution of the underlying limestone bedrock. Depressions in the ground surface can develop when bedrock surfaces dissolve over years of water migrating thru the area. The dissolved rock may leave a void space, or the void may be replaced by soft redeposited soil. Over time, the weight of the soil subsides over the void or soft soil, leaving a visible depression in the ground surface. A review of geographic maps revealed that the site is underlain by the Louisville Limestone formation. This formation is susceptible to karst activity and sinkhole formation.

The subject property is suitable for development with the apartment buildings and pavement areas, provided the site is inspected by a geotechnical engineer during the sitework, bldg, and road construction. This inspection would include a visual observation of the soil subgrade after the site has been stripped of grass and topsoil. A proofroll with a loaded dump truck would be conducted to identify any soft areas in the soil subgrade. Test pits with a backhoe or excavator may also be conducted to inspect any soft subgrade areas identified by the visual inspection and proofroll. If depressed areas and/or sinkholes are identified at the time of the construction inspection, recommendations for stabilizing the sinkholes would be provided on site. While there is some variation in the methods to stabilize sinkholes, the repair would generally be as follows: The sinkhole area would be cleaned of all soft soil down to bedrock. The excavation would be draped with a nonwoven geotextile fabric in the bottom and sides, and the area backfilled with crushed limestone. The geotextile fabric would then be placed over the crushed limestone, and the area backfilled with compacted soil up to finish grade. Any sinkholes that extend over property lines must be repaired on both properties to insure complete stabilization of the sinkhole area.

The Highgates Group has retained Asher Engineering to provide Construction Testing and Inspection during the sitework and building construction for the project. In addition to our normal inspections, we will include monitoring of the adjacent properties to confirm that the construction activities are not impacting the neighboring sites.

Sincerely,

Richard A. Linker, P.E.



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The Highgates Group	**Old Preston Highway Apartments** **10410 and 10414 Old Preston Hwy** **Louisville, KY**	**Asher Engineering, Inc.** **Project No.: 21-147** **Photo Date February 2018**

final report

December 22, 2021
Revised January 12, 2022

Traffic Impact Study

Apartments
Old Preston Highway (KY 6304)
Louisville, KY

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet

Level of Service remains unchanged after build

Table 2. Peak Hour Level of Service

Approach	A.M.			P.M.		
	2021 Existing	2024 No Build	2024 Build	2021 Existing	2024 No Build	2024 Build
Old Preston at Maple Spring Drive						
Maple Spring Drive Westbound	A 8.7	A 8.7	A 8.8	A 8.8	A 8.8	A 9.1
Old Preston Southbound	A 7.2	A 7.2	A 7.3	A 7.2	A 7.2	A 7.3
Old Preston at Entrance						
Entrance Eastbound			A 8.8			A 8.9
Old Preston Northbound (left)			A 7.3			A 7.4
Preston Highway at Cooper Chapel Road	**C 29.6**	**C 29.2**	**C 29.5**	**D 43.6**	**D 36.6**	**D 36.6**
Commerce Crossings Eastbound	E 59.2	E 56.0	E 56.4	E 77.6	E 77.5	E 77.5
Cooper Chapel Road Westbound	D 43.1	D 41.2	D 42.3	E 60.3	E 60.3	E 60.5
Preston Highway Northbound	C 25.6	C 25.3	C 25.4	D 52.7	C 25.6	C 25.9
Preston Highway Southbound	C 25.5	C 25.4	C 25.5	C 29.1	C 29.4	C 29.2
Preston Highway at Interchange Drive	**A 7.4**	**C 25.8**	**C 28.7**	**B 19.3**	**D 39.5**	**D 40.4**
Interchange Drive Eastbound	E 72.6	E 74.8	E 74.1	E 75.0	E 74.5	E 75.4
Entrance Westbound	F 87.9	F 68.2	E 68.2	F 84.8	E 79.1	E 79.1
Preston Highway Northbound	A 4.1	B 17.5	C 21.2	A 8.8	C 30.1	C 30.6
Preston Highway Southbound	A 5.9	C 22.6	C 23.8	B 19.2	D 36.4	D 37.4

Key: Level of Service, Delay in seconds per vehicle

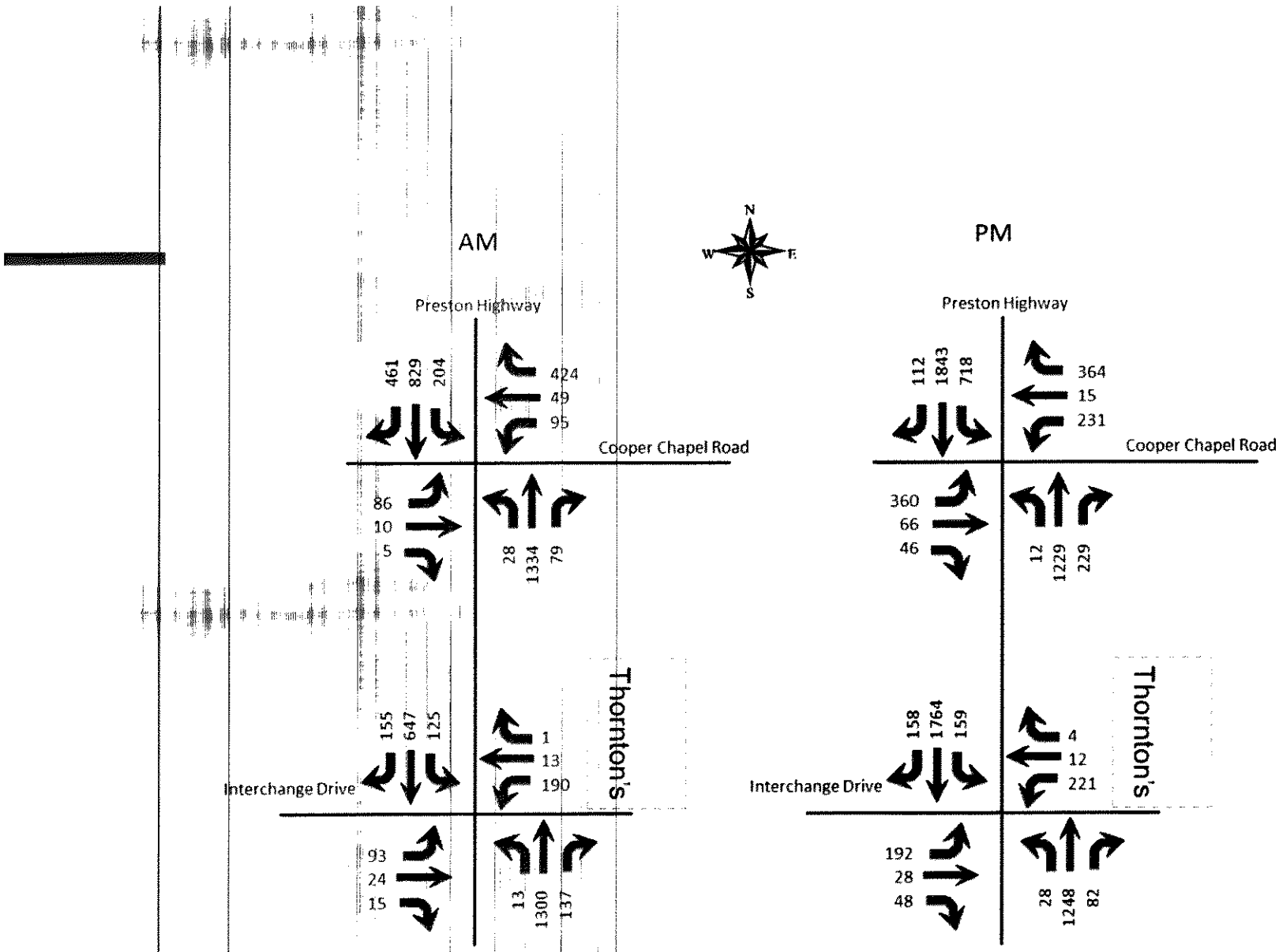


Figure 8. 2025 Build Peak Hour Volumes

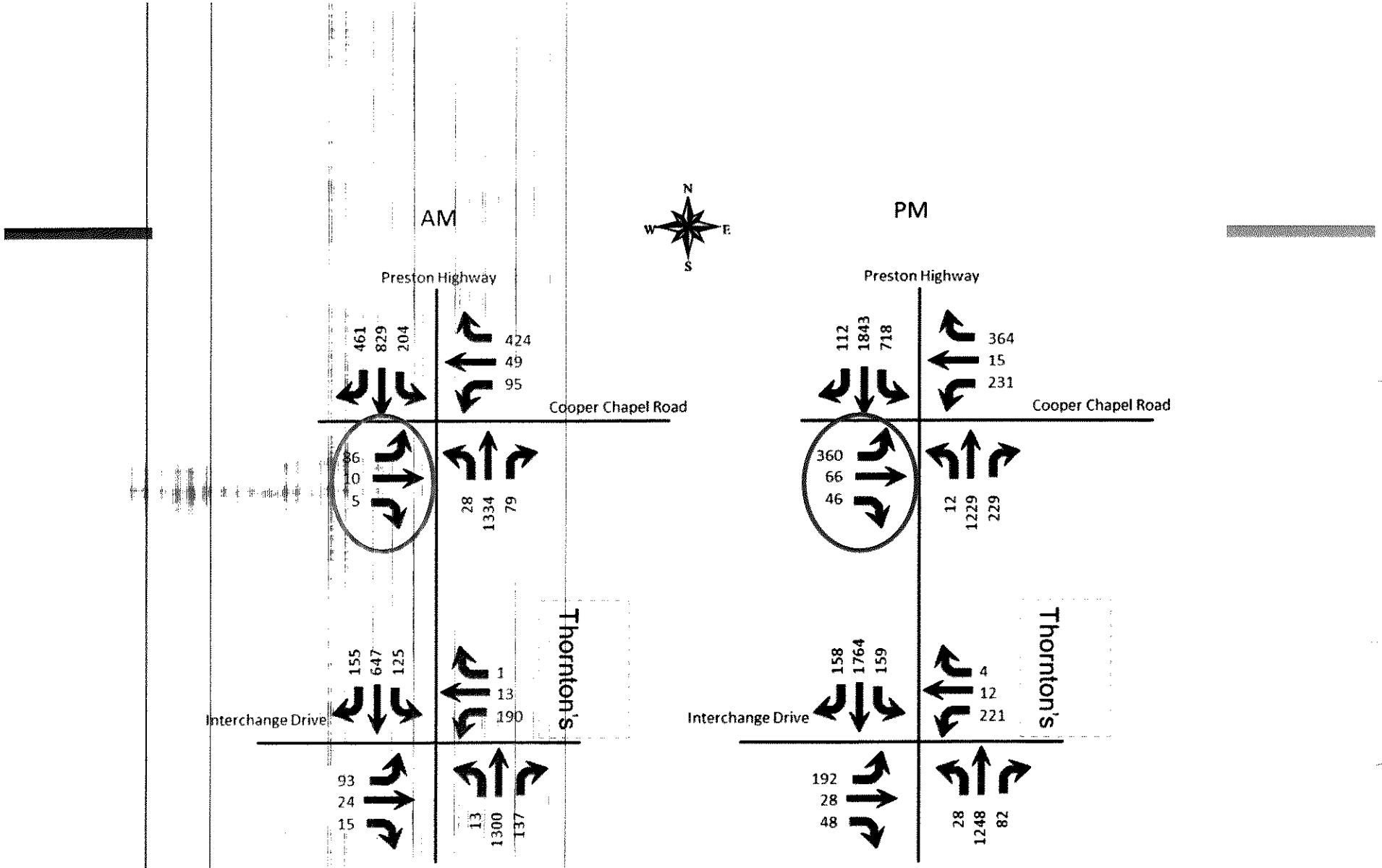
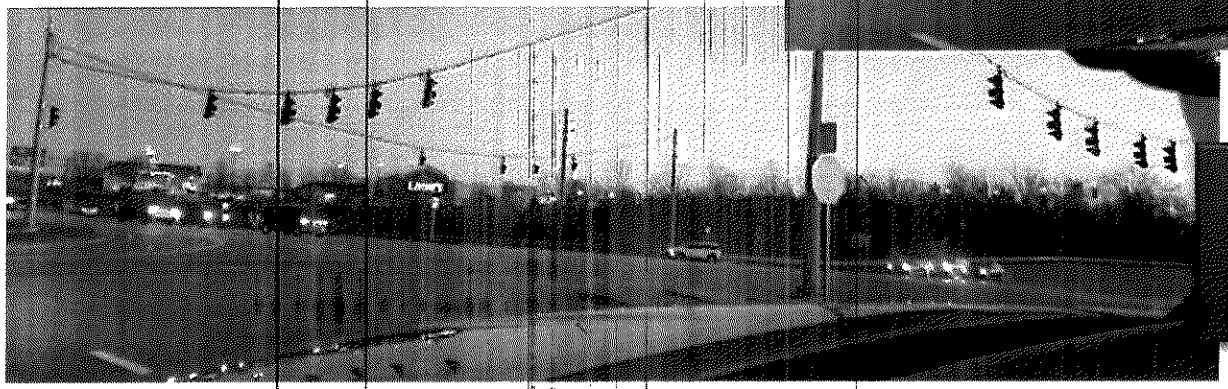


Figure 8. 2025 Build Peak Hour Volumes

Commerce Crossing Intersection AM

Commerce & Old Preston
1/11/2022-7:38am
As light turns green

Commerce & Old Preston
1/11/2022-7:38am
Green light



Commerce & Old Preston
1/11/2022-7:38am
Red light

Commerce Crossing Intersection PM

Commerce & Old Preston
1/11/2022-5:10 pm
Just turned green

Commerce & Old Preston
1/11/2022-5:11 pm
Just turned red

AM traffic to Commerce Crossings
Drive from Preston Highway

PM traffic to Preston Highway from Commerce Crossings Drive

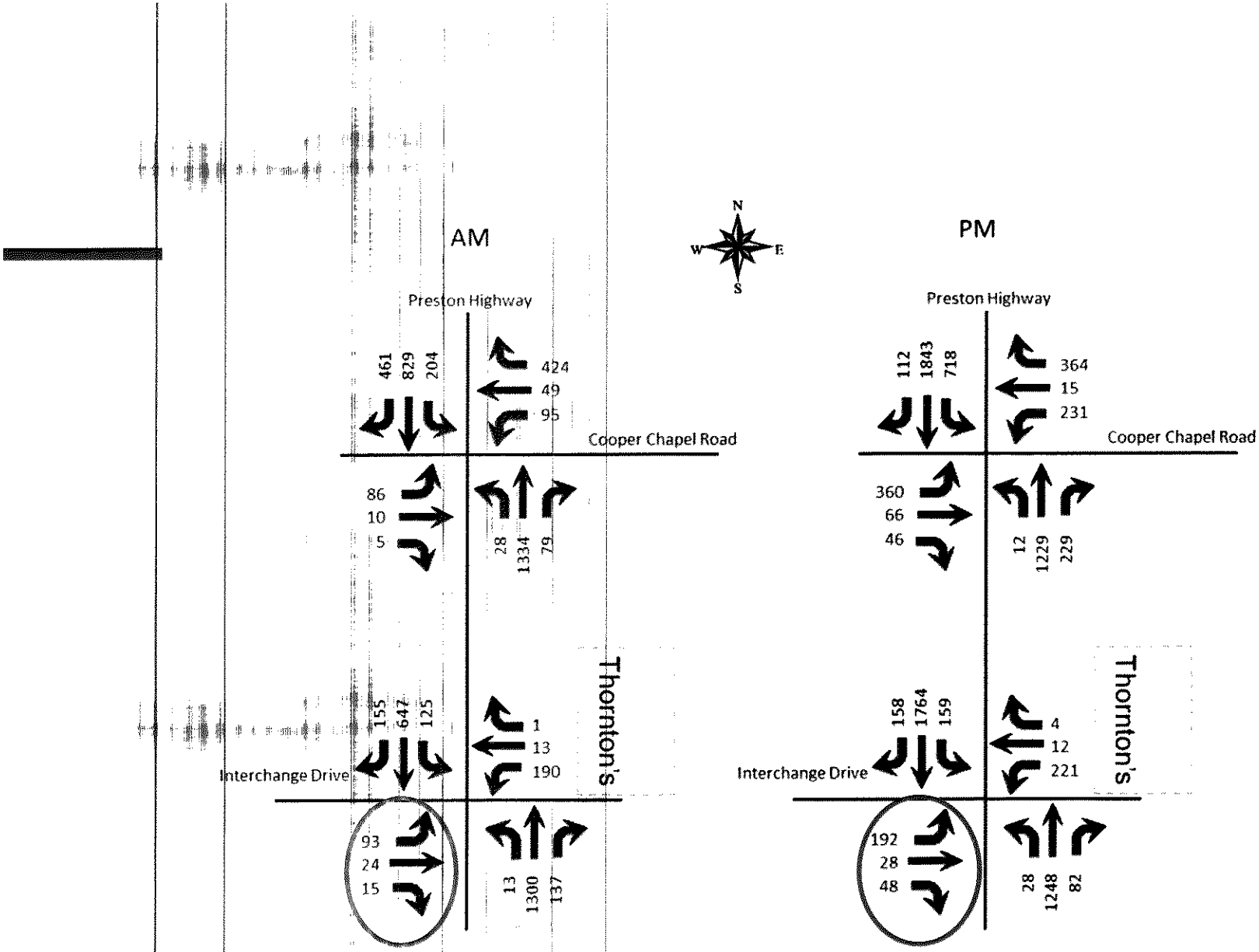


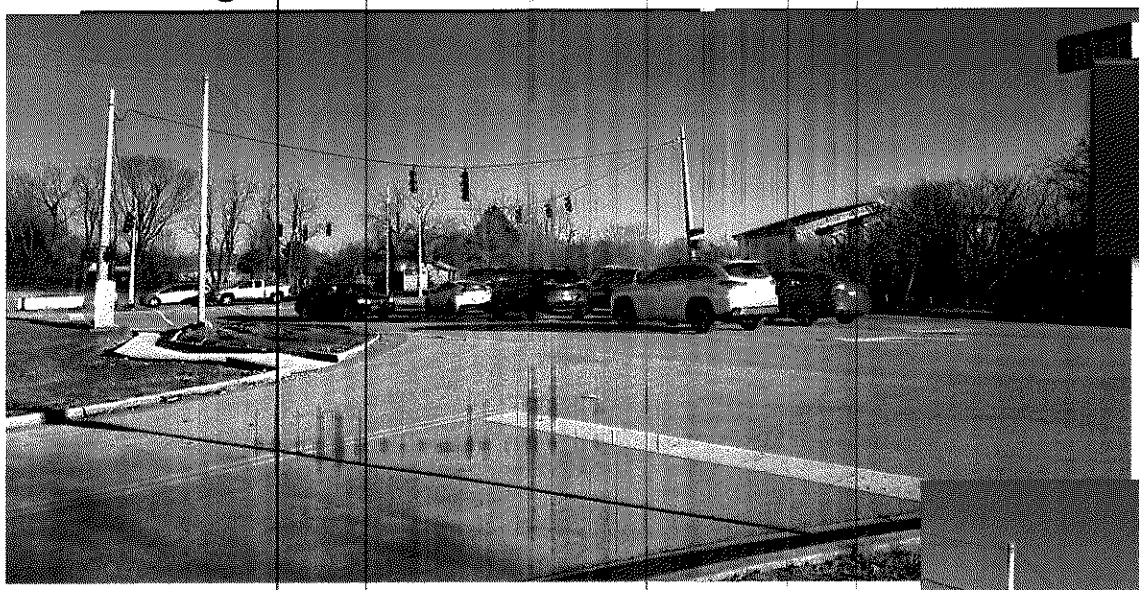
Figure 8. 2025 Build Peak Hour Volumes

Interchange Intersection AM

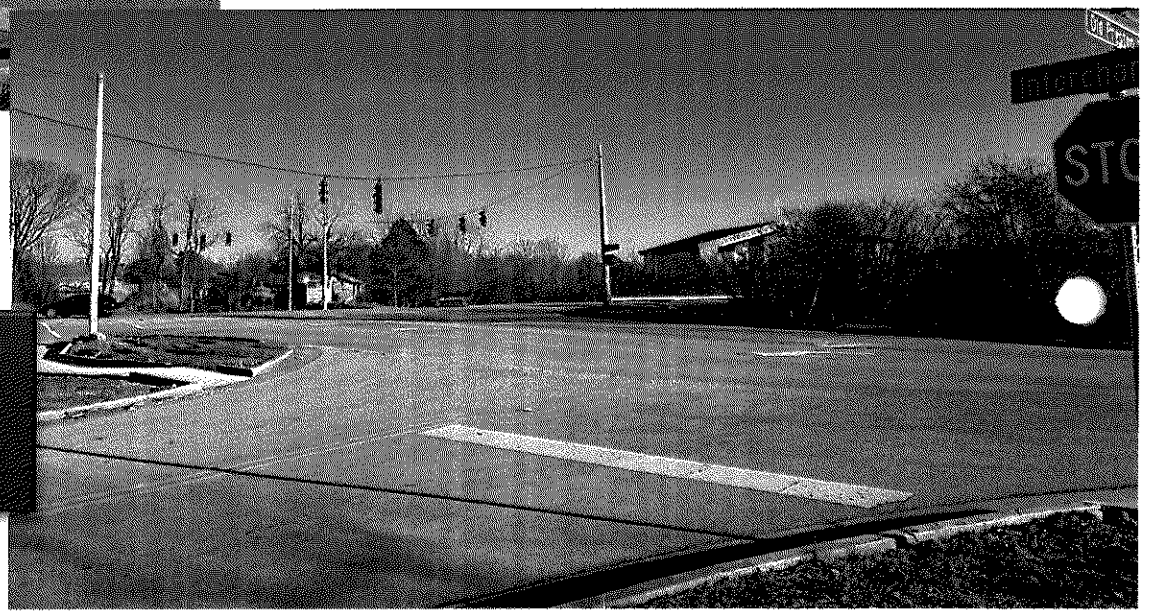
Interchange & Old Preston
1/11/2022-7:45 am
Green light

Interchange & Old Preston
1/11/2022-7:45am
Red light

Interchange Intersection PM



Interchange & Old Preston
1/11/2022- 4:39 pm
Red light



Interchange & Old Preston
1/11/2022- 4:40 pm
Green light

Louisville Metro Planning Commission Public Hearing – February 3, 2022

Louisville Metro Land Development & Transportation Committee – January 13, 2022,
Continued from December 9, 2021
Virtual Neighborhood Meeting – July 15, 2021

DOCKET NO. 21-ZONE-0104

ZONE CHANGE FROM R-4 TO R-7 TO ALLOW A 174-UNIT MULTI-FAMILY DEVELOPMENT ON PROPERTY LOCATED AT 10410 & 10414 OLD PRESTON HIGHWAY

HIGHGATES

Attorneys: Bardenwerper Talbott & Roberts, PLLC
Land Planners, Landscape Architects, & Engineers: Mindel Scott & Associates, Inc.

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2. Aerial photographs of the site and surrounding area
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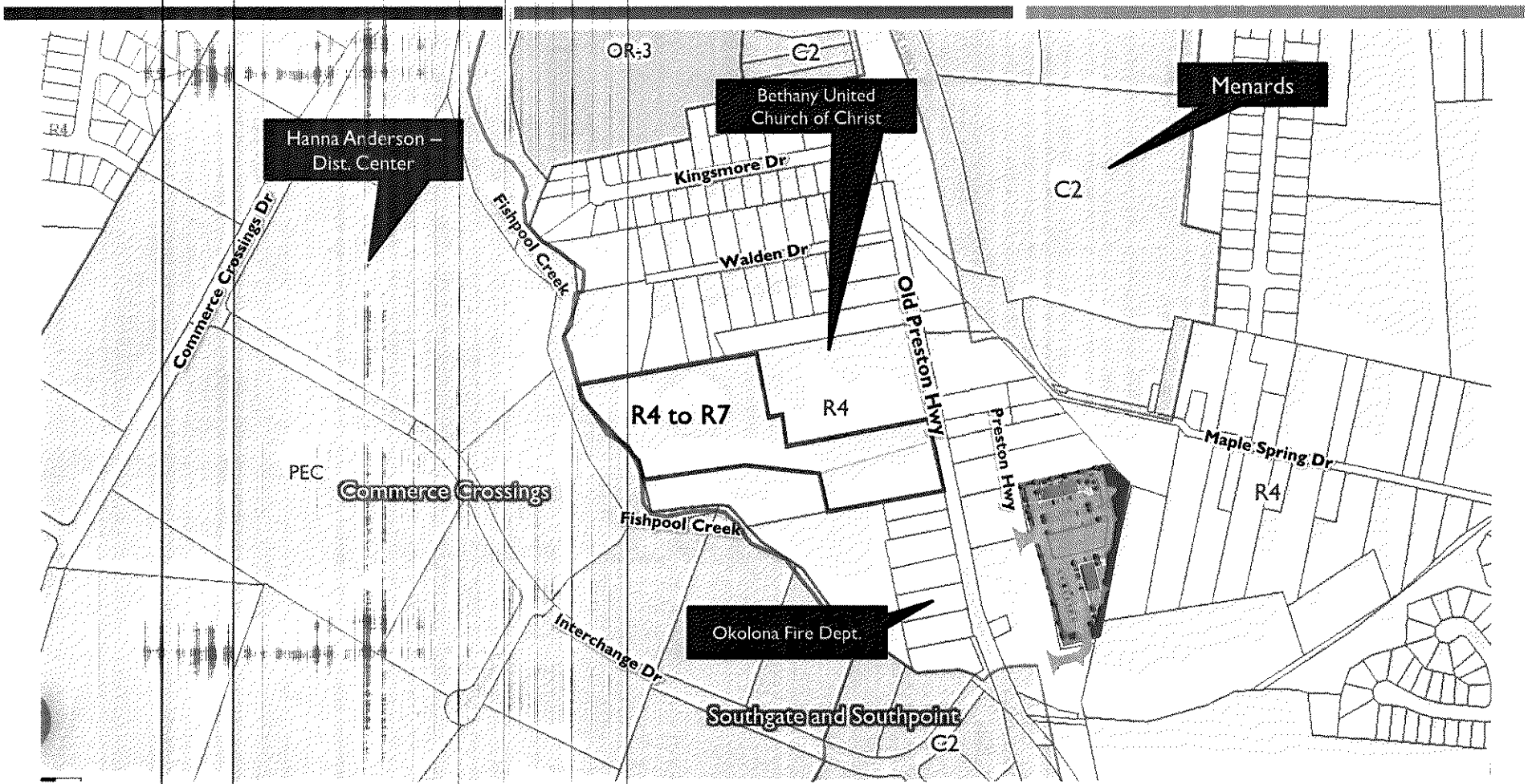
4. Development Plan and Geotechnical/Karst report
5. Building elevations
6. Traffic Study
7. Statement of Compliance filed with the original zone change application with all applicable Goals of the 2040 Plan
8. Proposed findings of fact pertaining to compliance with the 2040 Plan

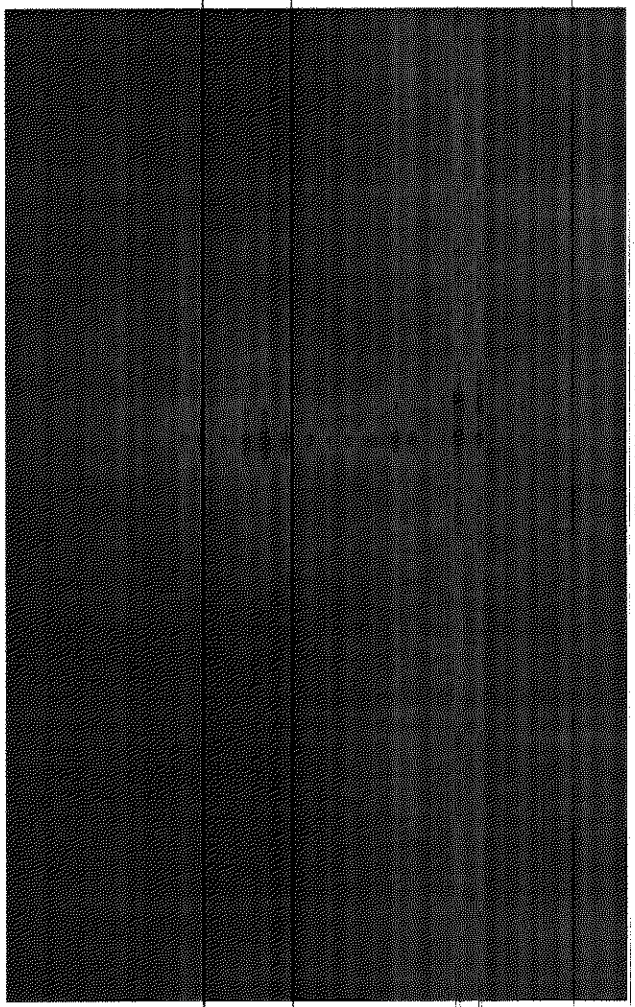
TAB 1
LOJIC ZONING MAP


OR-3
C2
Bethany United Church of Christ
Menards
Hanna Anderson – Dist. Center
Kingsmore Dr
Walden Dr
Commerce Crossings Dr
Fishpool Creek
Old Preston Hwy
C2
R4 to R7
R4
Preston Hwy
Maple Spring Dr
R4
PEC
Commerce Crossings
Fishpool Creek
Okolona Fire Dept.
Interchange Dr
Southgate and Southpoint
C2

TAB 2
AERIAL PHOTOGRAPH OF THE SITE AND SURROUNDING AREA

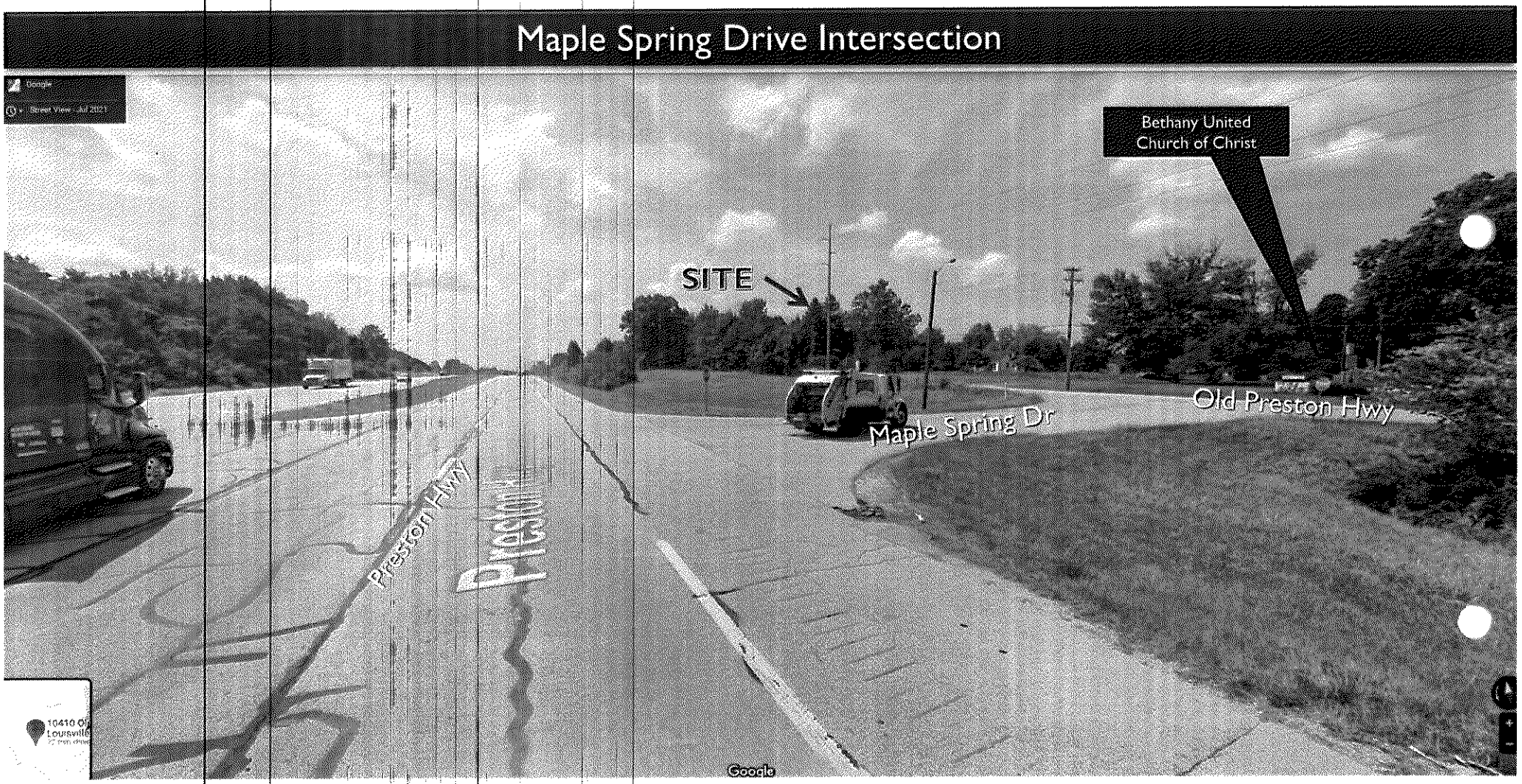
265
65
61
WOODSEND RD
TOLKIEN CT
RIVER TRAIL DR
COOPER CROSSINGS DR
COOPER CHURCH DR
OLDSHIRE RD
INDIAN FALLS DR
ARROWHEAD DR
HARROGATE RD
TIMBER
CHAPEL HILL RD
COOPER CHAPEL RD
NAMELESS WAY
MORRISON RD
RANGER RD
AGENA DR
TITAN DR
POLARIS DR
THOR AVE
SATURN DR
BLUELICK RD
HARNED AVE
CAVEN AVE
KURTZ AVE
WHISPERING BROOK DR
PIRATE LN
CAVEN CT
GUNN CT
NORMILE LN
MCCREA LN
COMMERCE CROSSINGS DR
KINGSMORE DR
WALDEN DR
OLD PRESTON HWY
MAPLE SPRING DR
CLOISTERWOOD DR
CHARLESWOOD RD
CHASEWOOD PL
RIPPLE CREEK DR
NIAGLI CT
CARLISLE LN
CARBINE LN
INTERCHANGE DR
APEX VIEW DR
MAPLE WAY
WALNUT WAY
LOCUST WAY
BEELER WAY
WAYCROSS AVE
CASEY PL
CASSIDY LN
BARRICK RD
HILLVIEW DR
HILLCROSS DR
SUSAN LN
HUTCHERSON DR

Kingsmore Dr
Walden Dr
Bethany United
Church of Christ
Commerce Crossings Dr
Interchange Dr
Commerce Crossings
Old Preston Hwy
Preston Hwy
Maple Spring Dr
Okolona Fire Dept.
Southgate and Southpoint

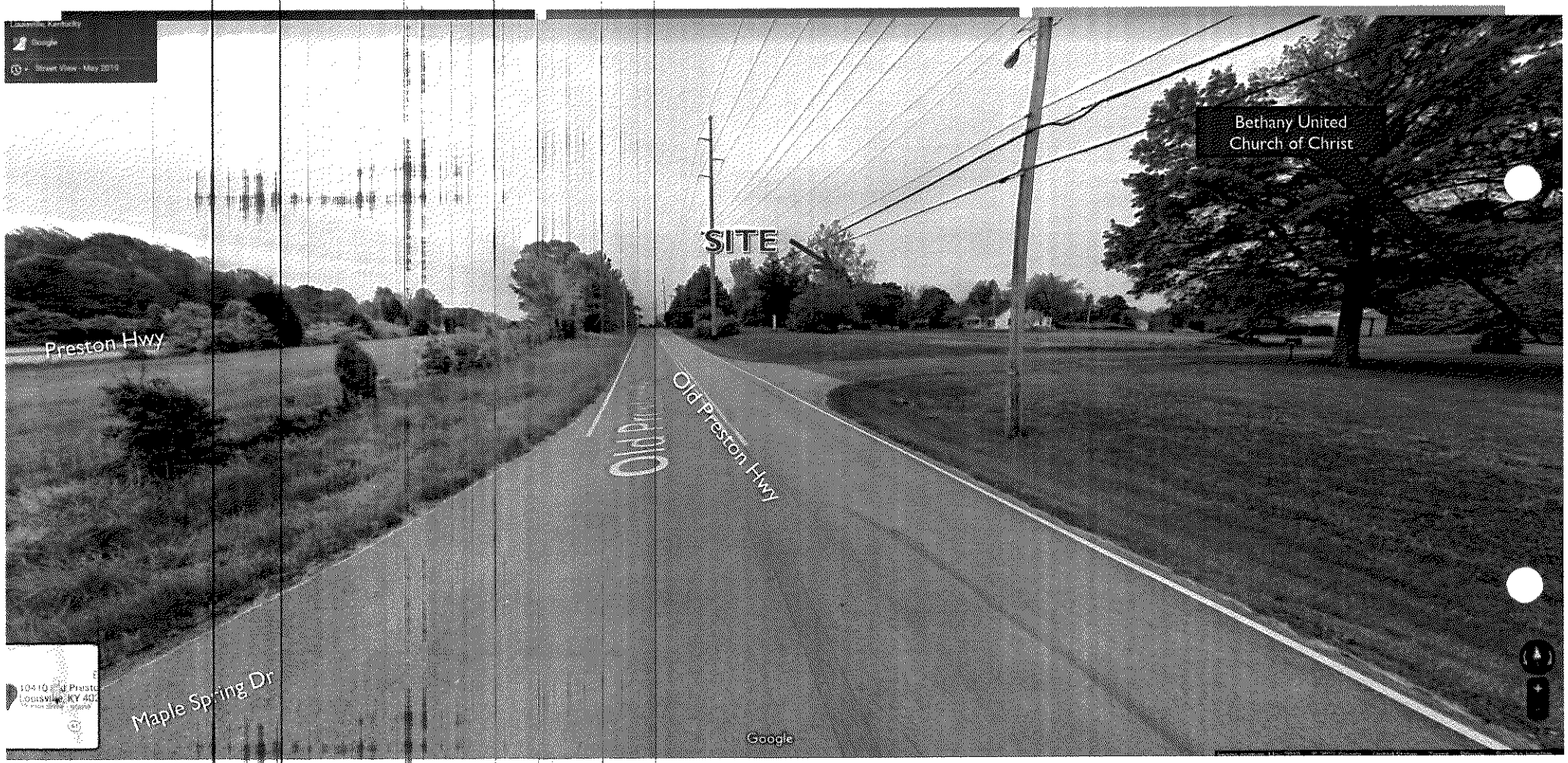


TAB 3
GROUND LEVEL PHOTOGRAPHS OF THE SITE AND SURROUNDING AREA

Maple Spring Drive Intersection

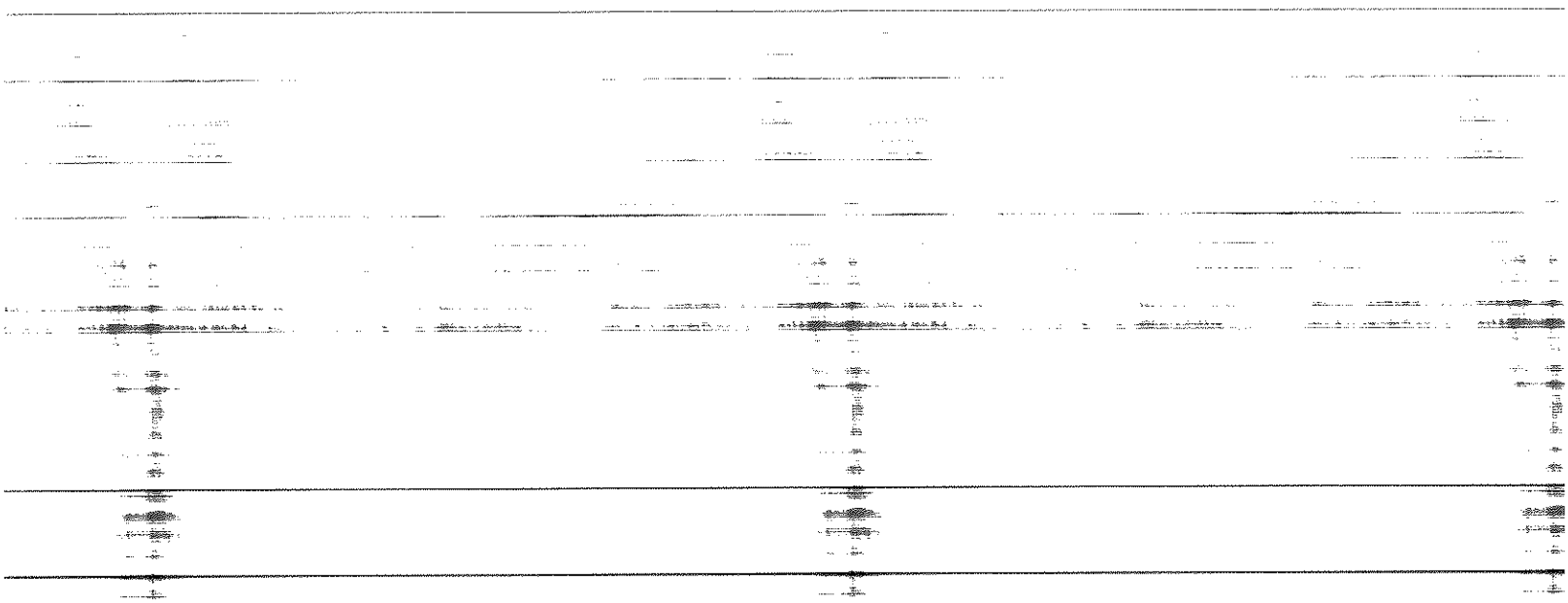


Looking south down Preston Hwy at Maple Spring Drive access to Old Preston Hwy.



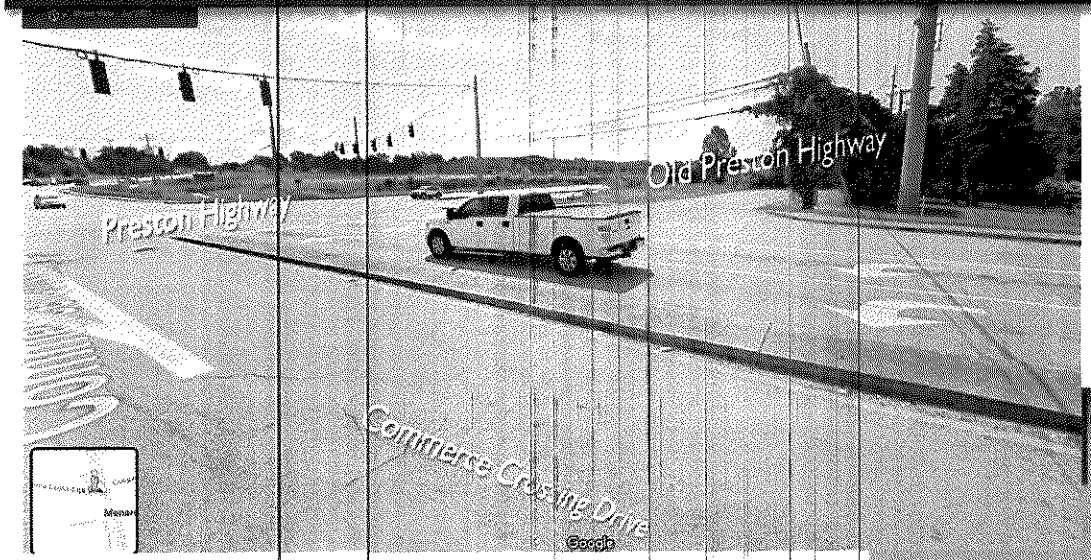
Looking south from Maple Spring Drive down Old Preston Hwy.

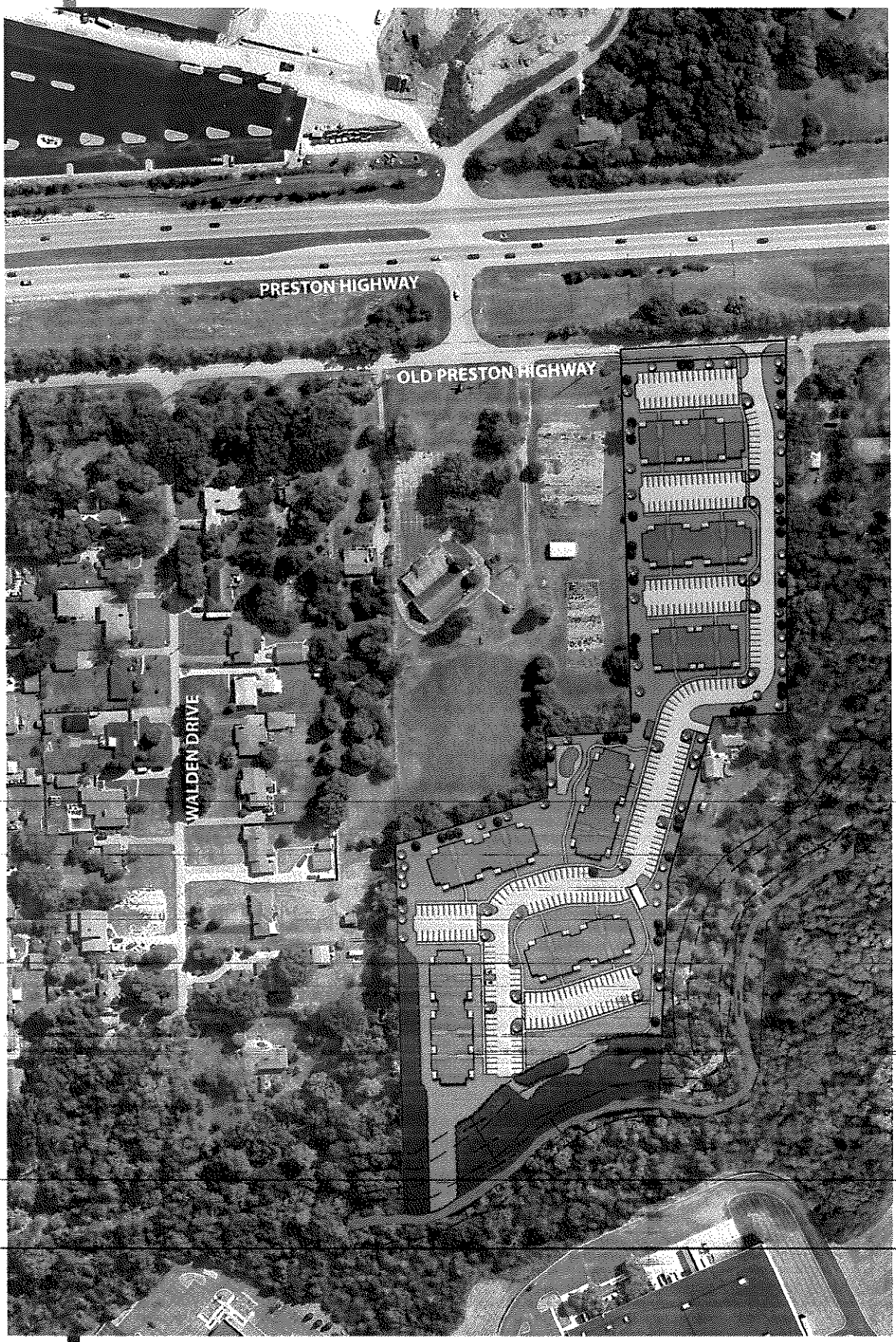
TAB 4
DEVELOPMENT PLAN AND GEOTECHNICAL / KARST REPORT



Adjacent properties south and north of site

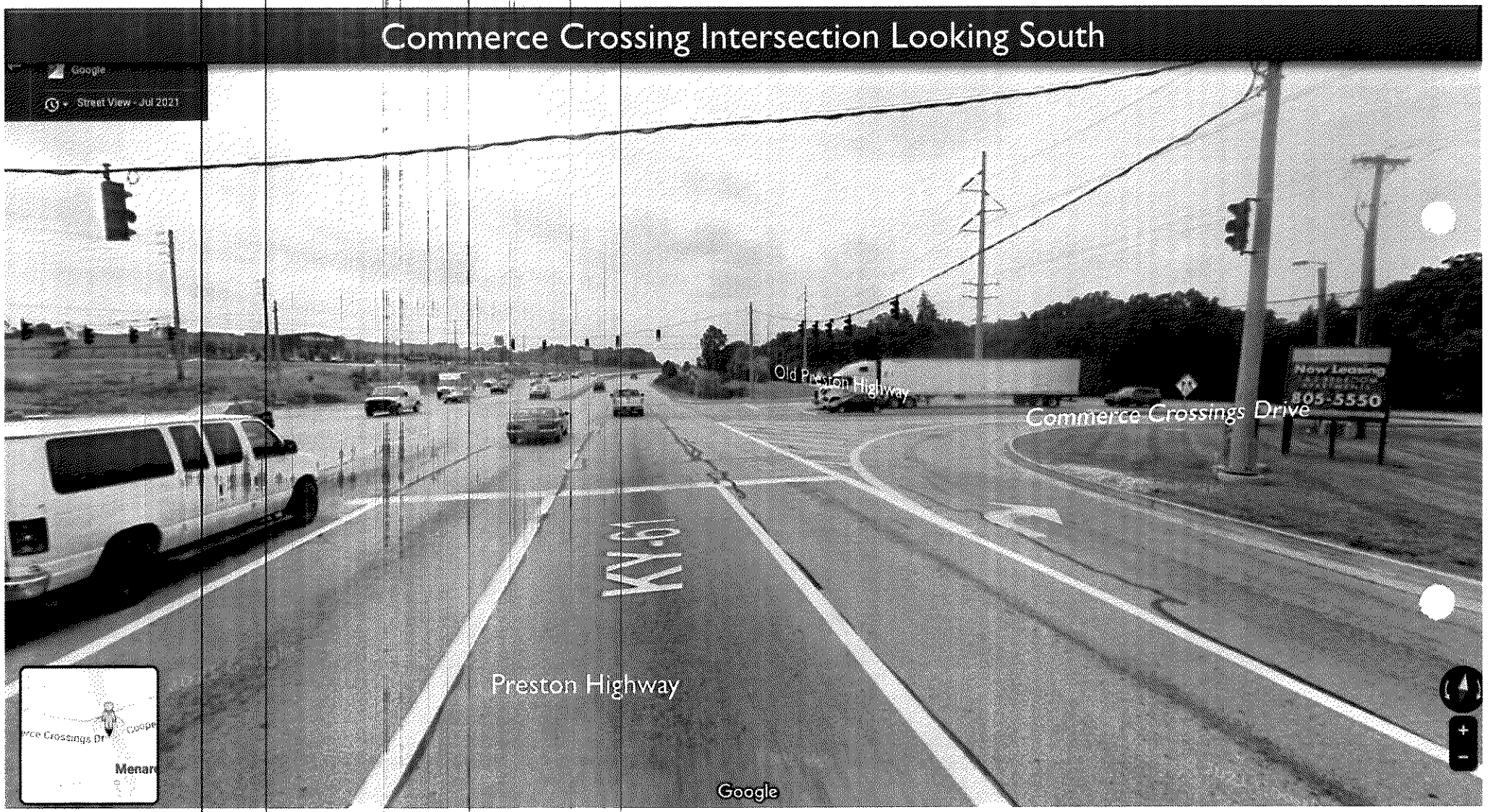
Commerce Crossing Intersection



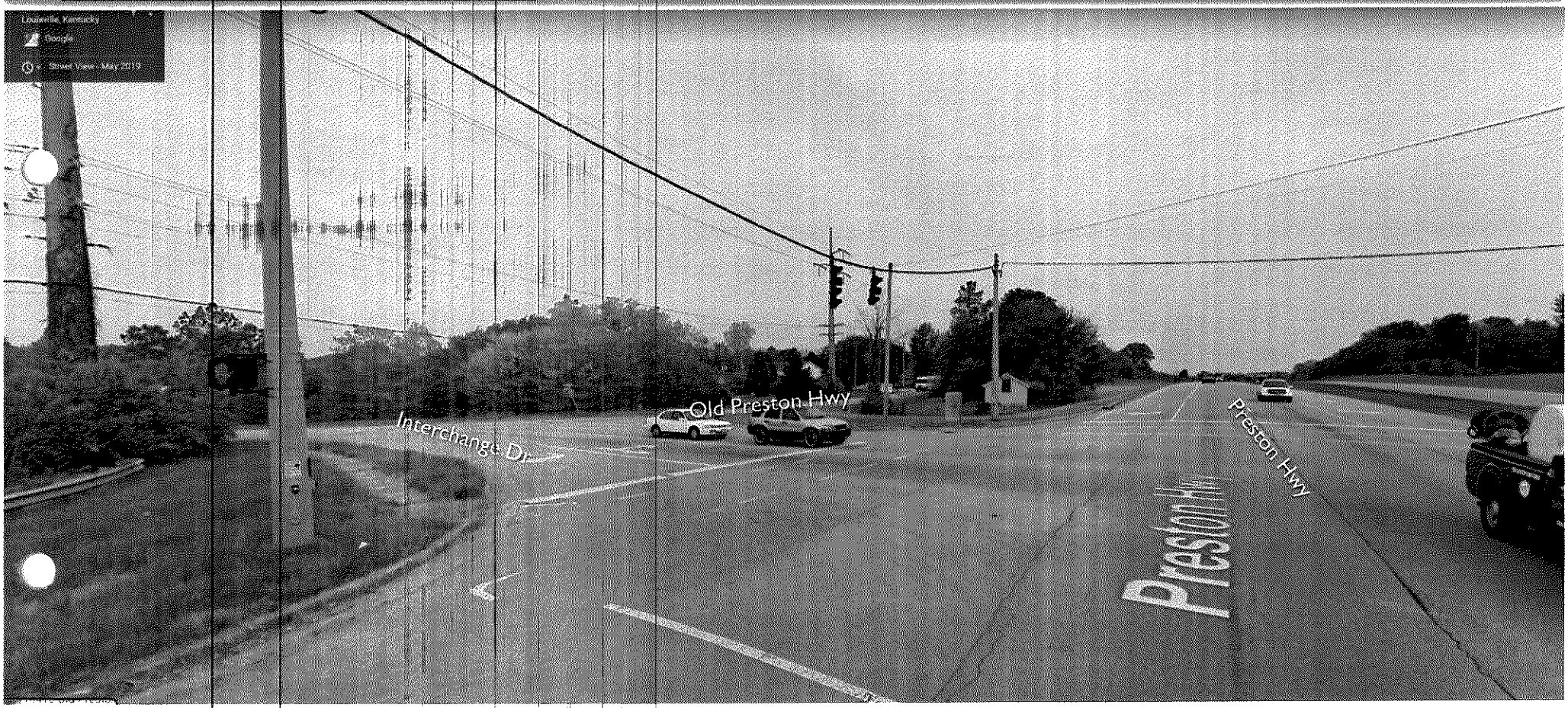

PRESTON HIGHWAY
OLD PRESTON HIGHWAY
WALDEN DRIVE

Looking north down Old Preston Hwy heading towards site. Okolona Fire Department to the left.

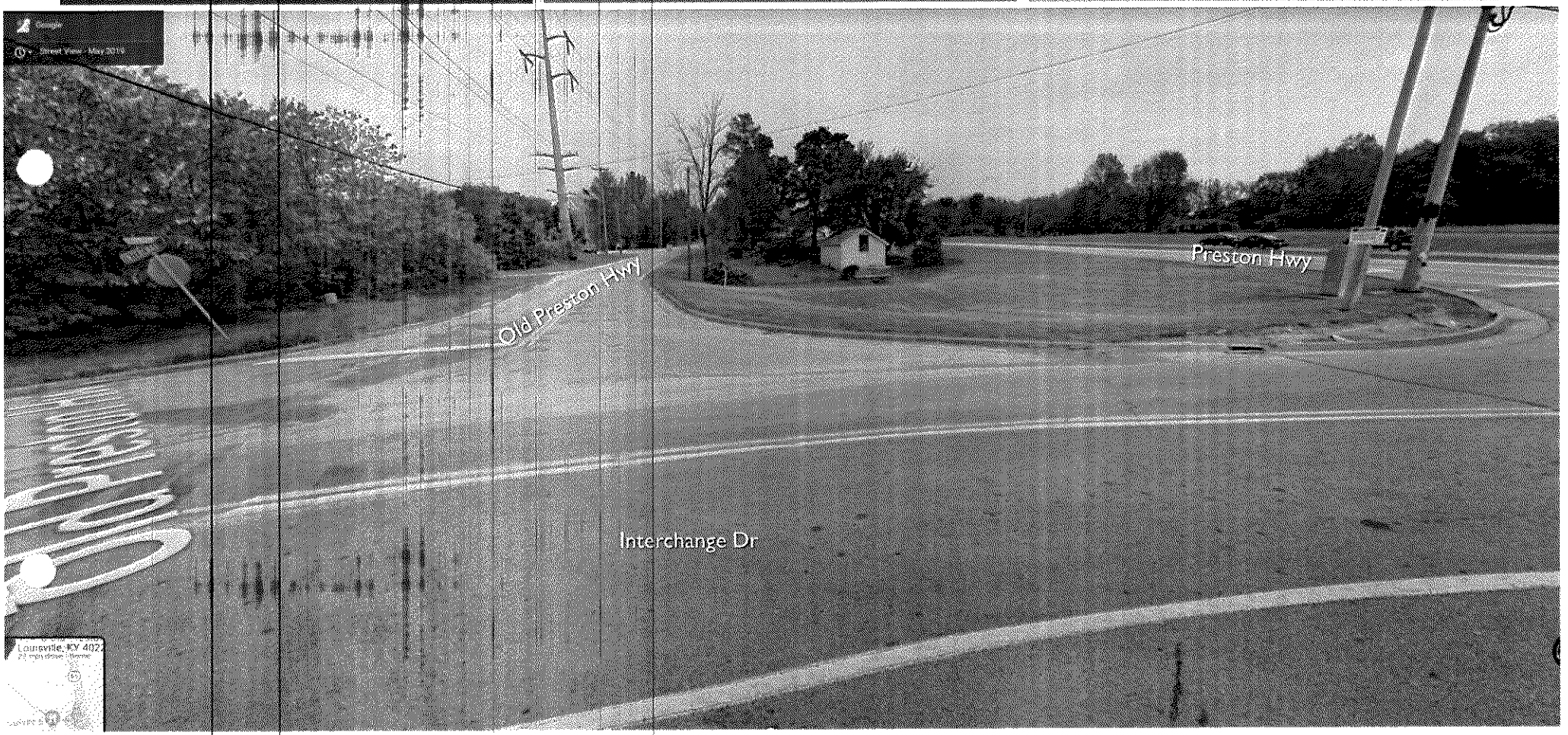
Commerce Crossing Intersection Looking South



Interchange Drive Intersection

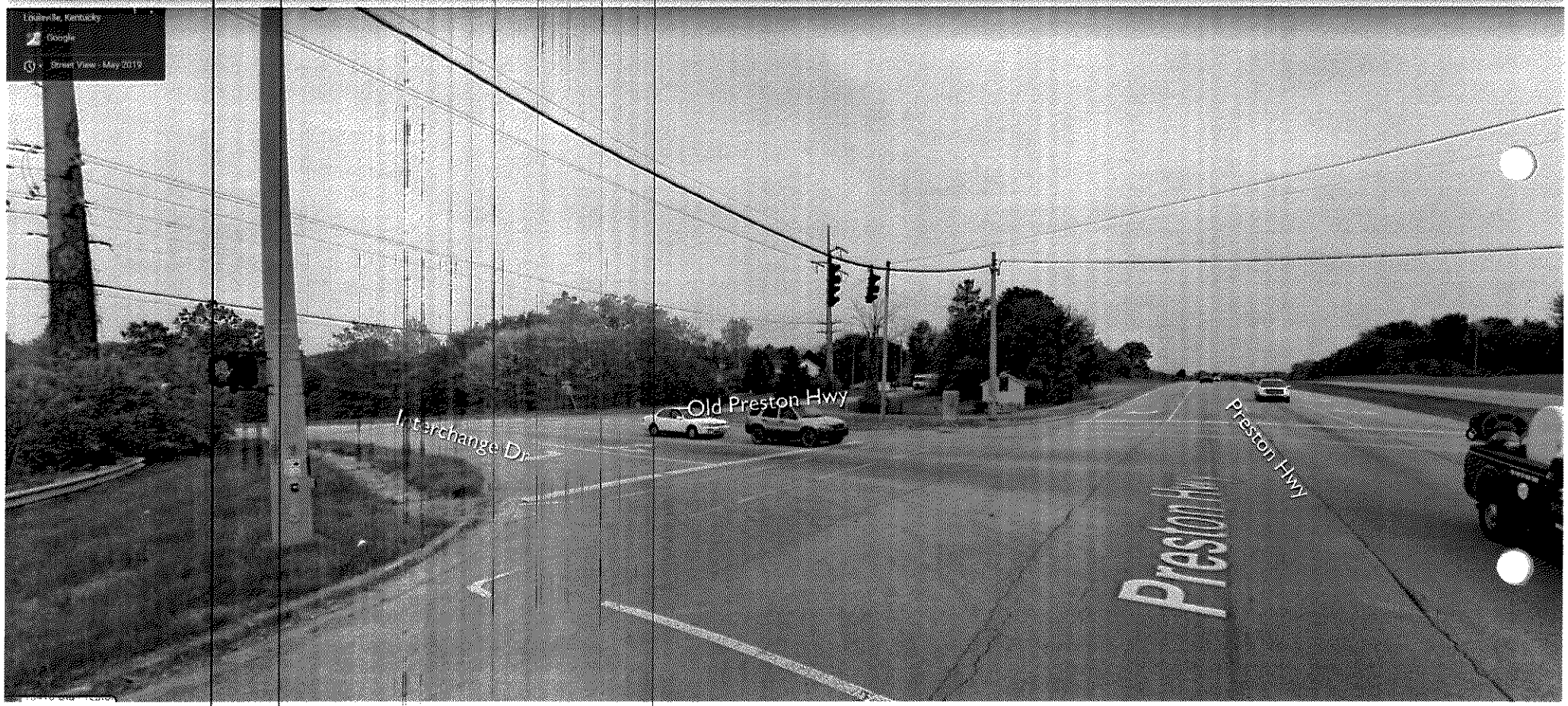


Looking north at entrance to Old Preston Hwy. from Preston Hwy and Interchange Drive.

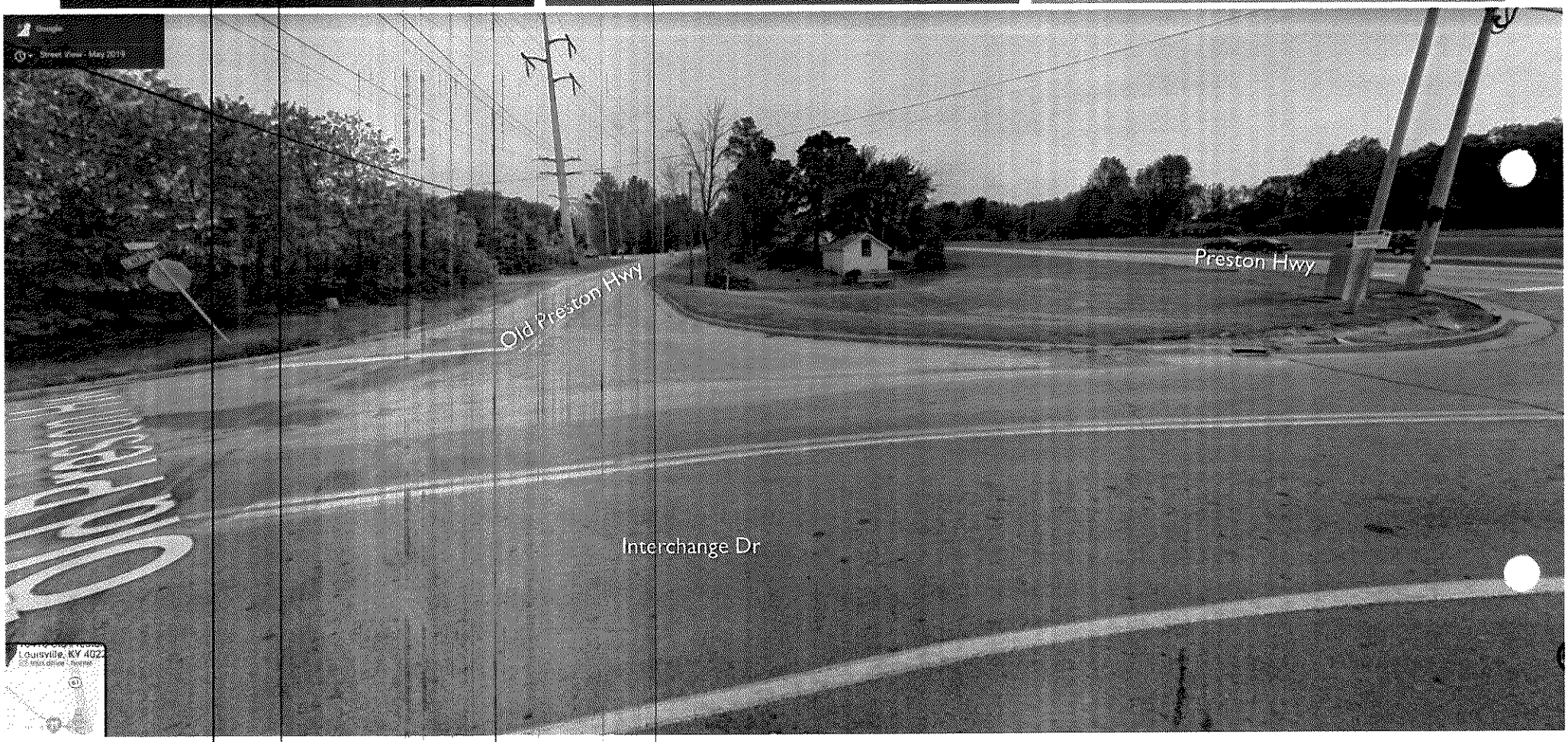


Looking north down Old Preston Hwy Interchange Drive.

Interchange Drive Intersection



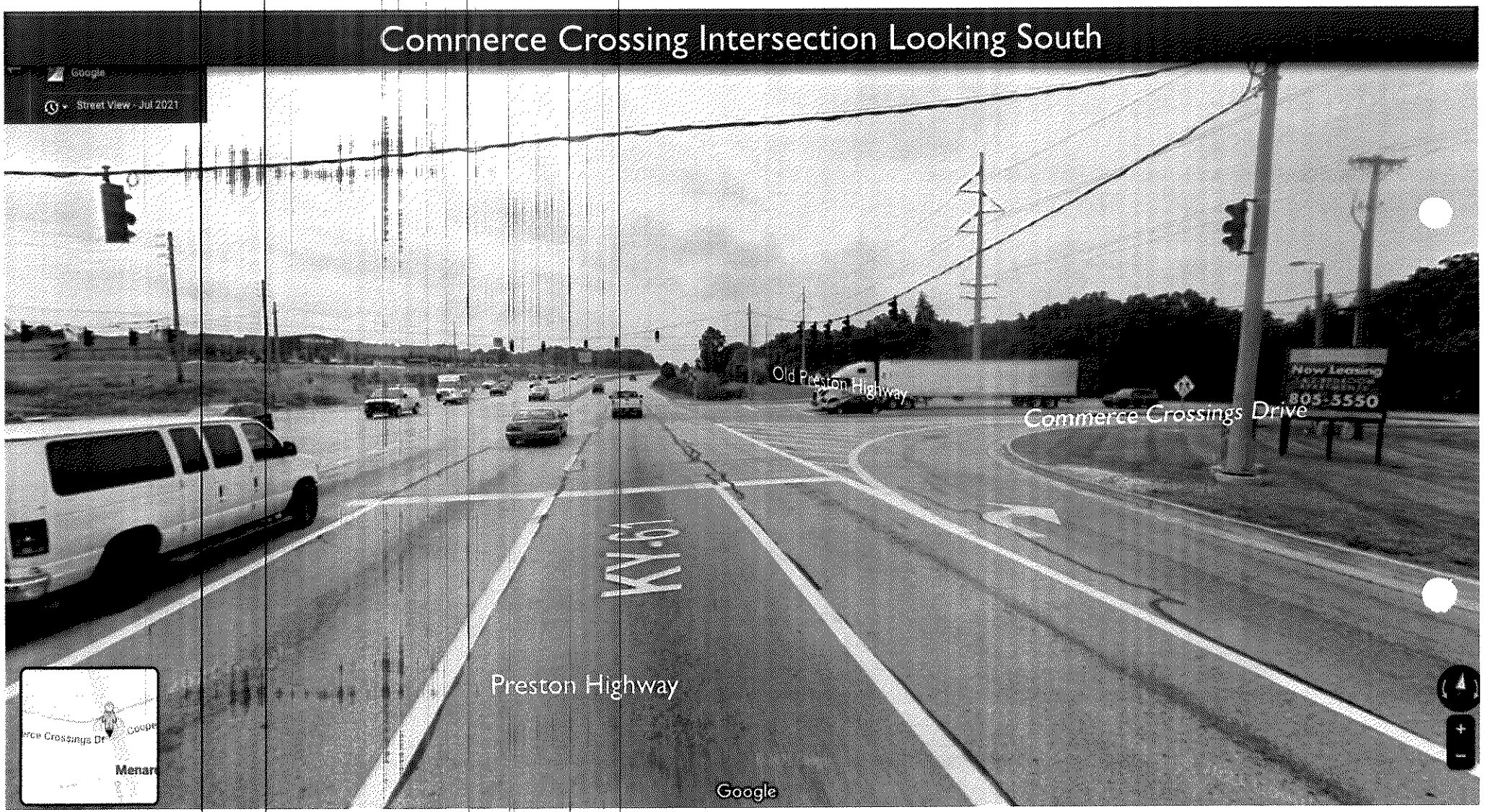
Looking north at entrance to Old Preston Hwy. from Preston Hwy and Interchange Drive.



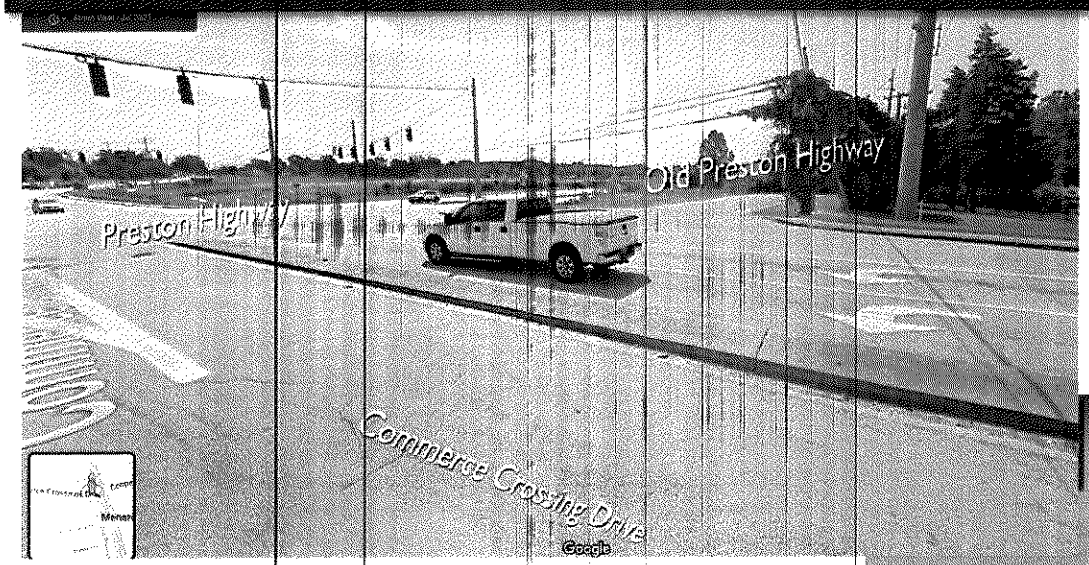
Looking north down Old Preston Hwy Interchange Drive.

Looking north down Old Preston Hwy heading towards site. Okolona Fire Department to the left.

Commerce Crossing Intersection Looking South

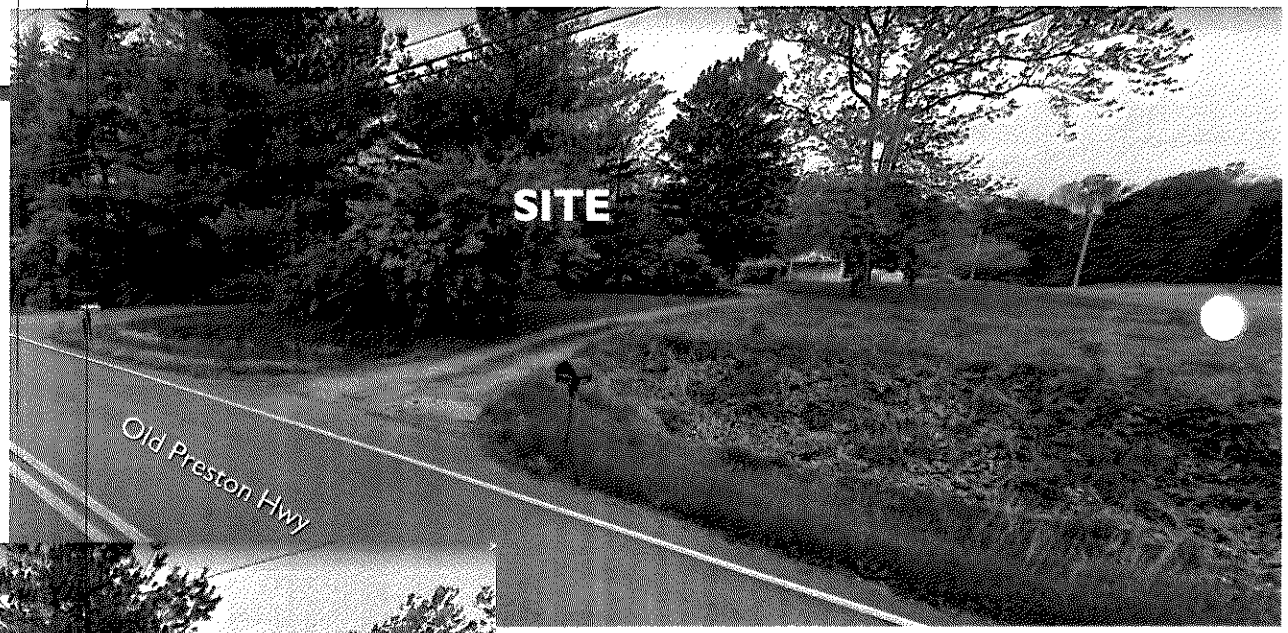


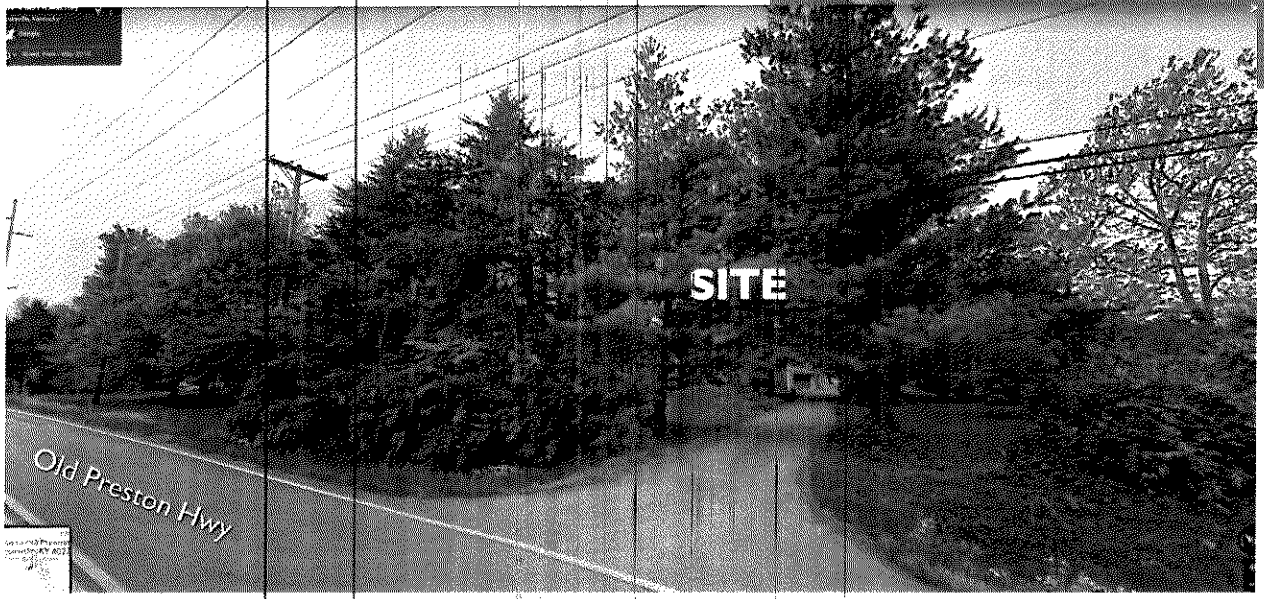
Commerce Crossing Intersection



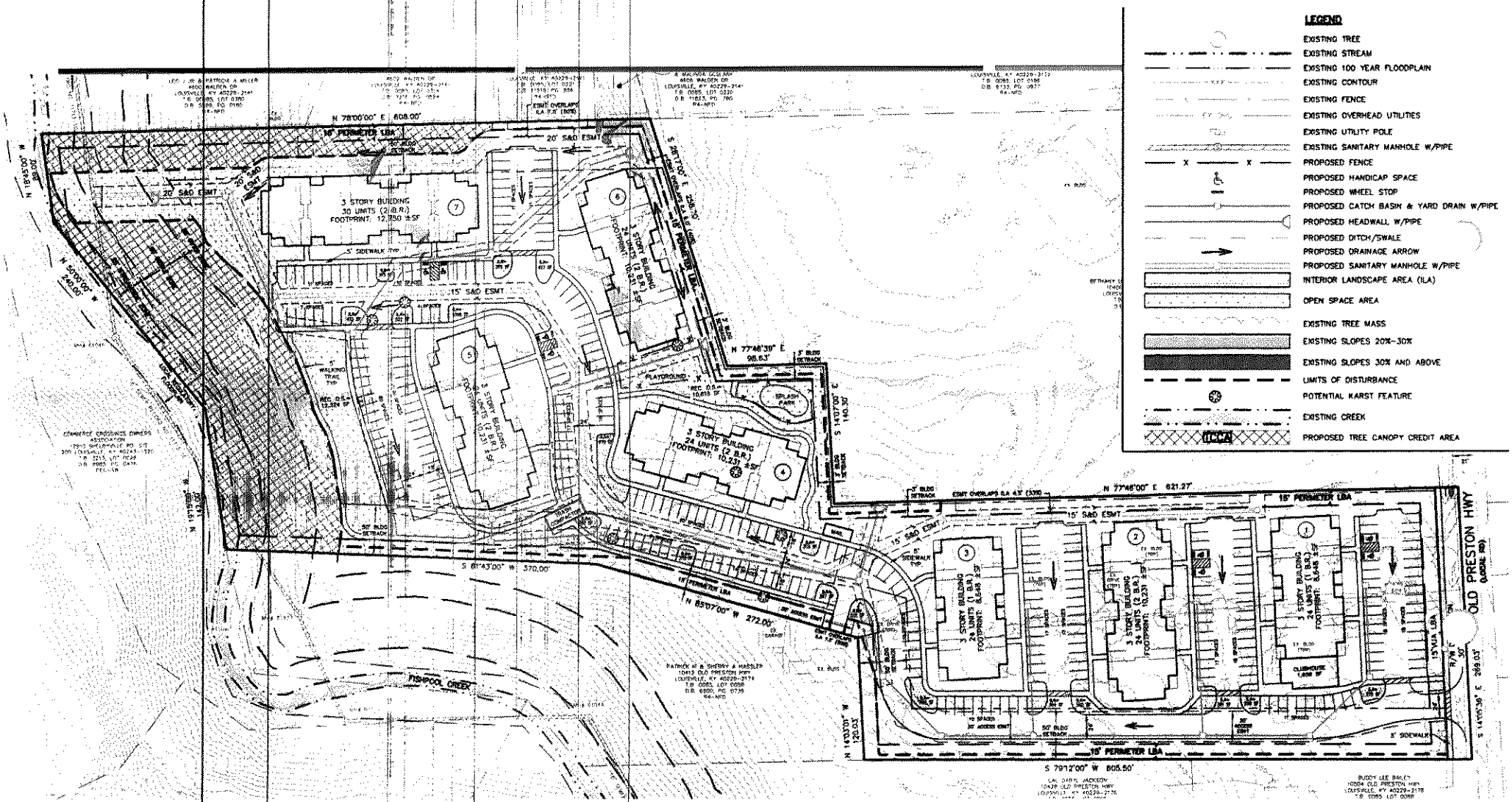
Adjacent properties south and north of site

View of existing houses on site to be removed.





TAB 4
DEVELOPMENT PLAN AND GEOTECHNICAL / KARST REPORT


LEGEND
EXISTING TREE
EXISTING STREAM
EXISTING 100 YEAR FLOODPLAIN
EXISTING CONTOUR
EXISTING FENCE
EXISTING OVERHEAD UTILITIES
EXISTING UTILITY POLE
EXISTING SANITARY MANHOLE W/PIPE
PROPOSED FENCE
PROPOSED HANDICAP SPACE
PROPOSED WHEEL STOP
PROPOSED CATCH BASIN & YARD DRAIN W/PIPE
PROPOSED HEADWALL W/PIPE
PROPOSED DITCH/SWALE
PROPOSED DRAINAGE ARROW
PROPOSED SANITARY MANHOLE W/PIPE
INTERIOR LANDSCAPE AREA (ILA)
OPEN SPACE AREA
EXISTING TREE MASS
EXISTING SLOPES 20%-30%
EXISTING SLOPES 30% AND ABOVE
LIMITS OF DISTURBANCE
POTENTIAL KARST FEATURE
EXISTING CREEK
TCCA
PROPOSED TREE CANOPY CREDIT AREA
N 78°00'00" E 608.00'
15' PERIMETER LBA
20' S&D ESMT
3 STORY BUILDING
30 UNITS (2 @ R.)
FOOTPRINT: 12,750 ±SF
5' SIDEWALK TYP.
30' BLDG SETBACK
15' S&D ESMT
3 STORY BUILDING
24 UNITS (2 B.R.)
FOOTPRINT: 10,231 ±SF
N 77°46'39" E
98.63'
5' BLDG SETBACK
PLAYGROUND
REC. 0.5 ac.
10,885 SF
SPLASH PARK
S 14°03'00" E
140.30'
N 77°46'00" E 621.27'
ESMT OVERLAPS ILA 4.5' (TYP.)
3 STORY BUILDING
24 UNITS (1 B.R.)
FOOTPRINT: 8,648 ±SF
CLUBHOUSE
1,800 SF
POOL
17' BLDG SETBACK
80' BLDG SETBACK
S 81°43'00" W 370.00'
N 85°07'00" W 272.00'
FISHPOOL CREEK
N 14°03'00" W
120.03'
S 79°12'00" W 805.50'
OLD PRESTON HWY
(LOCAL RD)
R/W 60'
S 14°05'36" E 366.03'
5' SIDEWALK
15' VUA LBA
PATRICK H & SHERRY A HASSLER
10412 OLD PRESTON HWY
LOUISVILLE, KY 40229-3174
T.B. 0065, LOT 0058
D.B. 6800, PG. 0735
BUDDY LEE BAILEY
10504 OLD PRESTON HWY
LOUISVILLE, KY 40229-2178
T.B. 0065 LOT 0088


PRESTON HIGHWAY
OLD PRESTON HIGHWAY
WALDEN DRIVE

Karst and Geotechnical Engineering Study

GEOTECHNICAL ENGINEERING STUDY

PROPOSED APARTMENTS
10410 OLD PRESTON HIGHWAY
LOUISVILLE, KENTUCKY

ASHER PROJECT NO. 21-077

Prepared For:

Mr. Brent Hackworth
brent@highgates.com

Prepared By:

Asher Engineering, Inc.
1021 South Floyd Street
Louisville, Kentucky 40203

July 13, 2021

January 15, 2022 Karst Update

Asher Engineering, Inc.
Environmental & Engineering Consulting

January 15, 2022

Mr. Brent Hackworth
brent@highgates.com

Re: Proposed Old Preston Highway Apartments
10410 and 10414 Old Preston Hwy

On January 15, 2022 Asher Engineering visited the referenced site to interview the residents and inspect the backyards of seven neighboring properties for possible karst activity and sinkholes. The properties visited were: 4600, 4602, 4604, and 4606 Walden Dr., and 10310, 10400, 10412 Old Preston Highway. We spoke with residents at 4600, 4604, and 4606 Walden Drive. No one was available for interview at the other properties at the time of our site visit.

Inspection of the depressed areas at the neighboring properties confirmed these areas are indeed sinkholes. We noted that the sinkholes at the backyards at 4602, 4604, and 4606 Walden Drive, and the sinkholes at 10310 and 10400 Old Preston Highway extend into the subject site. We also noted a sinkhole on the subject site just south of 4602 Walden Drive.

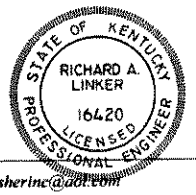
Sinkholes are formed by the dissolution of the underlying limestone bedrock. Depressions in the ground surface can develop when bedrock surfaces dissolve over years of water migrating thru the area. The dissolved rock may leave a void space, or the void may be replaced by soft redeposited soil. Over time, the weight of the soil subsides over the void or soft soil, leaving a visible depression in the ground surface. A review of geographic maps revealed that the site is underlain by the Louisville Limestone formation. This formation is susceptible to karst activity and sinkhole formation.

The subject property is suitable for development with the apartment buildings and pavement areas, provided the site is inspected by a geotechnical engineer during the sitework, bldg, and road construction. This inspection would include a visual observation of the soil subgrade after the site has been stripped of grass and topsoil. A proofroll with a loaded dump truck would be conducted to identify any soft areas in the soil subgrade. Test pits with a backhoe or excavator may also be conducted to inspect any soft subgrade areas identified by the visual inspection and proofroll. If depressed areas and/or sinkholes are identified at the time of the construction inspection, recommendations for stabilizing the sinkholes would be provided on site. While there is some variation in the methods to stabilize sinkholes, the repair would generally be as follows: The sinkhole area would be cleaned of all soft soil down to bedrock. The excavation would be draped with a nonwoven geotextile fabric in the bottom and sides, and the area backfilled with crushed limestone. The geotextile fabric would then be placed over the crushed limestone, and the area backfilled with compacted soil up to finish grade. Any sinkholes that extend over property lines must be repaired on both properties to insure complete stabilization of the sinkhole area.

The Highgates Group has retained Asher Engineering to provide Construction Testing and Inspection during the sitework and building construction for the project. In addition to our normal inspections, we will include monitoring of the adjacent properties to confirm that the construction activities are not impacting the neighboring sites.

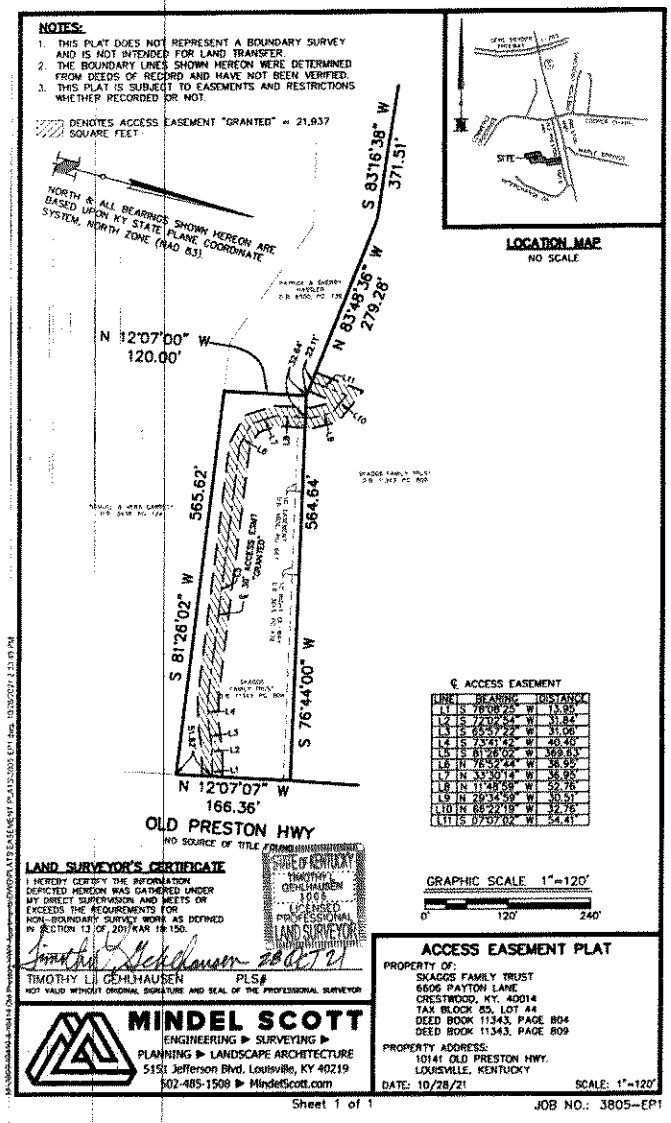
Sincerely,

Richard A. Linker, P.E.



1021 S. Floyd Street • Louisville, Kentucky 40203 • Office: (502) 589-0073 asherinc@aol.com

Access provided to the Hassler property



Okolona Fire Dept approving the access provided to the Hassler property

OKOLONA FIRE PROTECTION DISTRICT
Mark S. Little, Fire Chief
8501 Preston Highway
Louisville, Kentucky 40219
Phone (502) 964-5111 Fax (502) 966-8388
www.okolonafire.org

To: Allison Hicks -Mindel Scott

From: Major Frankie Nalley

Date: 1/21/2022

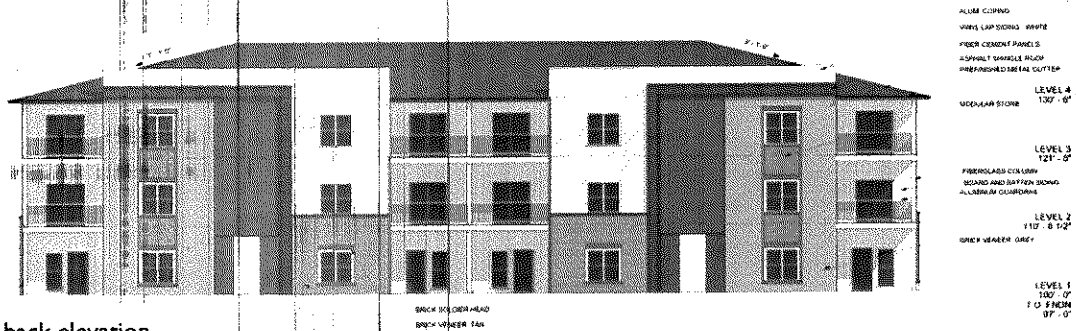
RE: 10410 and 10414 Old Preston Hwy

After meeting at the site today and seeing the proposed site plan for the apartments going in at 10410 and 10414 Old Preston Hwy. The Okolona Fire Department is good with the plans showing the access for 10412 Old Preston Hwy property connecting into the apartment complex. No separate access is needed for the address of 10412 Preston Hwy.

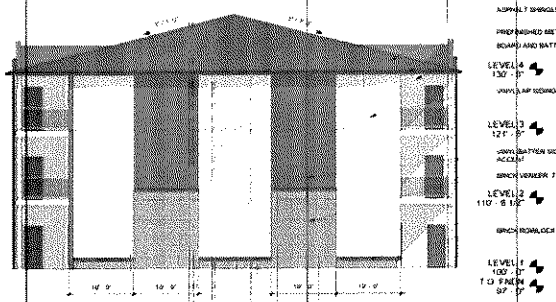
Fire Marshal
Major Frankie Nalley

TAB 5
BUILDING ELEVATIONS

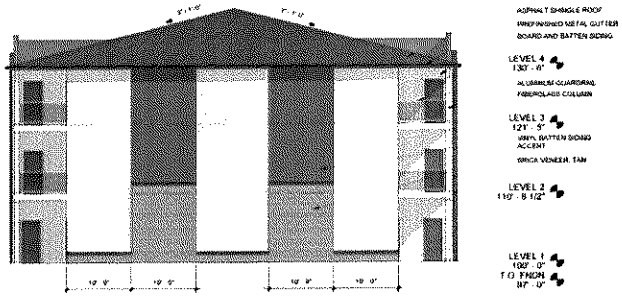
1 bdrm - front elevation



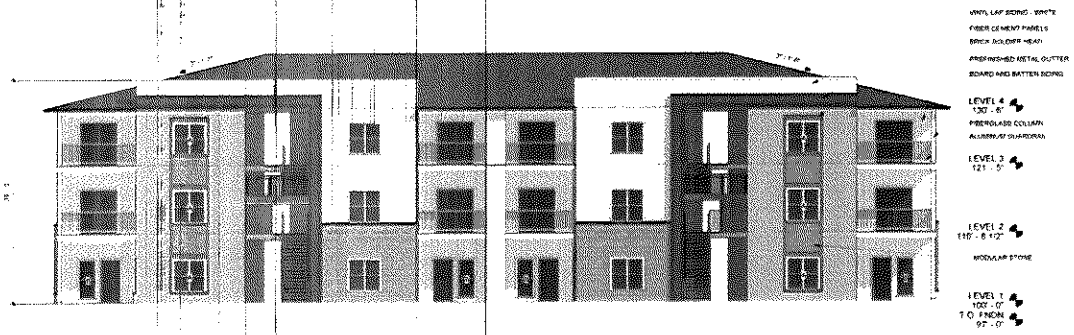
1 bdrm - back elevation



1 bdrm – side elevation

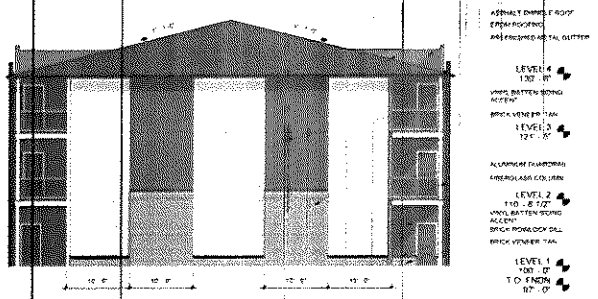


1 bdrm – side elevation

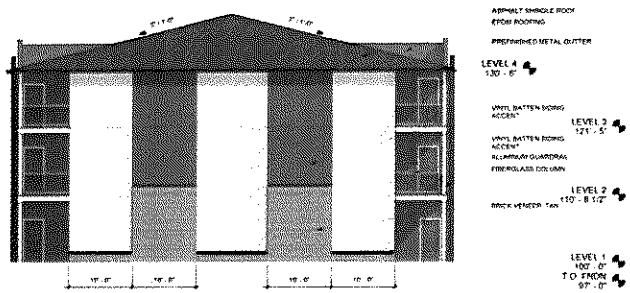


Type B - south elevation

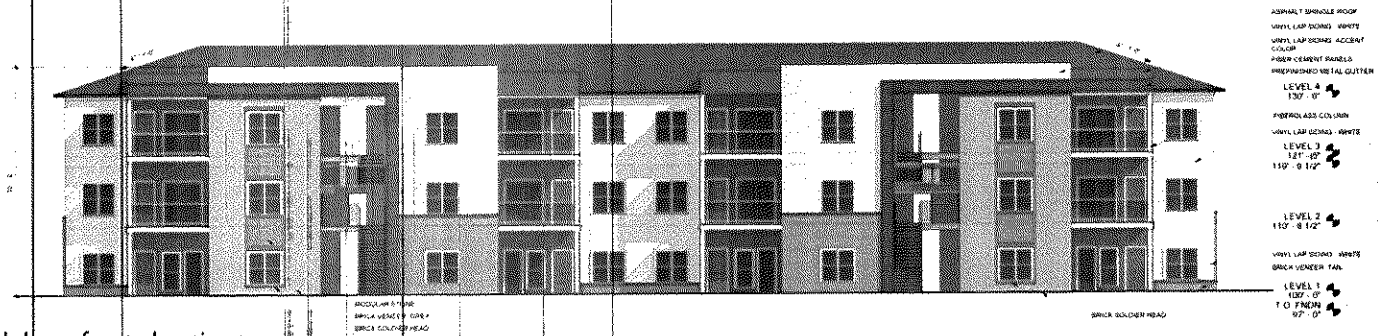
Type B - north elevation



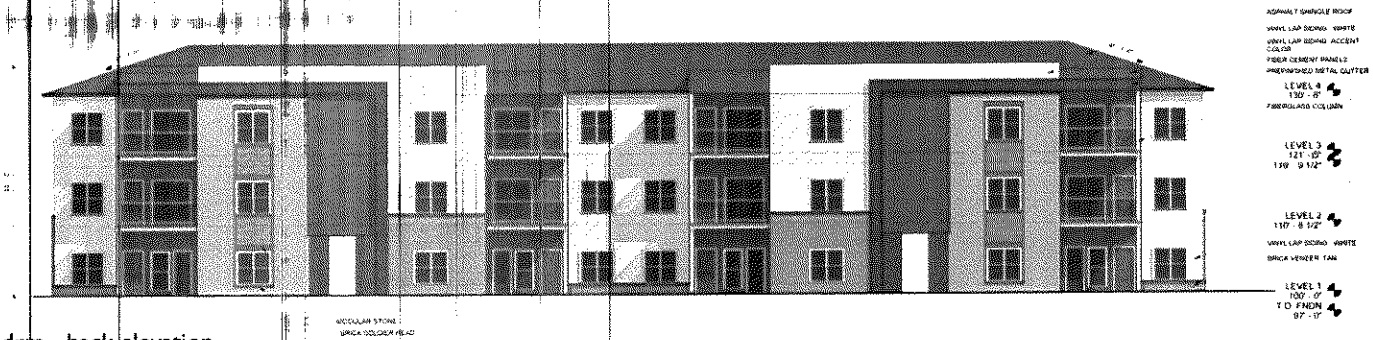
Type B - west elevation



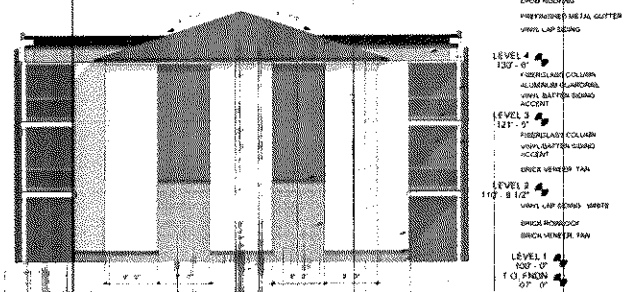
Type B - east elevation



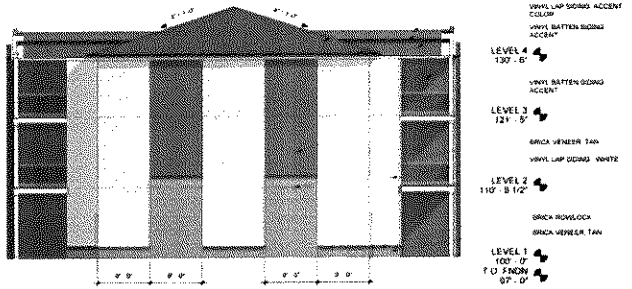
2 bdrm - front elevation



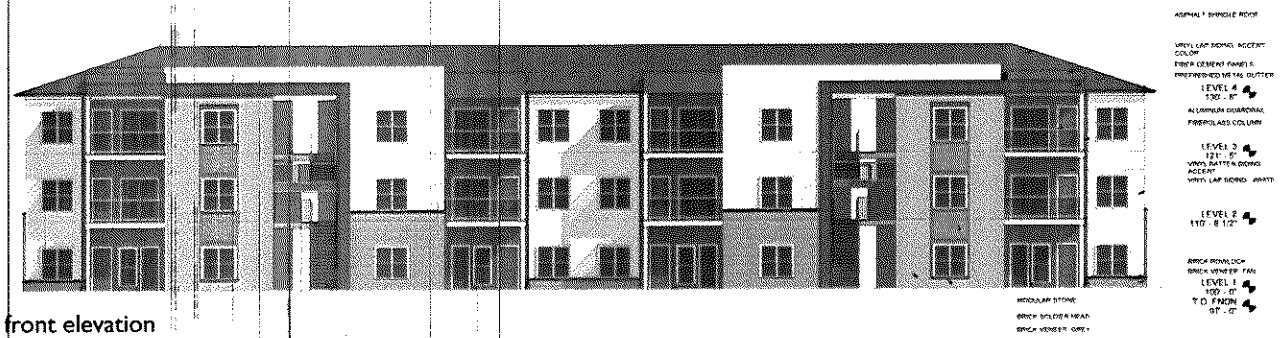
2 bdrm - back elevation



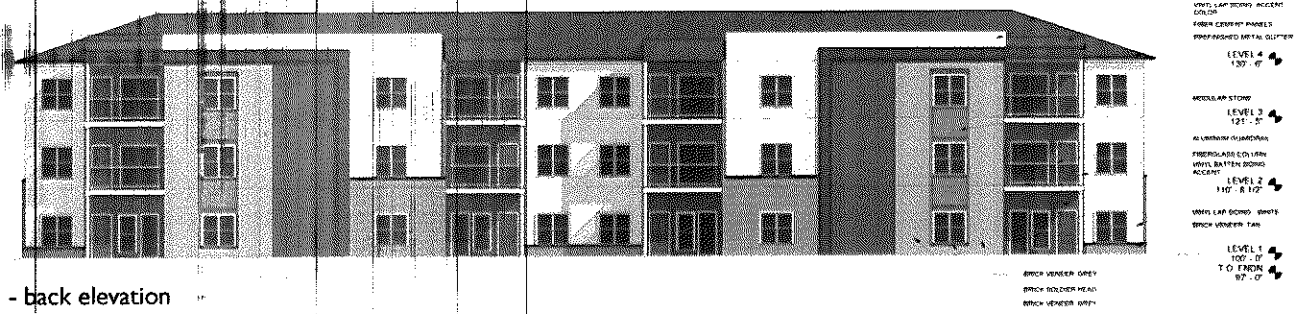
2 bdrm - east elevation



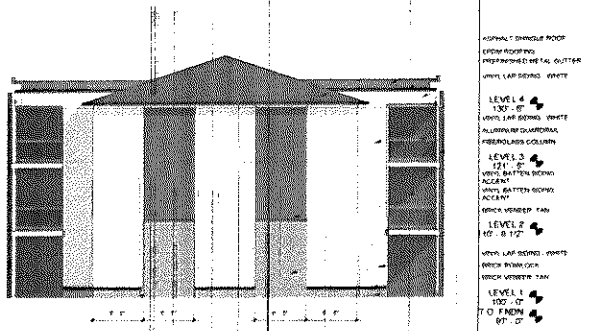
2 bdrm - west elevation



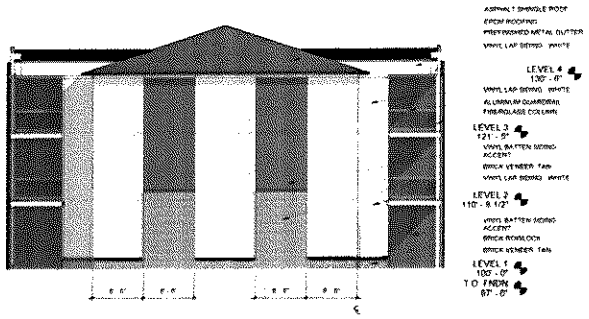
Type D - front elevation



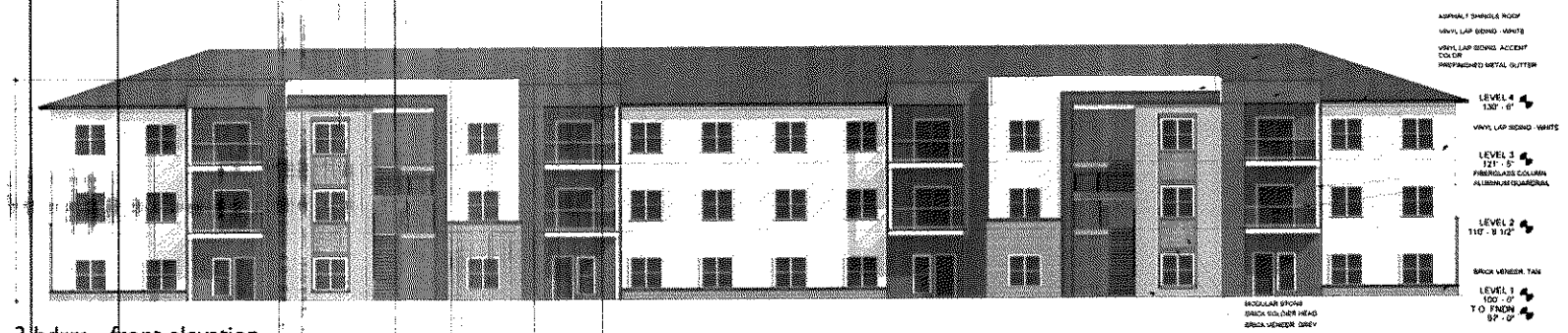
Type D - back elevation



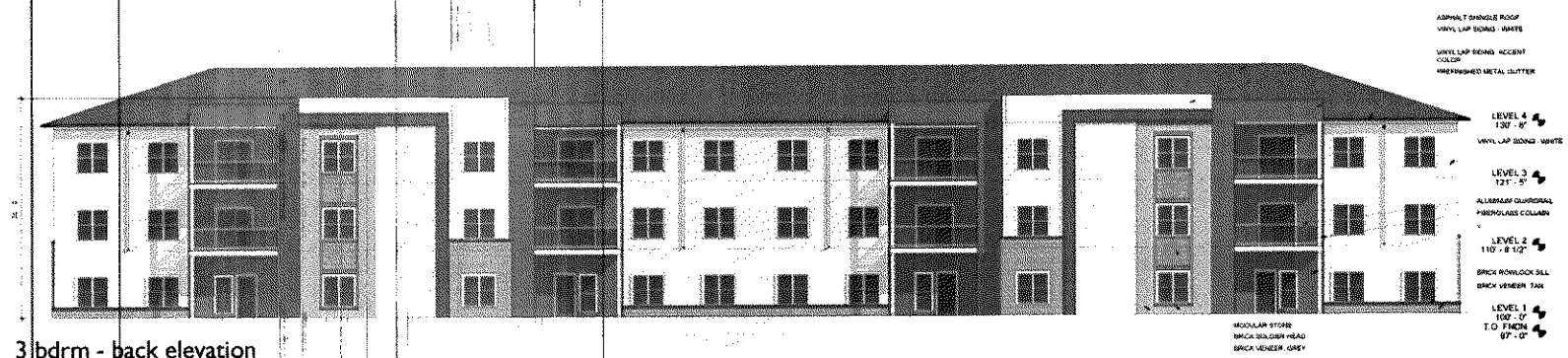
Type D - right elevation



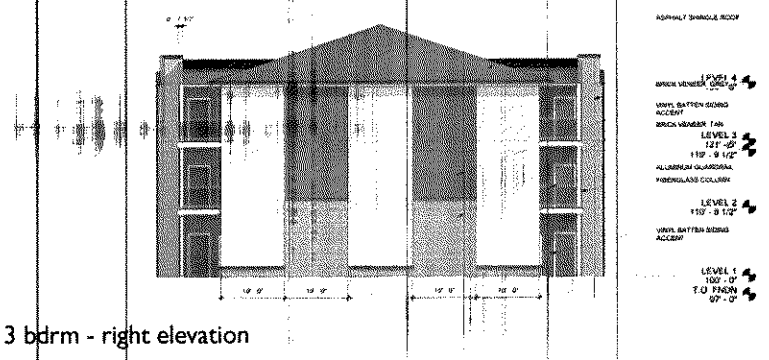
Type D – left elevation



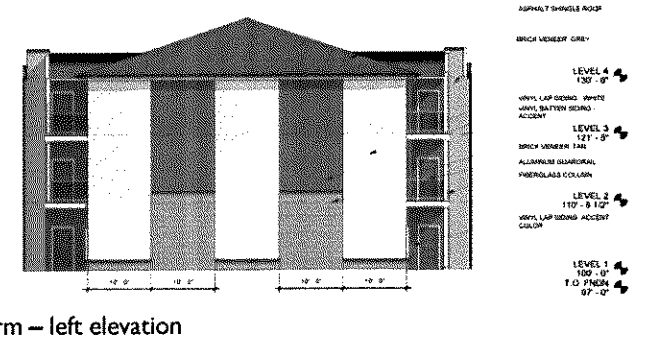
3 bdrm - front elevation



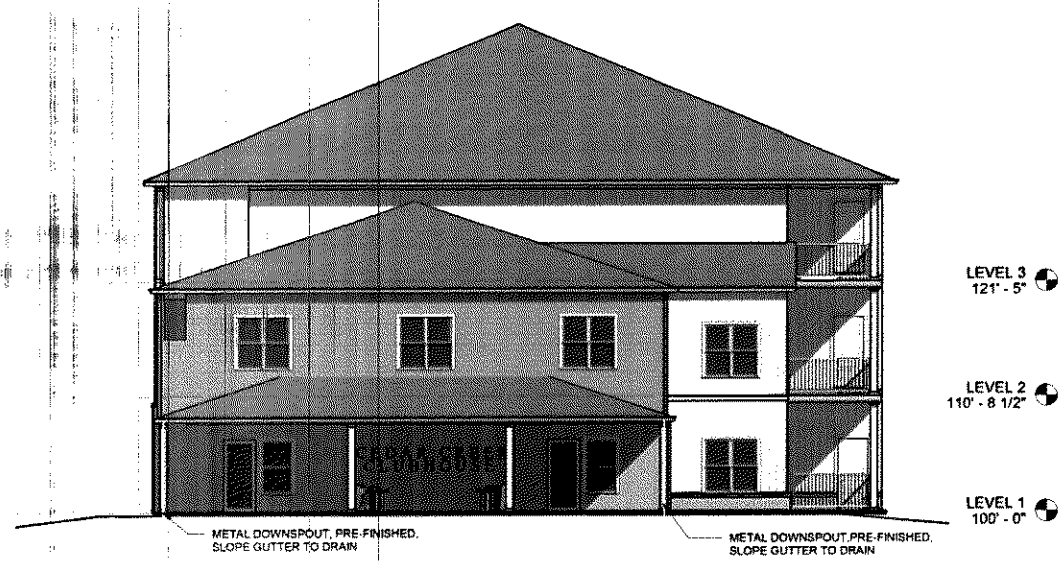
3 bdrm - back elevation



3 bdrm - right elevation



3 bdrm – left elevation



Clubhouse elevation

Clubhouse side 1 elevation

Clubhouse side 2 elevation

TAB 6
TRAFFIC STUDY

final report

December 22, 2021
Revised January 12, 2022

Traffic Impact Study

Apartments
Old Preston Highway (KY 6304)
Louisville, KY

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet

Level of Service remains unchanged after build

Table 2. Peak Hour Level of Service

Approach	A.M.			P.M.		
	2021 Existing	2024 No Build	2024 Build	2021 Existing	2024 No Build	2024 Build
Old Preston at Maple Spring Drive						
Maple Spring Drive Westbound	A 8.7	A 8.7	A 8.8	A 8.8	A 8.8	A 9.1
Old Preston Southbound	A 7.2	A 7.2	A 7.3	A 7.2	A 7.2	A 7.3
Old Preston at Entrance						
Entrance Eastbound			A 8.8			A 8.9
Old Preston Northbound (left)			A 7.3			A 7.4
Preston Highway at Cooper Chapel Road	**C 29.6**	**C 29.2**	**C 29.5**	**D 43.6**	**D 36.6**	**D 36.6**
Commerce Crossings Eastbound	E 59.2	E 56.0	E 56.4	E 77.6	E 77.5	E 77.5
Cooper Chapel Road Westbound	D 43.1	D 41.2	D 42.3	E 60.3	E 60.3	E 60.5
Preston Highway Northbound	C 25.6	C 25.3	C 25.4	D 52.7	C 25.6	C 25.9
Preston Highway Southbound	C 25.5	C 25.4	C 25.5	C 29.1	C 29.4	C 29.2
Preston Highway at Interchange Drive	**A 7.4**	**C 25.8**	**C 28.7**	**B 19.3**	**D 39.5**	**D 40.4**
Interchange Drive Eastbound	E 72.6	E 74.8	E 74.1	E 75.0	E 74.5	E 75.4
Entrance Westbound	F 87.9	F 68.2	E 68.2	F 84.8	E 79.1	E 79.1
Preston Highway Northbound	A 4.1	B 17.5	C 21.2	A 8.8	C 30.1	C 30.6
Preston Highway Southbound	A 5.9	C 22.6	C 23.8	B 19.2	D 36.4	D 37.4

Key: Level of Service, Delay in seconds per vehicle

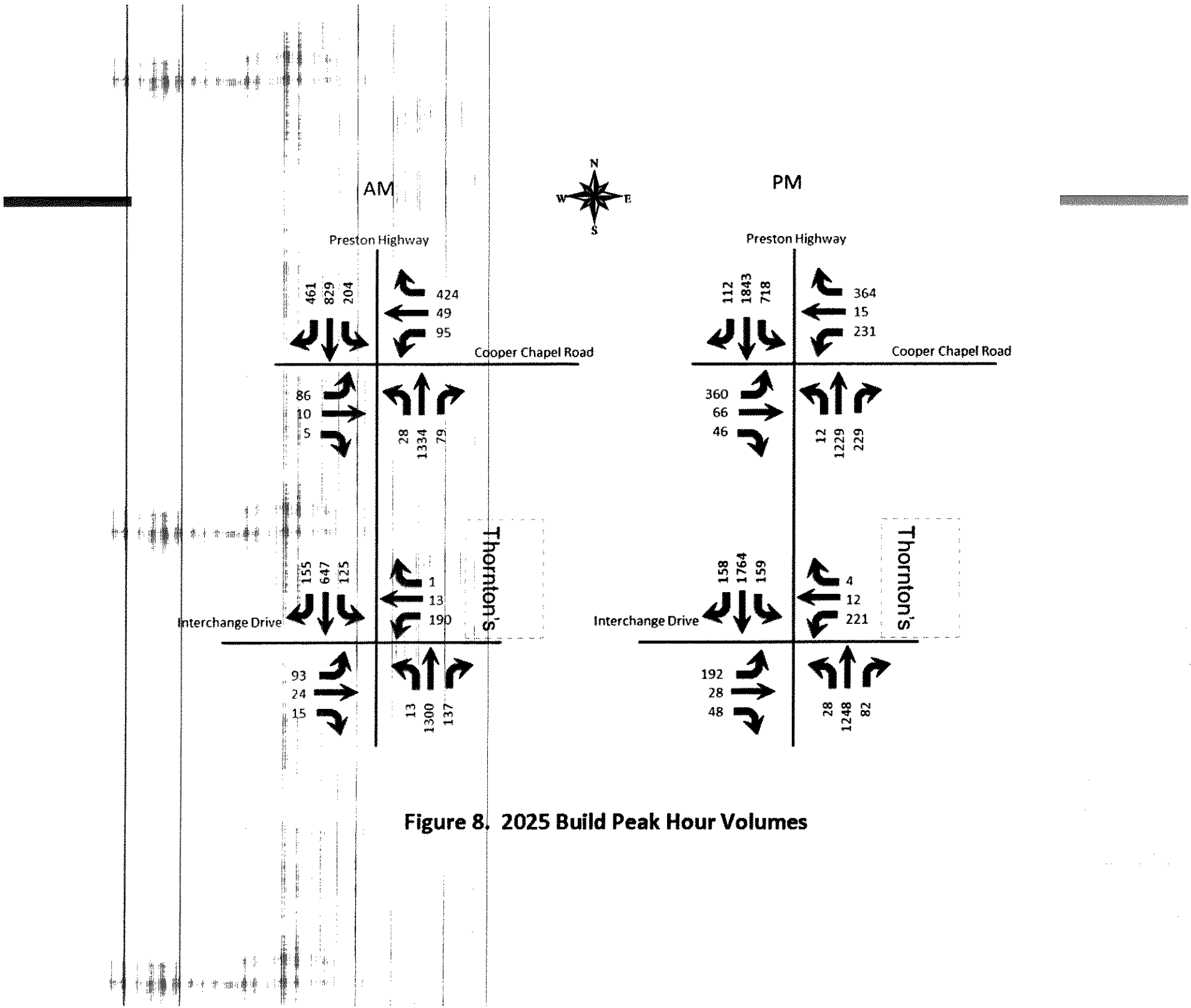


Figure 8. 2025 Build Peak Hour Volumes

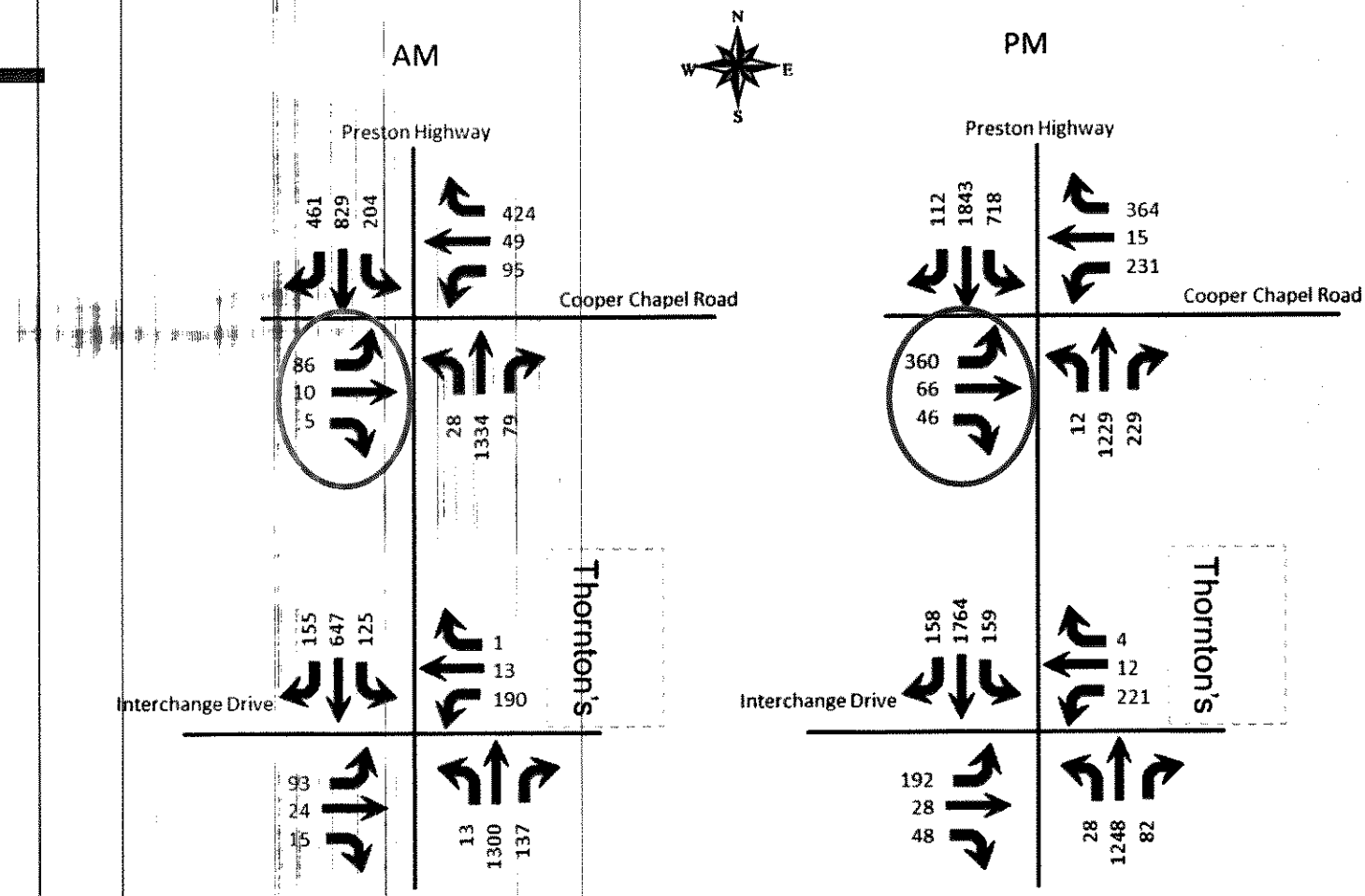


Figure 8. 2025 Build Peak Hour Volumes

Commerce Crossing Intersection AM

Commerce & Old Preston
1/11/2022-7:38am
As light turns green

Commerce & Old Preston
1/11/2022-7:38am
Green light

Commerce & Old Preston
1/11/2022-7:38am
Red light

Commerce Crossing Intersection PM

Commerce & Old Preston
1/11/2022-5:10 pm
Just turned green

Commerce & Old Preston
1/11/2022-5:11 pm
Just turned red

AM traffic to Commerce Crossings Drive from Preston Highway

PM traffic to Preston Highway from Commerce Crossings Drive

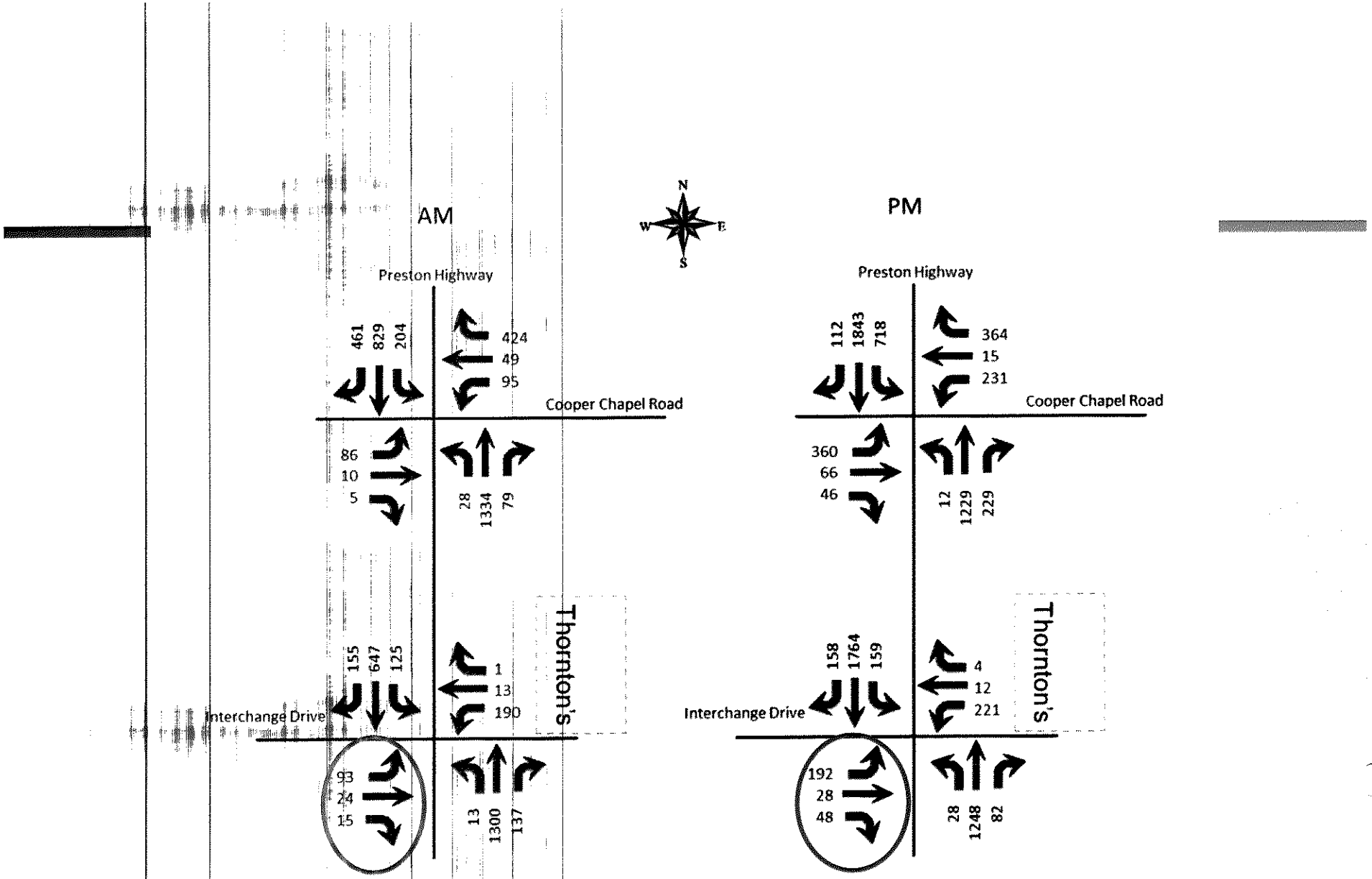


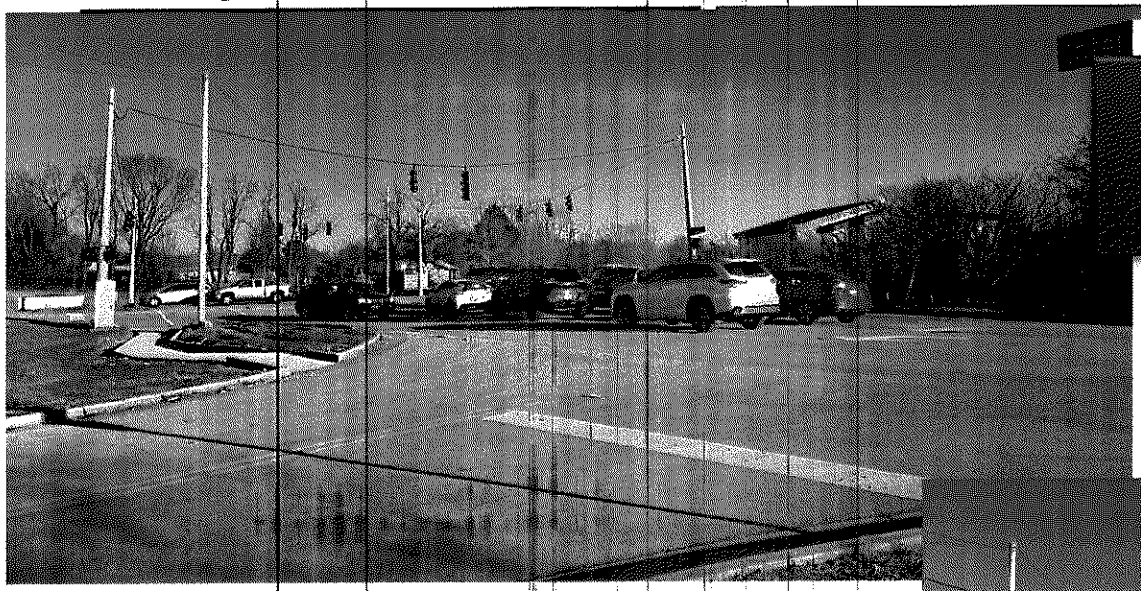
Figure 8. 2025 Build Peak Hour Volumes

Interchange Intersection AM

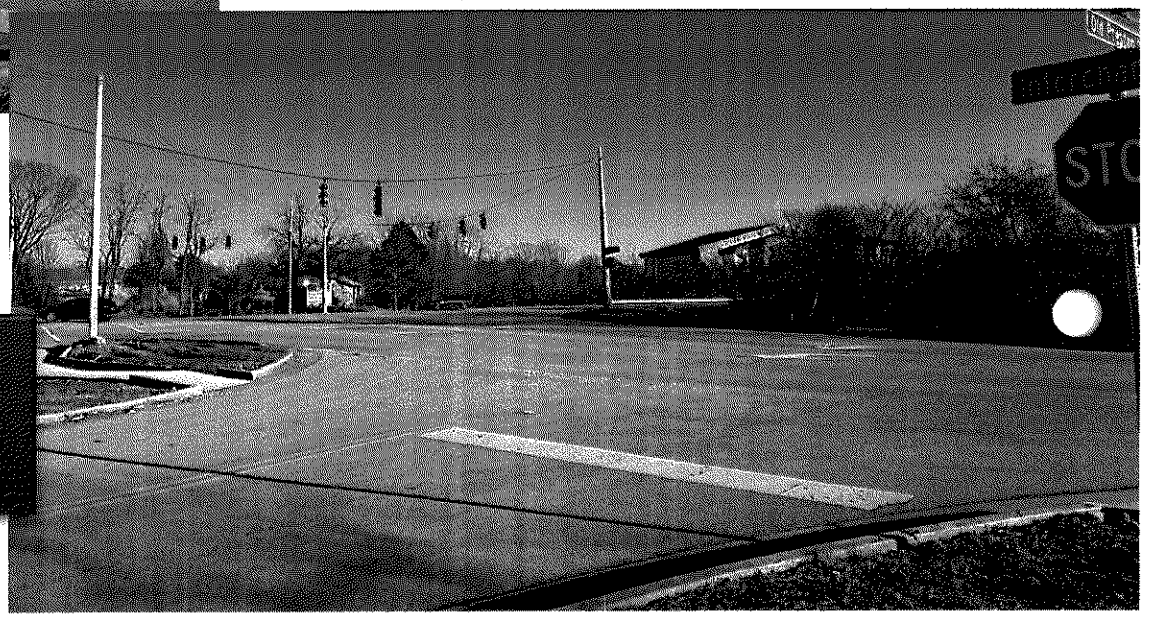
Interchange & Old Preston
1/11/2022-7:45 am
Green light

Interchange & Old Preston
1/11/2022-7:45am
Red light

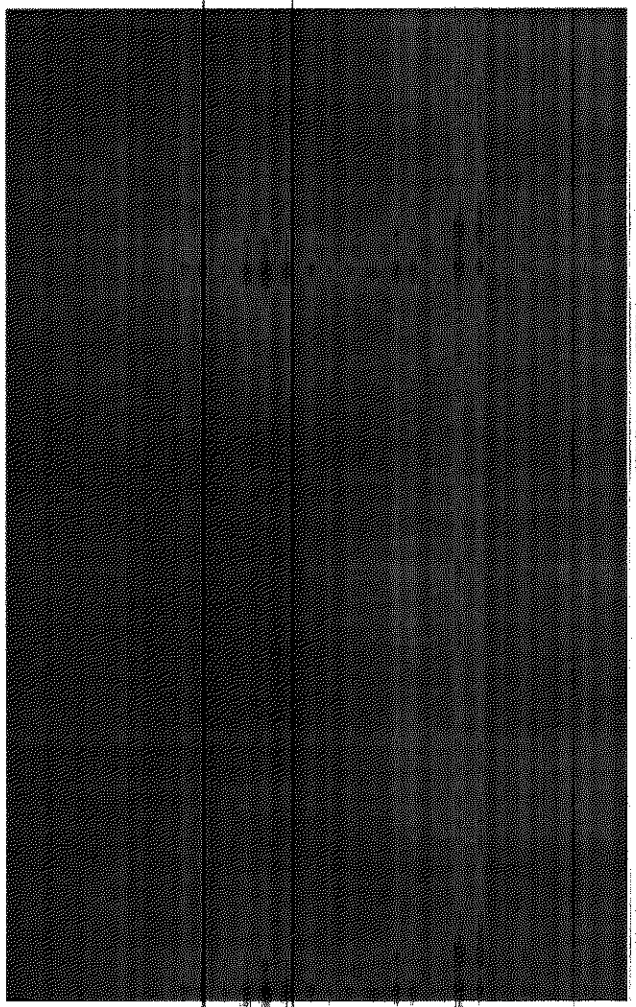
Interchange Intersection PM



Interchange & Old Preston
1/11/2022- 4:39 pm
Red light



Interchange & Old Preston
1/11/2022- 4:40 pm
Green light



TAB 7
STATEMENT OF COMPLIANCE FILED WITH THE ORIGINAL ZONE CHANGE APPLICATION WITH ALL APPLICABLE GOALS OF THE 2040 PLAN

final report

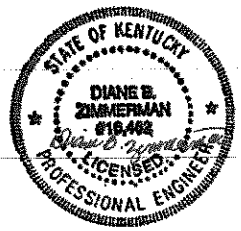
December 22, 2021
Revised January 12, 2022

Traffic Impact Study

Apartments
Old Preston Highway (KY 6304)
Louisville, KY

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet



DIANE B. ZIMMERMAN
Traffic Engineering, LLC

Table of Contents

INTRODUCTION

The development plan for apartments on Old Preston Highway shows 174 apartment units. **Figure 1** displays a map of the site. Access to the development will be on Old Preston Highway. The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study the impact area was defined to be the Old Preston Highway and Maple Springs Drive and the proposed entrance. Additionally, Louisville Metro requested analysis of the Preston Highway intersections with Commerce Crossings Drive and Interchange Drive, as an update to the traffic impact study dated October 7, 2021.

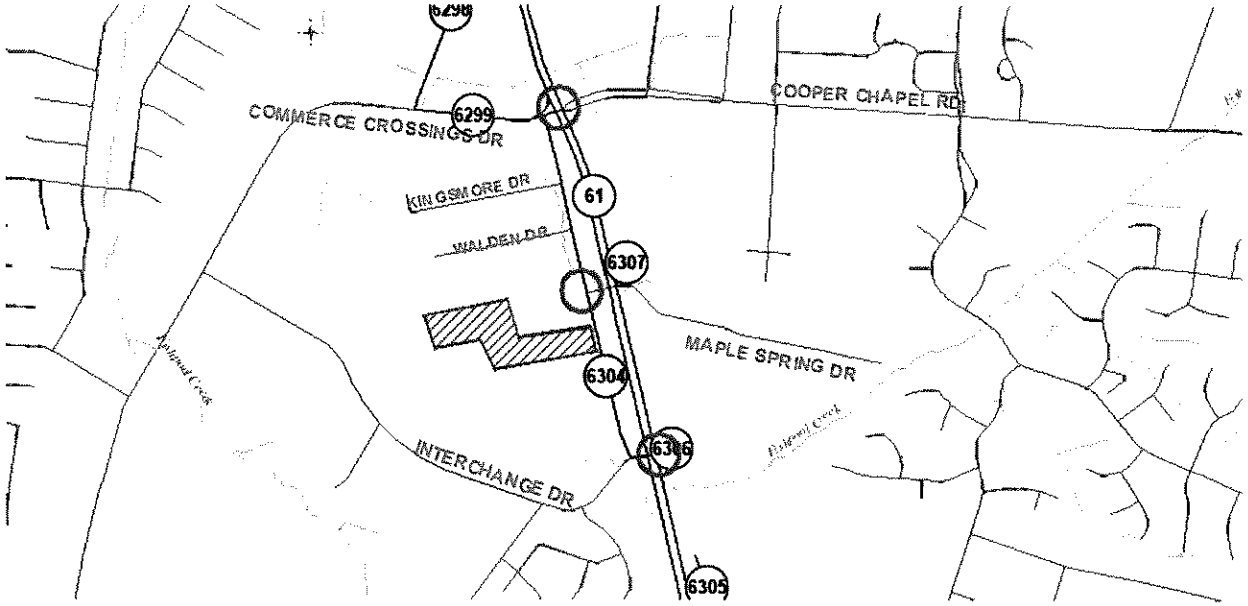


Figure 1. Site Map

EXISTING CONDITIONS

Old Preston Highway, KY 6304, is a state-maintained road with an estimated 2021 ADT of 400 vehicles per day between Commerce Crossing Drive and Interchange Drive, as provided by the Kentucky Transportation Cabinet at station 042. The road is a two-lane highway with ten-foot lanes, a one-foot shoulder (provided by the Kentucky Transportation Cabinet). The speed limit is 35 mph. There are no sidewalks. The intersection with Maple Spring Drive is controlled with a stop sign on Maple Spring Drive.

Peak hour traffic count for the intersection was obtained on Tuesday, August 24, 2021. The a.m. peak hour occurred between 7:15 and 8:15 and the p.m. occurred between 4:45 and 5:45. **Figure 2** illustrates the existing a.m. and p.m. peak hour traffic volumes. The Preston Highway counts were made April 13, 2021. **Figure 3** illustrates the Preston Highway peak hour volumes. The Appendix contains the full count data.

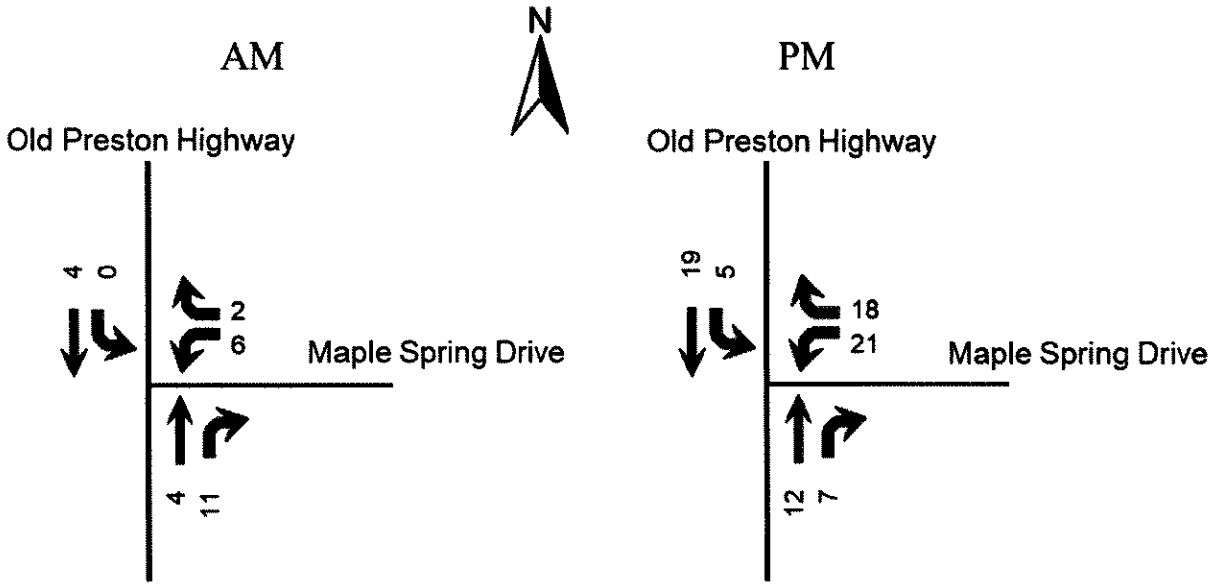


Figure 2. Existing Peak Hour Volumes Old Preston

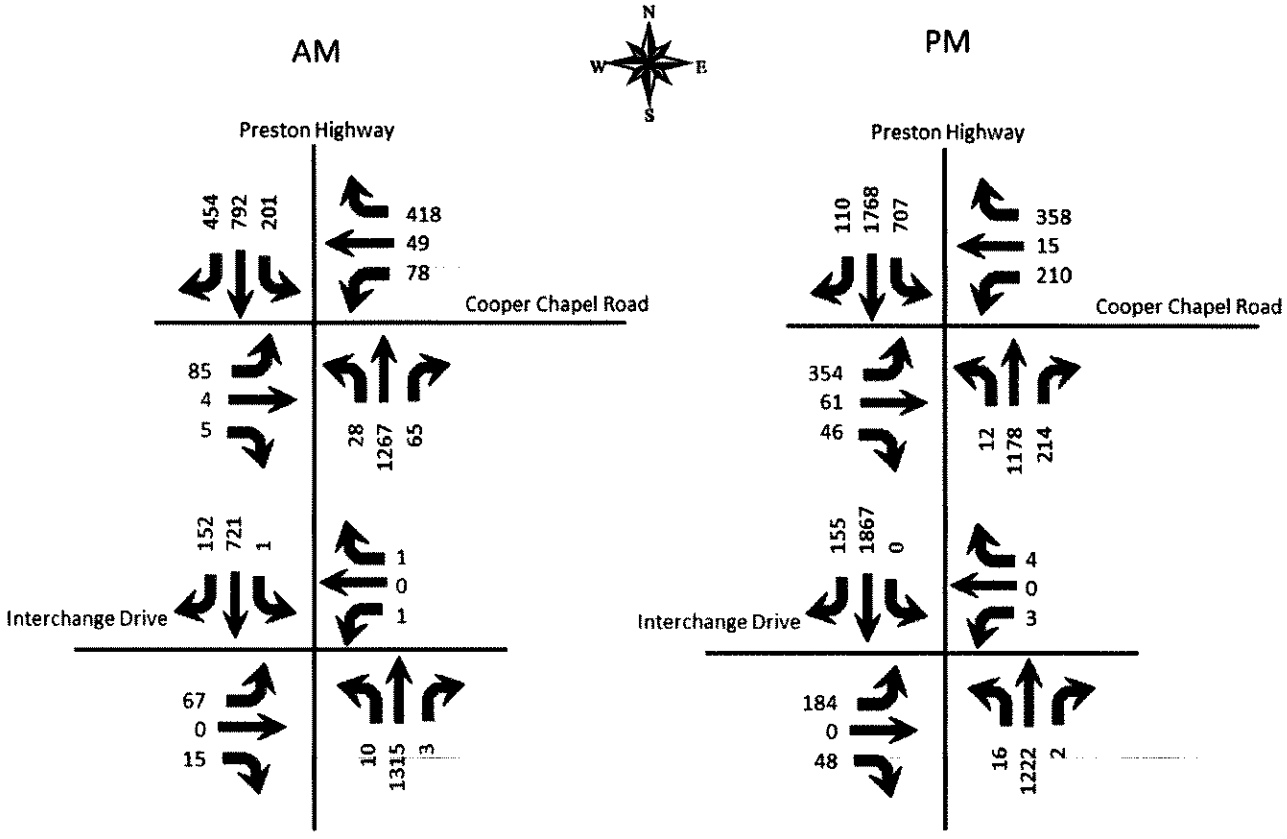


Figure 3. Existing Peak Hour Volumes Preston Highway

FUTURE CONDITIONS

The project completion date is 2024. An annual growth rate of 1.0 percent was applied to the 2021 volumes on Old Preston Highway. **Figure 4** displays the 2024 No Build peak hour volumes. For Preston Highway one half percent annual growth in traffic was added to the 2021 volumes as well as the trip generation from the proposed Thornton's and Chick Fil A. The no build volumes in **Figure 5** are the build volumes from the previously mention October 7, 2021 traffic impact study, plus the growth rate to arrive at 2024 from 2022.

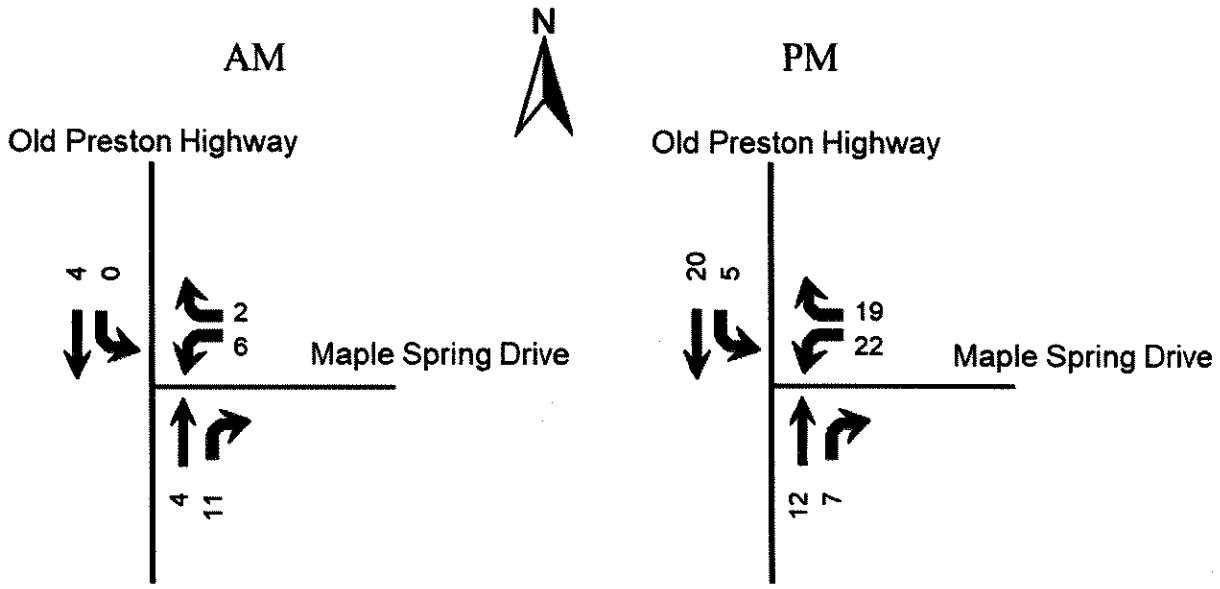


Figure 4. 2024 No Build Peak Hour Volumes Old Preston

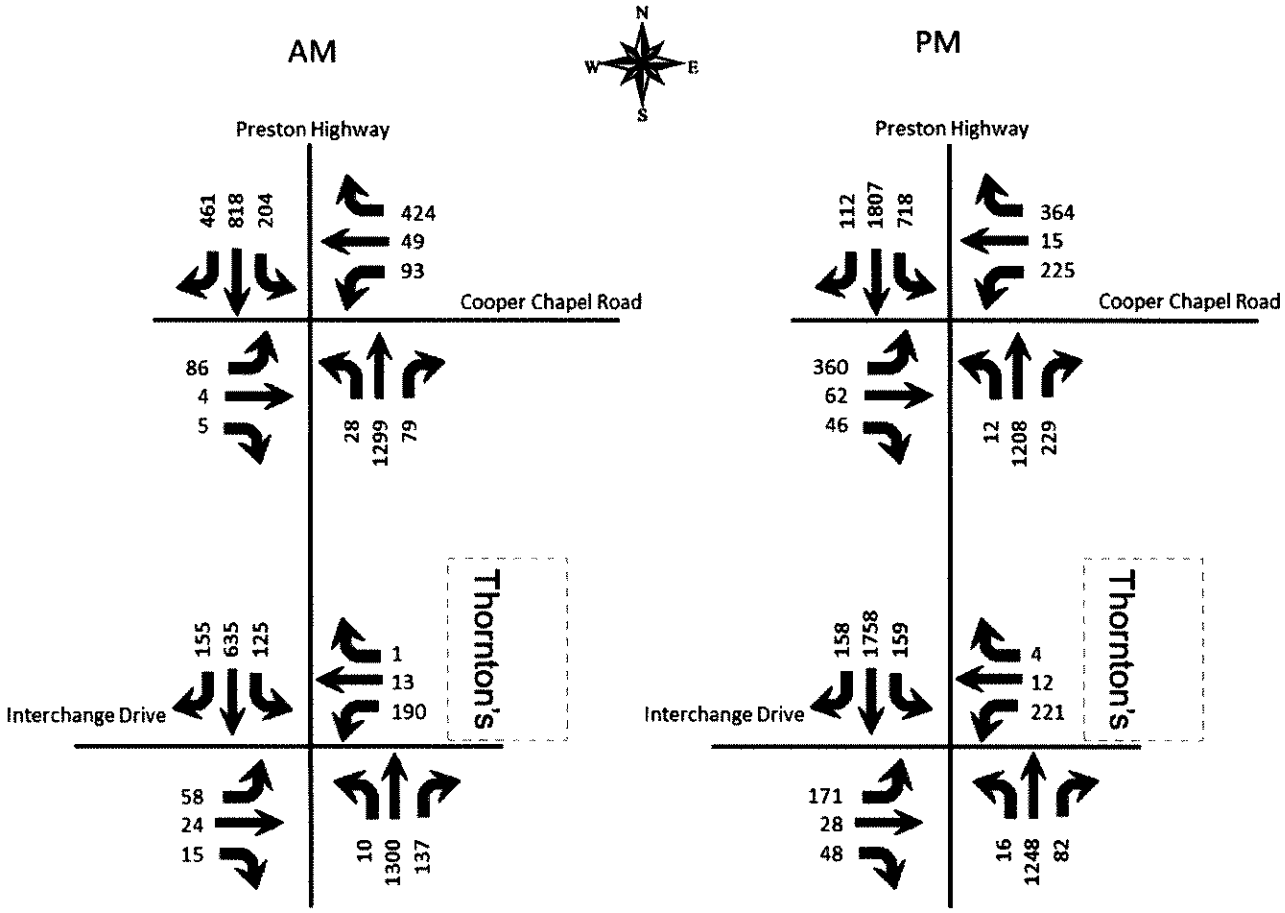


Figure 5. 2024 No Build Peak Hour Volumes Preston Highway

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 11th Edition contains trip generation rates for a wide range of developments. The land use of "Multi-family (Low-Rise) (220)" was reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The trips were assigned to the highway network with the percentages shown in **Figure 6**. **Figure 7** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figures 8 and 9** display the individual turning movements for the peak hours when the development is completed. Traffic to the north have been assigned to use Interchange Drive for analysis of a worst-case scenario.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour			P.M. Peak Hour		
Land Use	**Trips**	**In**	**Out**	**Trips**	**In**	**Out**
Multi-family (Mid-Rise) 174 units	77	18	59	95	60	35

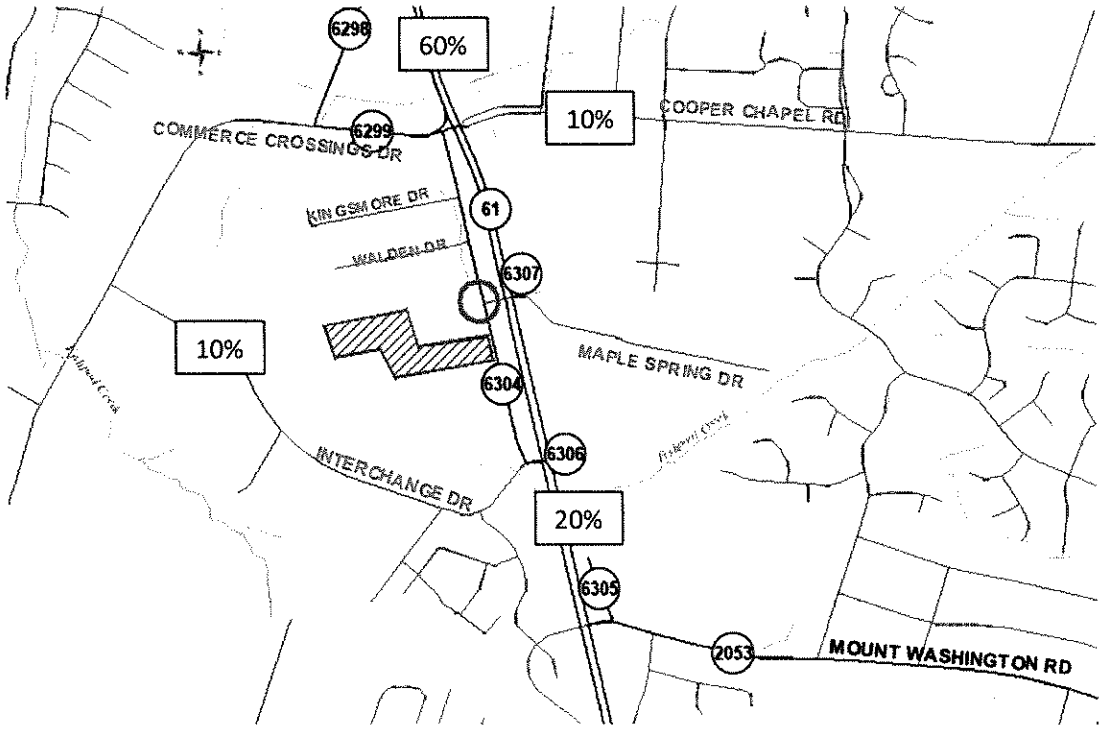


Figure 6. Trip Distribution Percentages

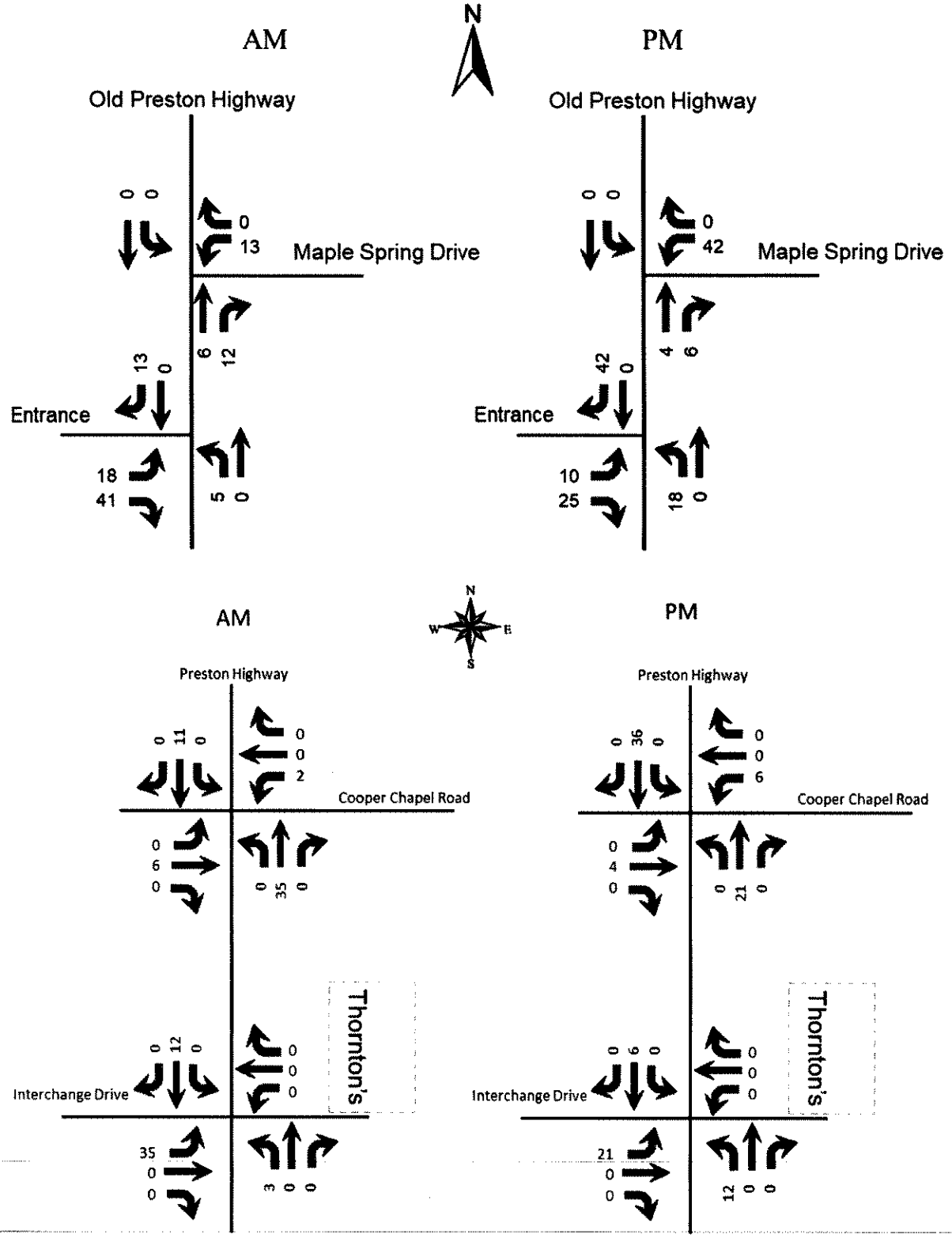


Figure 7. Peak Hour Trips Generated by Site

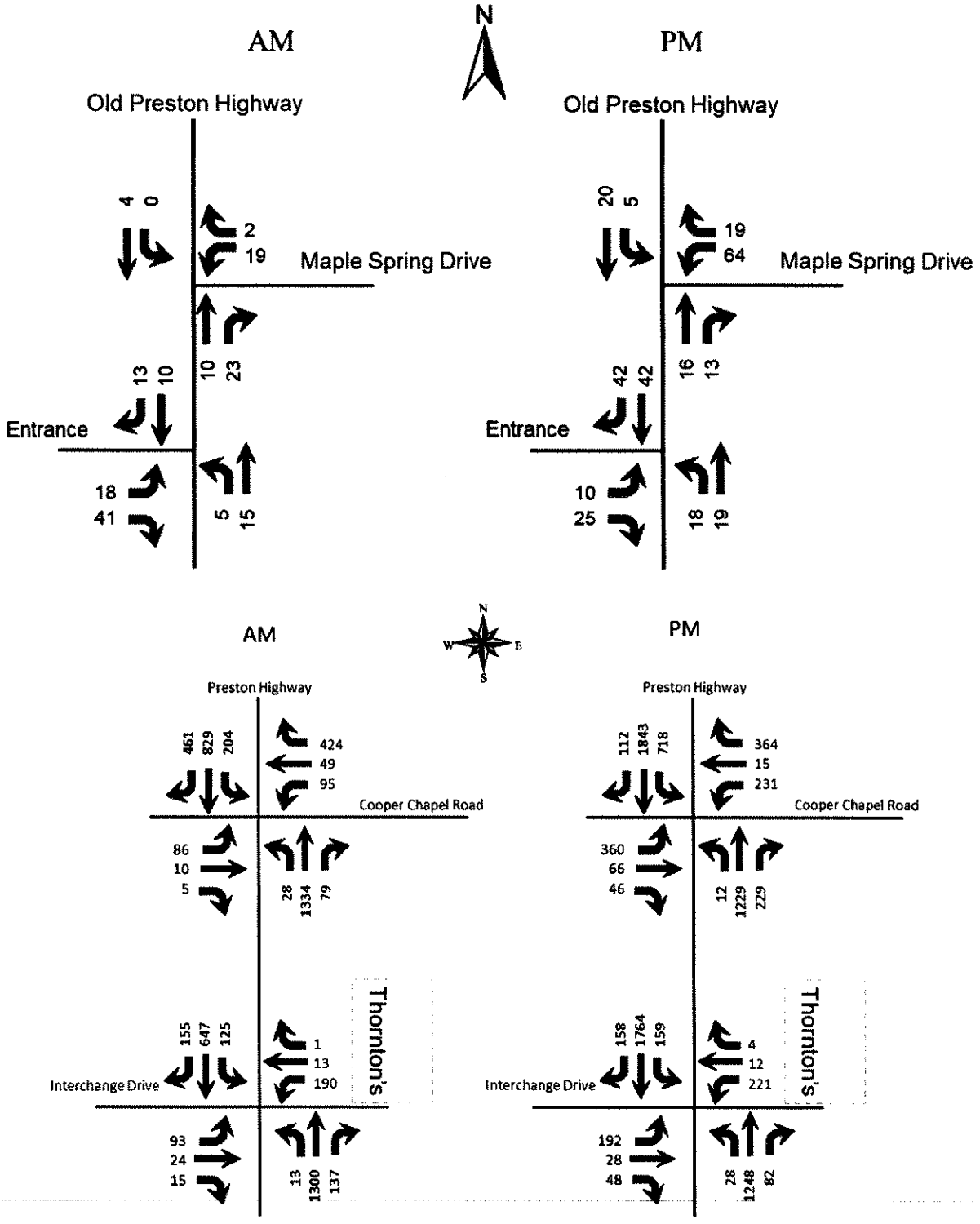


Figure 8. 2025 Build Peak Hour Volumes

ANALYSIS

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a "Level of Service". Level of Service is a ranking scale from A through F, "A" is the best operating condition and "F" is the worst. Level of Service results depend upon the facility that is analyzed. In this case, the Level of Service is based upon the total delay experienced for lanes at stop-controlled intersections.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 6th edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 7.9.5) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2021 Existing	2024 No Build	2024 Build	2021 Existing	2024 No Build	2024 Build
Old Preston at Maple Spring Drive						
Maple Spring Drive Westbound	A 8.7	A 8.7	A 8.8	A 8.8	A 8.8	A 9.1
Old Preston Southbound	A 7.2	A 7.2	A 7.3	A 7.2	A 7.2	A 7.3
Old Preston at Entrance						
Entrance Eastbound			A 8.8			A 8.9
Old Preston Northbound (left)			A 7.3			A 7.4
Preston Highway at Cooper Chapel Road	**C 29.6**	**C 29.2**	**C 29.5**	**D 43.6**	**D 36.6**	**D 36.6**
Commerce Crossings Eastbound	E 59.2	E 56.0	E 56.4	E 77.6	E 77.5	E 77.5
Cooper Chapel Road Westbound	D 43.1	D 41.2	D 42.3	E 60.3	E 60.3	E 60.5
Preston Highway Northbound	C 25.6	C 25.3	C 25.4	D 52.7	C 25.6	C 25.9
Preston Highway Southbound	C 25.5	C 25.4	C 25.5	C 29.1	C 29.4	C 29.2
Preston Highway at Interchange Drive	**A 7.4**	**C 25.8**	**C 28.7**	**B 19.3**	**D 39.5**	**D 40.4**
Interchange Drive Eastbound	E 72.6	E 74.8	E 74.1	E 75.0	E 74.5	E 75.4
Entrance Westbound	F 87.9	F 68.2	E 68.2	F 84.8	E 79.1	E 79.1
Preston Highway Northbound	A 4.1	B 17.5	C 21.2	A 8.8	C 30.1	C 30.6
Preston Highway Southbound	A 5.9	C 22.6	C 23.8	B 19.2	D 36.4	D 37.4

Key: Level of Service, Delay in seconds per vehicle

The entrance was evaluated for turn lanes using the Kentucky Transportation Cabinet Highway Design Guidance Manual dated July, 2020. The volume warrant is not met for turn lanes at the entrance.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2024 there will be a slight impact to the existing highway network. No improvements are needed to the roadway network to mitigate the impact.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Jefferson County, KY

Site 1 of 1
Old Preston Hwy (South)
Old Preston Hwy (North)

Maple Spring Dr

Date
Tuesday, August 24, 2021

Lat/Long
38.099733°, -85.671889°

Weather
Fair
87°F

0700 - 0900 (Weekday 2h Session) (08-24-2021)
All vehicles

	Northbound (Old Preston Hwy (South))				Southbound (Old Preston Hwy (North))				Westbound (Maple Spring Dr)				
TIME	Thru 1.1	Right 1.2	U-Turn 1.3	App Total	Left 1.4	Thru 1.5	U-Turn 1.6	App Total	Left 1.7	Right 1.8	U-Turn 1.9	App Total	Int Total
0700 - 0715	1	3	0	4	0	2	0	2	0	0	0	0	6
0715 - 0730	2	2	0	4	0	0	0	0	0	1	0	1	5
0730 - 0745	1	3	0	4	0	2	0	2	2	0	0	2	8
0745 - 0800	0	1	0	1	0	4	0	4	3	1	0	4	9
Hourly Total	4	9	0	13	0	8	0	8	5	2	0	7	28
0800 - 0815	1	5	0	6	0	0	0	0	1	0	0	1	7
0815 - 0830	0	3	0	3	0	0	0	0	0	0	0	0	3
0830 - 0845	1	4	0	5	0	1	0	1	0	0	0	0	6
0845 - 0900	2	4	0	6	1	1	0	2	0	0	0	0	8
Hourly Total	4	16	0	20	1	2	0	3	1	0	0	1	24
Grand Total	8	25	0	33	1	10	0	11	6	2	0	8	52
Approach %	24.24	75.76	0.00	-	9.09	90.91	0.00	-	75.00	25.00	0.00	-	
Intersection %	15.38	48.08	0.00	63.46	1.92	19.23	0.00	21.15	11.54	3.85	0.00	15.38	
PHF	0.50	0.55	0.00	0.63	0.00	0.38	0.00	0.38	0.50	0.50	0.00	0.50	0.81

1600 - 1800 (Weekday 2h Session) (08-24-2021)
All vehicles

	Northbound (Old Preston Hwy (South))				Southbound (Old Preston Hwy (North))				Westbound (Maple Spring Dr)				
TIME	Thru 1.1	Right 1.2	U-Turn 1.3	App Total	Left 1.4	Thru 1.5	U-Turn 1.6	App Total	Left 1.7	Right 1.8	U-Turn 1.9	App Total	Int Total
1600 - 1615	1	2	0	3	2	6	0	8	2	7	0	9	20
1615 - 1630	4	5	0	9	0	4	0	4	3	2	0	5	18
1630 - 1645	1	2	0	3	0	3	0	3	1	4	0	5	11
1645 - 1700	3	1	0	4	2	3	0	5	8	5	0	13	22
Hourly Total	9	10	0	19	4	16	0	20	14	18	0	32	71
1700 - 1715	1	2	0	3	1	3	0	4	5	6	0	11	18
1715 - 1730	3	0	0	3	2	6	0	8	4	4	0	8	19
1730 - 1745	5	4	0	9	0	7	0	7	4	3	0	7	23
1745 - 1800	6	1	0	7	0	5	0	5	3	0	0	3	15
Hourly Total	15	7	0	22	3	21	0	24	16	13	0	29	75
Grand Total	24	17	0	41	7	37	0	44	30	31	0	61	146
Approach %	58.54	41.46	0.00	-	15.91	84.09	0.00	-	49.18	50.82	0.00	-	
Intersection %	16.44	11.64	0.00	28.08	4.79	25.34	0.00	30.14	20.55	21.23	0.00	41.78	
PHF	0.60	0.44	0.00	0.53	0.63	0.68	0.00	0.75	0.66	0.75	0.00	0.75	0.89

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Preston Highway, KY

Site 1 of 3
KY-61 Preston Hwy (South)
KY-61 Preston Hwy (North)
Commerce Crossings Dr
Cooper Chapel Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.103518°, -85.672625°

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Commerce Crossings Dr					Cooper Chapel Rd					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Left 1.5	Thru 1.6	Right 1.7	U-Turn 1.8	App Total	Left 1.9	Thru 1.10	Right 1.11	U-Turn 1.12	App Total	Left 1.13	Thru 1.14	Right 1.15	U-Turn 1.16	App Total	Int Total
0700 - 0715	2	306	13	0	321	25	144	88	1	258	20	0	2	0	22	15	9	130	0	154	755
0715 - 0730	8	327	16	0	351	34	189	86	1	310	23	1	2	0	26	16	8	109	0	133	820
0730 - 0745	5	365	19	0	389	56	191	93	0	340	24	1	1	0	26	9	14	117	0	140	895
0745 - 0800	10	298	15	0	323	59	221	173	0	453	13	1	1	0	15	24	16	97	0	137	928
Hourly Total	25	1296	63	0	1384	174	745	440	2	1361	80	3	6	0	89	64	47	453	0	564	3398
0800 - 0815	5	277	15	0	297	52	191	102	0	345	25	1	1	0	27	29	11	95	0	135	804
0815 - 0830	6	259	18	0	283	54	155	67	0	276	15	1	3	0	19	21	3	82	0	106	684
0830 - 0845	4	267	26	0	297	39	187	59	0	285	15	5	2	0	22	28	3	106	0	137	741
0845 - 0900	6	253	25	0	284	44	199	51	0	294	28	3	3	0	34	38	7	84	0	129	741
Hourly Total	21	1056	84	0	1161	189	732	279	0	1200	83	10	9	0	102	116	24	367	0	507	2970
Grand Total	46	2352	147	0	2545	363	1477	719	2	2561	163	13	15	0	191	180	71	820	0	1071	6368
Approach %	1.81	92.42	5.78	0.00	-	14.17	57.67	28.07	0.08	-	85.34	6.81	7.85	0.00	-	16.81	6.63	76.56	0.00	-	
Intersection %	0.72	36.93	2.31	0.00	39.97	5.70	23.19	11.29	0.03	40.22	2.56	0.20	0.24	0.00	3.00	2.83	1.11	12.88	0.00	16.82	
PHF	0.70	0.87	0.86	0.00	0.87	0.85	0.90	0.66	0.25	0.80	0.85	1.00	0.63	0.00	0.87	0.67	0.77	0.89	0.00	0.97	0.93

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Commerce Crossings Dr					Cooper Chapel Rd					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Left 1.5	Thru 1.6	Right 1.7	U-Turn 1.8	App Total	Left 1.9	Thru 1.10	Right 1.11	U-Turn 1.12	App Total	Left 1.13	Thru 1.14	Right 1.15	U-Turn 1.16	App Total	Int Total
1600 - 1615	1	297	49	0	347	173	436	46	2	657	97	12	8	0	117	45	5	116	0	166	1287
1615 - 1630	3	261	55	0	319	173	411	48	1	633	60	18	10	0	88	60	4	113	0	177	1217
1630 - 1645	4	313	57	0	374	159	380	35	2	576	120	22	17	0	159	45	4	93	1	143	1252
1645 - 1700	1	297	50	1	349	186	445	26	0	657	61	11	9	0	81	54	4	78	0	136	1223
Hourly Total	9	1168	211	1	1389	691	1672	155	5	2523	338	63	44	0	445	204	17	400	1	622	4979
1700 - 1715	2	272	51	0	325	156	454	39	0	649	122	15	14	0	151	56	6	87	0	149	1274
1715 - 1730	4	296	56	0	356	206	489	10	1	706	51	13	6	0	70	54	1	100	0	155	1287
1730 - 1745	5	300	47	0	352	158	435	28	1	622	60	8	7	0	75	62	1	109	0	172	1221
1745 - 1800	2	280	58	0	340	119	401	23	0	543	36	6	4	0	46	52	3	96	0	151	1080
Hourly Total	13	1148	212	0	1373	639	1779	100	2	2520	269	42	31	0	342	224	11	392	0	627	4862
Grand Total	22	2316	423	1	2762	1330	3451	255	7	5043	607	105	75	0	787	428	28	792	1	1249	9841
Approach %	0.80	83.85	15.31	0.04	-	26.37	68.43	5.06	0.14	-	77.13	13.34	9.53	0.00	-	34.27	2.24	63.41	0.08	-	
Intersection %	0.22	23.53	4.30	0.01	28.07	13.51	35.07	2.59	0.07	51.24	6.17	1.07	0.76	0.00	8.00	4.35	0.28	8.05	0.01	12.69	
PHF	0.69	0.94	0.94	0.25	0.94	0.86	0.90	0.71	0.38	0.92	0.73	0.69	0.68	0.00	0.72	0.93	0.63	0.90	0.25	0.94	0.98

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Preston Highway, KY

Site 2 of 3
KY-61 Preston Hwy (South)
KY-61 Preston Hwy (North)
Old Preston Hwy
Local Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.096348°, -85.670213°

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Old Preston Hwy					Local Rd					
TIME	Left 2.1	Thru 2.2	Right 2.3	U-Turn 2.4	App Total	Left 2.5	Thru 2.6	Right 2.7	U-Turn 2.8	App Total	Left 2.9	Thru 2.10	Right 2.11	U-Turn 2.12	App Total	Left 2.13	Thru 2.14	Right 2.15	U-Turn 2.16	App Total	Int Total
0700 - 0715	5	314	0	0	319	0	100	52	0	152	23	0	2	0	25	0	0	0	0	0	496
0715 - 0730	0	331	0	0	331	0	147	65	0	212	22	0	2	0	24	0	0	0	0	0	567
0730 - 0745	4	398	1	0	403	0	175	33	0	208	19	0	3	0	22	1	0	0	0	1	634
0745 - 0800	4	299	1	1	305	0	199	32	0	231	14	0	7	0	21	0	0	1	0	1	558
Hourly Total	13	1342	2	1	1358	0	621	182	0	803	78	0	14	0	92	1	0	1	0	2	2255
0800 - 0815	0	287	1	1	289	0	200	22	1	223	12	0	3	0	15	0	0	0	0	0	527
0815 - 0830	2	257	0	0	259	1	167	14	0	182	9	0	0	0	9	0	0	0	0	0	450
0830 - 0845	0	283	0	0	283	1	198	13	0	212	20	0	3	0	23	0	0	0	0	0	518
0845 - 0900	2	279	1	0	282	0	234	16	0	250	11	0	1	1	13	0	0	0	0	0	545
Hourly Total	4	1106	2	1	1113	2	799	65	1	867	52	0	7	1	60	0	0	0	0	0	2040
Grand Total	17	2448	4	2	2471	2	1420	247	1	1670	130	0	21	1	152	1	0	1	0	2	4295
Approach %	0.69	99.07	0.16	0.08	-	0.12	85.03	14.79	0.06	-	85.53	0.00	13.82	0.66	-	50.00	0.00	50.00	0.00	-	
Intersection %	0.40	57.00	0.09	0.05	57.53	0.05	33.06	5.75	0.02	38.88	3.03	0.00	0.49	0.02	3.54	0.02	0.00	0.02	0.00	0.05	
PHF	0.50	0.83	0.75	0.50	0.82	0.00	0.90	0.58	0.25	0.95	0.76	0.00	0.54	0.00	0.85	0.25	0.00	0.25	0.00	0.50	0.90

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

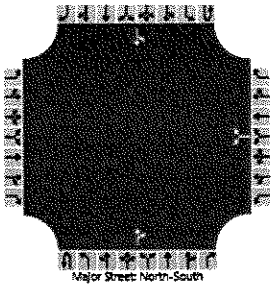
	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Old Preston Hwy					Local Rd					
TIME	Left 2.1	Thru 2.2	Right 2.3	U-Turn 2.4	App Total	Left 2.5	Thru 2.6	Right 2.7	U-Turn 2.8	App Total	Left 2.9	Thru 2.10	Right 2.11	U-Turn 2.12	App Total	Left 2.13	Thru 2.14	Right 2.15	U-Turn 2.16	App Total	Int Total
1600 - 1615	0	295	2	0	297	0	391	32	0	423	67	0	15	0	82	1	1	1	0	3	805
1615 - 1630	6	289	2	0	297	1	467	29	0	497	36	0	16	0	52	0	0	3	0	3	849
1630 - 1645	1	310	0	0	311	0	424	33	2	459	62	0	17	0	79	0	0	1	0	1	850
1645 - 1700	1	325	1	0	327	0	445	45	0	490	44	0	13	0	57	1	0	1	0	2	876
Hourly Total	8	1219	5	0	1232	1	1727	139	2	1869	209	0	61	0	270	2	1	6	0	9	3380
1700 - 1715	3	286	0	0	289	0	464	35	0	499	43	0	12	0	55	1	0	2	0	3	846
1715 - 1730	3	296	1	2	302	0	481	39	0	520	45	0	13	0	58	1	0	1	0	2	882
1730 - 1745	7	315	0	0	322	0	477	36	0	513	52	0	10	0	62	0	0	0	0	0	897
1745 - 1800	7	297	0	1	305	0	397	41	0	438	35	0	3	0	38	0	0	0	0	0	781
Hourly Total	20	1194	1	3	1218	0	1819	151	0	1970	175	0	38	0	213	2	0	3	0	5	3406
Grand Total	28	2413	6	3	2450	1	3546	290	2	3839	384	0	99	0	483	4	1	9	0	14	6786
Approach %	1.14	98.49	0.24	0.12	-	0.03	92.37	7.55	0.05	-	79.50	0.00	20.50	0.00	-	28.57	7.14	64.29	0.00	-	
Intersection %	0.41	35.56	0.09	0.04	36.10	0.01	52.25	4.27	0.03	56.57	5.66	0.00	1.46	0.00	7.12	0.06	0.01	0.13	0.00	0.21	
PHF	0.50	0.94	0.50	0.25	0.95	0.00	0.97	0.86	0.00	0.97	0.88	0.00	0.92	0.00	0.94	0.75	0.00	0.50	0.00	0.58	0.98

HCS Reports

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2021	North/South Street	Old Preston
Time Analyzed	AM Peak	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						6		2			4	11		0	4	
Percent Heavy Vehicles (%)						17		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)						6.57		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.65		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							10							0		
Capacity, c (veh/h)							990							1611		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							8.7							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							8.7							0.0		
Approach LOS							A									

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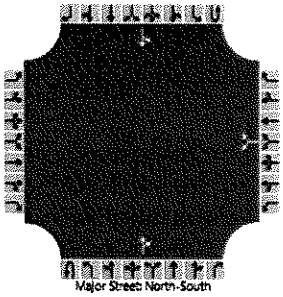
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						6		2			4	11		0	4	
Percent Heavy Vehicles (%)						17		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)						6.57		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.65		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							10							0		
Capacity, c (veh/h)							990							1611		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							8.7							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							8.7							0.0		
Approach LOS							A									

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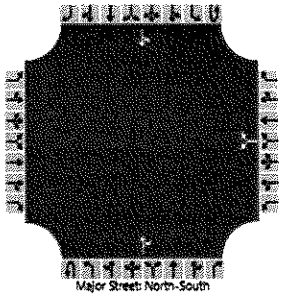
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	1/12/2021	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	AM Peak Build	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						19		2			10	23		0	4	
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)							26							0		
Capacity, c (veh/h)							982							1582		
v/c Ratio							0.03							0.00		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							8.8							7.3		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						8.8							0.0			
Approach LOS						A										

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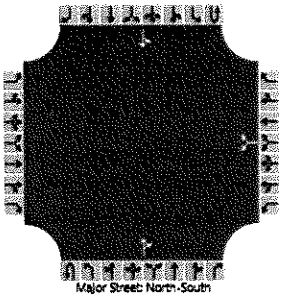
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2021	North/South Street	Old Preston
Time Analyzed	PM Peak	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						21		18			12	7		5	19	
Percent Heavy Vehicles (%)						0		6						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)						6.40		6.26						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.35						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							44							6		
Capacity, c (veh/h)							1000							1607		
v/c Ratio							0.04							0.00		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							8.8							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							8.8							1.5		
Approach LOS							A									

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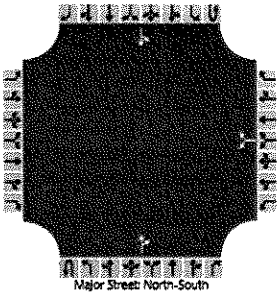
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						22		19			12	7		5	20	
Percent Heavy Vehicles (%)						0		6						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)						6.40		6.26						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.35						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							46							6		
Capacity, c (veh/h)							999							1607		
v/c Ratio							0.05							0.00		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							8.8							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						8.8							1.5			
Approach LOS						A										

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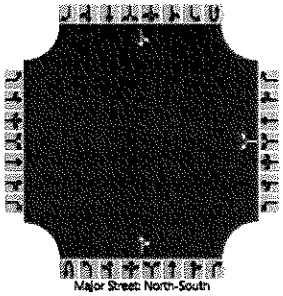
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	1/12/2022	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	PM Peak Build	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						64		19			16	13		5	20	
Percent Heavy Vehicles (%)						0		6						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)						6.40		6.26						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.35						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							93							6		
Capacity, c (veh/h)							969							1593		
v/c Ratio							0.10							0.00		
95% Queue Length, Q_{95} (veh)							0.3							0.0		
Control Delay (s/veh)							9.1							7.3		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							9.1							1.5		
Approach LOS							A									

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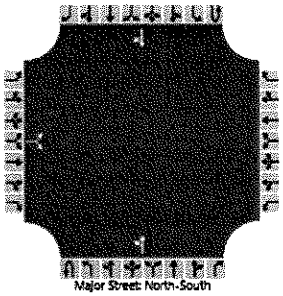
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	1/12/2022	East/West Street	Entrance
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	AM Peak	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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)		18		41						5	15				10	13
Percent Heavy Vehicles (%)		0		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)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			73							6						
Capacity, c (veh/h)			1029							1598						
v/c Ratio			0.07							0.00						
95% Queue Length, Q_{95} (veh)			0.2							0.0						
Control Delay (s/veh)			8.8							7.3						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		8.8								1.8						
Approach LOS		A														

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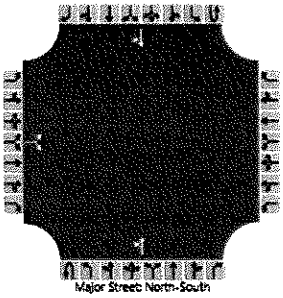
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	1/12/2022	East/West Street	Entrance
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	PM Peak	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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)		10		25						18	19				42	42
Percent Heavy Vehicles (%)		0		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)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			39							20						
Capacity, c (veh/h)			952							1512						
v/c Ratio			0.04							0.01						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			8.9							7.4						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		8.9								3.7						
Approach LOS		A														

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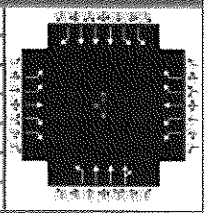
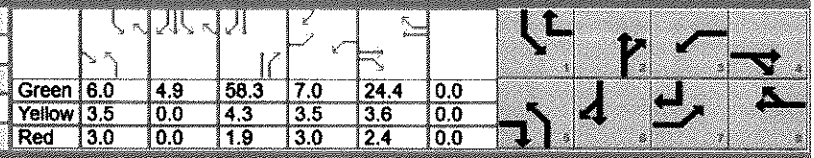
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	4	5	78	49	418	28	1267	65	201	792	454

Signal Information			
Cycle, s	125.7	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	6.0	4.9	58.3	7.0	24.4	0.0	
Yellow	3.5	0.0	4.3	3.5	3.6	0.0	
Red	3.0	0.0	1.9	3.0	2.4	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.5	30.4	13.5	30.4	12.5	64.5	17.4	69.3
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (g_s), s	5.5	2.2	5.1	19.7	4.1	25.7	10.0	15.3
Green Extension Time (g_e), s	0.7	4.2	0.4	4.6	0.0	32.6	0.8	34.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.21	0.00	0.17

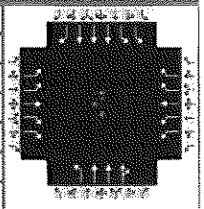
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	93	4	5	86	54	459	30	964	469	221	870	169
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1807	1689	1658	1585
Queue Service Time (g_s), s	3.5	0.2	0.2	3.1	3.0	17.7	2.1	23.7	23.7	8.0	13.3	6.6
Cycle Queue Clearance Time (g_c), s	3.5	0.2	0.2	3.1	3.0	17.7	2.1	23.7	23.7	8.0	13.3	6.6
Green Ratio (*g/C*)	0.06	0.19	0.24	0.06	0.19	0.28	0.05	0.46	0.46	0.09	0.50	0.56
Capacity (*c*), veh/h	183	368	688	186	368	786	84	1721	838	292	2499	885
Volume-to-Capacity Ratio (*X*)	0.509	0.012	0.008	0.460	0.146	0.584	0.360	0.560	0.560	0.756	0.348	0.191
Back of Queue (*Q*), ft/ln (95 th percentile)	73.4	5.1	2.9	65	63.9	258.3	42.8	371	356.9	163.1	218.2	102.5
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	0.2	0.1	2.5	2.6	10.2	1.7	14.5	14.3	6.3	8.4	4.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.22	0.51
Uniform Delay (d_1), s/veh	57.7	41.0	36.3	57.6	42.1	39.0	58.0	24.4	24.4	56.2	18.9	13.7
Incremental Delay (d_2), s/veh	3.7	0.0	0.0	2.4	0.3	1.1	0.8	0.3	0.7	4.0	0.1	0.1
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	0.0	0.0
Control Delay (*d*), s/veh	61.4	41.0	36.3	60.0	42.4	40.1	58.8	24.8	25.1	60.1	19.0	13.9
Level of Service (LOS)	E	D	D	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	59.2	E		43.1	D		25.6	C		25.5	C	
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.48	A	1.31	A	1.18	A

 HCS™ Streets Version 7.9.5 Generated: 12/23/2021 3:44:18 PM

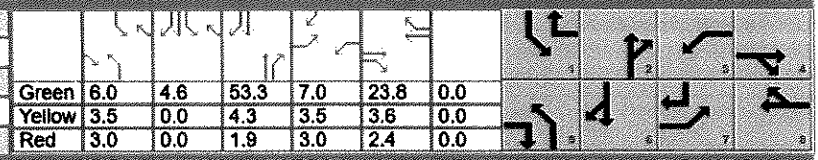
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 24 Preston NB.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	86	4	5	93	49	424	28	1299	79	204	618	461

Signal Information			
Cycle, s	119.9	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	6.0	4.6	53.3	7.0	23.8	0.0
Yellow	3.5	0.0	4.3	3.5	3.6	0.0
Red	3.0	0.0	1.9	3.0	2.4	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.5	29.8	13.5	29.8	12.5	59.5	17.1	64.1
Change Period, (*Y+R c*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (*g s*), s	5.3	2.2	5.6	19.0	3.8	22.7	9.8	15.7
Green Extension Time (*g e*), s	0.7	4.3	0.5	4.7	0.0	30.6	0.8	31.3
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.16	0.00	0.14

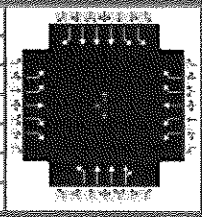
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	95	4	5	102	54	466	27	879	426	224	899	177
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1799	1689	1658	1585
Queue Service Time (*g s*), s	3.3	0.2	0.2	3.6	2.8	17.0	1.8	20.7	20.7	7.8	13.7	6.9
Cycle Queue Clearance Time (*g c*), s	3.3	0.2	0.2	3.6	2.8	17.0	1.8	20.7	20.7	7.8	13.7	6.9
Green Ratio (*g/C*)	0.06	0.20	0.25	0.06	0.20	0.29	0.05	0.44	0.44	0.09	0.48	0.54
Capacity (*c*), veh/h	192	377	708	195	377	805	88	1651	800	299	2404	859
Volume-to-Capacity Ratio (*X*)	0.492	0.012	0.008	0.523	0.143	0.579	0.302	0.532	0.533	0.749	0.374	0.206
Back of Queue (*Q*), ft/ln (95 th percentile)	70.2	4.8	2.7	74.1	60.2	248.8	35.5	330.5	317	156.7	223	106.3
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6	0.2	0.1	2.8	2.4	9.8	1.4	12.9	12.7	6.0	8.6	4.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.22	0.53
Uniform Delay (*d 1*), s/veh	54.8	38.7	34.0	54.9	39.7	36.6	55.0	24.2	24.2	53.4	19.5	14.2
Incremental Delay (*d 2*), s/veh	3.3	0.0	0.0	2.9	0.3	1.1	0.6	0.3	0.7	3.8	0.1	0.2
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	0.0	0.0
Control Delay (*d*), s/veh	58.1	38.7	34.0	57.8	40.0	37.7	55.6	24.6	24.9	57.1	19.7	14.4
Level of Service (LOS)	E	D	C	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	56.0	E		41.2	D		25.3	C		25.4	C	
Intersection Delay, s/veh / LOS	29.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.51	B	1.34	A	1.20	A

 HCS™ Streets Version 7.9.5 Generated: 12/23/2021 3:44:18 PM

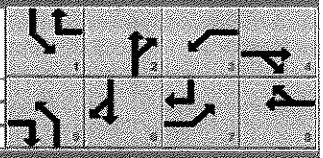
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jan 12, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 24 Preston B.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	86	10	5	95	49	424	28	1334	79	204	829	461

Signal Information					EB			WB			NB			SB		
Cycle, s	122.4	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	6.0	4.8		55.3	7.0	24.2	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0		4.3	3.5	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0		1.9	3.0	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.5	30.2	13.5	30.2	12.5	61.5	17.3	66.3
Change Period, (*Y+Rc*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (*gs*), s	5.4	2.6	5.7	19.4	3.8	23.6	9.9	16.0
Green Extension Time (*ge*), s	0.7	4.3	0.5	4.7	0.0	31.7	0.8	32.6
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.18	0.00	0.15

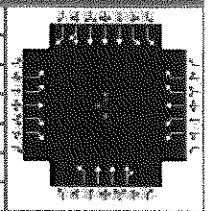
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	95	11	5	104	54	466	27	902	437	224	911	177
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1800	1689	1658	1585
Queue Service Time (*gs*), s	3.4	0.6	0.2	3.7	2.9	17.4	1.8	21.6	21.6	7.9	14.0	7.0
Cycle Queue Clearance Time (*gc*), s	3.4	0.6	0.2	3.7	2.9	17.4	1.8	21.6	21.6	7.9	14.0	7.0
Green Ratio (*g/C*)	0.06	0.20	0.25	0.06	0.20	0.29	0.05	0.45	0.45	0.09	0.49	0.55
Capacity (*c*), veh/h	188	375	703	191	375	802	86	1676	813	298	2441	868
Volume-to-Capacity Ratio (*X*)	0.502	0.029	0.008	0.546	0.143	0.581	0.309	0.538	0.538	0.753	0.373	0.204
Back of Queue (*Q*), ft/ln (95 th percentile)	71.9	12.3	2.8	77.8	61.7	253.9	36.4	343.3	329.3	160.5	227.7	107.2
Back of Queue (*Q*), veh/ln (95 th percentile)	2.7	0.5	0.1	3.0	2.5	10.0	1.4	13.4	13.2	6.2	8.8	4.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.23	0.54
Uniform Delay (*d1*), s/veh	56.1	39.7	34.9	56.2	40.6	37.5	56.3	24.3	24.4	54.6	19.5	14.1
Incremental Delay (*d2*), s/veh	3.5	0.0	0.0	3.3	0.3	1.1	0.6	0.3	0.7	3.9	0.1	0.2
Initial Queue 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
Control Delay (*d*), s/veh	59.6	39.7	34.9	59.5	40.9	38.6	56.9	24.7	25.0	58.4	19.6	14.3
Level of Service (LOS)	E	D	C	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	56.4	E		42.3	D		25.4	C		25.5	C	
Intersection Delay, s/veh / LOS	29.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.67	A	1.52	B	1.36	A	1.21	A

 HCS™ Streets Version 7.9.6 Generated: 1/12/2022 3:18:12 PM

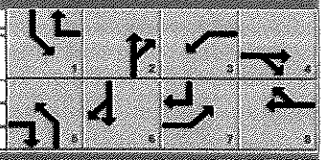
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	354	61	46	210	15	358	12	1176	214	707	1768	110

Signal Information					EB			WB			NB			SB		
Cycle, s	180.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	6.0	28.1		67.8	14.5	2.6	22.8					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	3.5		4.3	3.5	3.5	3.6					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.9	3.0	3.0	2.4					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.1	38.0	21.0	28.8	12.5	74.0	47.1	108.6
Change Period, (*Y+R c*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s	20.9	7.0	13.1	19.3	3.3		38.1	
Green Extension Time (*g e*), s	2.7	4.2	1.3	3.5	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.00	0.00	0.00	0.04	0.00		0.09	

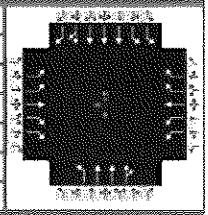
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	361	62	47	214	15	365	12	947	435	721	1804	112
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1733	1743	1870	1409
Queue Service Time (*g s*), s	18.9	5.0	2.4	11.1	1.3	17.3	1.3	38.6	38.2	36.1	15.5	2.7
Cycle Queue Clearance Time (*g c*), s	18.9	5.0	2.4	11.1	1.3	17.3	1.3	38.6	38.2	36.1	15.5	2.7
Green Ratio (*g/C*)	0.13	0.18	0.21	0.08	0.13	0.35	0.03	0.38	0.38	0.23	0.57	0.70
Capacity (*c*), veh/h	439	337	601	274	241	996	57	1420	653	805	4255	986
Volume-to-Capacity Ratio (*X*)	0.823	0.184	0.078	0.783	0.063	0.367	0.211	0.667	0.667	0.896	0.424	0.114
Back of Queue (*Q*), ft/ln (95 th percentile)	350.2	111.7	39.3	227.6	28.7	257.3	26.9	635.5	592.1	593.2	230.1	40.7
Back of Queue (*Q*), veh/ln (95 th percentile)	13.4	4.5	1.6	8.8	1.1	10.2	1.0	25.2	23.7	23.5	9.1	1.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.78	0.25	0.31	0.57	0.05	0.74	0.06	0.53	0.50	1.08	0.23	0.20
Uniform Delay (*d 1*), s/veh	76.2	62.9	57.0	81.2	69.2	43.4	87.5	49.7	48.5	67.1	11.2	4.8
Incremental Delay (*d 2*), s/veh	6.5	0.4	0.1	6.7	0.2	0.4	0.6	2.2	4.8	9.4	0.3	0.2
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	0.0	0.0
Control Delay (*d*), s/veh	82.7	63.3	57.1	87.9	69.3	43.7	88.1	51.9	53.3	76.5	11.6	5.0
Level of Service (LOS)	F	E	E	F	E	D	F	D	D	E	B	A
Approach Delay, s/veh / LOS	77.6	E		60.3	E		52.7	D		29.1	C	
Intersection Delay, s/veh / LOS	43.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.75	C	2.99	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.26	A	1.47	A	1.28	A	1.58	B

 HCS™ Streets Version 7.9.5 Generated: 12/24/2021 3:50:03 PM

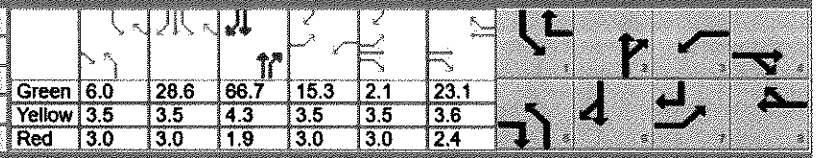
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 24 NB Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	360	62	46	225	15	364	12	1208	229	718	1807	112

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



	EB			WB			NB			SB		
Green	6.0	28.6		66.7	15.3	2.1	23.1					
Yellow	3.5	3.5		4.3	3.5	3.5	3.6					
Red	3.0	3.0		1.9	3.0	3.0	2.4					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.4	37.7	21.8	29.1	12.5	72.9	47.6	108.0
Change Period, (*Y+Rc*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	21.2	7.1	13.9	19.5	3.2		38.7	
Green Extension Time (g_e), s	2.7	4.3	1.4	3.6	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.01	0.00	0.00	0.04	0.00		0.14	

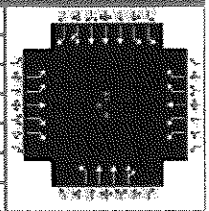
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	367	63	47	230	15	371	11	894	410	733	1844	114
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1728	1743	1870	1409
Queue Service Time (g_s), s	19.2	5.1	2.4	11.9	1.3	17.5	1.2	25.2	23.8	36.7	16.3	2.8
Cycle Queue Clearance Time (g_c), s	19.2	5.1	2.4	11.9	1.3	17.5	1.2	25.2	23.8	36.7	16.3	2.8
Green Ratio (*g/C*)	0.13	0.18	0.21	0.09	0.13	0.36	0.03	0.37	0.37	0.23	0.57	0.70
Capacity (*c*), veh/h	445	334	596	290	244	1008	57	1398	640	815	4230	984
Volume-to-Capacity Ratio (*X*)	0.825	0.189	0.079	0.791	0.063	0.369	0.192	0.640	0.640	0.899	0.436	0.116
Back of Queue (*Q*), ft/ln (95 th percentile)	354.8	113.8	39.4	240.1	28.6	259.8	24.5	307.6	262.5	603.3	238.6	42.1
Back of Queue (*Q*), veh/ln (95 th percentile)	13.5	4.6	1.6	9.3	1.1	10.3	0.9	12.2	10.5	23.9	9.4	1.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.79	0.25	0.31	0.60	0.05	0.74	0.06	0.26	0.22	1.10	0.24	0.21
Uniform Delay (d_1), s/veh	76.0	63.2	57.2	80.8	69.0	42.9	87.5	23.7	21.3	66.9	11.6	4.9
Incremental Delay (d_2), s/veh	6.5	0.4	0.1	6.5	0.2	0.4	0.4	1.5	3.3	10.0	0.3	0.2
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	0.0	0.0
Control Delay (*d*), s/veh	82.5	63.6	57.3	87.3	69.1	43.3	87.9	25.2	24.6	76.9	12.0	5.1
Level of Service (LOS)	F	E	E	F	E	D	F	C	C	E	B	A
Approach Delay, s/veh / LOS	77.5	E		60.3	E		25.6	C		29.4	C	
Intersection Delay, s/veh / LOS	36.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.75	C	2.99	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.28	A	1.50	B	1.30	A	1.60	B

 HCS™ Streets Version 7.9.5 Generated: 12/24/2021 3:50:03 PM

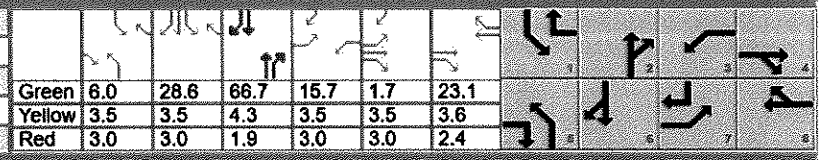
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jan 12, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 24 B Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	360	66	46	231	15	364	12	1229	229	716	1843	112

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	28.6	66.7	15.7	1.7	23.1						
Yellow	3.5	3.5	4.3	3.5	3.5	3.6						
Red	3.0	3.0	1.9	3.0	3.0	2.4						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.4	37.3	22.2	29.1	12.5	72.9	47.6	108.0
Change Period, (*Y+Rc*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*gs*), s	21.2	7.5	14.2	19.5	3.1		38.7	
Green Extension Time (*ge*), s	2.7	4.3	1.5	3.6	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.01	0.00	0.00	0.04	0.00		0.14	

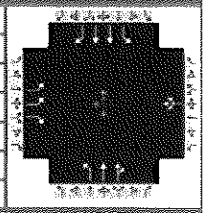
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	367	67	47	236	15	371	11	900	413	733	1881	114
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1730	1743	1870	1409
Queue Service Time (*gs*), s	19.2	5.5	2.4	12.2	1.3	17.5	1.1	25.7	24.3	36.7	16.8	2.8
Cycle Queue Clearance Time (*gc*), s	19.2	5.5	2.4	12.2	1.3	17.5	1.1	25.7	24.3	36.7	16.8	2.8
Green Ratio (*g/C*)	0.13	0.17	0.21	0.09	0.13	0.36	0.03	0.37	0.37	0.23	0.57	0.70
Capacity (*c*), veh/h	445	331	591	297	244	1008	57	1397	641	815	4229	984
Volume-to-Capacity Ratio (*X*)	0.825	0.204	0.079	0.794	0.063	0.369	0.191	0.644	0.645	0.899	0.445	0.116
Back of Queue (*Q*), ft/ln (95 th percentile)	354.8	121.7	39.5	244.8	28.6	259.8	24.3	314.5	265.6	603.3	243.2	42.2
Back of Queue (*Q*), veh/ln (95 th percentile)	13.5	4.9	1.6	9.5	1.1	10.3	0.9	12.5	10.6	23.9	9.6	1.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.79	0.27	0.32	0.61	0.05	0.74	0.06	0.26	0.22	1.10	0.24	0.21
Uniform Delay (*d1*), s/veh	76.0	63.6	57.5	80.6	68.9	42.9	87.5	24.1	21.6	66.9	11.7	4.9
Incremental Delay (*d2*), s/veh	6.5	0.4	0.1	6.5	0.2	0.4	0.4	1.5	3.3	10.0	0.3	0.2
Initial Queue 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
Control Delay (*d*), s/veh	82.5	64.1	57.6	87.1	69.1	43.3	87.9	25.6	24.9	76.9	12.0	5.1
Level of Service (LOS)	F	E	E	F	E	D	F	C	C	E	B	A
Approach Delay, s/veh / LOS	77.5	E		60.5	E		25.9	C		29.2	C	
Intersection Delay, s/veh / LOS	36.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.75	C	2.99	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.28	A	1.51	B	1.31	A	1.61	B

 HCS™ Streets Version 7.9.6 Generated: 1/12/2022 3:24:12 PM

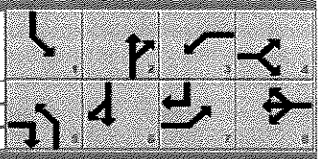
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	67		15	1	0	1	10	1315	3	1	721	152

Signal Information					EB			WB			NB		
Cycle, s	150.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	0.3	5.7		113.1	6.0	0.5	0.0		
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.5	0.0		4.3	3.6	3.6	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0		1.6	2.4	2.4	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		12.0		6.5	12.5	124.7	6.8	119.0
Change Period, (*Y+Rc*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	4.0	0.0
Queue Clearance Time (*gs*), s				2.2	3.0		2.1	
Green Extension Time (*ge*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				0.09	1.00		0.04	
Max Out Probability				0.00	0.00		0.00	

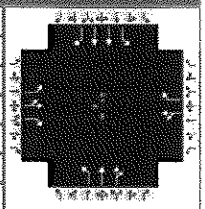
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	74		17		2		11	700	700	1	782	165
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661		1359		1704		1527	1856	1854	1810	1724	1585
Queue Service Time (*gs*), s	3.3		1.7		0.2		1.0	12.5	12.5	0.1	10.8	3.6
Cycle Queue Clearance Time (*gc*), s	3.3		1.7		0.2		1.0	12.5	12.5	0.1	10.8	3.6
Green Ratio (*g/C*)	0.04		0.08		0.00		0.04	0.79	0.79	0.00	0.75	0.79
Capacity (*c*), veh/h	133		109		6		61	1470	1468	3	2599	1258
Volume-to-Capacity Ratio (*X*)	0.560		0.153		0.368		0.174	0.477	0.477	0.338	0.301	0.131
Back of Queue (*Q*), ft/ln (95 th percentile)	68.7		31.4		4.8		21.6	138.8	135.5	3.8	158.9	43.6
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6		1.1		0.2		0.7	5.4	5.4	0.2	6.1	1.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17		0.52		0.00		0.09	0.00	0.00	0.04	0.00	0.15
Uniform Delay (*d1*), s/veh	70.7		64.3		74.6		71.7	2.8	2.8	74.8	5.9	3.6
Incremental Delay (*d2*), s/veh	3.7		0.6		13.3		0.9	0.8	0.8	49.9	0.3	0.2
Initial Queue Delay (*d3*), s/veh	0.0		0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	74.4		64.9		87.9		72.6	3.6	3.6	124.7	6.2	3.8
Level of Service (LOS)	E		E		F		E	A	A	F	A	A
Approach Delay, s/veh / LOS	72.6		E	87.9		F	4.1		A	5.9		A
Intersection Delay, s/veh / LOS	7.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.62	B	2.05	B
Bicycle LOS Score / LOS		F	0.49	A	1.70	B	1.29	A

 HCS™ Streets Version 7.9.5 Generated: 12/23/2021 3:44:18 PM

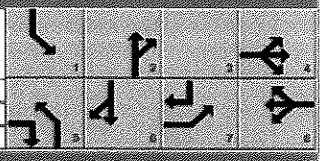
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 24 Preston NB.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	24	15	190	13	1	10	1300	137	125	635	155

Signal Information					EB			WB			NB		
Cycle, s	150.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	6.0	0.9		83.6	7.9	20.7	0.0		
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.5	3.5		4.3	3.6	3.6	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.6	2.4	2.4	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		13.9		26.7	12.5	89.5	19.9	96.9
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s		7.6		20.3	3.0		13.0	
Green Extension Time (*g e*), s		0.3		0.4	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.00	0.00		0.00	

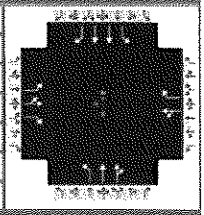
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	64	27	17		226	1	10	710	691	135	688	168
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359		1815	1610	1527	1856	1793	1810	1724	1585
Queue Service Time (*g s*), s	5.6	2.0	1.7		18.3	0.1	1.0	33.2	32.7	11.0	14.7	6.1
Cycle Queue Clearance Time (*g c*), s	5.6	2.0	1.7		18.3	0.1	1.0	33.2	32.7	11.0	14.7	6.1
Green Ratio (*g/C*)	0.05	0.05	0.09		0.14	0.14	0.04	0.56	0.56	0.09	0.61	0.66
Capacity (*c*), veh/h	90	100	126		251	222	61	1034	999	162	2092	1045
Volume-to-Capacity Ratio (*X*)	0.715	0.267	0.132		0.900	0.005	0.160	0.687	0.692	0.836	0.329	0.161
Back of Queue (*Q*), ft/ln (95 th percentile)	125.6	45.2	30.8		335.3	1.6	20	405.2	368.7	228.4	242.6	93.4
Back of Queue (*Q*), veh/ln (95 th percentile)	4.8	1.8	1.1		13.4	0.1	0.7	15.8	14.7	9.1	9.3	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00	0.51		0.00	0.00	0.08	0.00	0.00	2.28	0.00	0.31
Uniform Delay (*d 1*), s/veh	69.9	68.3	62.5		63.6	55.8	72.4	15.0	14.2	67.2	14.5	9.7
Incremental Delay (*d 2*), s/veh	10.1	1.4	0.5		4.7	0.0	0.8	2.5	2.6	10.0	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	80.0	69.7	63.0		68.3	55.8	73.2	17.5	16.9	77.2	14.9	10.0
Level of Service (LOS)	F	E	E		E	E	E	B	B	E	B	B
Approach Delay, s/veh / LOS	74.8	E		68.2	E		17.5	B		22.6	C	
Intersection Delay, s/veh / LOS	25.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.67	A	0.86	A	1.81	B	1.33	A

 HCS™ Streets Version 7.9.5 Generated: 12/23/2021 3:44:18 PM

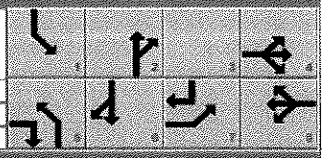
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jan 12, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 24 Preston B.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	93	24	15	190	13	1	13	1300	137	125	647	155

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	0.9	80.1	11.4	20.7	0.0	
Yellow	3.5	3.5	4.3	3.6	3.6	0.0	
Red	3.0	3.0	1.6	2.4	2.4	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		17.4		26.7	12.5	86.0	19.9	93.4
Change Period, (*Y+Rc*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s		10.9		20.3	3.2		13.1	
Green Extension Time (g_e), s		0.5		0.4	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.00	0.00		0.00	

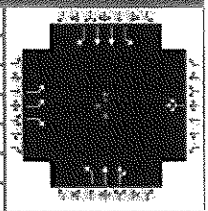
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	103	27	17		226	1	13	709	690	136	701	168
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359		1815	1610	1527	1856	1793	1810	1724	1585
Queue Service Time (g_s), s	8.9	2.0	1.6		18.3	0.1	1.2	37.0	36.3	11.1	16.0	6.1
Cycle Queue Clearance Time (g_c), s	8.9	2.0	1.6		18.3	0.1	1.2	37.0	36.3	11.1	16.0	6.1
Green Ratio (*g/C*)	0.08	0.08	0.12		0.14	0.14	0.04	0.53	0.53	0.09	0.58	0.66
Capacity (*c*), veh/h	130	144	157		251	222	61	990	957	162	2012	1045
Volume-to-Capacity Ratio (*X*)	0.796	0.185	0.106		0.900	0.005	0.207	0.716	0.720	0.836	0.349	0.161
Back of Queue (*Q*), ft/ln (95 th percentile)	199.6	43.3	29.8		335.3	1.6	26	473.9	429.6	228.4	261.9	93.5
Back of Queue (*Q*), veh/ln (95 th percentile)	7.6	1.7	1.0		13.4	0.1	0.9	18.5	17.2	9.1	10.0	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.50	0.00	0.50		0.00	0.00	0.10	0.00	0.00	2.28	0.00	0.31
Uniform Delay (d_1), s/veh	68.2	65.0	59.4		63.6	55.8	72.3	18.2	17.1	67.2	16.3	9.7
Incremental Delay (d_2), s/veh	10.5	0.6	0.3		4.7	0.0	1.1	3.0	3.1	10.0	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	78.7	65.6	59.6		68.3	55.8	73.4	21.2	20.3	77.2	16.8	10.0
Level of Service (LOS)	E	E	E		E	E	E	C	C	E	B	B
Approach Delay, s/veh / LOS	74.1	E		68.2	E		21.2	C		23.8	C	
Intersection Delay, s/veh / LOS	28.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.73	A	0.86	A	1.82	B	1.34	A

 HCS™ Streets Version 7.9.6 Generated: 1/12/2022 3:18:12 PM

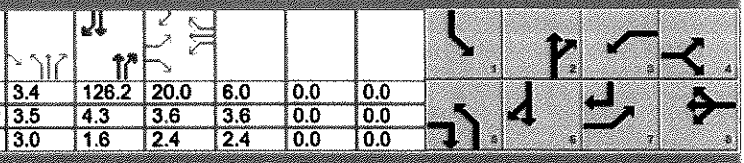
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	184		48	3	0	4	16	1222	2	0	1867	155

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	3.4	126.2	20.0	6.0	0.0	0.0
Yellow	3.5	4.3	3.6	3.6	0.0	0.0
Red	3.0	1.6	2.4	2.4	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		12.0	9.9	142.0	0.0	132.1
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	0.0	0.0
Queue Clearance Time (*g s*), s				2.7	3.6			
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	0.56			
Max Out Probability				0.00	0.00			

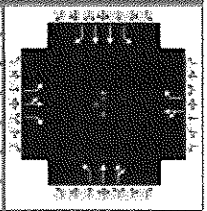
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	188		49		7		16	630	629	0	1846	153
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757		1610		1690		1810	1885	1884	1810	1781	1598
Queue Service Time (*g s*), s	9.0		4.9		0.7		1.6	19.9	19.9	0.0	61.1	3.8
Cycle Queue Clearance Time (*g c*), s	9.0		4.9		0.7		1.6	19.9	19.9	0.0	61.1	3.8
Green Ratio (*g/C*)	0.11		0.13		0.03		0.02	0.76	0.76		0.70	0.81
Capacity (*c*), veh/h	390		209		56		34	1425	1425	1	2497	1298
Volume-to-Capacity Ratio (*X*)	0.481		0.234		0.127		0.486	0.442	0.442	0.000	0.739	0.118
Back of Queue (*Q*), ft/ln (95 th percentile)	183.7		91.7		14.6		37.6	268.5	266.1	0	788.8	48.1
Back of Queue (*Q*), veh/ln (95 th percentile)	7.3		3.7		0.6		1.5	10.7	10.6	0.0	31.1	1.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46		1.53		0.00		0.15	0.00	0.00	0.00	0.00	0.16
Uniform Delay (*d 1*), s/veh	75.1		70.3		84.5		88.8	6.9	6.9	0.0	19.0	3.7
Incremental Delay (*d 2*), s/veh	0.9		0.6		0.4		7.5	0.7	0.7	0.0	1.5	0.1
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
Control Delay (*d*), s/veh	76.0		70.9		84.8		96.3	7.6	7.6	0.0	20.5	3.8
Level of Service (LOS)	E		E		F		F	A	A		C	A
Approach Delay, s/veh / LOS	75.0	E		84.8	F		8.8	A		19.2	B	
Intersection Delay, s/veh / LOS	19.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.64	B	2.07	B
Bicycle LOS Score / LOS		F	0.50	A	1.53	B	2.19	B

 HCS™ Streets Version 7.9.5 Generated: 12/24/2021 3:50:03 PM

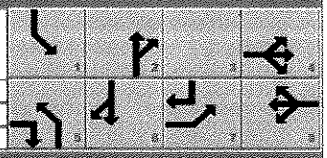
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 24 NB Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	171	28	48	221	12	4	16	1248	82	159	1758	158

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.0	3.3	92.2	20.0	25.5	0.0	
Yellow	3.5	3.5	4.3	3.6	3.6	0.0	
Red	3.0	3.0	1.6	2.4	2.4	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		31.5	14.5	98.1	24.4	108.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		11.8		25.1	3.5		17.6	
Green Extension Time (g_e), s		0.8		0.4	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.00	0.00		0.00	

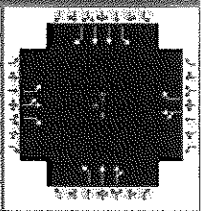
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	105	98	49		238	4	15	636	624	157	1738	156
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1836	1610		1814	1610	1810	1885	1844	1810	1781	1598
Queue Service Time (g_s), s	9.8	9.1	4.8		23.1	0.4	1.5	41.7	40.6	15.6	72.3	5.0
Cycle Queue Clearance Time (g_c), s	9.8	9.1	4.8		23.1	0.4	1.5	41.7	40.6	15.6	72.3	5.0
Green Ratio (*g/C*)	0.11	0.11	0.16		0.15	0.15	0.04	0.51	0.51	0.10	0.57	0.68
Capacity (*c*), veh/h	211	204	250		267	228	80	966	945	190	2019	1083
Volume-to-Capacity Ratio (*X*)	0.496	0.482	0.196		0.889	0.018	0.188	0.659	0.660	0.830	0.861	0.144
Back of Queue (*Q*), ft/ln (95 th percentile)	202.6	193.4	88.5		408.8	7.2	31.4	606.4	566.5	307.4	965.9	74.2
Back of Queue (*Q*), veh/ln (95 th percentile)	8.1	7.7	3.5		16.4	0.3	1.3	24.1	22.7	12.3	38.0	2.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.51	0.00	1.47		0.00	0.00	0.13	0.00	0.00	3.07	0.00	0.25
Uniform Delay (d_1), s/veh	74.5	74.7	66.2		75.3	66.4	83.8	27.7	26.0	87.5	29.5	7.9
Incremental Delay (d_2), s/veh	1.8	1.8	0.4		4.0	0.0	0.8	2.5	2.6	3.1	4.5	0.2
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	0.0
Control Delay (*d*), s/veh	76.3	76.4	66.6		79.3	66.5	84.6	30.2	28.6	90.6	34.0	8.1
Level of Service (LOS)	E	E	E		E	E	F	C	C	F	C	A
Approach Delay, s/veh / LOS	74.5	E		79.1	E		30.1	C		36.4	D	
Intersection Delay, s/veh / LOS	39.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.90	A	0.89	A	1.62	B	2.23	B

 HCS™ Streets Version 7.9.6 Generated: 12/24/2021 3:50:03 PM

HCS7 Signalized Intersection Results Summary

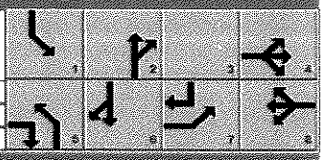
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jan 12, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 24 B Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192	28	48	221	12	4	28	1248	82	159	1784	158

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

	EB			WB			NB			SB		
Green	8.0	3.6		92.0	20.0	25.5	0.0					
Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Red	3.0	3.0		1.6	2.4	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		31.5	14.5	97.9	24.6	108.0
Change Period, (*Y+Rc*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	3.0	0.0
Queue Clearance Time (*gs*), s		13.0		25.1	4.6		17.9	
Green Extension Time (*ge*), s		0.9		0.4	0.1	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		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	118	107	49		238	4	26	631	618	160	1774	159
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1834	1610		1814	1610	1810	1885	1844	1810	1781	1598
Queue Service Time (*gs*), s	11.0	9.9	4.8		23.1	0.4	2.6	41.3	40.2	15.9	75.4	5.1
Cycle Queue Clearance Time (*gc*), s	11.0	9.9	4.8		23.1	0.4	2.6	41.3	40.2	15.9	75.4	5.1
Green Ratio (*g/C*)	0.11	0.11	0.16		0.15	0.15	0.04	0.51	0.51	0.11	0.57	0.68
Capacity (*c*), veh/h	211	204	250		267	228	80	963	942	192	2019	1083
Volume-to-Capacity Ratio (*X*)	0.557	0.525	0.196		0.889	0.018	0.327	0.655	0.656	0.832	0.878	0.147
Back of Queue (*Q*), ft/ln (95 th percentile)	223.9	207.6	88.5		408.8	7.2	55.1	601.5	561.8	310.5	1006.1	74.9
Back of Queue (*Q*), veh/ln (95 th percentile)	9.0	8.3	3.5		16.4	0.3	2.2	23.9	22.5	12.4	39.6	3.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.56	0.00	1.47		0.00	0.00	0.22	0.00	0.00	3.11	0.00	0.25
Uniform Delay (*d1*), s/veh	75.1	75.1	66.2		75.3	66.4	84.3	27.7	26.1	87.1	30.1	7.9
Incremental Delay (*d2*), s/veh	2.3	2.1	0.4		4.0	0.0	1.7	2.5	2.5	3.1	5.2	0.3
Initial Queue 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
Control Delay (*d*), s/veh	77.4	77.1	66.6		79.3	66.5	86.0	30.2	28.6	90.3	35.2	8.1
Level of Service (LOS)	E	E	E		E	E	F	C	C	F	D	A
Approach Delay, s/veh / LOS	75.4	E		79.1	E		30.6	C		37.4	D	
Intersection Delay, s/veh / LOS	40.4						D					

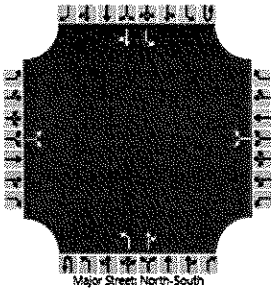
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.94	A	0.89	A	1.63	B	2.24	B

 HCS™ Streets Version 7.9.6 Generated: 1/12/2022 3:24:12 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	D8Z	Intersection	Herr Lane at Wesboro
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/30/2020	East/West Street	Wesboro
Analysis Year	2025	North/South Street	Herr Lane
Time Analyzed	PM Peak Build	Peak Hour Factor	0.94
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Providence Point		

Lanes



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	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		10		17		21		25		26	536	45		64	690	8
Percent Heavy Vehicles (%)		0		0		0		4		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.24		4.10				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.34		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			29				49			28				68		
Capacity, c (veh/h)			291				421			874				972		
v/c Ratio			0.10				0.12			0.03				0.07		
95% Queue Length, Q_{95} (veh)			0.3				0.4			0.1				0.2		
Control Delay (s/veh)			18.7				14.7			9.3				9.0		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		18.7				14.7				0.4				0.8		
Approach LOS		C				B										

HCS™ TWSC Version 7.9
Wesboro PM 25 B.xtw

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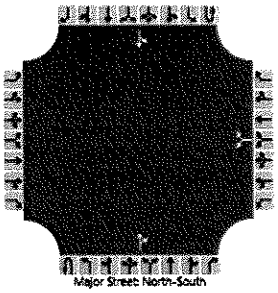
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Herr Lane at Wesboro
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	7/23/2020	East/West Street	Wesboro
Analysis Year	2035	North/South Street	Herr Lane
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.94
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Providence Point		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						21		25			535	45		64	707	
Percent Heavy Vehicles (%)						0		4						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)						6.40		6.24						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.34						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							49							68		
Capacity, c (veh/h)							269							973		
v/c Ratio							0.18							0.07		
95% Queue Length, Q_{95} (veh)							0.7							0.2		
Control Delay (s/veh)							21.4							9.0		
Level of Service (LOS)							C							A		
Approach Delay (s/veh)							21.4							1.7		
Approach LOS							C									

HCS™ TWSC Version 7.8.5
Wesboro PM 35 NB.xtw

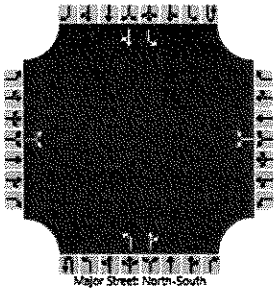
Generated: 7/23/2020 1:00:11 PM

HCS7 Two-Way Stop-Control Report

General Information

Analyst	DBZ	Intersection	Herr Lane at Wesboro
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/30/2020	East/West Street	Wesboro
Analysis Year	2035	North/South Street	Herr Lane
Time Analyzed	PM Peak Build	Peak Hour Factor	0.94
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Providence Point		

Lanes



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	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		10		17		21		25		26	562	45		64	734	8
Percent Heavy Vehicles (%)		0		0		0		4		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.24		4.10				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.34		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			29				49			28				68		
Capacity, c (veh/h)			273				392			839				949		
v/c Ratio			0.11				0.12			0.03				0.07		
95% Queue Length, Q_{95} (veh)			0.3				0.4			0.1				0.2		
Control Delay (s/veh)			19.7				15.5			9.4				9.1		
Level of Service (LOS)			C				C			A				A		
Approach Delay (s/veh)		19.7				15.5				0.4				0.7		
Approach LOS		C				C										

HCS™ TWSC Version 7.9
Wesboro PM 35 B.xtw

Generated: 10/30/2020 3:42:18 PM

final report

December 22, 2021

Traffic Impact Study

Apartments
Old Preston Highway (KY 6304)
Louisville, KY

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet

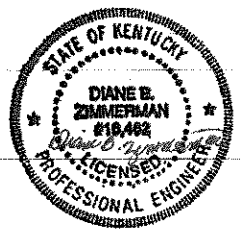


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Table of Contents

INTRODUCTION

The development plan for apartments on Old Preston Highway shows 174 apartment units. **Figure 1** displays a map of the site. Access to the development will be on Old Preston Highway. The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study the impact area was defined to be the Old Preston Highway and Maple Springs Drive and the proposed entrance. Additionally, Louisville Metro requested analysis of the Preston Highway intersections with Commerce Crossings Drive and Interchange Drive, as an update to the traffic impact study dated October 7, 2021.

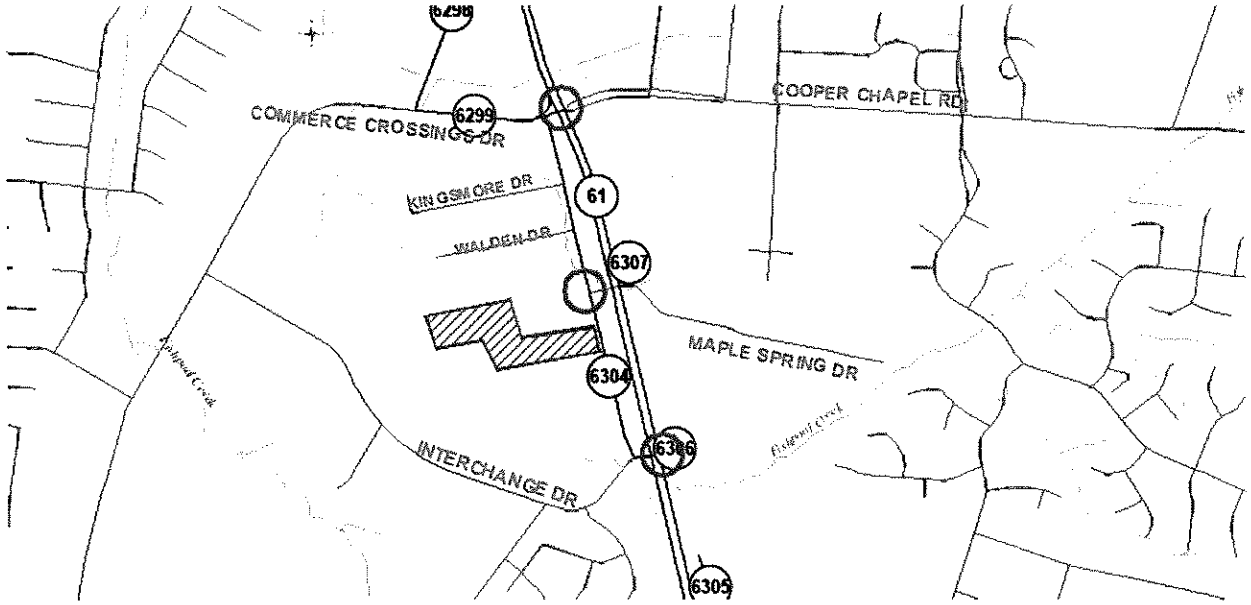

Figure 1. Site Map

EXISTING CONDITIONS

Old Preston Highway, KY 6304, is a state-maintained road with an estimated 2021 ADT of 400 vehicles per day between Commerce Crossing Drive and Interchange Drive, as provided by the Kentucky Transportation Cabinet at station 042. The road is a two-lane highway with ten-foot lanes, a one-foot shoulder (provided by the Kentucky Transportation Cabinet). The speed limit is 35 mph. There are no sidewalks. The intersection with Maple Spring Drive is controlled with a stop sign on Maple Spring Drive.

Peak hour traffic count for the intersection was obtained on Tuesday, August 24, 2021. The a.m. peak hour occurred between 7:15 and 8:15 and the p.m. occurred between 4:45 and 5:45. **Figure 2** illustrates the existing a.m. and p.m. peak hour traffic volumes. The Preston Highway counts were made April 13, 2021. **Figure 3** illustrates the Preston Highway peak hour volumes. The Appendix contains the full count data.

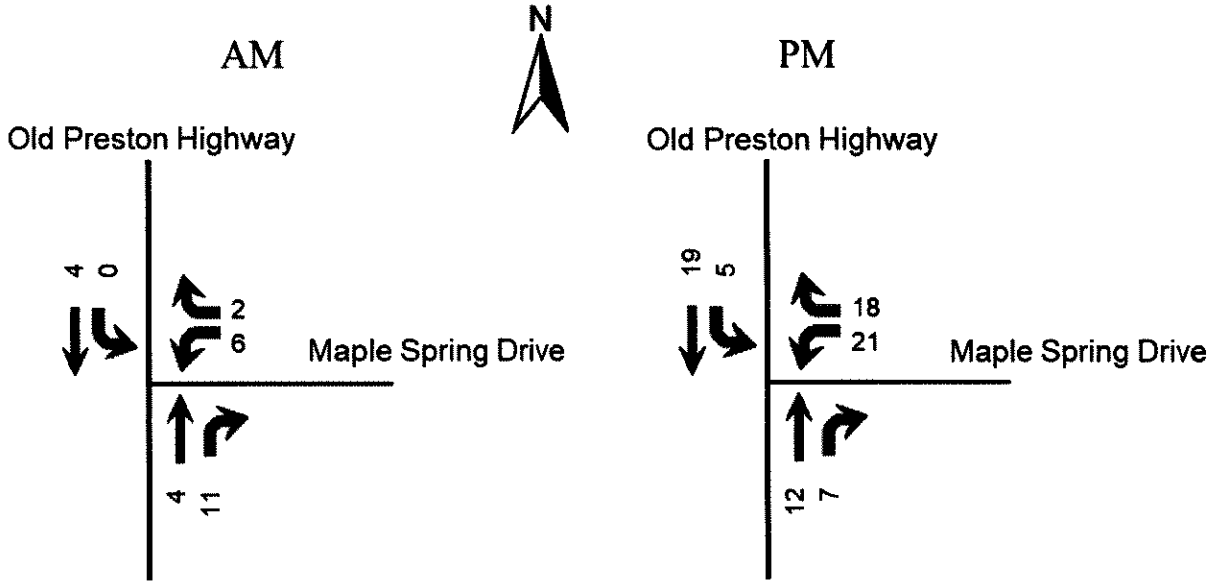

Figure 2. Existing Peak Hour Volumes Old Preston

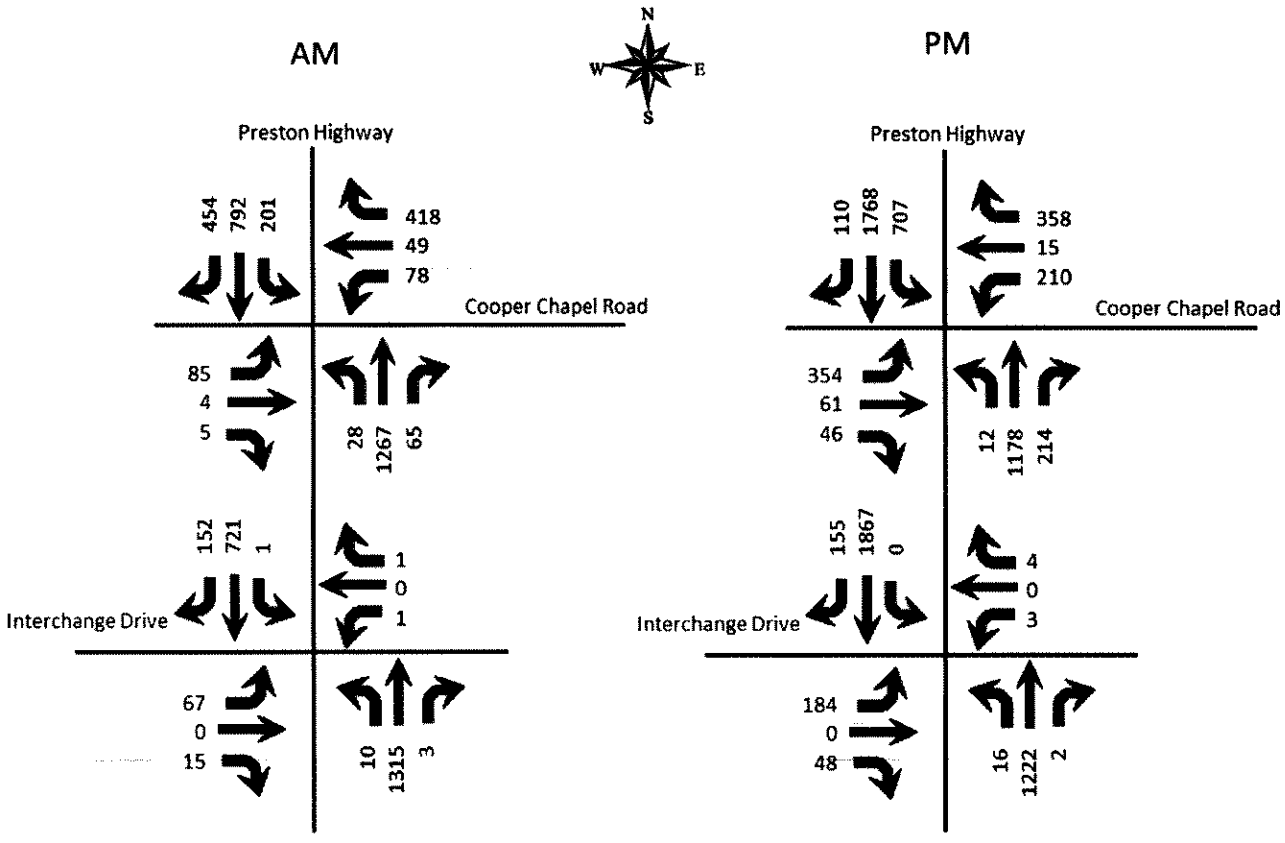

Figure 3. Existing Peak Hour Volumes Preston Highway

FUTURE CONDITIONS

The project completion date is 2024. An annual growth rate of 1.0 percent was applied to the 2021 volumes on Old Preston Highway. **Figure 4** displays the 2024 No Build peak hour volumes. For Preston Highway one half percent annual growth in traffic was added to the 2021 volumes as well as the trip generation from the proposed Thornton's and Chick Fil A. The no build volumes in **Figure 5** are the build volumes from the previously mention October 7, 2021 traffic impact study, plus the growth rate to arrive at 2024 from 2022.

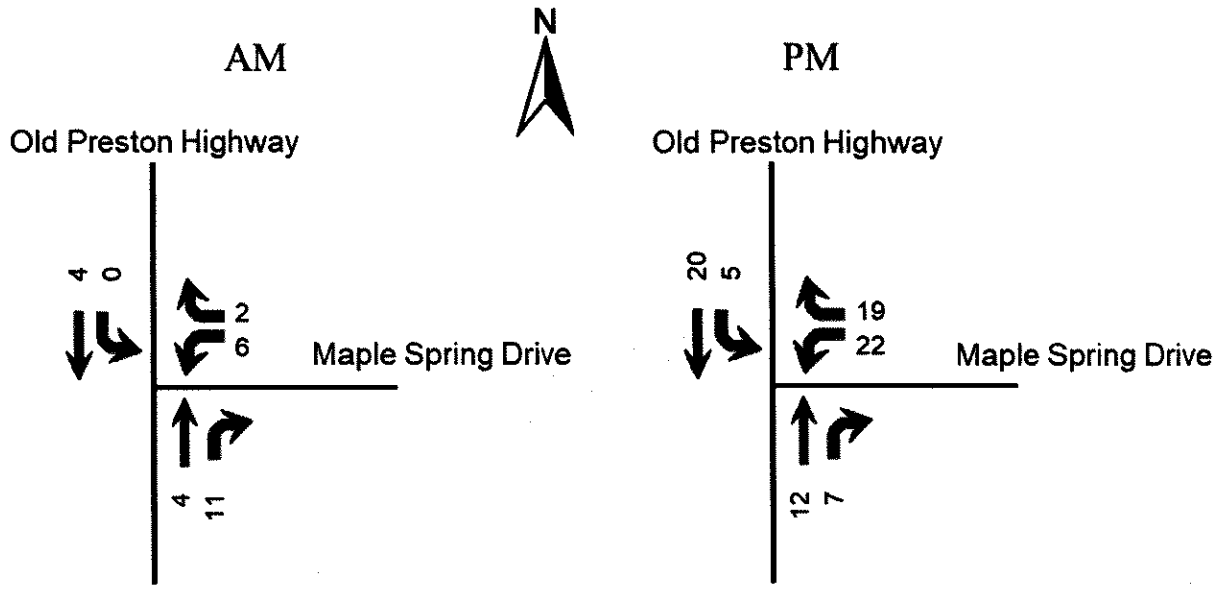

Figure 4. 2024 No Build Peak Hour Volumes Old Preston

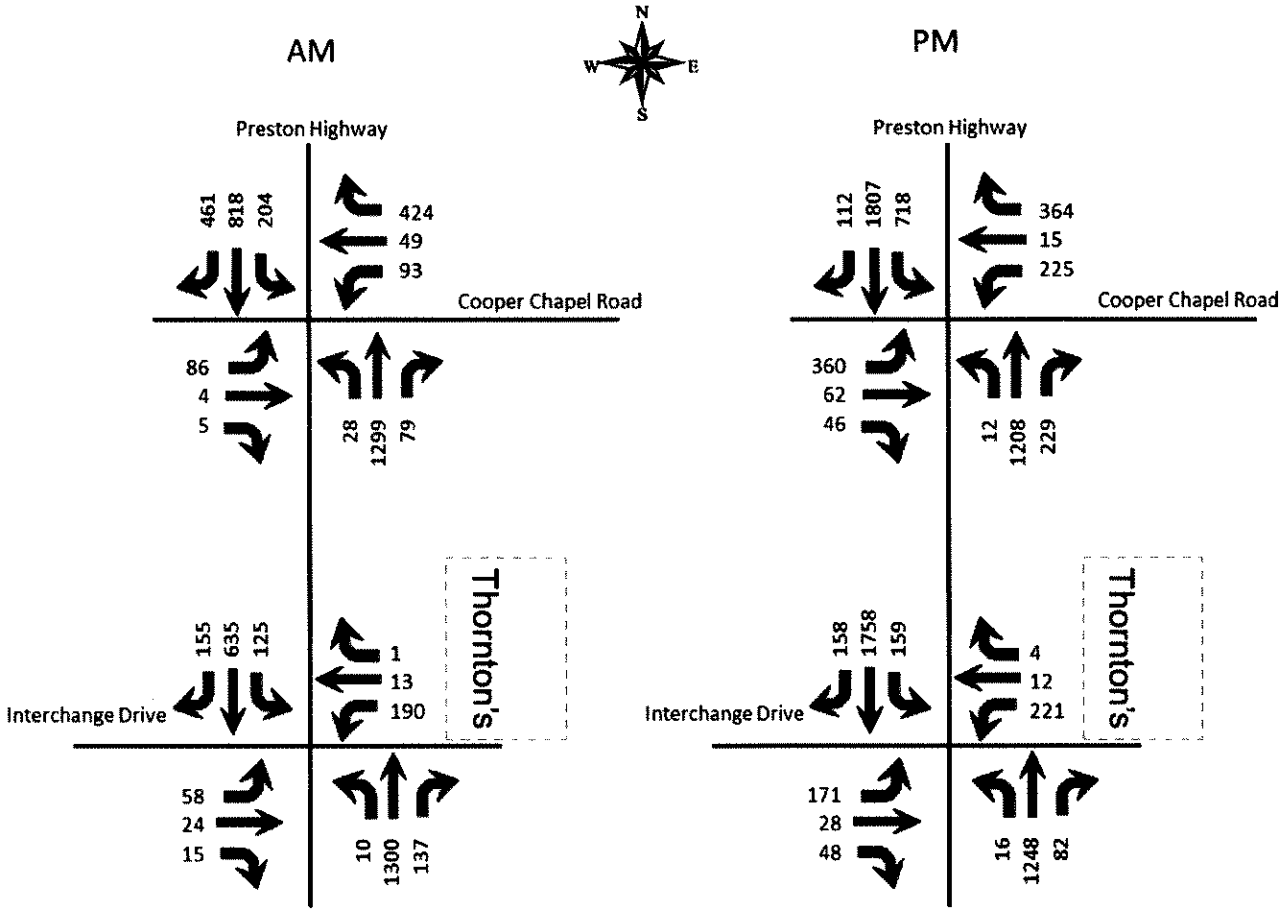

Figure 5. 2024 No Build Peak Hour Volumes Preston Highway

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 11th Edition contains trip generation rates for a wide range of developments. The land use of "Multi-family (Low-Rise) (220)" was reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The trips were assigned to the highway network with the percentages shown in **Figure 6**. **Figure 7** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figures 8 and 9** display the individual turning movements for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour			P.M. Peak Hour		
Land Use	**Trips**	**In**	**Out**	**Trips**	**In**	**Out**
Multi-family (Mid-Rise) 174 units	77	18	59	95	60	35

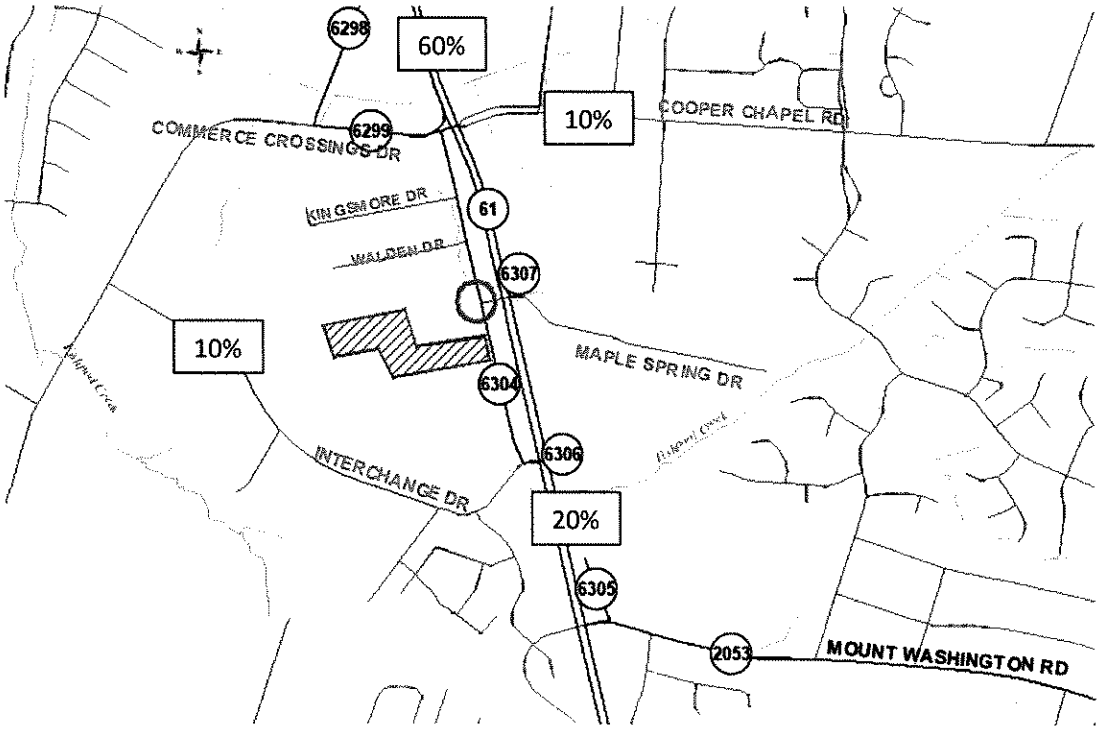

Figure 6. Trip Distribution Percentages

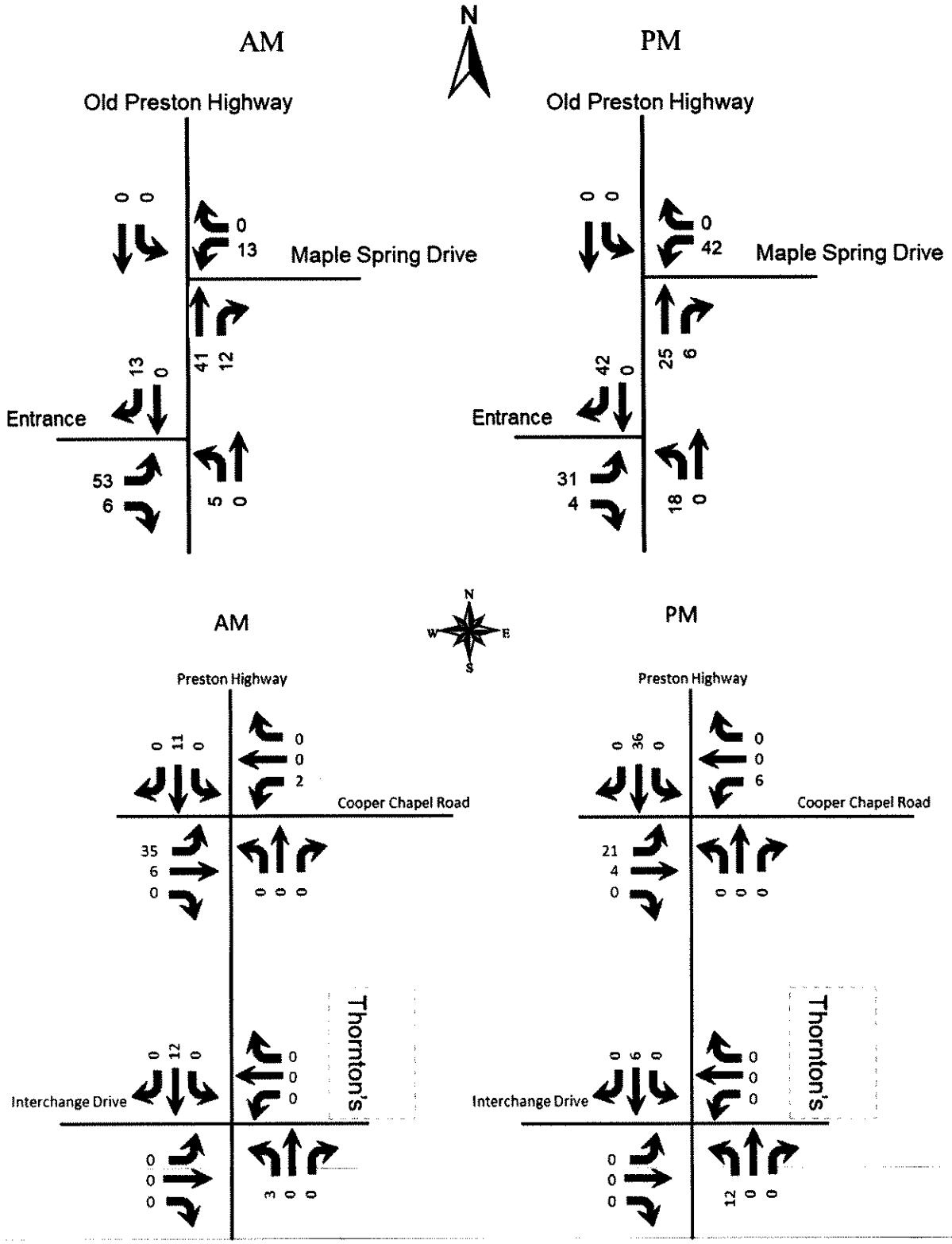

Figure 7. Peak Hour Trips Generated by Site

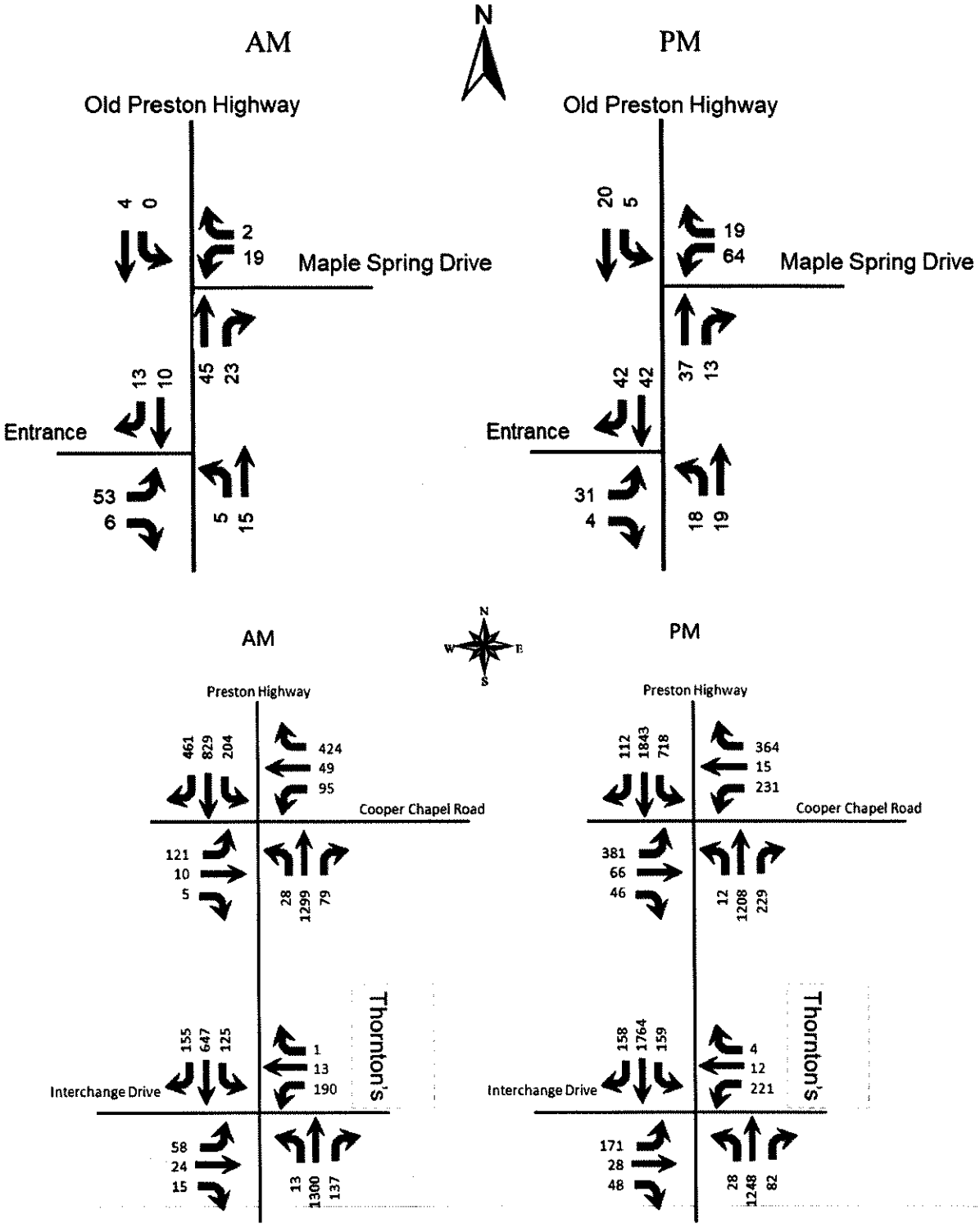

Figure 8. 2025 Build Peak Hour Volumes

ANALYSIS

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a "Level of Service". Level of Service is a ranking scale from A through F, "A" is the best operating condition and "F" is the worst. Level of Service results depend upon the facility that is analyzed. In this case, the Level of Service is based upon the total delay experienced for lanes at stop-controlled intersections.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 6th edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 7.9.5) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2021 Existing	2024 No Build	2024 Build	2021 Existing	2024 No Build	2024 Build
Old Preston at Maple Spring Drive						
Maple Spring Drive Westbound	A 8.7	A 8.7	A 9.0	A 8.8	A 8.8	A 9.3
Old Preston Southbound	A 7.2	A 7.2	A 7.4	A 7.2	A 7.2	A 7.3
Old Preston at Entrance						
Entrance Eastbound			A 9.0			A 9.3
Old Preston Northbound (left)			A 7.3			A 7.4
Preston Highway at Cooper Chapel Road	**C 29.6**	**C 29.2**	**C 30.2**	**D 43.6**	**D 36.6**	**D 37.1**
Commerce Crossings Eastbound	E 59.2	E 56.0	E 58.1	E 77.6	E 77.5	E 76.9
Cooper Chapel Road Westbound	D 43.1	D 41.2	D 42.0	E 60.3	E 60.3	E 60.6
Preston Highway Northbound	C 25.6	C 25.3	C 25.9	D 52.7	C 25.6	C 25.8
Preston Highway Southbound	C 25.5	C 25.4	C 25.9	C 29.1	C 29.4	C 29.8
Preston Highway at Interchange Drive	**A 7.4**	**C 25.8**	**C 26.0**	**B 19.3**	**D 39.5**	**D 40.1**
Interchange Drive Eastbound	E 72.6	E 74.8	E 74.8	E 75.0	E 74.5	E 74.5
Entrance Westbound	F 87.9	F 68.2	E 68.2	F 84.8	E 79.1	E 79.1
Preston Highway Northbound	A 4.1	B 17.5	B 18.0	A 8.8	C 30.1	C 30.6
Preston Highway Southbound	A 5.9	C 22.6	C 22.5	B 19.2	D 36.4	D 37.2

Key: Level of Service, Delay in seconds per vehicle

The entrance was evaluated for turn lanes using the Kentucky Transportation Cabinet Highway Design Guidance Manual dated July, 2020. The volume warrant is not met for turn lanes at the entrance.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2024 there will be a slight impact to the existing highway network. No improvements are needed to the roadway network to mitigate the impact.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
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Jefferson County, KY

Site 1 of 1
Old Preston Hwy (South)
Old Preston Hwy (North)

Maple Spring Dr

Date
Tuesday, August 24, 2021

Lat/Long
38.099733°, -85.671889°

Weather
Fair
87°F

0700 - 0900 (Weekday 2h Session) (08-24-2021)
All vehicles

	Northbound				Southbound				Westbound				
	Old Preston Hwy (South)				Old Preston Hwy (North)				Maple Spring Dr				
TIME	Thru 1.1	Right 1.2	U-Turn 1.3	App Total	Left 1.4	Thru 1.5	U-Turn 1.6	App Total	Left 1.7	Right 1.8	U-Turn 1.9	App Total	Int Total
0700 - 0715	1	3	0	4	0	2	0	2	0	0	0	0	6
0715 - 0730	2	2	0	4	0	0	0	0	0	1	0	1	5
0730 - 0745	1	3	0	4	0	2	0	2	2	0	0	2	8
0745 - 0800	0	1	0	1	0	4	0	4	3	1	0	4	9
Hourly Total	4	9	0	13	0	8	0	8	5	2	0	7	28
0800 - 0815	1	5	0	6	0	0	0	0	1	0	0	1	7
0815 - 0830	0	3	0	3	0	0	0	0	0	0	0	0	3
0830 - 0845	1	4	0	5	0	1	0	1	0	0	0	0	6
0845 - 0900	2	4	0	6	1	1	0	2	0	0	0	0	8
Hourly Total	4	16	0	20	1	2	0	3	1	0	0	1	24
Grand Total	8	25	0	33	1	10	0	11	6	2	0	8	52
Approach %	24.24	75.76	0.00	-	9.09	90.91	0.00	-	75.00	25.00	0.00	-	
Intersection %	15.38	48.08	0.00	63.46	1.92	19.23	0.00	21.15	11.54	3.85	0.00	15.38	
PHF	0.50	0.55	0.00	0.63	0.00	0.38	0.00	0.38	0.50	0.50	0.00	0.50	0.81

1600 - 1800 (Weekday 2h Session) (08-24-2021)
All vehicles

	Northbound				Southbound				Westbound				
	Old Preston Hwy (South)				Old Preston Hwy (North)				Maple Spring Dr				
TIME	Thru 1.1	Right 1.2	U-Turn 1.3	App Total	Left 1.4	Thru 1.5	U-Turn 1.6	App Total	Left 1.7	Right 1.8	U-Turn 1.9	App Total	Int Total
1600 - 1615	1	2	0	3	2	6	0	8	2	7	0	9	20
1615 - 1630	4	5	0	9	0	4	0	4	3	2	0	5	18
1630 - 1645	1	2	0	3	0	3	0	3	1	4	0	5	11
1645 - 1700	3	1	0	4	2	3	0	5	8	5	0	13	22
Hourly Total	9	10	0	19	4	16	0	20	14	18	0	32	71
1700 - 1715	1	2	0	3	1	3	0	4	5	6	0	11	18
1715 - 1730	3	0	0	3	2	6	0	8	4	4	0	8	19
1730 - 1745	5	4	0	9	0	7	0	7	4	3	0	7	23
1745 - 1800	6	1	0	7	0	5	0	5	3	0	0	3	15
Hourly Total	15	7	0	22	3	21	0	24	16	13	0	29	75
Grand Total	24	17	0	41	7	37	0	44	30	31	0	61	146
Approach %	58.54	41.46	0.00	-	15.91	84.09	0.00	-	49.18	50.82	0.00	-	
Intersection %	16.44	11.64	0.00	28.08	4.79	25.34	0.00	30.14	20.55	21.23	0.00	41.78	
PHF	0.60	0.44	0.00	0.53	0.63	0.68	0.00	0.75	0.66	0.75	0.00	0.75	0.89

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
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Preston Highway, KY

Site 1 of 3
KY-61 Preston Hwy (South)
KY-61 Preston Hwy (North)
Commerce Crossings Dr
Cooper Chapel Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.103518°, -85.672625°

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Commerce Crossings Dr					Cooper Chapel Rd					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Left 1.5	Thru 1.6	Right 1.7	U-Turn 1.8	App Total	Left 1.9	Thru 1.10	Right 1.11	U-Turn 1.12	App Total	Left 1.13	Thru 1.14	Right 1.15	U-Turn 1.16	App Total	Int Total
0700 - 0715	2	306	13	0	321	25	144	88	1	258	20	0	2	0	22	15	9	130	0	154	755
0715 - 0730	8	327	16	0	351	34	189	86	1	310	23	1	2	0	26	16	8	109	0	133	820
0730 - 0745	5	365	19	0	389	56	191	93	0	340	24	1	1	0	26	9	14	117	0	140	895
0745 - 0800	10	298	15	0	323	59	221	173	0	453	13	1	1	0	15	24	16	97	0	137	928
Hourly Total	25	1296	63	0	1384	174	745	440	2	1361	80	3	6	0	89	64	47	453	0	564	3398
0800 - 0815	5	277	15	0	297	52	191	102	0	345	25	1	1	0	27	29	11	95	0	135	804
0815 - 0830	6	259	18	0	283	54	155	67	0	276	15	1	3	0	19	21	3	82	0	106	684
0830 - 0845	4	267	26	0	297	39	187	59	0	285	15	5	2	0	22	28	3	106	0	137	741
0845 - 0900	6	253	25	0	284	44	199	51	0	294	28	3	3	0	34	38	7	84	0	129	741
Hourly Total	21	1056	84	0	1161	189	732	279	0	1200	83	10	9	0	102	116	24	367	0	507	2970
Grand Total	46	2352	147	0	2545	363	1477	719	2	2561	163	13	15	0	191	180	71	820	0	1071	6368
Approach %	1.81	92.42	5.78	0.00	-	14.17	57.67	28.07	0.08	-	85.34	6.81	7.85	0.00	-	16.81	6.63	76.56	0.00	-	
Intersection %	0.72	36.93	2.31	0.00	39.97	5.70	23.19	11.29	0.03	40.22	2.56	0.20	0.24	0.00	3.00	2.83	1.11	12.88	0.00	16.82	
PHF	0.70	0.87	0.86	0.00	0.87	0.85	0.90	0.66	0.25	0.80	0.85	1.00	0.63	0.00	0.87	0.67	0.77	0.89	0.00	0.97	0.93

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Commerce Crossings Dr					Cooper Chapel Rd					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Left 1.5	Thru 1.6	Right 1.7	U-Turn 1.8	App Total	Left 1.9	Thru 1.10	Right 1.11	U-Turn 1.12	App Total	Left 1.13	Thru 1.14	Right 1.15	U-Turn 1.16	App Total	Int Total
1600 - 1615	1	297	49	0	347	173	436	46	2	657	97	12	8	0	117	45	5	116	0	166	1287
1615 - 1630	3	261	55	0	319	173	411	48	1	633	60	18	10	0	88	60	4	113	0	177	1217
1630 - 1645	4	313	57	0	374	159	380	35	2	576	120	22	17	0	159	45	4	93	1	143	1252
1645 - 1700	1	297	50	1	349	186	445	26	0	657	61	11	9	0	81	54	4	78	0	136	1223
Hourly Total	9	1168	211	1	1389	691	1672	155	5	2523	338	63	44	0	445	204	17	400	1	622	4979
1700 - 1715	2	272	51	0	325	156	454	39	0	649	122	15	14	0	151	56	6	87	0	149	1274
1715 - 1730	4	296	56	0	356	206	489	10	1	706	51	13	6	0	70	54	1	100	0	155	1287
1730 - 1745	5	300	47	0	352	158	435	28	1	622	60	8	7	0	75	62	1	109	0	172	1221
1745 - 1800	2	280	58	0	340	119	401	23	0	543	36	6	4	0	46	52	3	96	0	151	1080
Hourly Total	13	1148	212	0	1373	639	1779	100	2	2520	269	42	31	0	342	224	11	392	0	627	4862
Grand Total	22	2316	423	1	2762	1330	3451	255	7	5043	607	105	75	0	787	428	28	792	1	1249	9841
Approach %	0.80	83.85	15.31	0.04	-	26.37	68.43	5.06	0.14	-	77.13	13.34	9.53	0.00	-	34.27	2.24	63.41	0.08	-	
Intersection %	0.22	23.53	4.30	0.01	28.07	13.51	35.07	2.59	0.07	51.24	6.17	1.07	0.76	0.00	8.00	4.35	0.28	8.05	0.01	12.69	
PHF	0.69	0.94	0.94	0.25	0.94	0.86	0.90	0.71	0.38	0.92	0.73	0.69	0.68	0.00	0.72	0.93	0.63	0.90	0.25	0.94	0.98

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Preston Highway, KY

Site 2 of 3
KY-61 Preston Hwy (South)
KY-61 Preston Hwy (North)
Old Preston Hwy
Local Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.096348°, -85.670213°

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Old Preston Hwy					Local Rd					
TIME	Left 2.1	Thru 2.2	Right 2.3	U-Turn 2.4	App Total	Left 2.5	Thru 2.6	Right 2.7	U-Turn 2.8	App Total	Left 2.9	Thru 2.10	Right 2.11	U-Turn 2.12	App Total	Left 2.13	Thru 2.14	Right 2.15	U-Turn 2.16	App Total	Int Total
0700 - 0715	5	314	0	0	319	0	100	52	0	152	23	0	2	0	25	0	0	0	0	0	496
0715 - 0730	0	331	0	0	331	0	147	65	0	212	22	0	2	0	24	0	0	0	0	0	567
0730 - 0745	4	398	1	0	403	0	175	33	0	208	19	0	3	0	22	1	0	0	0	1	634
0745 - 0800	4	299	1	1	305	0	199	32	0	231	14	0	7	0	21	0	0	1	0	1	558
Hourly Total	13	1342	2	1	1358	0	621	182	0	803	78	0	14	0	92	1	0	1	0	2	2255
0800 - 0815	0	287	1	1	289	0	200	22	1	223	12	0	3	0	15	0	0	0	0	0	527
0815 - 0830	2	257	0	0	259	1	167	14	0	182	9	0	0	0	9	0	0	0	0	0	450
0830 - 0845	0	283	0	0	283	1	198	13	0	212	20	0	3	0	23	0	0	0	0	0	518
0845 - 0900	2	279	1	0	282	0	234	16	0	250	11	0	1	1	13	0	0	0	0	0	545
Hourly Total	4	1106	2	1	1113	2	799	65	1	867	52	0	7	1	60	0	0	0	0	0	2040
Grand Total	17	2448	4	2	2471	2	1420	247	1	1670	130	0	21	1	152	1	0	1	0	2	4295
Approach %	0.69	99.07	0.16	0.08	-	0.12	85.03	14.79	0.06	-	85.53	0.00	13.82	0.66	-	50.00	0.00	50.00	0.00	-	
Intersection %	0.40	57.00	0.09	0.05	57.53	0.05	33.06	5.75	0.02	38.88	3.03	0.00	0.49	0.02	3.54	0.02	0.00	0.02	0.00	0.05	
PHF	0.50	0.83	0.75	0.50	0.82	0.00	0.90	0.58	0.25	0.95	0.76	0.00	0.54	0.00	0.85	0.25	0.00	0.25	0.00	0.50	0.90

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

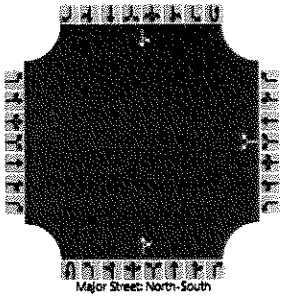
	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Old Preston Hwy					Local Rd					
TIME	Left 2.1	Thru 2.2	Right 2.3	U-Turn 2.4	App Total	Left 2.5	Thru 2.6	Right 2.7	U-Turn 2.8	App Total	Left 2.9	Thru 2.10	Right 2.11	U-Turn 2.12	App Total	Left 2.13	Thru 2.14	Right 2.15	U-Turn 2.16	App Total	Int Total
1600 - 1615	0	295	2	0	297	0	391	32	0	423	67	0	15	0	82	1	1	1	0	3	805
1615 - 1630	6	289	2	0	297	1	467	29	0	497	36	0	16	0	52	0	0	3	0	3	849
1630 - 1645	1	310	0	0	311	0	424	33	2	459	62	0	17	0	79	0	0	1	0	1	850
1645 - 1700	1	325	1	0	327	0	445	45	0	490	44	0	13	0	57	1	0	1	0	2	876
Hourly Total	8	1219	5	0	1232	1	1727	139	2	1869	209	0	61	0	270	2	1	6	0	9	3380
1700 - 1715	3	286	0	0	289	0	464	35	0	499	43	0	12	0	55	1	0	2	0	3	846
1715 - 1730	3	296	1	2	302	0	481	39	0	520	45	0	13	0	58	1	0	1	0	2	882
1730 - 1745	7	315	0	0	322	0	477	36	0	513	52	0	10	0	62	0	0	0	0	0	897
1745 - 1800	7	297	0	1	305	0	397	41	0	438	35	0	3	0	38	0	0	0	0	0	781
Hourly Total	20	1194	1	3	1218	0	1819	151	0	1970	175	0	38	0	213	2	0	3	0	5	3406
Grand Total	28	2413	6	3	2450	1	3546	290	2	3839	384	0	99	0	483	4	1	9	0	14	6786
Approach %	1.14	98.49	0.24	0.12	-	0.03	92.37	7.55	0.05	-	79.50	0.00	20.50	0.00	-	28.57	7.14	64.29	0.00	-	
Intersection %	0.41	35.56	0.09	0.04	36.10	0.01	52.25	4.27	0.03	56.57	5.66	0.00	1.46	0.00	7.12	0.06	0.01	0.13	0.00	0.21	
PHF	0.50	0.94	0.50	0.25	0.95	0.00	0.97	0.86	0.00	0.97	0.88	0.00	0.92	0.00	0.94	0.75	0.00	0.50	0.00	0.58	0.98

HCS Reports

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2021	North/South Street	Old Preston
Time Analyzed	AM Peak	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						6		2			4	11		0	4	
Percent Heavy Vehicles (%)						17		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)						6.57		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.65		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							10							0		
Capacity, c (veh/h)							990							1611		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							8.7							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							8.7							0.0		
Approach LOS							A									

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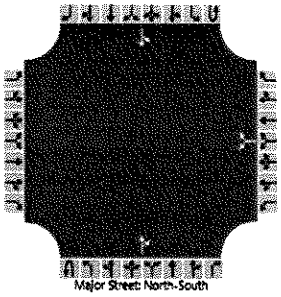
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						6		2			4	11		0	4	
Percent Heavy Vehicles (%)						17		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)						6.57		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.65		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							10							0		
Capacity, c (veh/h)							990							1611		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							8.7							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						8.7							0.0			
Approach LOS						A										

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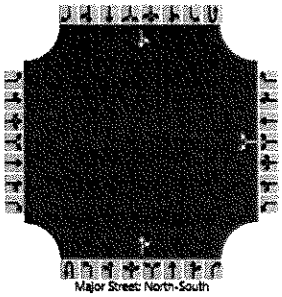
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	AM Peak Build	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						19		2			45	23		0	4	
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)							26							0		
Capacity, c (veh/h)							928							1526		
v/c Ratio							0.03							0.00		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							9.0							7.4		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							9.0							0.0		
Approach LOS							A									

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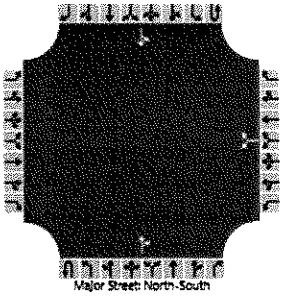
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2021	North/South Street	Old Preston
Time Analyzed	PM Peak	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						21		18			12	7		5	19	
Percent Heavy Vehicles (%)						0		6						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)						6.40		6.26						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.35						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							44							6		
Capacity, c (veh/h)							1000							1607		
v/c Ratio							0.04							0.00		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							8.8							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							8.8							1.5		
Approach LOS							A									

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HCS7 Two-Way Stop-Control Report

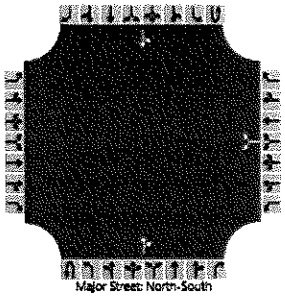
General Information

Analyst	DBZ
Agency/Co.	Diane B Zimmerman Traffic Engineering
Date Performed	12/22/2021
Analysis Year	2024
Time Analyzed	PM Peak No Build
Intersection Orientation	North-South
Project Description	Old Preston Apt

Site Information

Intersection	Old Preston at Maple Spri
Jurisdiction	
East/West Street	Maple Springs Dr
North/South Street	Old Preston
Peak Hour Factor	0.89
Analysis Time Period (hrs)	0.25

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						22		19			12	7		5	20	
Percent Heavy Vehicles (%)						0		6						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)						6.40		6.26						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.35						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							46							6		
Capacity, c (veh/h)							999							1607		
v/c Ratio							0.05							0.00		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							8.8							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							8.8							1.5		
Approach LOS							A									

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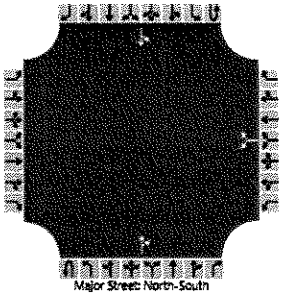
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Preston at Maple Spri
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/22/2021	East/West Street	Maple Springs Dr
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	PM Peak Build	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						64		19			37	13		5	20	
Percent Heavy Vehicles (%)						0		6						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)						6.40		6.26						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.35						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							93							6		
Capacity, c (veh/h)							940							1561		
v/c Ratio							0.10							0.00		
95% Queue Length, Q_{95} (veh)							0.3							0.0		
Control Delay (s/veh)							9.3							7.3		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.3							1.5			
Approach LOS						A										

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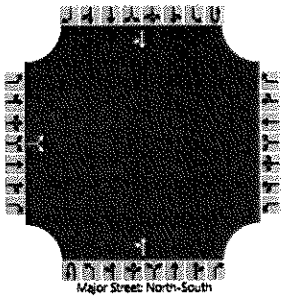
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/23/2021	East/West Street	Entrance
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	AM Peak	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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)		53		6						5	15				10	13
Percent Heavy Vehicles (%)		0		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)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			73							6						
Capacity, c (veh/h)			969							1598						
v/c Ratio			0.08							0.00						
95% Queue Length, Q_{95} (veh)			0.2							0.0						
Control Delay (s/veh)			9.0							7.3						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		9.0								1.8						
Approach LOS		A														

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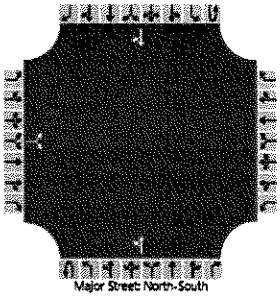
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	12/23/2021	East/West Street	Entrance
Analysis Year	2024	North/South Street	Old Preston
Time Analyzed	PM Peak	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Preston Apt		

Lanes



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)		31		4						18	19				42	42
Percent Heavy Vehicles (%)		0		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)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			39							20						
Capacity, c (veh/h)			869							1512						
v/c Ratio			0.05							0.01						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			9.3							7.4						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		9.3								3.7						
Approach LOS		A														

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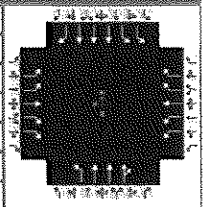
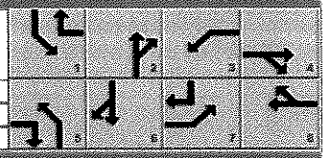
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	4	5	78	49	418	28	1267	65	201	792	454

Signal Information					EB			WB			NB			SB		
Cycle, s	125.7	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	6.0	4.9		58.3	7.0	24.4	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0		4.3	3.5	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0		1.9	3.0	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.5	30.4	13.5	30.4	12.5	64.5	17.4	69.3
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (g_s), s	5.5	2.2	5.1	19.7	4.1	25.7	10.0	15.3
Green Extension Time (g_e), s	0.7	4.2	0.4	4.6	0.0	32.6	0.8	34.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.21	0.00	0.17

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	93	4	5	86	54	459	30	964	469	221	870	169
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1807	1689	1658	1585
Queue Service Time (g_s), s	3.5	0.2	0.2	3.1	3.0	17.7	2.1	23.7	23.7	8.0	13.3	6.6
Cycle Queue Clearance Time (g_c), s	3.5	0.2	0.2	3.1	3.0	17.7	2.1	23.7	23.7	8.0	13.3	6.6
Green Ratio (*g/C*)	0.06	0.19	0.24	0.06	0.19	0.28	0.05	0.46	0.46	0.09	0.50	0.56
Capacity (*c*), veh/h	183	368	688	186	368	786	84	1721	838	292	2499	885
Volume-to-Capacity Ratio (*X*)	0.509	0.012	0.008	0.460	0.146	0.584	0.360	0.560	0.560	0.756	0.348	0.191
Back of Queue (*Q*), ft/ln (95 th percentile)	73.4	5.1	2.9	65	63.9	258.3	42.6	371	356.9	163.1	218.2	102.5
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	0.2	0.1	2.5	2.6	10.2	1.7	14.5	14.3	6.3	8.4	4.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.22	0.51
Uniform Delay (d_1), s/veh	57.7	41.0	36.3	57.6	42.1	39.0	58.0	24.4	24.4	56.2	18.9	13.7
Incremental Delay (d_2), s/veh	3.7	0.0	0.0	2.4	0.3	1.1	0.8	0.3	0.7	4.0	0.1	0.1
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	0.0	0.0
Control Delay (*d*), s/veh	61.4	41.0	36.3	60.0	42.4	40.1	58.8	24.8	25.1	60.1	19.0	13.9
Level of Service (LOS)	E	D	D	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	59.2	E		43.1	D		25.6	C		25.5	C	
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.48	A	1.31	A	1.18	A

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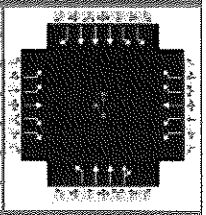
HCS7 Signalized Intersection Results Summary

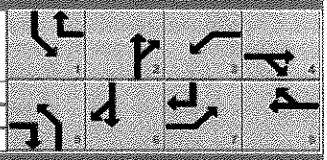
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 24 Preston NB.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	86	4	5	93	49	424	28	1299	79	204	818	461

Signal Information			
Cycle, s	119.9	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

	EB			WB			NB			SB		
Green	6.0	4.6		53.3	7.0	23.8	0.0					
Yellow	3.5	0.0		4.3	3.5	3.6	0.0					
Red	3.0	0.0		1.9	3.0	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.5	29.8	13.5	29.8	12.5	59.5	17.1	64.1
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (g_s), s	5.3	2.2	5.6	19.0	3.8	22.7	9.8	15.7
Green Extension Time (g_e), s	0.7	4.3	0.5	4.7	0.0	30.6	0.8	31.3
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.16	0.00	0.14

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	95	4	5	102	54	466	27	879	426	224	899	177
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1799	1689	1658	1585
Queue Service Time (g_s), s	3.3	0.2	0.2	3.6	2.8	17.0	1.8	20.7	20.7	7.8	13.7	6.9
Cycle Queue Clearance Time (g_c), s	3.3	0.2	0.2	3.6	2.8	17.0	1.8	20.7	20.7	7.8	13.7	6.9
Green Ratio (*g/C*)	0.06	0.20	0.25	0.06	0.20	0.29	0.05	0.44	0.44	0.09	0.48	0.54
Capacity (*c*), veh/h	192	377	708	195	377	805	88	1651	800	299	2404	859
Volume-to-Capacity Ratio (*X*)	0.492	0.012	0.008	0.523	0.143	0.579	0.302	0.532	0.533	0.749	0.374	0.206
Back of Queue (*Q*), ft/ln (95 th percentile)	70.2	4.8	2.7	74.1	60.2	248.8	35.5	330.5	317	156.7	223	106.3
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6	0.2	0.1	2.8	2.4	9.8	1.4	12.9	12.7	6.0	8.6	4.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.22	0.53
Uniform Delay (d_1), s/veh	54.8	38.7	34.0	54.9	39.7	36.6	55.0	24.2	24.2	53.4	19.5	14.2
Incremental Delay (d_2), s/veh	3.3	0.0	0.0	2.9	0.3	1.1	0.6	0.3	0.7	3.8	0.1	0.2
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	0.0	0.0
Control Delay (*d*), s/veh	58.1	38.7	34.0	57.8	40.0	37.7	55.6	24.6	24.9	57.1	19.7	14.4
Level of Service (LOS)	E	D	C	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	56.0	E		41.2	D		25.3	C		25.4	C	
Intersection Delay, s/veh / LOS	29.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.51	B	1.34	A	1.20	A

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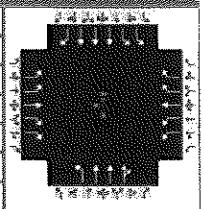
HCS7 Signalized Intersection Results Summary

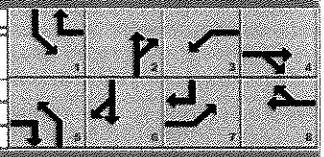
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 24 Preston B.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	121	10	5	95	49	424	28	1299	79	204	829	461

Signal Information			
Cycle, s	121.8	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	6.0	4.7		53.9	7.0	0.8	24.1					
Yellow	3.5	0.0		4.3	3.5	0.0	3.6					
Red	3.0	0.0		1.9	3.0	0.0	2.4					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	14.3	30.9	13.5	30.1	12.5	60.1	17.2	64.8
Change Period, (*Y+Rc*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (*gs*), s	6.8	2.6	5.7	19.3	3.8	23.0	9.9	16.2
Green Extension Time (*ge*), s	1.0	4.3	0.5	4.7	0.0	30.8	0.8	31.6
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.17	0.00	0.14

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	133	11	5	104	54	466	26	877	425	224	911	177
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1799	1689	1658	1585
Queue Service Time (*gs*), s	4.8	0.6	0.2	3.7	2.9	17.3	1.8	21.0	21.0	7.9	14.2	7.0
Cycle Queue Clearance Time (*gc*), s	4.8	0.6	0.2	3.7	2.9	17.3	1.8	21.0	21.0	7.9	14.2	7.0
Green Ratio (*g/C*)	0.06	0.20	0.25	0.06	0.20	0.29	0.05	0.44	0.44	0.09	0.48	0.55
Capacity (*c*), veh/h	212	389	724	192	376	803	86	1643	796	298	2396	866
Volume-to-Capacity Ratio (*X*)	0.627	0.028	0.008	0.543	0.143	0.580	0.307	0.534	0.534	0.752	0.380	0.204
Back of Queue (*Q*), ft/ln (95 th percentile)	102	12	2.8	77.2	61.3	252.3	36.1	336.7	322.9	159.5	230.4	107.2
Back of Queue (*Q*), veh/ln (95 th percentile)	3.8	0.5	0.1	2.9	2.5	9.9	1.4	13.2	12.9	6.1	8.9	4.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.23	0.54
Uniform Delay (*d1*), s/veh	55.6	38.8	34.0	55.9	40.4	37.2	55.9	24.8	24.8	54.3	20.0	14.1
Incremental Delay (*d2*), s/veh	5.1	0.0	0.0	3.2	0.3	1.1	0.6	0.3	0.7	3.8	0.1	0.2
Initial Queue 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
Control Delay (*d*), s/veh	60.7	38.8	34.0	59.1	40.6	38.3	56.6	25.1	25.5	58.1	20.2	14.3
Level of Service (LOS)	E	D	C	E	D	D	E	C	C	E	C	B
Approach Delay, s/veh / LOS	58.1	E		42.0	D		25.9	C		25.9	C	
Intersection Delay, s/veh / LOS	30.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.73	A	1.52	B	1.34	A	1.21	A

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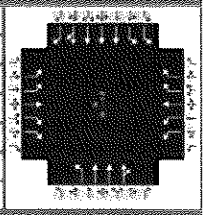
HCS7 Signalized Intersection Results Summary

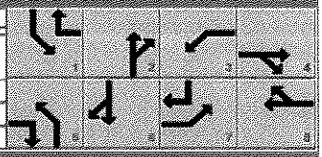
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	354	61	46	210	15	358	12	1178	214	707	1768	110

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	28.1	67.8	14.5	2.6	22.8	
Yellow	3.5	3.5	4.3	3.5	3.5	3.6	
Red	3.0	3.0	1.9	3.0	3.0	2.4	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.1	38.0	21.0	28.8	12.5	74.0	47.1	108.6
Change Period, (*Y+Rc*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*gs*), s	20.9	7.0	13.1	19.3	3.3		38.1	
Green Extension Time (*ge*), s	2.7	4.2	1.3	3.5	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.00	0.00	0.00	0.04	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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	361	62	47	214	15	365	12	947	435	721	1804	112
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1733	1743	1870	1409
Queue Service Time (*gs*), s	18.9	5.0	2.4	11.1	1.3	17.3	1.3	38.6	38.2	36.1	15.5	2.7
Cycle Queue Clearance Time (*gc*), s	18.9	5.0	2.4	11.1	1.3	17.3	1.3	38.6	38.2	36.1	15.5	2.7
Green Ratio (*g/C*)	0.13	0.18	0.21	0.08	0.13	0.35	0.03	0.38	0.38	0.23	0.57	0.70
Capacity (*c*), veh/h	439	337	601	274	241	996	57	1420	653	805	4255	986
Volume-to-Capacity Ratio (*X*)	0.823	0.184	0.078	0.783	0.063	0.367	0.211	0.667	0.667	0.896	0.424	0.114
Back of Queue (*Q*), ft/ln (95 th percentile)	350.2	111.7	39.3	227.6	28.7	257.3	26.9	635.5	592.1	593.2	230.1	40.7
Back of Queue (*Q*), veh/ln (95 th percentile)	13.4	4.5	1.6	8.8	1.1	10.2	1.0	25.2	23.7	23.5	9.1	1.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.78	0.25	0.31	0.57	0.05	0.74	0.06	0.53	0.50	1.08	0.23	0.20
Uniform Delay (*d1*), s/veh	76.2	62.9	57.0	81.2	69.2	43.4	87.5	49.7	48.5	67.1	11.2	4.8
Incremental Delay (*d2*), s/veh	6.5	0.4	0.1	6.7	0.2	0.4	0.6	2.2	4.8	9.4	0.3	0.2
Initial Queue 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
Control Delay (*d*), s/veh	82.7	63.3	57.1	87.9	69.3	43.7	88.1	51.9	53.3	76.5	11.6	5.0
Level of Service (LOS)	F	E	E	F	E	D	F	D	D	E	B	A
Approach Delay, s/veh / LOS	77.6	E		60.3	E		52.7	D		29.1	C	
Intersection Delay, s/veh / LOS	43.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.75	C	2.99	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.26	A	1.47	A	1.28	A	1.58	B

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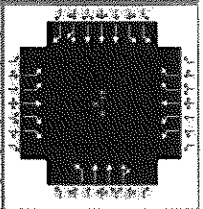
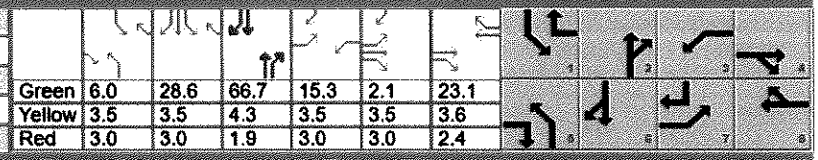
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 24 NB Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	360	62	46	225	15	364	12	1208	229	718	1807	112

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



	EB			WB			NB			SB		
Green	6.0	28.6		66.7	15.3	2.1	23.1					
Yellow	3.5	3.5		4.3	3.5	3.5	3.6					
Red	3.0	3.0		1.9	3.0	3.0	2.4					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.4	37.7	21.8	29.1	12.5	72.9	47.6	108.0
Change Period, (*Y+R c*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s	21.2	7.1	13.9	19.5	3.2		38.7	
Green Extension Time (*g e*), s	2.7	4.3	1.4	3.6	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.01	0.00	0.00	0.04	0.00		0.14	

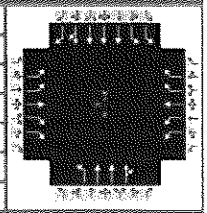
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	367	63	47	230	15	371	11	894	410	733	1844	114
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1728	1743	1870	1409
Queue Service Time (*g s*), s	19.2	5.1	2.4	11.9	1.3	17.5	1.2	25.2	23.8	36.7	16.3	2.8
Cycle Queue Clearance Time (*g c*), s	19.2	5.1	2.4	11.9	1.3	17.5	1.2	25.2	23.8	36.7	16.3	2.8
Green Ratio (*g/C*)	0.13	0.18	0.21	0.09	0.13	0.36	0.03	0.37	0.37	0.23	0.57	0.70
Capacity (*c*), veh/h	445	334	596	290	244	1008	57	1398	640	815	4230	984
Volume-to-Capacity Ratio (*X*)	0.825	0.189	0.079	0.791	0.063	0.369	0.192	0.640	0.640	0.899	0.436	0.116
Back of Queue (*Q*), ft/ln (95 th percentile)	354.8	113.8	39.4	240.1	28.6	259.8	24.5	307.6	262.5	603.3	238.6	42.1
Back of Queue (*Q*), veh/ln (95 th percentile)	13.5	4.6	1.6	9.3	1.1	10.3	0.9	12.2	10.5	23.9	9.4	1.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.79	0.25	0.31	0.60	0.05	0.74	0.06	0.26	0.22	1.10	0.24	0.21
Uniform Delay (*d 1*), s/veh	76.0	63.2	57.2	80.8	69.0	42.9	87.5	23.7	21.3	66.9	11.6	4.9
Incremental Delay (*d 2*), s/veh	6.5	0.4	0.1	6.5	0.2	0.4	0.4	1.5	3.3	10.0	0.3	0.2
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	0.0	0.0
Control Delay (*d*), s/veh	82.5	63.6	57.3	87.3	69.1	43.3	87.9	25.2	24.6	76.9	12.0	5.1
Level of Service (LOS)	F	E	E	F	E	D	F	C	C	E	B	A
Approach Delay, s/veh / LOS	77.5	E		60.3	E		25.6	C		29.4	C	
Intersection Delay, s/veh / LOS	36.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.75	C	2.99	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.28	A	1.50	B	1.30	A	1.60	B

 HCS™ Streets Version 7.9.5 Generated: 12/24/2021 3:60:03 PM

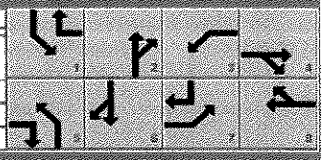
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 24 B Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	381	66	46	231	15	364	12	1208	229	718	1843	112

Signal Information					EB			WB			NB			SB		
Cycle, s	180.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	6.0	28.4		65.7	15.7	3.0	23.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	3.5		4.3	3.5	3.5	3.6					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.9	3.0	3.0	2.4					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	31.7	38.5	22.2	29.0	12.5	71.9	47.4	106.8
Change Period, (*Y+Rc*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*gs*), s	22.3	7.4	14.2	19.5	3.1		38.7	
Green Extension Time (*ge*), s	2.8	4.3	1.5	3.5	0.0	0.0	2.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.01	0.00	0.00	0.06	0.00		0.20	

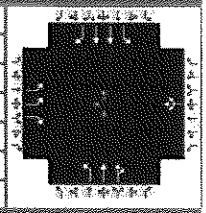
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	389	67	47	236	15	371	11	887	407	733	1881	114
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1728	1743	1870	1409
Queue Service Time (*gs*), s	20.3	5.4	2.4	12.2	1.3	17.5	1.1	25.2	23.7	36.7	17.3	2.8
Cycle Queue Clearance Time (*gc*), s	20.3	5.4	2.4	12.2	1.3	17.5	1.1	25.2	23.7	36.7	17.3	2.8
Green Ratio (*g/C*)	0.14	0.18	0.21	0.09	0.13	0.36	0.03	0.36	0.36	0.23	0.56	0.70
Capacity (*c*), veh/h	468	343	610	297	243	1005	57	1375	630	812	4181	985
Volume-to-Capacity Ratio (*X*)	0.830	0.196	0.077	0.794	0.063	0.370	0.191	0.645	0.646	0.902	0.450	0.116
Back of Queue (*Q*), ft/ln (95 th percentile)	371.1	120.6	39.1	244.8	28.6	260.1	24.3	304.9	261.2	605.9	251.2	42.9
Back of Queue (*Q*), veh/ln (95 th percentile)	14.2	4.8	1.6	9.5	1.1	10.3	0.9	12.1	10.4	24.0	9.9	1.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.82	0.27	0.31	0.61	0.05	0.74	0.06	0.25	0.22	1.10	0.25	0.21
Uniform Delay (*d1*), s/veh	75.3	62.7	56.5	80.6	69.0	43.1	87.5	23.8	21.4	67.0	12.3	5.0
Incremental Delay (*d2*), s/veh	6.4	0.4	0.1	6.5	0.2	0.4	0.4	1.6	3.5	10.6	0.4	0.2
Initial Queue 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
Control Delay (*d*), s/veh	81.7	63.0	56.6	87.1	69.2	43.4	87.9	25.4	24.9	77.7	12.7	5.2
Level of Service (LOS)	F	E	E	F	E	D	F	C	C	E	B	A
Approach Delay, s/veh / LOS	76.9	E		60.6	E		25.8	C		29.8	C	
Intersection Delay, s/veh / LOS	37.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.75	C	2.99	C	2.60	C	2.42	B
Bicycle LOS Score / LOS	1.32	A	1.51	B	1.30	A	1.61	B

 HCS™ Streets Version 7.9.6 Generated: 12/24/2021 3:50:03 PM

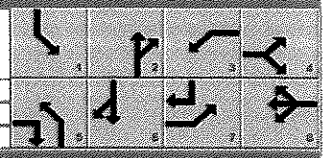
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	67		15	1	0	1	10	1315	3	1	721	152

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



	EB			WB			NB			SB		
Green	0.3	5.7		113.1	6.0	0.5	0.0					
Yellow	3.5	0.0		4.3	3.6	3.6	0.0					
Red	3.0	0.0		1.6	2.4	2.4	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		12.0		6.5	12.5	124.7	6.8	119.0
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s				2.2	3.0		2.1	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				0.09	1.00		0.04	
Max Out Probability				0.00	0.00		0.00	

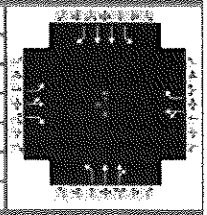
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	74		17		2		11	700	700	1	782	165
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661		1359		1704		1527	1856	1854	1810	1724	1585
Queue Service Time (*g s*), s	3.3		1.7		0.2		1.0	12.5	12.5	0.1	10.8	3.6
Cycle Queue Clearance Time (*g c*), s	3.3		1.7		0.2		1.0	12.5	12.5	0.1	10.8	3.6
Green Ratio (*g/C*)	0.04		0.08		0.00		0.04	0.79	0.79	0.00	0.75	0.79
Capacity (*c*), veh/h	133		109		6		61	1470	1468	3	2599	1258
Volume-to-Capacity Ratio (*X*)	0.560		0.153		0.368		0.174	0.477	0.477	0.338	0.301	0.131
Back of Queue (*Q*), ft/ln (95 th percentile)	68.7		31.4		4.8		21.6	138.8	135.5	3.8	158.9	43.6
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6		1.1		0.2		0.7	5.4	5.4	0.2	6.1	1.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17		0.52		0.00		0.09	0.00	0.00	0.04	0.00	0.15
Uniform Delay (*d 1*), s/veh	70.7		64.3		74.6		71.7	2.8	2.8	74.8	5.9	3.6
Incremental Delay (*d 2*), s/veh	3.7		0.6		13.3		0.9	0.8	0.8	49.9	0.3	0.2
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
Control Delay (*d*), s/veh	74.4		64.9		87.9		72.6	3.6	3.6	124.7	6.2	3.8
Level of Service (LOS)	E		E		F		E	A	A	F	A	A
Approach Delay, s/veh / LOS	72.6		E	87.9		F	4.1		A	5.9		A
Intersection Delay, s/veh / LOS	7.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.62	B	2.05	B
Bicycle LOS Score / LOS		F	0.49	A	1.70	B	1.29	A

 HCS™ Streets Version 7.9.5 Generated: 12/23/2021 3:44:18 PM

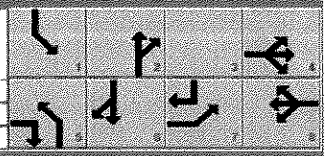
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 24 Preston NB.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	24	15	190	13	1	10	1300	137	125	635	155

Signal Information					EB			WB			NB		
Cycle, s	150.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	6.0	0.9		83.6	7.9	20.7	0.0		
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.5	3.5		4.3	3.6	3.6	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.6	2.4	2.4	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		13.9		26.7	12.5	89.5	19.9	96.9
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s		7.6		20.3	3.0		13.0	
Green Extension Time (*g e*), s		0.3		0.4	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.00	0.00		0.00	

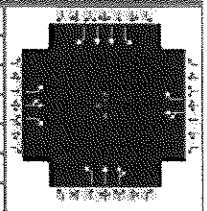
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	64	27	17		226	1	10	710	691	135	688	168
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359		1815	1610	1527	1856	1793	1810	1724	1585
Queue Service Time (*g s*), s	5.6	2.0	1.7		18.3	0.1	1.0	33.2	32.7	11.0	14.7	6.1
Cycle Queue Clearance Time (*g c*), s	5.6	2.0	1.7		18.3	0.1	1.0	33.2	32.7	11.0	14.7	6.1
Green Ratio (*g/C*)	0.05	0.05	0.09		0.14	0.14	0.04	0.56	0.56	0.09	0.61	0.66
Capacity (*c*), veh/h	90	100	126		251	222	61	1034	999	162	2092	1045
Volume-to-Capacity Ratio (*X*)	0.715	0.267	0.132		0.900	0.005	0.160	0.687	0.692	0.836	0.329	0.161
Back of Queue (*Q*), ft/ln (95 th percentile)	125.6	45.2	30.8		335.3	1.6	20	405.2	368.7	228.4	242.6	93.4
Back of Queue (*Q*), veh/ln (95 th percentile)	4.8	1.8	1.1		13.4	0.1	0.7	15.8	14.7	9.1	9.3	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00	0.51		0.00	0.00	0.08	0.00	0.00	2.28	0.00	0.31
Uniform Delay (*d 1*), s/veh	69.9	68.3	62.5		63.6	55.8	72.4	15.0	14.2	67.2	14.5	9.7
Incremental Delay (*d 2*), s/veh	10.1	1.4	0.5		4.7	0.0	0.8	2.5	2.6	10.0	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	80.0	69.7	63.0		68.3	55.8	73.2	17.5	16.9	77.2	14.9	10.0
Level of Service (LOS)	F	E	E		E	E	E	B	B	E	B	B
Approach Delay, s/veh / LOS	74.8	E		68.2	E		17.5	B		22.6	C	
Intersection Delay, s/veh / LOS	25.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.67	A	0.86	A	1.81	B	1.33	A

 HCS™ Streets Version 7.9.6 Generated: 12/23/2021 3:44:18 PM

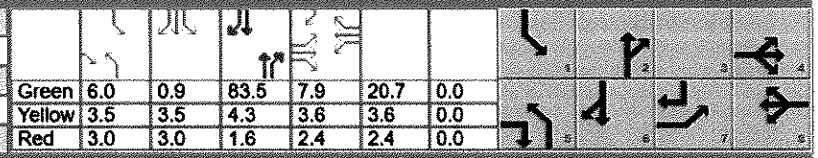
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 24 Preston B.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	24	15	190	13	1	13	1300	137	125	647	155

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	0.9		83.5	7.9		20.7	0.0				
Yellow	3.5	3.5		4.3	3.6		3.6	0.0				
Red	3.0	3.0		1.6	2.4		2.4	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		13.9		26.7	12.5	89.4	19.9	96.9
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s		7.6		20.3	3.2		13.1	
Green Extension Time (g_e), s		0.3		0.4	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		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	64	27	17		226	1	13	709	690	136	701	168
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359		1815	1610	1527	1856	1793	1810	1724	1585
Queue Service Time (g_s), s	5.6	2.0	1.7		18.3	0.1	1.2	33.4	33.0	11.1	15.1	6.1
Cycle Queue Clearance Time (g_c), s	5.6	2.0	1.7		18.3	0.1	1.2	33.4	33.0	11.1	15.1	6.1
Green Ratio (*g/C*)	0.05	0.05	0.09		0.14	0.14	0.04	0.56	0.56	0.09	0.61	0.66
Capacity (*c*), veh/h	90	100	126		251	222	61	1033	999	162	2092	1045
Volume-to-Capacity Ratio (*X*)	0.715	0.267	0.132		0.900	0.005	0.207	0.686	0.690	0.836	0.335	0.161
Back of Queue (*Q*), ft/ln (95 th percentile)	125.6	45.2	30.8		335.3	1.6	26.1	411.7	375.9	228.2	247.2	93.5
Back of Queue (*Q*), veh/ln (95 th percentile)	4.8	1.8	1.1		13.4	0.1	0.9	16.1	15.0	9.1	9.4	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00	0.51		0.00	0.00	0.10	0.00	0.00	2.28	0.00	0.31
Uniform Delay (d_1), s/veh	69.9	68.3	62.5		63.6	55.8	72.5	15.3	14.5	67.2	14.6	9.7
Incremental Delay (d_2), s/veh	10.1	1.4	0.5		4.7	0.0	1.1	2.5	2.6	9.9	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	80.0	69.7	63.0		68.3	55.8	73.6	17.7	17.1	77.1	15.0	10.0
Level of Service (LOS)	F	E	E		E	E	E	B	B	E	B	B
Approach Delay, s/veh / LOS	74.8	E		68.2	E		18.0	B		22.5	C	
Intersection Delay, s/veh / LOS	26.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.67	A	0.86	A	1.82	B	1.34	A

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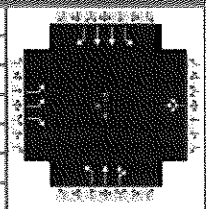
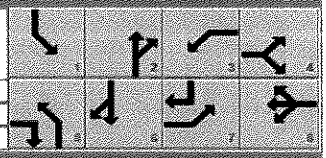
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 21 Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	184		48	3	0	4	16	1222	2	0	1867	155

Signal Information					EB			WB			NB			SB		
Cycle, s	180.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	3.4	126.2		20.0	6.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	4.3		3.6	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.6		2.4	2.4	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		12.0	9.9	142.0	0.0	132.1
Change Period, (*Y+Rc*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	0.0	0.0
Queue Clearance Time (*gs*), s				2.7	3.6			
Green Extension Time (*ge*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	0.56			
Max Out Probability				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		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	188		49		7		16	630	629	0	1846	153
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757		1610		1690		1810	1885	1884	1810	1781	1598
Queue Service Time (*gs*), s	9.0		4.9		0.7		1.6	19.9	19.9	0.0	61.1	3.8
Cycle Queue Clearance Time (*gc*), s	9.0		4.9		0.7		1.6	19.9	19.9	0.0	61.1	3.8
Green Ratio (*g/C*)	0.11		0.13		0.03		0.02	0.76	0.76		0.70	0.81
Capacity (*c*), veh/h	390		209		56		34	1425	1425	1	2497	1298
Volume-to-Capacity Ratio (*X*)	0.481		0.234		0.127		0.486	0.442	0.442	0.000	0.739	0.118
Back of Queue (*Q*), ft/ln (95 th percentile)	183.7		91.7		14.8		37.6	268.5	266.1	0	788.8	48.1
Back of Queue (*Q*), veh/ln (95 th percentile)	7.3		3.7		0.6		1.5	10.7	10.6	0.0	31.1	1.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46		1.53		0.00		0.15	0.00	0.00	0.00	0.00	0.16
Uniform Delay (*d1*), s/veh	75.1		70.3		84.5		88.8	6.9	6.9	0.0	19.0	3.7
Incremental Delay (*d2*), s/veh	0.9		0.6		0.4		7.5	0.7	0.7	0.0	1.5	0.1
Initial Queue Delay (*d3*), s/veh	0.0		0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	76.0		70.9		84.8		96.3	7.6	7.6	0.0	20.5	3.8
Level of Service (LOS)	E		E		F		F	A	A		C	A
Approach Delay, s/veh / LOS	75.0		E	84.8		F	8.8		A	19.2		B
Intersection Delay, s/veh / LOS	19.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.64	B	2.07	B
Bicycle LOS Score / LOS		F	0.50	A	1.53	B	2.19	B

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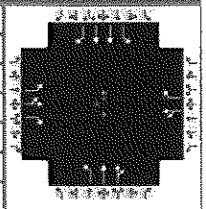
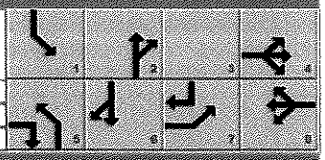
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 No Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 24 NB Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	171	28	48	221	12	4	16	1248	82	159	1758	158

Signal Information					EB			WB			NB			SB		
Cycle, s	180.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	8.0	3.3		92.2	20.0	25.5	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.6	2.4	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		31.5	14.5	98.1	24.4	108.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		11.8		25.1	3.5		17.6	
Green Extension Time (g_e), s		0.8		0.4	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		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	105	98	49		238	4	15	636	624	157	1738	156
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1836	1610		1814	1610	1810	1885	1844	1810	1781	1598
Queue Service Time (g_s), s	9.8	9.1	4.8		23.1	0.4	1.5	41.7	40.6	15.6	72.3	5.0
Cycle Queue Clearance Time (g_c), s	9.8	9.1	4.8		23.1	0.4	1.5	41.7	40.6	15.6	72.3	5.0
Green Ratio (*g/C*)	0.11	0.11	0.16		0.15	0.15	0.04	0.51	0.51	0.10	0.57	0.68
Capacity (*c*), veh/h	211	204	250		267	228	80	966	945	190	2019	1083
Volume-to-Capacity Ratio (*X*)	0.496	0.482	0.196		0.889	0.018	0.188	0.659	0.660	0.830	0.861	0.144
Back of Queue (*Q*), ft/ln (95 th percentile)	202.6	193.4	88.5		408.8	7.2	31.4	606.4	566.5	307.4	965.9	74.2
Back of Queue (*Q*), veh/ln (95 th percentile)	8.1	7.7	3.5		16.4	0.3	1.3	24.1	22.7	12.3	38.0	2.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.51	0.00	1.47		0.00	0.00	0.13	0.00	0.00	3.07	0.00	0.25
Uniform Delay (d_1), s/veh	74.5	74.7	66.2		75.3	66.4	83.8	27.7	26.0	87.5	29.5	7.9
Incremental Delay (d_2), s/veh	1.8	1.8	0.4		4.0	0.0	0.8	2.5	2.6	3.1	4.5	0.2
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	0.0
Control Delay (*d*), s/veh	76.3	76.4	66.6		79.3	66.5	84.6	30.2	28.6	90.6	34.0	8.1
Level of Service (LOS)	E	E	E		E	E	F	C	C	F	C	A
Approach Delay, s/veh / LOS	74.5	E		79.1	E		30.1	C		36.4	D	
Intersection Delay, s/veh / LOS	39.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.90	A	0.89	A	1.62	B	2.23	B

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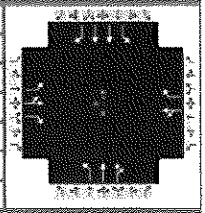
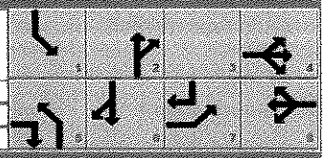
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Dec 23, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2024 Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 24 B Preston.xus		
Project Description	Old Preston Apt				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	171	28	48	221	12	4	28	1248	82	159	1764	158

Signal Information					EB			WB			NB			SB		
Cycle, s	180.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	8.0	3.6		92.0	20.0	25.5	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.6	2.4	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		31.5	14.5	97.9	24.6	108.0
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	3.0	0.0
Queue Clearance Time (*g s*), s		11.8		25.1	4.6		17.9	
Green Extension Time (*g e*), s		0.8		0.4	0.1	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		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	105	98	49		238	4	26	631	618	160	1774	159
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1836	1610		1814	1610	1810	1885	1844	1810	1781	1598
Queue Service Time (*g s*), s	9.8	9.1	4.8		23.1	0.4	2.6	41.3	40.2	15.9	75.3	5.0
Cycle Queue Clearance Time (*g c*), s	9.8	9.1	4.8		23.1	0.4	2.6	41.3	40.2	15.9	75.3	5.0
Green Ratio (*g/C*)	0.11	0.11	0.16		0.15	0.15	0.04	0.51	0.51	0.11	0.57	0.68
Capacity (*c*), veh/h	211	204	250		267	228	80	963	942	192	2019	1083
Volume-to-Capacity Ratio (*X*)	0.496	0.482	0.196		0.889	0.018	0.327	0.655	0.656	0.832	0.878	0.147
Back of Queue (*Q*), ft/ln (95 th percentile)	202.6	193.4	88.5		408.8	7.2	55.1	601.5	581.8	310.3	1001.6	74.3
Back of Queue (*Q*), veh/ln (95 th percentile)	8.1	7.7	3.5		16.4	0.3	2.2	23.9	22.5	12.4	39.4	2.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.51	0.00	1.47		0.00	0.00	0.22	0.00	0.00	3.10	0.00	0.25
Uniform Delay (*d 1*), s/veh	74.5	74.7	66.2		75.3	66.4	84.3	27.7	26.1	87.1	29.9	7.8
Incremental Delay (*d 2*), s/veh	1.8	1.8	0.4		4.0	0.0	1.7	2.5	2.5	3.1	5.1	0.2
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	0.0
Control Delay (*d*), s/veh	76.3	76.4	66.6		79.3	66.5	86.0	30.2	28.6	90.3	35.0	8.0
Level of Service (LOS)	E	E	E		E	E	F	C	C	F	D	A
Approach Delay, s/veh / LOS	74.5	E		79.1	E		30.6	C		37.2	D	
Intersection Delay, s/veh / LOS	40.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.90	A	0.89	A	1.63	B	2.24	B

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HCS7 Two-Way Stop-Control Report

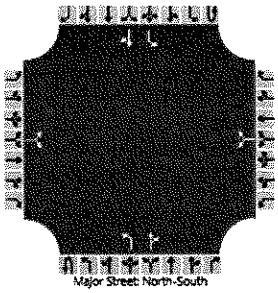
General Information

Analyst	DBZ
Agency/Co.	Diane B Zimmerman Traffic Engineering
Date Performed	10/30/2020
Analysis Year	2025
Time Analyzed	PM Peak Build
Intersection Orientation	North-South
Project Description	Providence Point

Site Information

Intersection	Herr Lane at Wesboro
Jurisdiction	
East/West Street	Wesboro
North/South Street	Herr Lane
Peak Hour Factor	0.94
Analysis Time Period (hrs)	0.25

Lanes



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	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		10		17		21		25		26	536	45		64	690	8
Percent Heavy Vehicles (%)		0		0		0		4		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.24		4.10				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.34		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			29				49			28				68		
Capacity, c (veh/h)			291				421			874				972		
v/c Ratio			0.10				0.12			0.03				0.07		
95% Queue Length, Q_{95} (veh)			0.3				0.4			0.1				0.2		
Control Delay (s/veh)			18.7				14.7			9.3				9.0		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		18.7				14.7				0.4				0.8		
Approach LOS		C				B										

HCS™ TWSC Version 7.9
Wesboro PM 25 B.xtw

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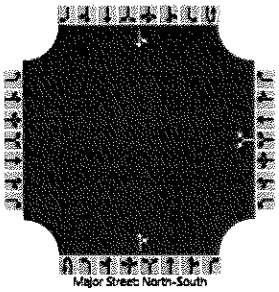
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Herr Lane at Wesboro
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	7/23/2020	East/West Street	Wesboro
Analysis Year	2035	North/South Street	Herr Lane
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.94
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Providence Point		

Lanes



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	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						21		25			535	45		64	707	
Percent Heavy Vehicles (%)						0		4						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)						6.40		6.24						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.34						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							49							68		
Capacity, c (veh/h)							269							973		
v/c Ratio							0.18							0.07		
95% Queue Length, Q_{95} (veh)							0.7							0.2		
Control Delay (s/veh)							21.4							9.0		
Level of Service (LOS)							C							A		
Approach Delay (s/veh)						21.4							1.7			
Approach LOS						C										

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HCS7 Two-Way Stop-Control Report

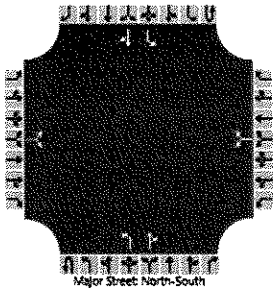
General Information

Analyst	DBZ
Agency/Co.	Diane B Zimmerman Traffic Engineering
Date Performed	10/30/2020
Analysis Year	2035
Time Analyzed	PM Peak Build
Intersection Orientation	North-South
Project Description	Providence Point

Site Information

Intersection	Herr Lane at Wesboro
Jurisdiction	
East/West Street	Wesboro
North/South Street	Herr Lane
Peak Hour Factor	0.94
Analysis Time Period (hrs)	0.25

Lanes



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	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		10		17		21		25		26	562	45		64	734	8
Percent Heavy Vehicles (%)		0		0		0		4		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.24		4.10				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.34		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			29				49			28				68		
Capacity, c (veh/h)			273				392			839				949		
v/c Ratio			0.11				0.12			0.03				0.07		
95% Queue Length, Q_{95} (veh)			0.3				0.4			0.1				0.2		
Control Delay (s/veh)			19.7				15.5			9.4				9.1		
Level of Service (LOS)			C				C			A				A		
Approach Delay (s/veh)		19.7				15.5				0.4				0.7		
Approach LOS		C				C										

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CASE #21-ZONE-0104 – JUSTIFICATION FOR LAND-DISTURBING ACTIVITY ON SLOPES 30% OR GREATER

Project Name and Location:	Old Preston Highway Apartments, 10410 & 10414 Old Preston Highway
Proposed Use:	Multi-Family Residential
Request:	Zone Change from R-4 to R-7
Owner	Skaggs Family Trust
Applicant:	Highgates Development

Located north of the intersection with Interchange Drive on Old Preston Highway, the Old Preston Highway Apartment site consists of two contiguous parcels on 9.78 total acres of land. The proposal is for a change of zoning from R-4 to R-7 to construct a 174-unit multi-family development. The overall net density will be 17.79 dwelling units per acre and includes over 110,000 SF of open space provided throughout the development.

Steep slopes are present on this site. Slopes greater than 30% however, are minimal. There is approximately 780 SF of area greater than 30% on the proposed development. This is equivalent to only 0.18% of the total net area. Steep slopes between 20% and 30% are also present on this site. The largest consolidated area of 20%-30% slopes are proposed for preservation. This preserved area is located adjacent to Fishpool Creek and is located at the west end of the site.

Asher Engineering, Inc. has performed geotechnical evaluation of the site and a report has been submitted to Louisville Planning and Design Services. The report did not indicate any negative impacts due to the proposed development. Furthermore, the geotechnical report outlines recommendations for development and indicates that the soils on this site "are suitable for support of new buildings and roads, and are suitable for structural fill".

Received November 1, 2021 Planning & Design 21-ZONE-0104

MEMORANDUM OF UNDERSTANDING

WHEREAS, Patrick Hassler and Sherry Hassler, husband and wife ("Hassler"), with an address of 10412 Old Preston Hwy, Louisville, KY 40229, are the owners of real estate lying to the North and West and contiguous to said real estate of The Skaggs Family Trust, James Mark Skaggs and Jon Skaggs, Co-Trustees, by virtue of a deed September 12, 1994, and recorded in Deed Book 6500, Page 739, of record in the office of the Clerk for Jefferson County, Kentucky (the "Hassler Property"), and

WHEREAS, The Skaggs Family Trust, James Mark Skaggs and Jon Skaggs, Co-Trustees ("Skaggs") has entered into a Real Estate Purchase and Sale Agreement, as amended from time-to-time, with T Big Ventures Inc. ("T Big"). for the sale and purchase of their property located at 10410 and 10414 Old Preston Hwy., Louisville, Kentucky (the "Skaggs' Property"), and

WHEREAS, in anticipation of said sale and transfer of the Skagg's Property to T Big, T Big and Hassler desire to establish and define the location of a future easement across the Skaggs' Property for the benefit of the Hassler Property for ingress and egress.

NOW, therefore, subject to the terms set forth hereinbelow, T Big does hereby agree to grant to Hassler, their heirs and assigns, a perpetual, non-exclusive easement over the that portion of Skaggs' Property and contiguous to the Hasslers' property as shown on the Access Easement Plat (the "Plat") by Mindel Scott and Associates, Inc. attached hereto and marked as Exhibit "A". Said easement is limited to the hatched area, as shown on the attached Plat as shown as "30' ACCESS ESMT GRANTED".

Said easement shall be in the form set forth hereto as Exhibit A, except that the grantor therein may be altered to Joseph Waldman or any other entity owned by him, in part or in whole, or otherwise under the control of Joseph Waldman pursuant to an assignment of the Purchase Agreement on or before closing.

However, in the event T Big (i) does not receive all permits and approvals necessary for its intended use of the property as an apartment complex, or (ii) does not consummate its conveyance pursuant to the Purchase Agreement, T Big's obligation to execute and grant the easement contemplated herein shall terminate and neither party shall have any further obligation to the other.

IN TESTIMONY WHEREOF, witness the authorized signature of the T Big and Hasslers the day and date set forth below.

GRANTOR: T Big Ventures Inc.,

By: _____

Printed Name: _____

Its: _____

DEED OF ACCESS EASEMENT

Know all men by these presents that, whereas **T Big Ventures Inc.**, hereinafter called the Grantor, is the owner of the following described real estate, to wit:

10410 Old Preston Hwy.

BEGINNING at a point in the center of Preston Highway, f/k/a Louisville & Shepherdsville Pike, 196.8 feet Northwardly from the Southeast corner of Lot 2, Issac Brooks Division, said corner of Joseph Logsdon; thence with the center line of said Preston Highway North 14° 07' West 100 feet, South 77° 46' West 621.27 feet; thence with North 14° 07' West 140.30 feet; thence North 28° 17' West 258.20 feet; thence South 78° West 608 feet to the center of a Branch; thence with a center of said Branch and with its meanders South 18° 45' East 89 feet; East 89 feet; South 50° East 240 feet, South 19-1/4 ° East 142 feet, more or less, to a corner of the 1-2/3 acres conveyed to Robert F. Flora by deed dated December 30, 1937, of record in Deed Book 1660, Page 648, in the Office of the County Clerk of Jefferson County, Kentucky; thence leaving said Branch and with the North line of said 1-2/3 acres, North 81° 43' East 370 feet, more or less; thence South 85° 07' East 272 feet; thence North 74° 46' East 603.3 feet to the beginning.

Being that same property conveyed to **T Big Ventures Inc.**, by Deed dated _____ and recorded on _____ in Deed Book _____, Page _____, of record in the office of the Clerk for Jefferson County, Kentucky.

AND

10414 Old Preston Hwy.

BEGINNING at a point in the center line of Preston Street, or Highway, North 14° 07' West 30 feet from the Southeast corner of Lot 2 of the Isaacs Brooks Division recorded in Deed Book 552, Page 335, in the Office of the Clerk of the County Court of Jefferson County, Kentucky; thence with the center line of Preston Highway, North 14° 07' West

166.80 feet to a point in the center line of said Highway; thence South 74° 44' West passing a pipe at 40 feet, continuing on same line to a railroad spike at the Northwest corner of property, in all 604.64 feet; thence South 14° 07' East 120.00 feet to a pin and property corner; thence North 79° 10' East passing a pipe at 565.46 feet, continuing on the same line to the point of beginning, in all 605.50 feet, containing 1.99 acres; said above described property being subject to a 10 foot easement along the entire North line, for ingress and egress to the property conveyed to Joseph E. Hassler and wife as set out in Deed recorded in Deed Book

3615, Page 47, in the Office of the Clerk aforesaid; and being the remaining portion of the property conveyed to Charles W. Brooks and Wilma Lee Brooks, his wife, for their joint lives with remainder in fee simple to the survivor of them by deed dated February 9, 1951, and recorded in Deed Book 2719, Page 465, in the Office of the Clerk aforesaid, the said Charles W. Brooks, having died February, 1975, thereby vesting the fee simple title to said property in Wilma Lee Brooks, party of the first part.

Being that same property conveyed to **T Big Ventures Inc.**, by Deed dated _____ and recorded on _____ in Deed Book _____, Page _____, of record in the office of the Clerk for Jefferson County, Kentucky.

WHEREAS, **PATRICK HASSLER and SHERRY HASSLER,** husband and wife, with an address of 10412 Old Preston Hwy, Louisville, KY 40229, herein called the Grantees, are the owners of real estate lying to the North and West and contiguous to said real estate of Grantor by virtue of a deed September 12, 1994, and recorded in Deed Book 6500, Page 739, of record in the office of the Clerk for Jefferson County, Kentucky, and

WHEREAS, the Grantor and Grantees desire to establish and define an easement across Grantor's property for the benefit of Grantees' property for ingress and egress.

NOW, therefore, in consideration of the sum of One Dollar ($1.00) received to the full satisfaction of the Grantees, the Grantor does hereby grant to the Grantees, their heirs and assigns, a perpetual, non-exclusive easement over the that portion of Grantor's property and contiguous to the Grantees' property as shown on the Access Easement Plat (the "Plat") by Mindel Scott and Associates, Inc. attached hereto and marked as Exhibit "A". Said easement is limited to the hatched area, as shown on the attached Plat as shown as "30' ACCESS ESMT GRANTED".

Said easement includes the right of ingress and egress over Grantor's property to and from the easement for access to Grantee's real estate for its current use as a single-family residence. These presents shall not be deemed to include or grant any right, title, interest, claim or demand in or to said real estate of the Grantor other than the right granted herein. Excepting any damages specifically caused by the Grantee, the Grantor shall have the sole authority and responsibility for the maintenance and upkeep of the easement. This easement shall run with the land and shall bind and inure to the benefit of the Grantor and Grantees, and their successors, assigns, heirs and personal representatives.

[signature pages to follow]

IN TESTIMONY WHEREOF, witness the authorized signature of the Grantor and Grantees the day and date set forth below.

GRANTOR: T Big Ventures Inc.,

By: _____

Printed Name: _____

Its: _____

COMMONWEALTH OF KENTUCKY

COUNTY OF _____

I, _____ the undersigned Notary Public, do hereby certify that the foregoing Access Easement was this day produced to me in said state and county and acknowledged before me this _____ day of _____, 2021, by **T Big Ventures, Inc.,** to be his voluntary act and deed on behalf of said Trust.

WITNESS my hand and notarial seal.

My commission expires: _____

_____
NOTARY PUBLIC

GRANTEES:

_____
PATRICK HASSLER

_____
SHERRY HASSLER

COMMONWEALTH OF KENTUCKY

COUNTY OF _____

The foregoing Access Easement was subscribed, sworn to and acknowledged before me this _____ day of _____, 2021, by the Grantees, **PATRICK HASSLER and SHERRY HASSLER**, husband and wife.

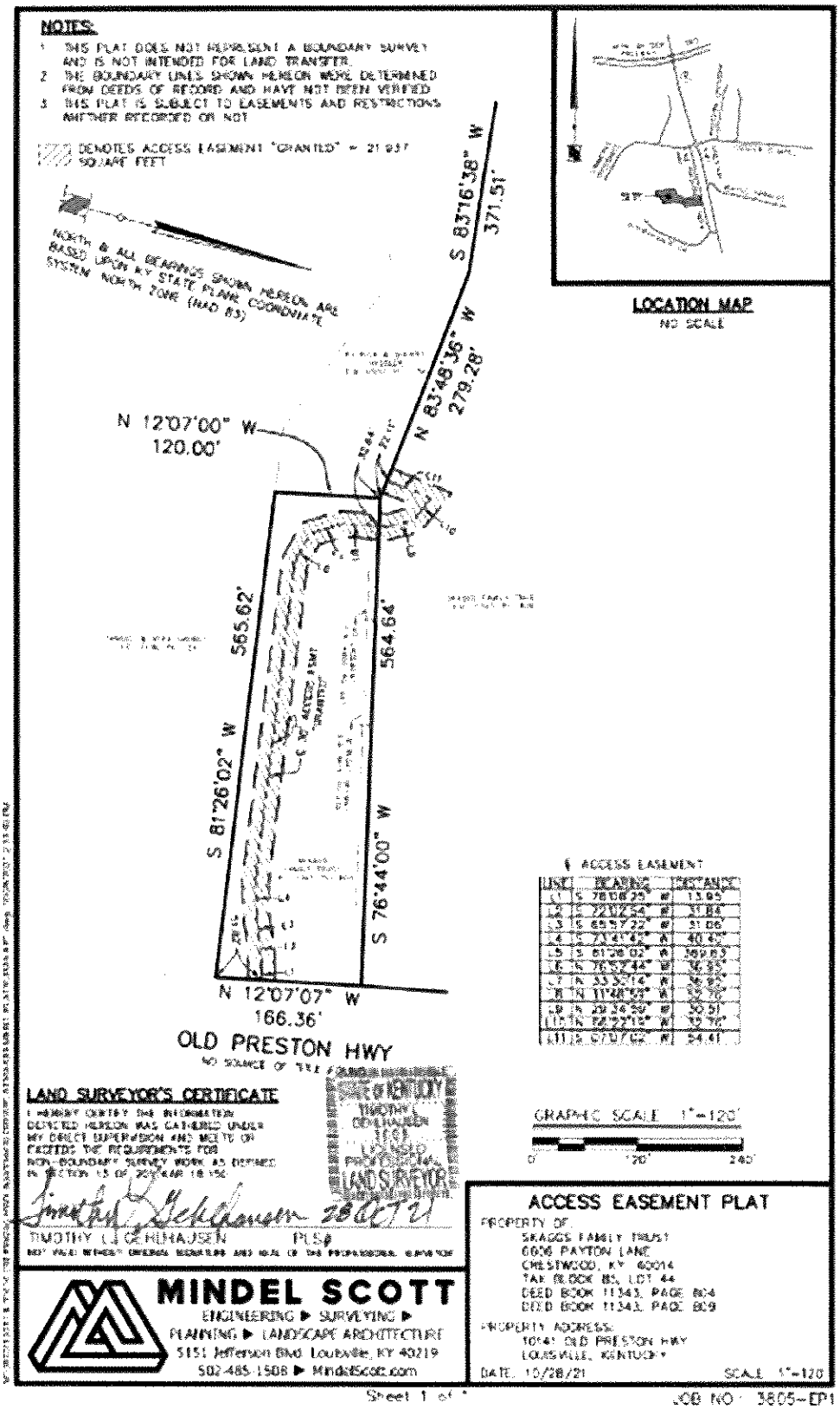
WITNESS my hand and notarial seal.

My commission expires: _____

_____
NOTARY PUBLIC

_____
Printed Signature

THIS INSTRUMENT PREPARED BY:
Jason A. Lopp, #87538
CHURCH LANGDON LOPP & BANET LLC
318 Pearl Street, #200
New Albany, IN 47150
(812)725-8224



Asher Engineering, Inc.

Environmental & Engineering Consulting

October 12, 2021

Mr. Brent Hackworth
brent@highgates.com

RE: Slope Stability
Proposed Apartments
10410 Old Preston Highway
Louisville, Ky

Dear Mr. Hackworth,

In July, 2021 Asher Engineering visited the referenced site to conduct a subsurface investigation for the proposed apartment complex. The subsurface conditions were explored by conducting 9 test pits across the site. The test pits were consistent with about 12 in. topsoil layer underlain by moist, firm, brown silty clay soil down to limestone bedrock.

The site topography is generally flat to gently sloping with some areas of the site at slightly steeper slope. While no slope failures were noted during our site visit, the areas with significant slopes will be inspected by the Asher Engineer during the earthwork portion of the site development, and inspected during construction of new building foundations. Placement of any fill in sloped areas must be benched into the slope and placed horizontally, and compacted to 98 percent of the Standard Proctor (ASTM D698). Field density tests would be conducted to confirm that the specified compaction was achieved.

The site should be graded such that water drains away from the structures. Some areas may require additional efforts to insure positive drainage away from the building foundations. This may include perimeter and subfloor drains connected to a sump or French drain. The site should be graded such that water drains away from the structures. Any such recommendations would be made by Asher Engineering at the time of building construction.

Inspection reports would be prepared documenting the sitework and construction of all building pads, including any building areas constructed on slopes.

Sincerely,

Richard A. Linker, P.E.

STATE OF KENTUCKY
RICHARD A. LINKER
16420
LICENSED PROFESSIONAL ENGINEER

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21 - ZONE - 0104

GEOTECHNICAL ENGINEERING STUDY

PROPOSED APARTMENTS
10410 OLD PRESTON HIGHWAY
LOUISVILLE, KENTUCKY

ASHER PROJECT NO. 21-077

Prepared For:

Mr. Brent Hackworth
brent@highgates.com

Prepared By:

Asher Engineering, Inc.
1021 South Floyd Street
Louisville, Kentucky 40203

July 13, 2021

Asher Engineering, Inc.
Environmental & Engineering Consulting

July 13, 2021

Mr. Brent Hackworth
brent@highgates.com

Re: Geotechnical Engineering Study
Proposed Apartments
10410 Old Preston Highway
Louisville, Kentucky

Dear Brent,

Asher Engineering has completed a Geotechnical Engineering Study for the referenced project. This report contains the findings of our subsurface exploration, geotechnical recommendations to aid design of foundations and floor slabs, and construction recommendations with regard to site work, fill placement, and foundation installation and inspection.

We appreciate the opportunity to be of service to you on this project. If we can be of further assistance, or if you have any questions regarding this report, please contact our office.

Sincerely,

Richard A. Linker, P. E.

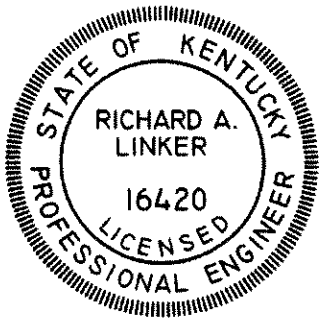

TABLE OF CONTENTS

1.0 PROJECT INFORMATION

The project site is located at 10410 Old Preston Highway, in Louisville, Ky.
The site is an open grass-covered flat rectangular shaped tract with scattered mature trees. A review of historical aerial photographs (Appendix) revealed that the property is previously undeveloped land with some large tilled gardens but no full crop coverage. .

Proposed for construction are 3-story, slab on grade apartment buildings. Asphalt paved parking and access drives will be provided throughout.

2.0 SUBSURFACE EXPLORATION

The subsurface conditions were explored by conducting 9 test pits across the site. The test pits were consistent with about 12 in. topsoil layer underlain by moist, firm, brown silty clay soil down to limestone bedrock. A summary of each test pit is included in the Appendix. The depth to refusal at each test pit is summarized below.

Test Pit	Depth to Refusal, Ft.
1	1.5
2	2.6
3	8 ft. no rock encountered
4	7
5	6.3
6	5.5
7	4.0
8	6.9
9	7.0

No water was noted in the test pits . The limestone bedrock can weather resulting in an irregular surface and elevation differenced over short horizontal distances.

3.0 Design and Construction Recommendations

The following design and construction recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions.

3.1 Site Development

We recommend an 8 to 12 in. stripping depth be used. Thicker topsoil/rich soil will be encountered in areas that were once tilled gardens, while other areas will have a less thick topsoil layer.

The silty clay soils on site are suitable for support of the new bldgs and roads, and are suitable for use as structural fill.

It is likely that Limestone bedrock will be encountered in utility trenches and bldg pad / footing excavations. The limestone cannot be ripped with an excavator, and will have to be blasted or hoe rammed.

3.2 Shallow Foundations and Floor Slabs

Footings bearing on firm natural soil, or engineered fill placed over firm soil may be proportioned using a net allowable bearing capacity of 3400 psf. Footings can bear on firm natural soil or bedrock. A Site Classification B should be used for seismic design. Wall footings should be at least 16 in. wide and column footings should be at least 24 in. wide to provide an adequate factor of safety for bearing capacity. All exterior footings and footings in unheated areas must bear at least 24 in. below final exterior grade for frost protection. Interior footings can bear at nominal depths below the floor.

Footing excavations that extend to bedrock do not have to be over-excavated to provide a 'cushion' of soil or crushed stone between the bottom of footing and bedrock. Footings can be poured directly on bedrock even if footing elevations in other portions of the bldg encounter clay soil. However, rock will have to be removed such that the entire footing design thickness and footing design depth can be provided.

The building subgrades should be inspected and approved by the geotechnical engineer prior to the placement of grade raise fill or the stone subbase. The slab should be supported on a 4-in. layer of KY Dense Graded Aggregate (DGA) compacted to 98 percent of the standard Proctor (ASTM D-698).

3.4 Below Grade Walls

Below grade walls should be designed to provide drainage to relieve hydrostatic pressure. A clean, free draining granular fill (KY No. 57 stone) should be used to backfill against below grade walls. The backfill zone should be drained using a perforated pipe at the base of the wall. An Equivalent Hydrostatic Pressure (EHP) of 50 pcf may be used to design below grade walls. A unit weight of 130 pcf should be used for the granular backfill.

3.5 Pavements

New pavement areas should be inspected by the geotechnical engineer to determine the suitability of the subgrade and to provide recommendations for stabilization if necessary. Assuming proper subgrade preparation, a California Bearing Ratio (CBR) value of 5 is recommended. This value applies for both undisturbed soil and the stone subbase that is stable under a proofroll, and for soil that is recompacted to at least 95 percent of the standard Proctor maximum dry density.

The following asphalt pavement section is recommended for areas that will be limited to automobiles and light trucks:

Automobile and Light Truck Areas	1.0 in. asphalt concrete surface 2.0 in. asphalt concrete base 4.0 in. KY DGA limestone 4.0 in. 4-Minus or Surge limestone

Areas that may experience heavier loading conditions should be provided with the following pavement section.

Heavy Truck Areas	1.0 in. asphalt concrete surface 3.0 in. asphalt concrete base 4.0 in. KY DGA 6.0 in 4-Minus or Surge limestone

4.0 CONSTRUCTION RECOMMENDATIONS

Variations in subsurface conditions should be expected during construction. It is therefore recommended that the geotechnical engineer be retained by the Owner to review the soils-related phases of the project and to correlate the test data with the soil conditions that are encountered during construction.

4.1 Subgrade Preparation

Prior to construction or the placement of new engineered fill or stone subbase, the exposed subgrade should be evaluated by the project geotechnical engineer. The existing subgrade should be carefully inspected by proofrolling with a loaded dump truck prior to the placement of fill to identify soft areas. Any soft areas identified by the proofroll would be undercut and stabilized with crushed stone. The contractor should exercise discretion when selecting equipment sizes and also control surface water while the subgrade soils are exposed. The severity of this potential problem depends to a great extent on the weather conditions during construction.

4.2 Engineered Fill

Engineered fill should be placed on a prepared subgrade that has been inspected and approved by the project geotechnical engineer. The inspection would include proofrolling of the exposed subgrade with a loaded pan or other suitable rubber-tired piece of equipment. If unsuitable material is disclosed, an appropriate remedial measure would be recommended by the geotechnical engineer at that time. Engineered fill placement and compaction operations should be monitored by the geotechnical engineer or his representative. Field density tests should be performed on each lift as necessary to insure that the specified compaction is being achieved. Soil fill placed in the proposed building area should be compacted to at least 98 percent of the standard Proctor maximum dry density (ASTM D-698). Fill placed in the paved areas should be compacted to 95 percent, and fill placed in green areas to 90 percent.

4.3 Foundation Excavations

All foundation excavations should be evaluated by the geotechnical engineer or his representative to insure adequate foundation support. All concrete for foundations should be poured the same day the excavation is made.

Appendix

Historical Aerial Photographs

Summary of Test Pits

High Gates	**Proposed Apartments** **10410 Old Preston Highway** **Louisville, Kentucky**	**Asher Engineering, Inc.** **Project No.: 21-077** **Photo Date June 2020**

High Gates	**Proposed Apartments** **10410 Old Preston Highway** **Louisville, Kentucky**	**Asher Engineering, Inc.** **Project No.: 21-077** **Photo Date March 1993**

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10410 Old Preston Hwy.
High Gates
21-077

Test Pit #1

0" to 7" Topsoil with roots
7" to 18" Silty Clay; moist; firm; brown; silty
18" Limestone; shelf rock; Possible Karst Activity Near-By
Refusal at 1 ft. 6 in.

Test Pit #2

0" to 4" Topsoil with heavy roots
4" to 31" Silty Clay; moist; firm; brown; silty with trace rock fragments and roots
31" Limestone; Surface Rock Outcrop
Refusal at 2 ft. 7 in.

Test Pit #3

0" to 10" Topsoil with roots to 18"
10" to 36" Silty Clay; moist; firm; brown; silty
36" to 96" Silty Clay; moist; firm; red brown
Terminated at 8 ft.

Test Pit #4

0" to 14" Topsoil with heavy roots
14" to 36" Silty Clay; moist; firm; brown; silty
36" to 84" Silty Clay; moist; firm; red brown with gray
84" Limestone
Refusal at 7 ft.

Test Pit #5

0" to 4" Topsoil (minimal)
4" to 36" Silty Clay; very moist; firm; brown; very silty
36" to 76" Silty Clay; moist; firm; red brown
76" Limestone; Karst Activity Near-By
Refusal at 6 ft. 4 in.

Test Pit #6

0" to 12" Topsoil with roots
12" to 36" Silty Clay; very moist; firm; brown; very silty
36" to 66" Silty Clay; moist; firm; red brown with gray; trace limestone floater at 4 ft.
66" Limestone
Refusal at 5 ft. 6 in.

Test Pit #7

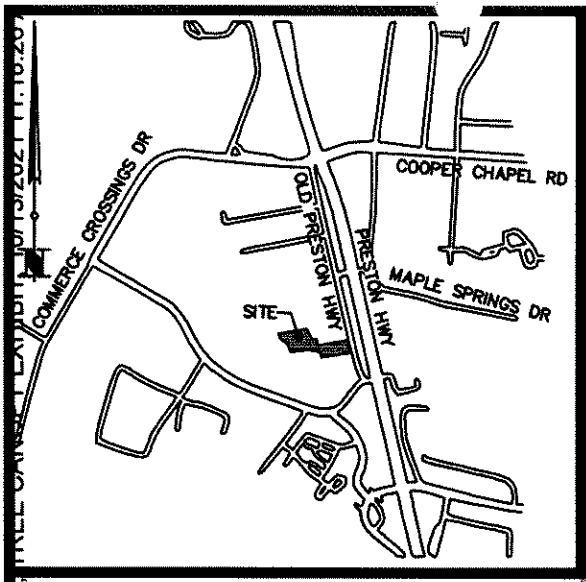
0" to 10" Topsoil with roots
10" to 24" Silty Clay; very moist; firm; brown; silty
24" to 48" Silty Clay; moist; firm; red brown with gray
48" Limestone
Refusal at 4 ft.

Test Pit #8

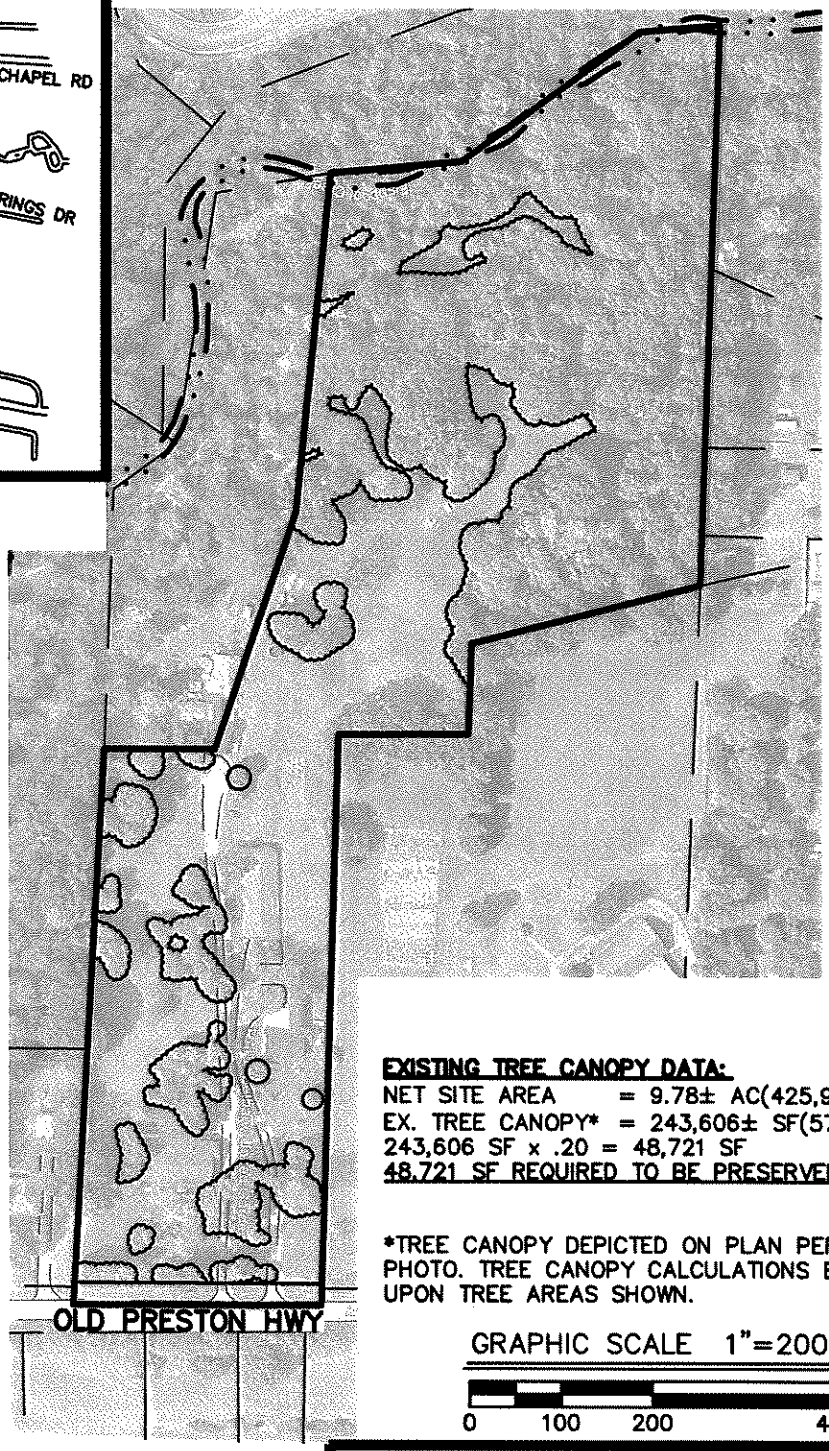
0" to 10" Topsoil with roots
10" to 30" Silty Clay; dry/moist; firm; tan brown; silty with trace roots
30" to 82" Silty Clay; moist; firm; red brown
82" Limestone
Refusal at 6 ft. 10 in.

Test Pit #9

0" to 12" Topsoil with roots
12" to 84" Silty Clay; moist; firm; red brown; silty
Terminated at 7 ft.



LOCATION MAP
NO SCALE



EXISTING TREE CANOPY DATA:
NET SITE AREA = 9.78± AC(425,936± SF)
EX. TREE CANOPY* = 243,606± SF(57%)
243,606 SF x .20 = 48,721 SF
48,721 SF REQUIRED TO BE PRESERVED

*TREE CANOPY DEPICTED ON PLAN PER AERIAL PHOTO. TREE CANOPY CALCULATIONS BASED UPON TREE AREAS SHOWN.

GRAPHIC SCALE 1"=200'
0 100 200 400

LEGEND
EX. TREE MASS

THE PURPOSE OF THIS EXHIBIT IS TO QUANTIFY THE EXISTING TREE COVERAGE.

MINDEL SCOTT
ENGINEERING ▶ SURVEYING ▶
PLANNING ▶ LANDSCAPE ARCHITECTURE
5151 Jefferson Blvd. Louisville, KY 40219
502-485-1508 ▶ MindelScott.com

EXISTING TREE CANOPY EXHIBIT: 21-ZONE-0104

PROPERTY OF:
SKAGGS FAMILY TRUST
6606 PAYTON LANE
CRESTWOOD, KY. 40014
TAX BLOCK 85, LOT 44 & 266
D.B. 11343 PG. 804, & D.B. 11343 PG. 809

PROPERTY ADDRESS:
10410 & 10414 OLD PRESTON HWY
LOUISVILLE, KY 40229

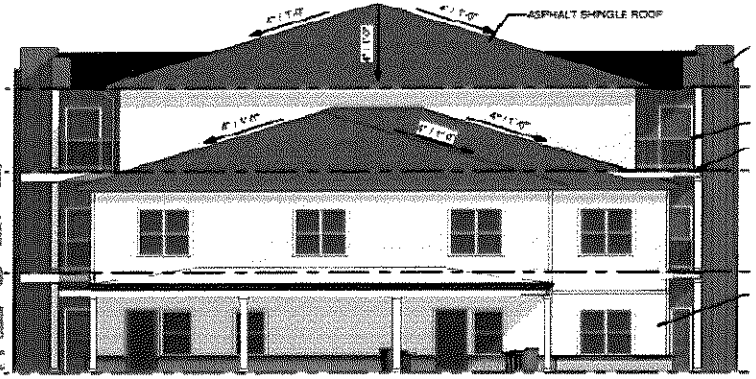
DATE: OCTOBER 13, 2021

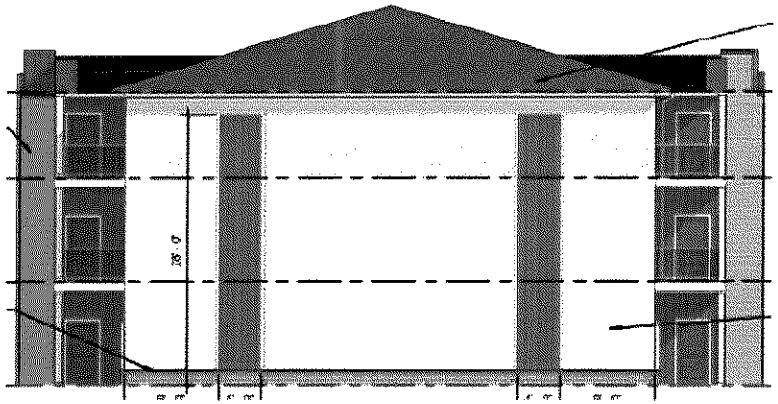
JOB NO.: 3805

21 - ... ZONE ... - 0104

HIGHGATES

OLD PRESTON ELEVATIONS
Leasing Office and Building 1



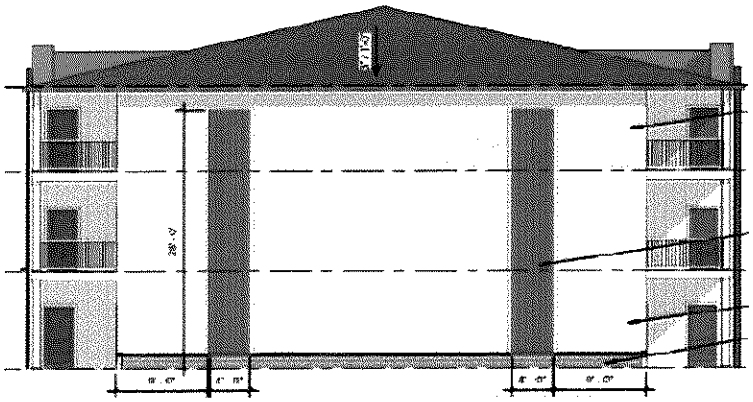


Per Building Code
Height of a building means the vertical distance from the established grade in front of the lot or from the average natural grade at the face of the front of the building wall, if higher, to the average of the top of the cornice of flat roofs, or the roof line of a mansard roof, or to the middle height of the highest gable or dormer in a pitched or hipped roof, or if there are no gables or dormers, to the middle height of such pitched or hipped roof

RECEIVED
OCT 15 2021
PLANNING &
DESIGN SERVICES
21-ZONE-1004

HIGHGATES

OLD PRESTON ELEVATIONS
1 Bedroom Buildings

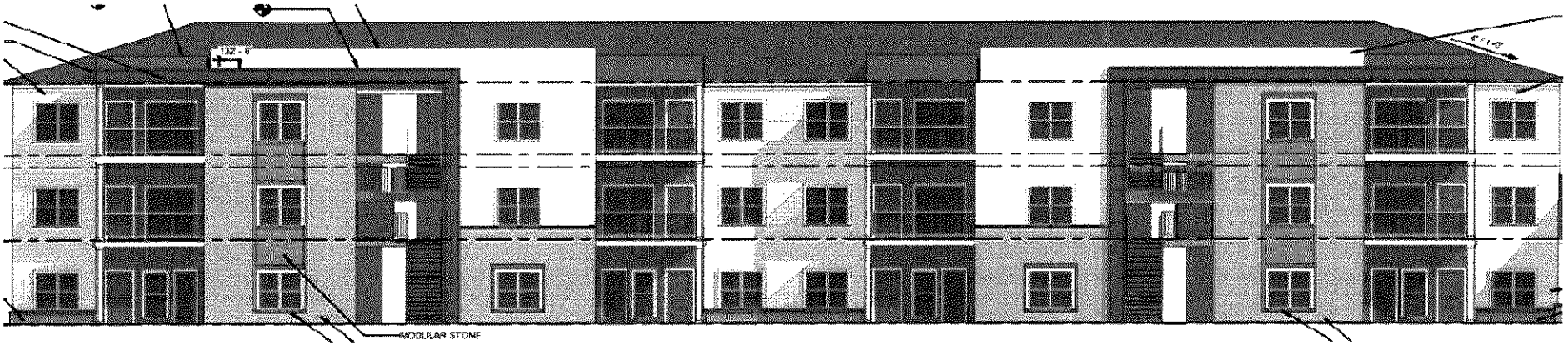


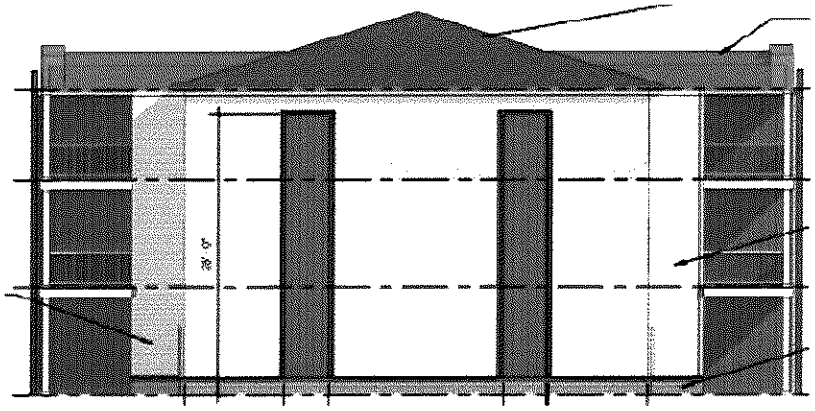
Per Building Code:
Height of a building means the vertical distance from the established grade in front of the lot or from the average natural grade at the base of the front of the building wall, if higher, to the average of the top of the cornice of flat roofs, or the roofline or to the deck line of a mansard roof, or to the middle height of the highest gable or dormer in a pitched or hipped roof, or if there are no gables or dormers, to the middle height of such pitched or hipped roof.

21 - ZONE - 0104

HIGHGATES

OLD PRESTON ELEVATIONS
2 Bedroom Buildings





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