

TRAFFIC IMPACT AND ACCESS STUDY

**PROPOSED ELDERLY CARE AND RESIDENTIAL SUB-DIVISION
FOREST ACRES, SOUTH CAROLINA**

Prepared for:

**H & M Real Estate Holdings, LLC.
Columbia, SC**

**Submitted
April, 2015**

Prepared by:

**SRS Engineering, Inc.
801 Mohawk Drive
West Columbia, SC. 29169**





SRS Engineering, LLC
801 Mohawk Drive
West Columbia, SC 29169

April 27, 2015

Mr. Mike Brickle
H & M Real Estate Holdings, LLC
P.O. Box 7141
Columbia, SC 29202

Email: mnbrickle@aol.com

**RE: Traffic Impact and Access Study
Elderly Memory Care and Residential Development
Forest Acres/Columbia, SC**

Dear Mr. Brickle:

As requested, SRS Engineering, LLC (SRS) has completed an assessment of the traffic impacts associated with the development of a new Elderly Memory Care and small number of residential units to be located between Sunnyside Drive and North Beltline Boulevard in Forest Acres, SC. The following provides a summary of this study's findings.

PROJECT DESCRIPTION

The project site is located between Sunnyside Drive and N. Beltline Boulevard and is broken down into two separate free-standing developments; the first being an elderly memory care facility containing a single office/institutional building (43,325 sf), 14 single-family and nine townhome residential units. These three land-uses will be provided access to/from Sunnyside Drive via two proposed access drives. To the east and provided access to/from Belmont Drive, 22 single-family residential units are planned. As scheduled, the entire development is planned to be constructed and occupied by 2018. **Figure 1** depicts the site location in relation to the regional roadway system (Figures located at end of report). **Figure 2** depicts the proposed development plan.

EXISTING CONDITIONS

A comprehensive field inventory of the project study area was conducted in December 2014 (schools were still in session at time of counts). The field inventory included a collection of geometric data, traffic volumes and traffic control within the study area. The following sections detail the current traffic conditions and include a description of roadways/intersections serving the site and traffic flow in close proximity to the project.

Study Area Roadways

Sunnyside Drive- is a two-lane collector with a north/south where directional traffic flow is separated by a double-yellow center-line. This roadway has a posted speed limit of 30 miles-per-hour (mph) and is under the jurisdiction of the SCDOT.

Belmont Drive- is a two-lane dead-end roadway with a north/south orientation. The section of this roadway adjacent to the site has no posted speed limit and currently has a length of approximately 200-foot (paved section) and then a short dirt section and is under the jurisdiction of the SCDOT.

Study Area Intersections

As identified by staff from the City of Forest Acres, the following intersections have been required to be analyzed in order to determine project impact on the surrounding roadway network.

1. Belmont Drive at West Buchanan Drive;
2. N. Beltline Boulevard at West Buchanan Drive;
3. Sunnyside Drive at northern site access (elderly care facility 23 residential units); and
4. Sunnyside Drive at southern site access (elderly care facility).

Figure 3 illustrates the existing geometrics and traffic control for the study area intersections and surrounding roadways.

Traffic Volumes

In order to determine the existing traffic volume flow patterns within the study area, manual turning movement counts were performed. Weekday morning (7:00-9:00 AM) and evening (4:00-6:00 PM) peak period turning movement specific counts were conducted at the above referenced study area intersections.

Summarized count sheets for the study area intersections are included in the Appendix of this report. **Figure 4** graphically depicts the representative 2014 Existing AM and PM peak-hour traffic volumes at the study area intersections to be used for analytical purposes.

FUTURE CONDITIONS

Traffic analyses for future conditions have been conducted for two separate scenarios: first, 2018 No-Build conditions, which include an annual normal growth in traffic, all pertinent background development traffic, and any pertinent planned roadway/intersection improvements; and secondly, 2018 Build conditions, which account for all No-Build conditions PLUS traffic generated by the proposed development.

Future No-Build Traffic Conditions

Planned Roadway Improvements

Based on discussions with SCDOT staff, there are no currently planned/funded roadway improvement projects that will affect the study area intersections.

Annual Growth Rate

Based on historical SCDOT data along N. Beltline Boulevard, a 2-percent annual growth rate has been utilized to project future conditions. This 2-percent annual growth, which would account for all unspecified traffic growth, was applied to the Existing peak-hour traffic volumes.

The anticipated 2018 No-Build AM and PM peak-hour traffic volumes, which reflect the annual 2-percent growth rate, are shown in Figure 5.

Site-Generated Traffic

Traffic volumes expected to be generated by the proposed project were forecasted using the Ninth Edition of the ITE *Trip Generation* manual, as published by the Institute of Transportation Engineers. Table 1 depicts the anticipated site-generated traffic.

Table 1
TRIP GENERATION SUMMARY¹
Elderly Care & Residential Project- Sunnyside Drive

Time Period	Belmont Drive	Sunnyside Drive		
	22 Single-Family Units (a)	43,325 sf (64 bed) Memory Care Facility (b)	9 Townhome Units (c)	14 Single-Family Units (d)
Weekday Daily	210	180	50	140
AM Peak-Hour				
Enter	4	8	1	3
Exit	<u>13</u>	<u>4</u>	<u>3</u>	<u>8</u>
Total	17	12	4	11
PM Peak-Hour				
Enter	14	10	4	9
Exit	<u>8</u>	<u>9</u>	<u>1</u>	<u>5</u>
Total	22	19	5	14

1. ITE *TRIP GENERATION* 9th Ed. LUC 210, 230 & 254.

As shown, the proposed development has been broken down into its respective components and trip generation expected for each use estimated. The single-family portion of the project (accessed to/from Belmont Drive/W. Buchanan Drive, shown by column a) is expected to generate 210 two-way daily trips of which a total of 17 trips (4 entering and 17 exiting) are expected during the AM peak-hour. During PM peak-hour, a total of 22 trips (14 entering, 8 exiting) are expected.

The western section of the development, which will be accessed to/from Sunnyside Drive (columns b, c and d), will generate a sum/total of 370 daily two-way daily trips of which a total of 27 trips (12 entering and 15 exiting) are expected during the AM peak-hour. During the PM peak-hour, a total of 38 trips (23 entering, 15 exiting) are expected.

Distribution Pattern

The directional distribution of site-generated traffic on the study area roadways has been based on an evaluation of existing travel patterns. The anticipated patterns (one for Elderly Memory Care and one for the residential projects) are shown in Table 2. These distribution patterns have been applied to the site-generated traffic volumes from Table 1 to develop the respective site-generated specific volumes for the study area intersections illustrated in Figure 6. It should be noted that the assignment of site-generated traffic to access drives for the Elderly Memory Care development have been made specific to the development plans for on-site circulation and relative parking areas for each of the planned facilities.

Table 2
TRIP DISTRIBUTION PATTERN
Elderly Care & Residential Project- Sunnyside Drive

Roadways	Direction To/From	Residential Belmont Drive	Elderly Care Sunnyside Drive	Residential Sunnyside Drive
		Percent Enter/Exit	Percent Enter/Exit	Percent Enter/Exit
Sunnyside Drive	North	0	45	55
	South	0	55	45
N. Beltline Boulevard	North	40	0	0
	South	55	0	0
Belmont Drive	South	5	0	0
	Total	100	100	100

Note: Based on the existing traffic patterns.

Future Build Traffic Conditions

The site-generated traffic, as depicted in Figure 6, has been added to the respective 2018 No-Build traffic volumes shown in Figure 5. This results in the peak-hour Build traffic volumes, which are graphically depicted in Figure 7. These volumes were used as the basis to determine potential improvement measures necessary to mitigate traffic impacts caused by the project.

TRAFFIC OPERATIONS

Analysis Methodology

A primary result of capacity analysis is the assignment of Level-of-Service (LOS) to traffic facilities under various traffic flow conditions. The concept of Level-of-Service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A Level-of-Service designation provides an index to the quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six Levels-of-Service are defined for each type of facility (signalized and unsignalized intersections). They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst.

Since the Level-of-Service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of Levels-of-Service depending on the time of day, day of week, or period of a year.

Analysis Results

As part of this TIAS, capacity analyses have been performed at the study area intersections under both Existing and Future (No-Build & Build) conditions. The results of these analyses are summarized in Table 3.

**Table 3
 LEVEL-OF-SERVICE SUMMARY¹
 Elderly Care & Residential Project- Sunnyside Drive**

<u>Signalized Intersection</u>	<u>Time Period</u>	<u>2014 EXISTING</u>			<u>2018 NO-BUILD</u>			<u>2018 BUILD</u>		
		<u>V/C^a</u>	<u>Delay^b</u>	<u>LOS^c</u>	<u>V/C</u>	<u>Delay</u>	<u>LOS</u>	<u>V/C</u>	<u>Delay</u>	<u>LOS</u>
N. Beltline Boulevard at W. Buchanan Drive	AM	0.50	9.7	A	0.54	10.2	B	0.54	10.5	B
	PM	0.39	5.2	A	0.42	5.4	A	0.43	5.6	A
<u>Unsignalized Intersections</u>										
W. Buchanan Drive at Belmont Drive	AM	-	9.3	A	-	9.3	A	-	9.4	A
	PM	-	8.9	A	-	8.9	A	-	9.4	A
Sunnyside Drive at Northern Site Access	AM	To be Constructed by Development			To be Constructed by Development			-	8.9	A
	PM	To be Constructed by Development			To be Constructed by Development			-	9.2	A
Sunnyside Drive at Southern Site Access	AM	To be Constructed by Development			To be Constructed by Development			-	8.9	A
	PM	To be Constructed by Development			To be Constructed by Development			-	9.4	A

- a. Volume-to-Capacity ratio.
- b. Delay in seconds-per-vehicle.
- c. LOS = Level-of-Service.

GENERAL NOTES:

- 1. For signalized intersections, Delay is representative of overall intersection.
- 2. For unsignalized intersections, Delay is representative of critical movement/lane group/approach.

As shown in Table 3, under 2014 Existing and both Future year conditions; 2018 No-Build and 2018 Build; the study area intersections of N. Beltline Boulevard at W. Buchanan Drive and W. Buchanan Drive at Belmont Drive indicate good service levels during both peak-hours. Operations are very good at each of these intersections due to the relatively low volume of traffic on the minor street roadways as compared to the high volumes of traffic on N. Beltline Boulevard.

Similar operations currently exist along Sunnyside Drive where the volume of traffic existing and/or projected on Sunnyside Drive is relatively low resulting in good service levels. The proposed site access drives to/from Sunnyside Drive and Belmont Drive are each anticipated to operate at good service levels during both peak hours assuming the recommended geometry and traffic control for the proposed access drives as detailed in the next section of this report.

MITIGATION

The final phase of the analysis process is to identify mitigating measures which may either minimize the impact of the project on the transportation system or tend to alleviate poor service levels not caused by the project. The following describes measures necessary to mitigate the project's impact.

Proposed Site Access Drives- Sunnyside Drive

As planned, two access drives will be constructed to serve the proposed Elderly Care development along Sunnyside Drive as well as the small number of residential units. The northern access will be located approximately 150-feet south of the Brookwood Court intersection. The second/southern access will be located 440-feet south of the northern site access drive. The following describe the suggested geometry and traffic control for each of the access drives:

1. Construct access drives to provide a two-lane cross-section with one lane entering the site and one lane exiting the site designated as a shared left and right- turn lane;
2. In accordance with SCDOT design guidelines (*Fig 15.5A & 15.5F SCDOT Design Manual*) neither a separate left-turn lane nor separate right-turn entering the site are recommended; and
3. Movements exiting the site at both access drives should be placed under STOP sign control.

Both of these access drive intersections must be designed/constructed to meet current applicable SCDOT standards and/or guidelines in terms of sight distance. At a posted speed limit of 30 mph along Sunnyside Drive, clear maintained sight lines of 335-feet must be provided for safe operation in accordance with *Table 7-12 of the ARMS manual*. It is assumed that this will be the responsibility of the project's civil engineer and will be depicted by the site plan/submittal information.

Access Drive Residential Units- Belmont Drive

Access for the 22 single-family units will be provided by extending the 2-lane cross-section of Belmont Drive in a north easterly direction for approximately 1,300-feet through the site and terminate in the form of a cul-de-sac. Access for the individual residential units will be directly provided to/from this extension.

It should be noted that the development plans on upgrading Belmont Drive north of the intersection with W. Buchanan Drive resulting the upgrading of the current section which is in disrepair.

Off-Site Study Area Intersections

As shown in Table 3, the adjacent off-site intersections of N. Beltline Boulevard at W. Buchanan Drive and W. Buchanan Drive at Belmont Drive are each expected to operate at very good service levels during both peak hours under the future Build condition. Based on these results, no mitigation is suggested at this time.

SUMMARY

SRS has completed a single Traffic Impact Study which addresses the relative to the development of a new Elderly Memory Care facility and residential units between Sunnyside Drive and Belmont Drive in Forest Acres. As planned, the development section adjacent to Sunnyside Drive will contain a Memory Care/Alzheimer's facility totaling 43,325-sf and 23 residential units comprised of 14 single-family units and nine townhome units. These facilities will be provided access via two planned drives to/from Sunnyside Drive with the primary access being the north access.

The planned 22 unit residential sub-division will be provided access via an extension of Belmont Avenue from its current termini (proximity of W. Buchanan Drive) in to the site ending in a cul-de-sac geometry. Both projects are expected to be constructed and operational by 2018.

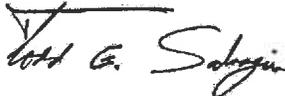
Mr. Mike Brickle
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Based on the completed analyses, neither project has a significant impact on the study area roadways or intersections within the defined study area. Operations at the adjacent intersections of N. Beltline Boulevard at W. Buchanan Drive and W. Buchanan Drive at Belmont Avenue are currently very good which is expected to continue in the future during both peak hours studied.

Suggested geometry and traffic control for the two planned site access drives along Sunnyside Avenue have been made which will result in two new unsignalized intersections. These recommendations will allow the site access drives to each operate at good service levels and have defined sight distance lengths in accordance with SC DOT requirements. The planned sub-division will be served by extending Belmont Avenue into the site terminating in a cul-de-sac geometry at the western boundary of the sub-division. This will essentially provide a formal fourth approach leg to the W. Buchanan Drive at Belmont Avenue intersection.

If you have any questions or comments regarding any information contained within this report, please contact me at (803) 361 3265.

Regards,



SRS ENGINEERING, LLC
Todd E. Salvagin
Principal

Attachments

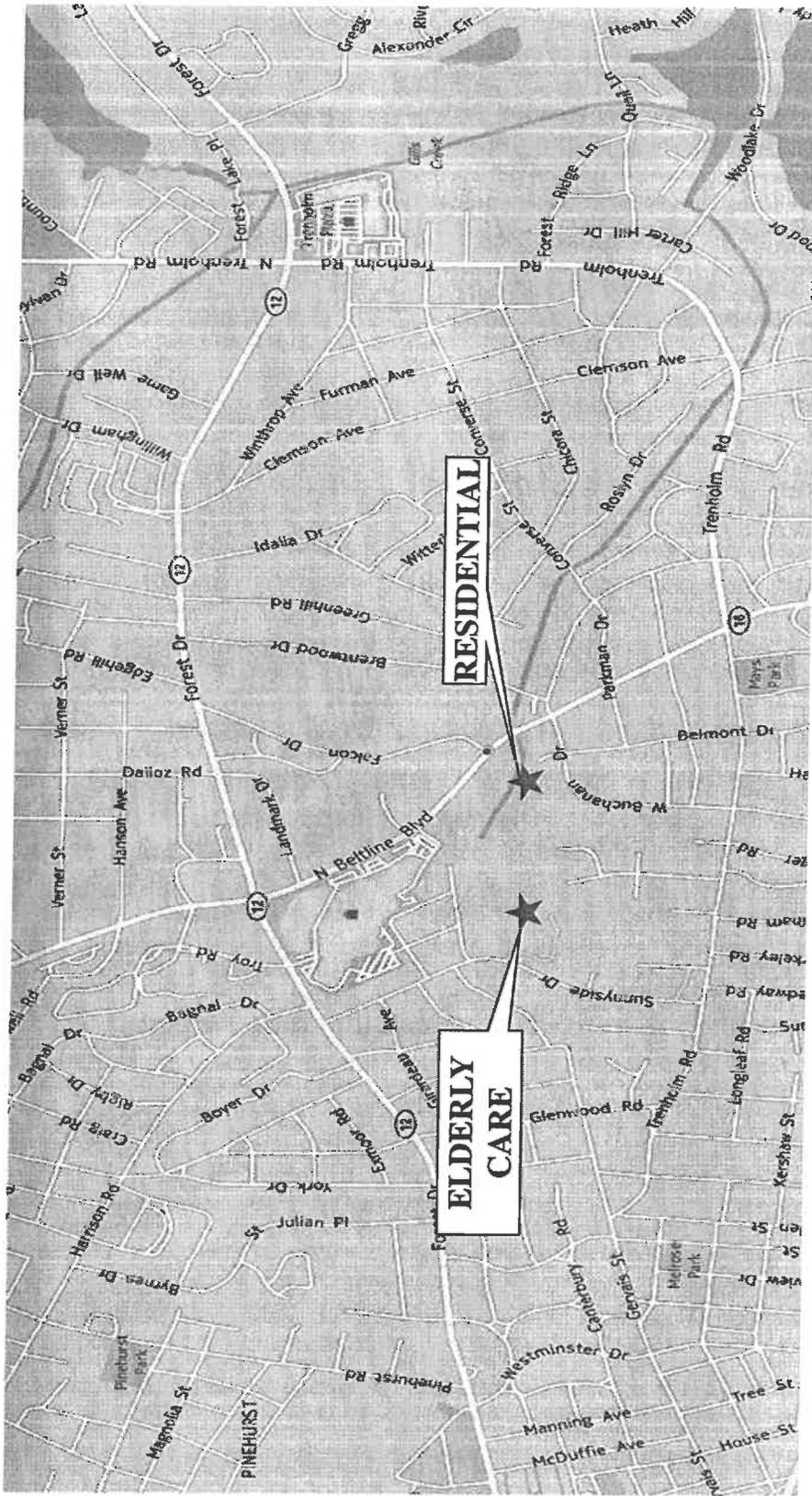
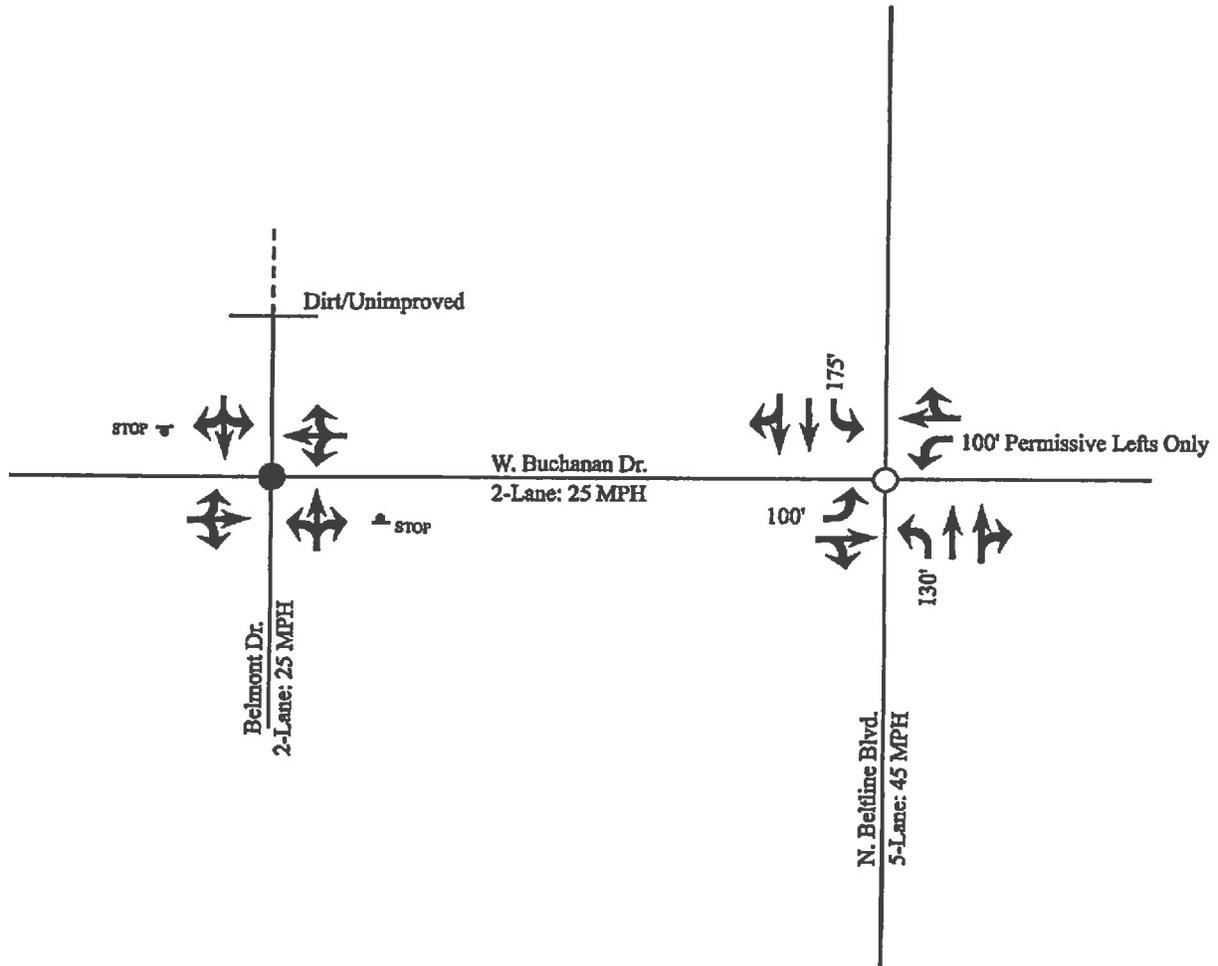


Figure 1
SITE LOCATION MAP
 Elderly Care & Residential Development: Forrest Acres, SC

NOT TO SCALE



NOT TO SCALE



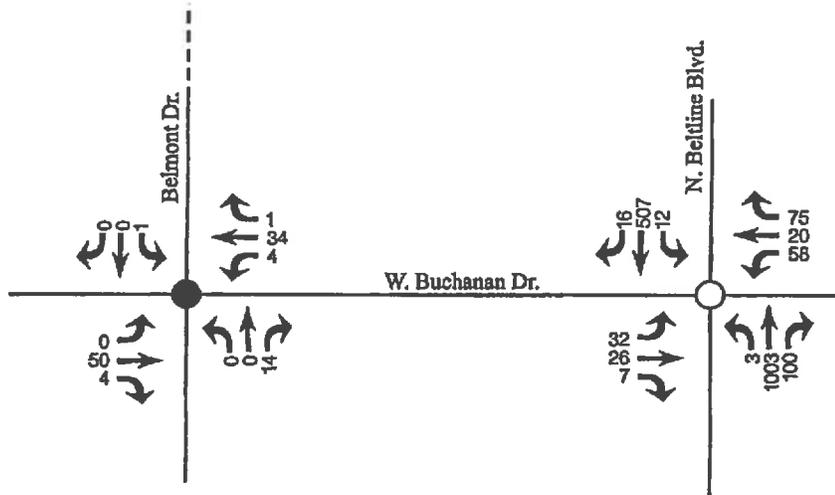
LEGEND

- = Signalized Intersection
- = Unsignalized Intersection
- ↔ = Lane Designation
- 000' = Storage Length

Figure 3
**EXISTING GEOMETRY &
 TRAFFIC CONTROL**
Elderly Care & Residential Development: Forrest Acres, SC

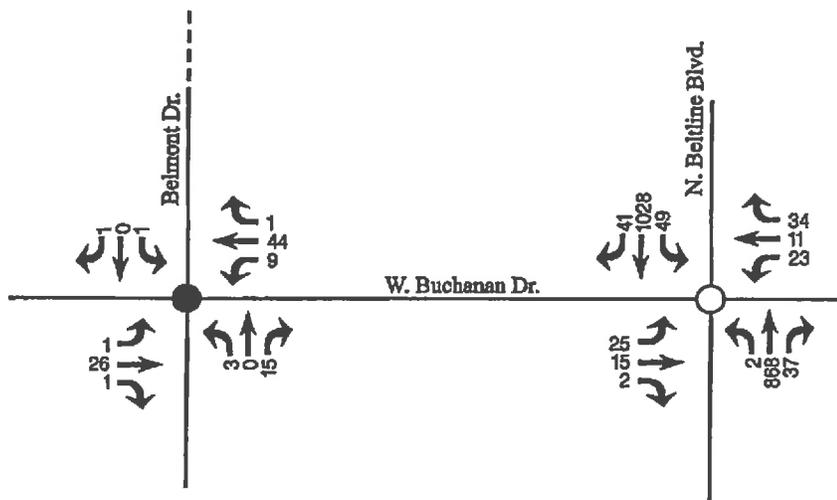


AM PEAK-HOUR



NOT TO SCALE

PM PEAK-HOUR



LEGEND

- = Signalized Intersection
- = Unsignalized Intersection
- = Lane Designation

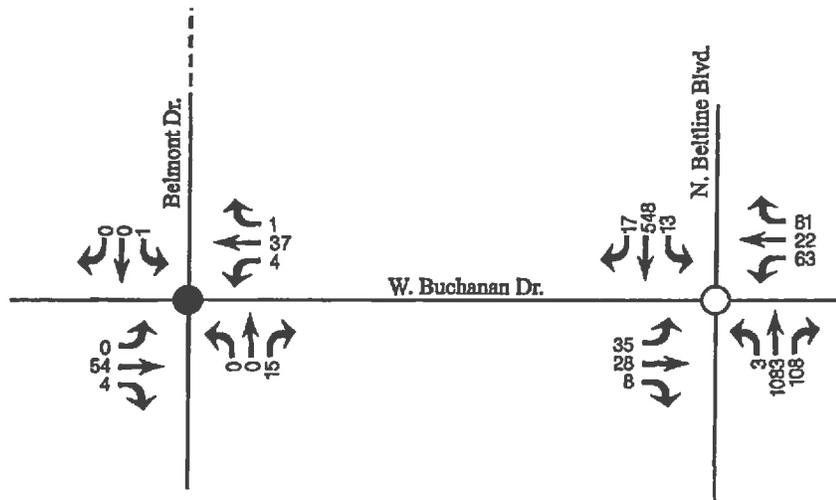
Figure 4

2014 EXISTING TRAFFIC VOLUMES

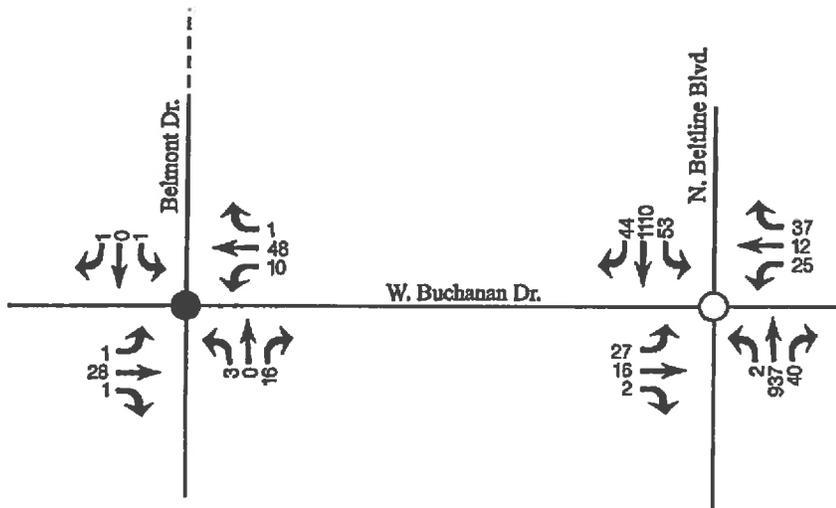
Elderly Care & Residential Development: Forrest Acres, SC



AM PEAK-HOUR



PM PEAK-HOUR



LEGEND

- - Signalized Intersection
- - Unsignalized Intersection
- ↔ - Lane Designation

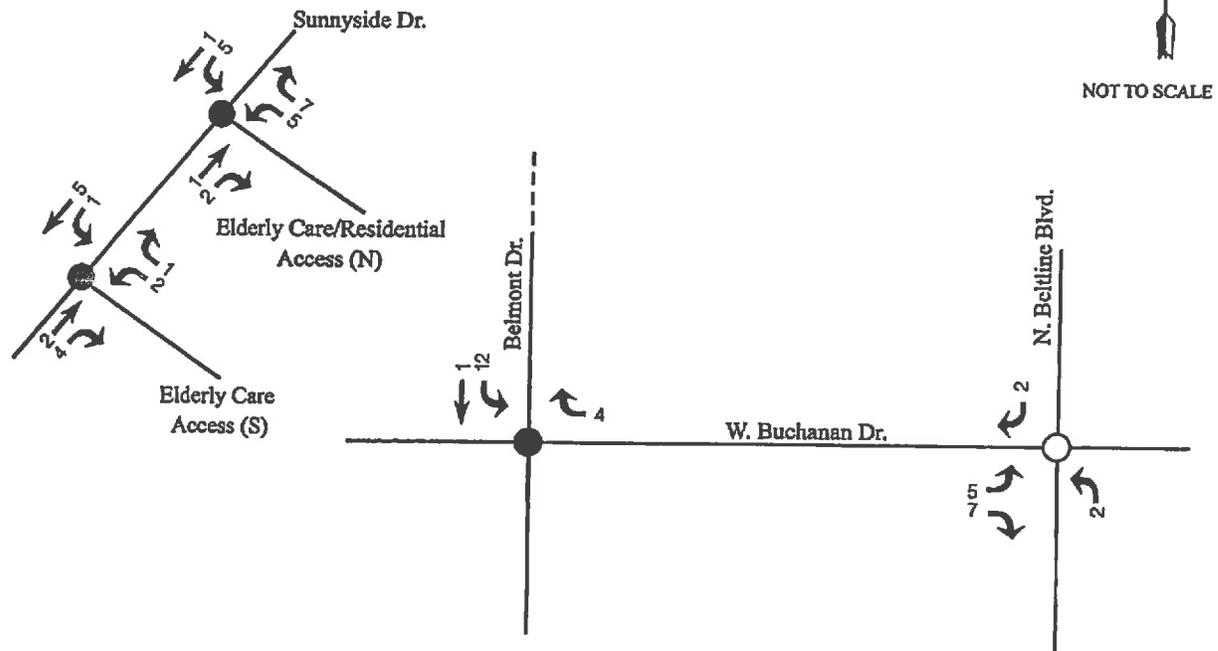
Figure 5

2018 NO BUILD TRAFFIC VOLUMES

Elderly Care & Residential Development: Forrest Acres, SC

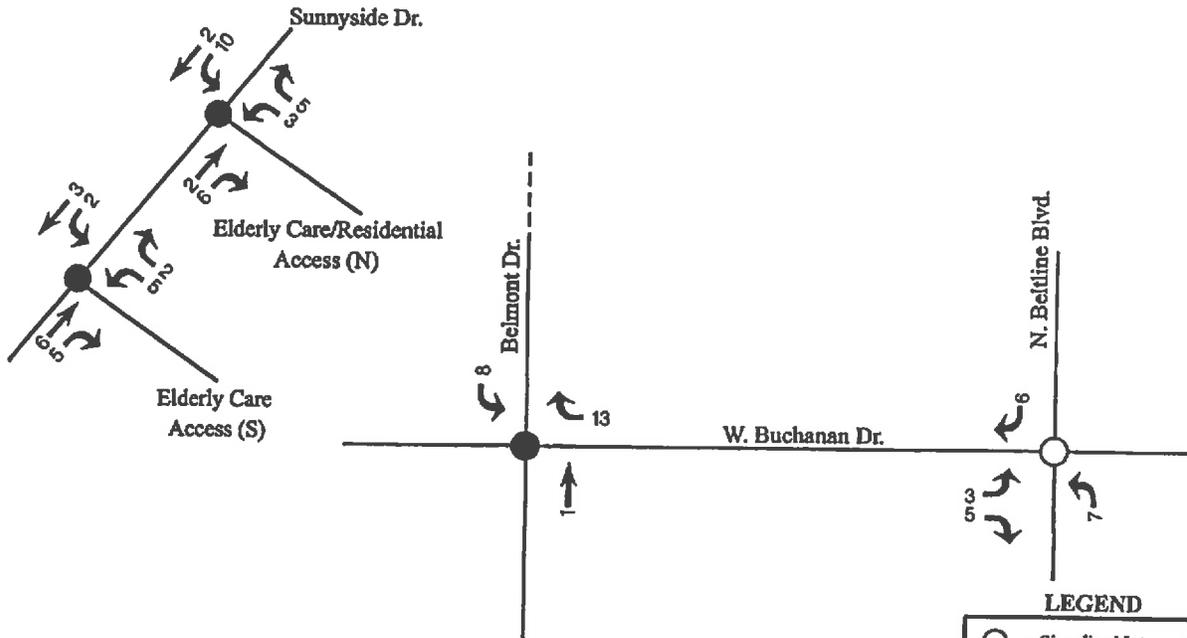


AM PEAK-HOUR



NOT TO SCALE

PM PEAK-HOUR



LEGEND

- = Signalized Intersection
- = Unsignalized Intersection
- ↔ = Lane Designation

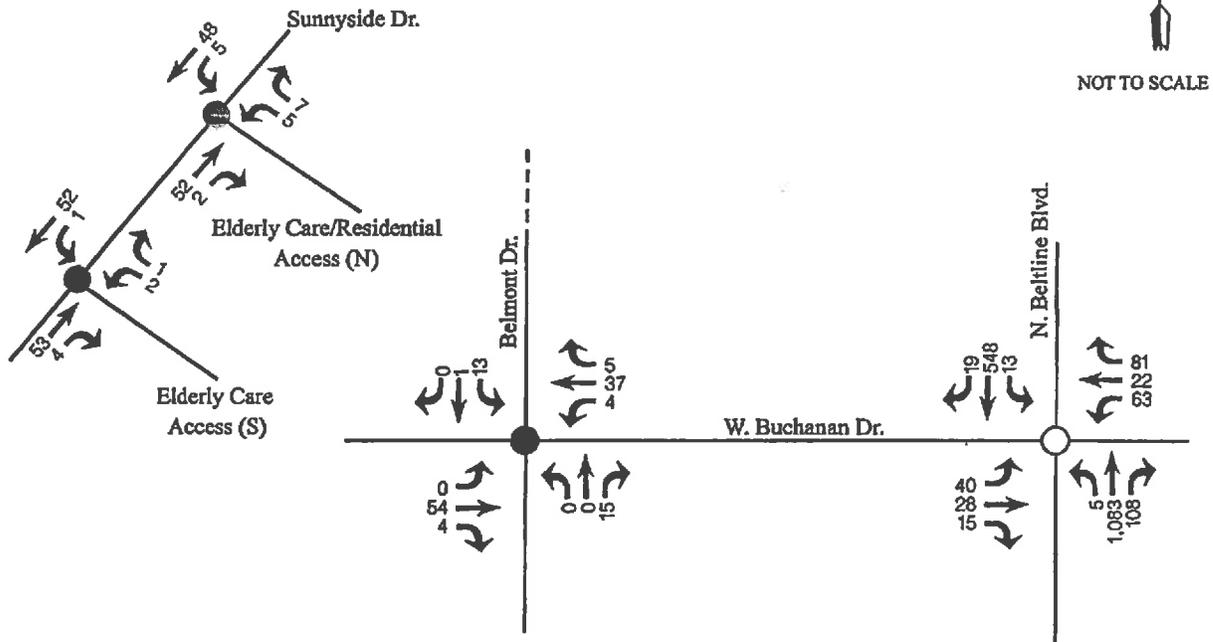
Figure 6

SITE GENERATED TRAFFIC VOLUMES

Elderly Care & Residential Development: Forrest Acres, SC

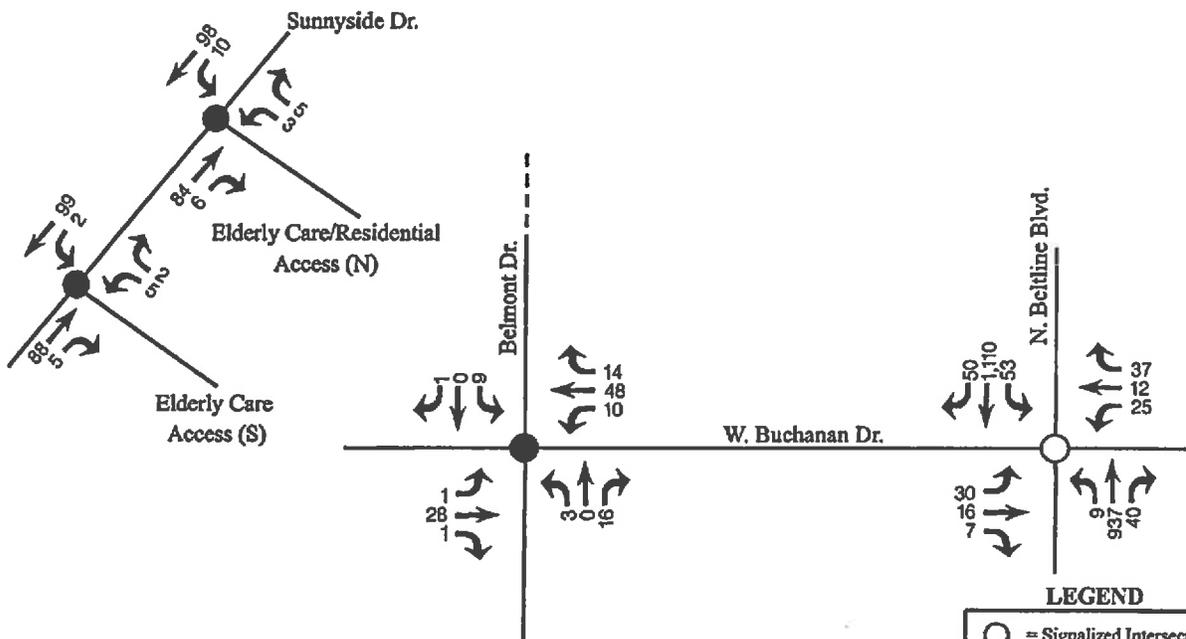


AM PEAK-HOUR



NOT TO SCALE

PM PEAK-HOUR



LEGEND

- = Signalized Intersection
- = Unsignalized Intersection
- ↔ = Lane Designation

Figure 7

2018 BUILD TRAFFIC VOLUMES

Elderly Care & Residential Development: Forrest Acres, SC



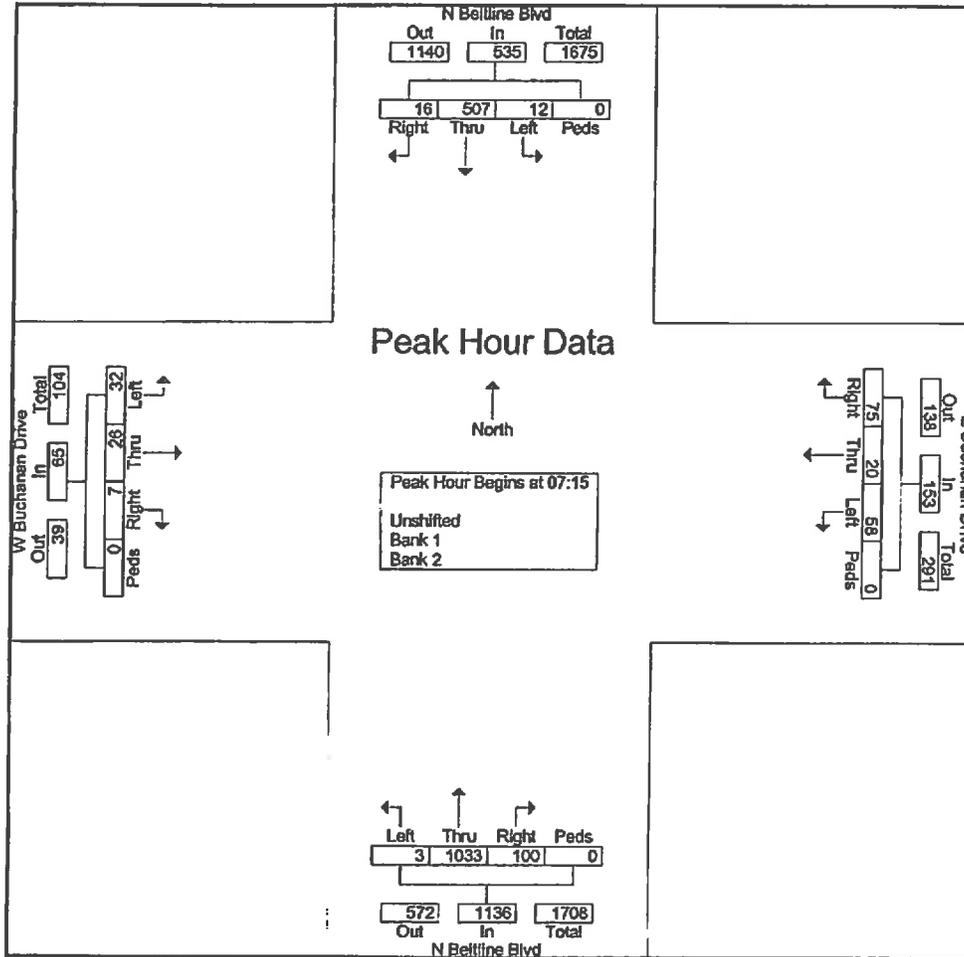
COUNT DATA

Short Counts

735 Maryland St.
Columbia, SC 29201
You Can Count On Us!

File Name : Beltline at Buchanan
Site Code : 00000000
Start Date : 12/16/2014
Page No : 3

Start Time	N Beltline Blvd Southbound					E Buchanan Drive Westbound					N Beltline Blvd Northbound					W Buchanan Drive Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15																					
07:15	2	119	2	0	123	8	3	10	0	21	1	258	30	0	289	7	6	2	0	15	448
07:30	1	148	4	0	153	22	6	24	0	52	1	324	39	0	364	14	10	4	0	28	597
07:45	6	125	3	0	134	22	7	21	0	50	1	242	18	0	261	6	6	0	0	12	457
08:00	3	115	7	0	125	6	4	20	0	30	0	209	13	0	222	5	4	1	0	10	387
Total Volume	12	507	16	0	535	58	20	75	0	153	3	1033	100	0	1136	32	26	7	0	65	1889
% App. Total	2.2	94.8	3	0		37.9	13.1	49	0		0.3	90.9	8.8	0		49.2	40	10.8	0		
PHF	.500	.856	.571	.000	.874	.659	.714	.781	.000	.736	.750	.797	.641	.000	.780	.571	.650	.438	.000	.580	.791



Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

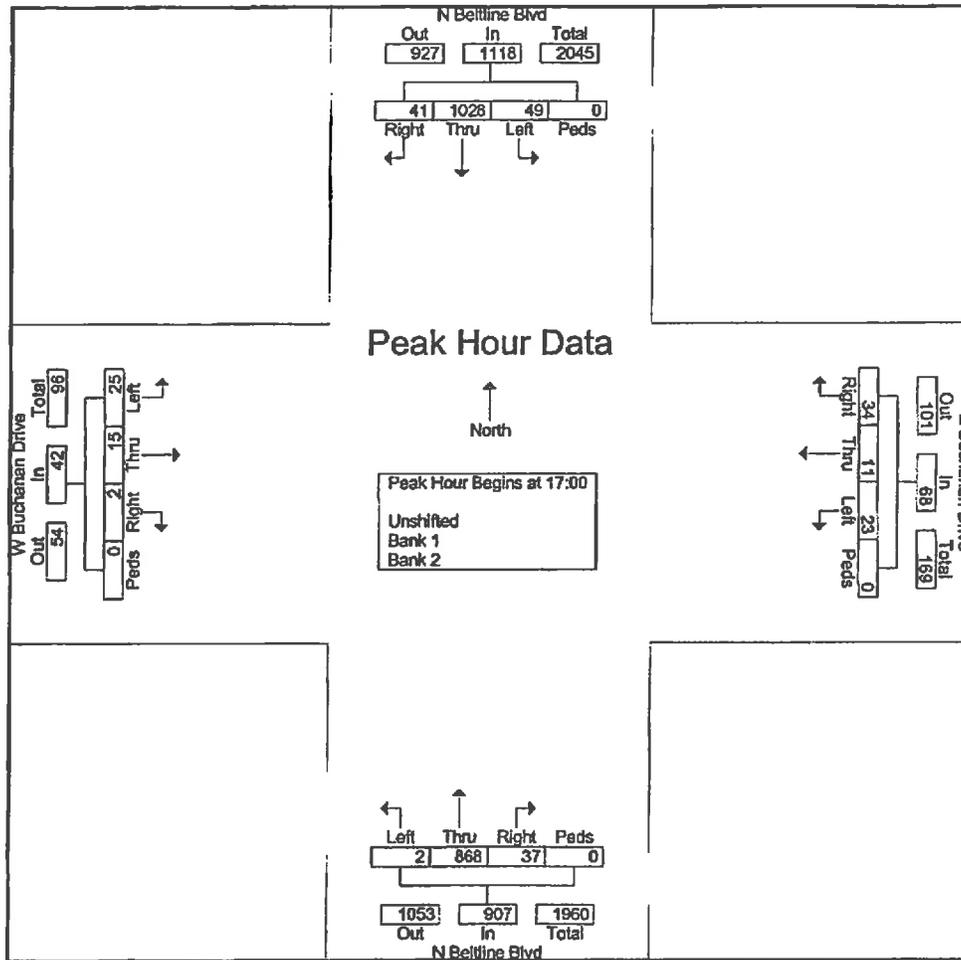
	07:00					07:30					07:15					07:15				
+0 mins.	1	146	0	0	152	2	6	2	0	20	1	258	30	0	289	7	6	2	0	15
+15 mins.	2	119	2	0	123	22	7	21	0	50	1	324	39	0	364	14	10	4	0	28
+30 mins.	1	148	4	0	153	6	4	20	0	30	1	242	18	0	261	6	6	0	0	12
+45 mins.	6	125	3	0	134	7	6	17	0	30	0	209	13	0	222	5	4	1	0	10
Total Volume	15	538	9	0	562	57	23	82	0	162	3	1033	100	0	1136	32	26	7	0	65
% App. Total	2.7	95.7	1.6	0		35.2	14.2	50.6	0		0.3	90.9	8.8	0		49.2	40	10.8	0	
PHF	.625	.809	.663	.000	.918	.648	.821	.854	.000	.779	.750	.797	.641	.000	.780	.571	.650	.438	.000	.580

Short Counts

735 Maryland St.
Columbia, SC 29201
You Can Count On Us!

File Name : Beltline at Buchanan
Site Code : 00000000
Start Date : 12/16/2014
Page No : 5

Start Time	N Beltline Blvd Southbound					E Buchanan Drive Westbound					N Beltline Blvd Northbound					W Buchanan Drive Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	12	286	16	0	314	5	3	8	0	16	1	214	4	0	219	9	7	0	0	16	565
17:15	12	280	10	0	302	4	3	8	0	15	0	202	8	0	210	7	1	1	0	9	536
17:30	13	226	10	0	249	8	3	11	0	22	0	208	5	0	213	2	3	1	0	6	490
17:45	12	236	5	0	253	6	2	7	0	15	1	244	20	0	265	7	4	0	0	11	544
Total Volume	49	1028	41	0	1118	23	11	34	0	68	2	868	37	0	907	25	15	2	0	42	2135
% App. Total	4.4	91.9	3.7	0		33.8	16.2	50	0		0.2	95.7	4.1	0		59.5	35.7	4.8	0		
PHF	.942	.899	.641	.000	.899	.719	.917	.773	.000	.773	.500	.889	.463	.000	.856	.694	.536	.500	.000	.656	.945



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	16:30					16:00					17:00					16:15				
+0 mins.	9	237	5	0	251		4		0			214	4	0	219	8	3	1	0	12
+15 mins.	5	253	4	0	262	6	7	13	0	26	0	202	8	0	210	2	1	1	0	4
+30 mins.	12	286	16	0	314	9	5	7	0	21	0	208	5	0	213	8	3	1	0	12
+45 mins.	12	280	10	0	302	5	2	4	0	11	1	244	20	0	265	9	7	0	0	16
Total Volume	38	1056	35	0	1129	29	18	46	0	93	2	868	37	0	907	27	14	3	0	44
% App. Total	3.4	93.5	3.1	0		31.2	19.4	49.5	0		0.2	95.7	4.1	0		81.4	31.8	6.8	0	
PHF	.792	.923	.547	.000	.899	.806	.643	.523	.000	.864	.500	.889	.463	.000	.856	.750	.500	.750	.000	.688

Time	Combined										Compassing Approach										Southbound Approach									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sum 216

$$\begin{array}{r}
 90 \\
 12 \\
 \hline
 102 \\
 132 \\
 \hline
 234
 \end{array}$$

← 92
 ← 97

TURNING MOVEMENT COUNT FORM

CITY <u>Columbia, SC</u>	LOCATION <u>Forrest Acres</u>	Show North	INTERSECTION DIAGRAM
DATE <u>12/16/2014</u>	DAY OF WEEK _____		
COUNTED BY _____	INTERSECTION NUMBER _____		

COMMENTS

TIME PERIOD		NORTHBOUND ON Belmont Drive			SOUTHBOUND ON			EASTBOUND ON W. Buchanan Drive			WESTBOUND ON W. Buchanan Drive			TOTAL	PEAK TOTAL
FROM	TO	L	T	R	L	T	R	L	T	R	L	T	R		

Morning AM Peak Period

7:00	7:15	0		4					2	0	0	5		11	78
7:15	7:30	0		1					3	0	0	6		10	90
7:30	7:45	0		6					9	2	0	18		35	102
7:45	8:00	0		4					9	2	0	7		22	76
8:00	8:15	0		1					10	0	0	12		23	64
8:15	8:30	0		3					5	0	1	13		22	
8:30	8:45	0		1					2	1	0	5		9	
8:45	9:00	0		2					2	0	0	6		10	
														0	
PK HR TOTALS		0	0	14	0	0	0	0	33	4	1	50	0	102	
PHF														0.73	
TOTAL		0	0	22	0	0	0	0	42	6	1	72	0	142	

Evening Pm Peak Period

4:00	4:15	0		1					9	0	0	9		19	68
4:15	4:30	0		1					12	0	0	17		30	76
4:30	4:45	1		0					2	0	1	4		8	68
4:45	5:00	1		1					3	0	2	4		11	86
5:00	5:15	0		3					12	0	0	12		27	92
5:15	5:30	1		4					6	0	1	10		22	
5:30	5:45	1		3					6	1	6	9		26	
5:45	6:00	1		7					5	0	0	4		17	
PK HR TOTALS		3	0	17	0	0	0	0	29	1	7	35	0	82	
PHF														0.77	
TOTAL		5	0	20	0	0	0	0	55	1	10	69	0	160	

CAPACITY ANALYSIS

- **2014 Existing**
- **2018 No-Build**
- **2018 Build**

ELDERLY CARE & RESIDENTIAL DEV.
5: W Buchanan Dr & N. Beltline Blvd

AM EXISTING
12/17/2014



Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	32	26	7	58	20	75	3	1003
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Flt	1.00	0.97	1.00	0.88	1.00	0.99	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1770	1803	1770	1642	1770	3491	1770	3523
Flt Permitted	0.58	1.00	0.73	1.00	0.40	1.00	0.17	1.00
Satd. Flow (perm)	1081	1803	1359	1642	745	3491	320	3523
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	41	33	9	73	25	95	4	1270
RTOR Reduction (vph)	0	8	0	0	86	0	0	4
Lane Group Flow (vph)	41	34	0	73	34	0	4	1393
Turn Type	Perm							
Protected Phases	4	4	8	8	2	2	6	6
Permitted Phases	4	4	8	8	2	2	6	6
Actuated Green, G (s)	11.8	11.8	11.8	11.8	96.2	96.2	96.2	96.2
Effective Green, g (s)	11.8	11.8	11.8	11.8	96.2	96.2	96.2	96.2
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.80	0.80	0.80	0.80
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	106	177	134	161	597	2799	257	2824
v/s Ratio Prot	0.04	0.02	0.05	0.02	0.01	0.40	0.05	0.19
v/s Ratio Perm	0.04	0.02	0.05	0.02	0.01	0.50	0.06	0.23
v/c Ratio	0.39	0.19	0.54	0.21	0.01	0.50	0.06	0.23
Uniform Delay, d1	50.7	49.7	51.5	49.8	2.4	3.9	2.5	2.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.5	4.5	0.7	0.0	0.6	0.4	0.2
Delay (s)	53.0	50.2	56.0	50.5	2.4	4.6	2.9	3.1
Level of Service	D	D	E	D	A	A	A	A
Approach Delay (s)		51.6		52.6		4.6		3.1
Approach LOS		D		D		A		A

Intersection Summary	
HCM Average Control Delay	9.7
HCM Volume to Capacity ratio	0.50
Actuated Cycle Length (s)	120.0
Intersection Capacity Utilization	50.8%
Analysis Period (min)	15
c Critical Lane Group	
HCM Level of Service	A
Sum of lost time (s)	12.0
ICU Level of Service	A

ELDERLY CARE & RESIDENTIAL DEV.
8: W Buchanan Dr & N. Beltline Blvd

PM EXISTING
12/17/2014



Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Lane Configurations	↑	↑	↑	↑	↑	↑	↑↑	↑↑	↑	↑↑	↑	↑↑	↑
Volume (vph)	25	15	2	23	11	34	2	868	37	49	1028	41	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	0.95	1.00
Fr	1.00	0.98	1.00	0.89	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1832	1770	1652	1770	1652	1770	3518	1770	3518	1770	3519	3519
Flt Permitted	0.73	1.00	0.75	1.00	0.23	1.00	0.29	1.00	0.29	1.00	0.29	1.00	1.00
Satd. Flow (perm)	1351	1832	1389	1652	437	1652	437	3518	534	3518	534	3519	3519
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	16	2	25	12	37	2	943	40	53	1117	45	45
RTOR Reduction (vph)	0	2	0	0	35	0	0	1	0	0	1	0	0
Lane Group Flow (vph)	27	16	0	25	14	0	2	982	0	53	1161	0	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm		
Protected Phases	4		8		2		2		6		6		
Permitted Phases	4		8		2		2		6		6		
Actuated Green, G (s)	6.9	6.9	6.9	6.9	101.1	101.1	101.1	101.1	101.1	101.1	101.1	101.1	101.1
Effective Green, g (s)	6.9	6.9	6.9	6.9	101.1	101.1	101.1	101.1	101.1	101.1	101.1	101.1	101.1
Actuated g/C Ratio	0.06	0.06	0.06	0.06	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	78	105	80	95	368	2964	450	2965	450	2965	450	2965	450
v/s Ratio Prot	0.01		0.01		0.01		0.28		0.10		0.33		
v/s Ratio Perm	0.02		0.02		0.00		0.10		0.10		0.33		
v/c Ratio	0.35	0.15	0.31	0.15	0.01	0.33	0.12	0.39	0.12	0.39	0.12	0.39	0.12
Uniform Delay, d1	54.4	53.8	54.3	53.8	1.5	2.1	1.7	2.2	1.7	2.2	1.7	2.2	1.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.7	2.2	0.7	0.0	0.3	0.5	0.4	0.5	0.4	0.5	0.4	0.5
Delay (s)	57.0	54.5	56.5	54.5	1.5	2.4	2.2	2.6	2.2	2.6	2.2	2.6	2.2
Level of Service	E	D	E	D	A	A	A	A	A	A	A	A	A
Approach Delay (s)	56.0		55.2		2.4		2.6		2.4		2.6		
Approach LOS	E		E		A		A		A		A		

Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39	Sum of lost time (s)	12.0
Actuated Cycle Length (s)	120.0	ICU Level of Service	B
Intersection Capacity Utilization	56.1%		
Analysis Period (min)	15		
c Critical Lane Group			

ELDERLY CARE & RESIDENTIAL DEV.
14: W Buchanan Dr & Belmont Dr

AM EXISTING
12/17/2014



Movement	EB	EBTL	EBR	WB	WBT	WBR	NB	NBTL	NBR	SB	SBTL	SBR
Lane Configurations	↔			↔			↔			↔		
Volume (veh/h)	0	50	4	4	34	1	0	0	14	1	0	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	4	4	37	1	0	0	15	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)	440											
pX, platoon unblocked												
vC, conflicting volume	38			59			103	103	57	118	105	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	38			59			103	103	57	118	105	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
fP (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/m)	1572			1545			876	785	1010	843	783	1035

Direction Lane	EB	WB	NB	SB
Volume Total	59	42	15	1
Volume Left	0	4	0	1
Volume Right	4	1	15	0
cSH	1572	1545	1010	843
Volume to Capacity	0.00	0.00	0.02	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	0.8	8.6	9.3
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.8	8.6	9.3
Approach LOS		A	A	

Intersection Summary	
Average Delay	1.5
Intersection Capacity Utilization	15.2%
ICU Level of Service	A
Analysis Period (min)	15

ELDERLY CARE & RESIDENTIAL DEV.
11: W Buchanan Dr & Belmont Dr

PM EXISTING
12/17/2014



Movement	EB	WB	NB	SB
Lane Configurations	↕	↕	↕	↕
Volume (veh/h)	1	26	1	9
Sign Control	Free	Free	Stop	Stop
Grade	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	28	1	10
Pedestrians				
Lane Width (ft)				
Walking Speed (ft/s)				
Percent Blockage				
Right turn flare (veh)				
Median type	None	None		
Median storage (veh)				
Upstream signal (ft)			445	
pX, platoon unblocked				
vC, conflicting volume	49	29	100	99
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	49	29	100	99
tC, single (s)	4.1	4.1	7.1	6.5
tC, 2 stage (s)				
tF (s)	2.2	2.2	3.5	4.0
p0 queue free %	100	99	100	100
cM capacity (veh/h)	1558	1584	876	785

Direction	EB	WB	NB	SB
Volume Total	30	59	20	2
Volume Left	1	10	3	1
Volume Right	1	1	16	1
cSH	1558	1584	1013	924
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.3	1.3	8.6	8.9
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	1.3	8.6	8.9
Approach LOS			A	A

Intersection Summary	
Average Delay	2.4
Intersection Capacity Utilization	16.4%
ICU Level of Service	A
Analysis Period (min)	15

ELDERLY CARE & RESIDENTIAL DEV.
14: W Buchanan Dr & Belmont Dr

AM NB 2018
12/17/2014



Movement	EB	WB	NB	SB
Lane Configurations	↕	↕	↕	↕
Volume (veh/h)	0	50	4	4
Sign Control	Free	Free	Stop	Stop
Grade	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	59	5	5
Pedestrians				
Lane Width (ft)				
Walking Speed (ft/s)				
Percent Blockage				
Right turn flare (veh)				
Median type	None	None		
Median storage (veh)				
Upstream signal (ft)			440	
pX, platoon unblocked				
vC, conflicting volume	41	63	111	112
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	41	63	111	112
tC, single (s)	4.1	4.1	7.1	6.5
tC, 2 stage (s)				
tF (s)	2.2	2.2	3.5	4.0
p0 queue free %	100	100	100	100
cM capacity (veh/h)	1568	1539	865	776

Direction	EB	WB	NB	SB
Volume Total	63	46	16	1
Volume Left	0	5	0	1
Volume Right	5	1	16	0
cSH	1568	1539	1004	830
Volume to Capacity	0.00	0.00	0.02	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	0.8	8.6	9.3
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.8	8.6	9.3
Approach LOS		A	A	

Intersection Summary	
Average Delay	1.5
Intersection Capacity Utilization	15.6%
ICU Level of Service	A
Analysis Period (min)	15

ELDERLY CARE & RESIDENTIAL DEV.
11: W Buchanan Dr & Belmont Dr

PM NB 2018
12/17/2014



Movement	EB	WB	NB	SB
Lane Configurations	↔		↔	
Volume (veh/h)	1	26	1	9
Sign Control	Free		Free	
Grade	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	31	1	11
Pedestrians				
Lane Width (ft)				
Walking Speed (ft/s)				
Percent Blockage				
Right turn flare (veh)				
Median type	None		None	
Median storage (veh)				
Upstream signal (ft)	445			
pX, platoon unblocked				
vC, conflicting volume	53		32	
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	53		32	
tC, single (s)	4.1		4.1	
tC, 2 stage (s)				
tF (s)	2.2		2.2	
p0 queue free %	100		99	
cvt capacity (veh/h)	1553		1581	

Direction	EB	WB	NB	SB
Volume Total	33	63	21	2
Volume Left	1	11	4	1
Volume Right	1	1	18	1
cSH	1553	1581	1008	914
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	1	2	0
Control Delay (s)	0.3	1.3	8.6	8.9
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	1.3	8.6	8.9
Approach LOS			A	A

Intersection Summary	
Average Delay	2.4
Intersection Capacity Utilization	16.9%
ICU Level of Service	A
Analysis Period (min)	15

ELDERLY CARE & RESIDENTIAL DEV.
5: W Buchanan Dr & N. Beltline Blvd

AM NB 2018
12/17/2014



Movement	EB	NB	WB	SB	NET	EB	NB	WB	SB			
Lane Configurations	↖	↖	↖	↖	↖↗	↖	↖	↖	↖			
Volume (vph)	32	26	7	58	20	75	3	1003	100	12	507	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flt	1.00	0.97		1.00	0.88		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1770	1802		1770	1641		1770	3491		1770	3523	
Flt Permitted	0.54	1.00		0.73	1.00		0.38	1.00		0.15	1.00	
Satd. Flow (perm)	1012	1802		1354	1641		704	3491		276	3523	
Peak-hour factor, PHF	0.79	0.79		0.79	0.79		0.79	0.79		0.79	0.79	
Growth Factor (vph)	108%	108%		108%	108%		108%	108%		108%	108%	
Adj. Flow (vph)	44	36		79	27		103	4		1371	137	
RTOR Reduction (vph)	0	9		0	77		0	0		4	0	
Lane Group Flow (vph)	44	37		0	79		53	0		4	1504	
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.3	12.3		12.3	12.3		95.7	95.7		95.7	95.7	
Effective Green, g (s)	12.3	12.3		12.3	12.3		95.7	95.7		95.7	95.7	
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.80	0.80		0.80	0.80	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap. (vph)	104	185		139	168		561	2784		220	2810	
v/s Ratio Prot		0.02			0.03			c0.43			0.20	
v/s Ratio Perm	0.04			c0.06			0.01			0.06		
v/c Ratio	0.42	0.20		0.57	0.31		0.01	0.54		0.07	0.25	
Uniform Delay, d1	50.5	49.3		51.3	49.9		2.5	4.3		2.6	3.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.5		5.2	1.1		0.0	0.8		0.6	0.2	
Delay (s)	53.3	49.9		56.6	51.0		2.5	5.1		3.3	3.3	
Level of Service	D	D		E	D		A	A		A	A	
Approach Delay (s)		51.5			53.1			5.1			3.3	
Approach LOS		D			D			A			A	

Intersection Summary	
HCM Average Control Delay	10.2
HCM Volume to Capacity ratio	0.54
Actuated Cycle Length (s)	120.0
Intersection Capacity Utilization	53.5%
Analysis Period (min)	15
HCM Level of Service	B
Sum of lost time (s)	12.0
ICU Level of Service	A

c Critical Lane Group

ELDERLY CARE & RESIDENTIAL DEV.
8: W Buchanan Dr & N. Beltline Blvd

PM NB 2018
12/17/2014



Movement	EB1	EB2	EB3	WB1	WB2	WB3	NB1	NB2	NB3	SB1	SB2	SB3
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	25	15	2	23	11	34	2	868	37	49	1028	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flt	1.00	0.98		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1835		1770	1652		1770	3518		1770	3519	
Flt Permitted	0.72	1.00		0.74	1.00		0.21	1.00		0.26	1.00	
Satd. Flow (perm)	1346	1835		1386	1652		393	3518		489	3519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	29	18	2	27	13	40	2	1019	43	58	1207	48
RTOR Reduction (vph)	0	2	0	0	38	0	0	1	0	0	1	0
Lane Group Flow (vph)	29	18	0	27	15	0	2	1061	0	58	1254	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.1	7.1		7.1	7.1		100.9	100.9		100.9	100.9	
Effective Green, g (s)	7.1	7.1		7.1	7.1		100.9	100.9		100.9	100.9	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.84	0.84		0.84	0.84	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap. (vph)	80	109		82	98		330	2958		411	2959	
v/s Ratio Prot		0.01			0.01			0.30			c0.36	
v/s Ratio Perm	c0.02			0.02			0.01			0.12		
v/c Ratio	0.36	0.17		0.33	0.16		0.01	0.36		0.14	0.42	
Uniform Delay, d1	54.3	53.6		54.2	53.6		1.5	2.2		1.7	2.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.7		2.4	0.7		0.0	0.3		0.7	0.4	
Delay (s)	57.1	54.4		56.5	54.4		1.6	2.5		2.4	2.8	
Level of Service	E	D		E	D		A	A		A	A	
Approach Delay (s)		56.0			55.1			2.5			2.8	
Approach LOS		E			E			A			A	

Intersection Summary	
HCM Average Control Delay	5.4
HCM Volume to Capacity ratio	0.42
Actuated Cycle Length (s)	120.0
Intersection Capacity Utilization	58.6%
Analysis Period (min)	15
HCM Level of Service	A
Sum of lost time (s)	12.0
ICU Level of Service	B

c Critical Lane Group

ELDERLY CARE & RESIDENTIAL DEV.
5: W Buchanan Dr & N. Beltline Blvd

AM BUILD 2018
4/24/2015

Movement	EBL	EB	EBR	WBL	WB	WBR	NB	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Volume (vph)	40	28	15	63	22	81	5	1083	108	13	548	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.88		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1764		1770	1643		1770	3491		1770	3521	
Flt Permitted	0.54	1.00		0.72	1.00		0.38	1.00		0.15	1.00	
Satd. Flow (perm)	1009	1764		1345	1643		702	3491		276	3521	
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	51	35	19	80	28	103	6	1371	137	16	694	24
RTOR Reduction (vph)	0	17	0	0	77	0	0	4	0	0	1	0
Lane Group Flow (vph)	51	37	0	80	54	0	6	1504	0	16	717	0
Turn Type	Perm											
Protected Phases	4		8		2		2		6		6	
Permitted Phases	4		8		2		2		6		6	
Actuated Green, G (s)	12.5	12.5		12.5	12.5		95.5	95.5		95.5	95.5	
Effective Green, g (s)	12.5	12.5		12.5	12.5		95.5	95.5		95.5	95.5	
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.80	0.80		0.80	0.80	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	105	184		140	171		559	2778		220	2802	
v/s Ratio Prot		0.02			0.03			0.43			0.20	
v/s Ratio Perm	0.05			0.06			0.01			0.06		
w/c Ratio	0.49	0.20		0.57	0.32		0.01	0.54		0.07	0.26	
Uniform Delay, d1	50.7	49.2		51.2	49.8		2.5	4.4		2.7	3.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.5		5.5	1.1		0.0	0.8		0.6	0.2	
Delay (s)	54.2	49.7		56.7	50.9		2.6	5.2		3.3	3.4	
Level of Service	D	D		E	D		A	A		A	A	
Approach Delay (s)		51.9			53.1			5.1			3.4	
Approach LOS		D			D			A			A	

Intersection Summary	
HCM Average Control Delay	10.5
HCM Volume to Capacity ratio	0.54
Actuated Cycle Length (s)	120.0
Intersection Capacity Utilization	53.5%
Analysis Period (min)	15
c. Critical Lane Group	
HCM Level of Service	B
Sum of lost time (s)	12.0
ICU Level of Service	A

ELDERLY CARE & RESIDENTIAL DEV.
8: W Buchanan Dr & N. Beltline Blvd

PM BUILD 2018
4/24/2015

Movement	EBL	EBT	EBR	WB	WBT	WBR	NBU	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	30	16	7	25	12	37	9	937	40	53	1110	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flt	1.00	0.95		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1773		1770	1652		1770	3518		1770	3516	
Flt Permitted	0.72	1.00		0.74	1.00		0.21	1.00		0.26	1.00	
Satd. Flow (perm)	1346	1773		1380	1652		390	3518		489	3516	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	17	8	27	13	40	10	1018	43	58	1207	54
RTOR Reduction (vph)	0	8	0	0	38	0	0	1	0	0	2	0
Lane Group Flow (vph)	33	17	0	27	15	0	10	1060	0	58	1259	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.3	7.3		7.3	7.3		100.7	100.7		100.7	100.7	
Effective Green, g (s)	7.3	7.3		7.3	7.3		100.7	100.7		100.7	100.7	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.84	0.84		0.84	0.84	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	82	108		84	100		327	2952		410	2951	
v/s Ratio Prot	0.01			0.01			0.30			0.36		
v/s Ratio Perm	0.02			0.02			0.03			0.12		
w/c Ratio	0.40	0.16		0.32	0.15		0.03	0.36		0.14	0.43	
Uniform Delay, d1	54.3	53.4		54.0	53.4		1.6	2.2		1.8	2.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	0.7		2.2	0.7		0.2	0.3		0.7	0.5	
Delay (s)	57.5	54.2		56.2	54.1		1.8	2.6		2.5	2.9	
Level of Service	E	D		E	D		A	A		A	A	
Approach Delay (s)	56.0			54.8			2.6			2.9		
Approach LOS	E			D			A			A		

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Lane Configurations	↔			↔			↔			↔		
Volume (veh/h)	0	54	4	4	37	5	0	0	15	13	1	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	59	4	4	40	5	0	0	16	14	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)	440											
pX, platoon unblocked												
vC, conflicting volume	46			63			113	115	61	129	115	43
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	46			63			113	115	61	129	115	43
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	98	100	100
cM, capacity (veh/h)	1562			1540			862	773	1004	829	773	1027

Direction	EB	WB	NB	SB
Volume Total	63	50	16	15
Volume Left	0	4	0	14
Volume Right	4	5	16	0
cSH	1562	1540	1004	824
Volume to Capacity	0.00	0.00	0.02	0.02
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.0	0.7	8.6	9.4
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.7	8.6	9.4
Approach LOS		A	A	

Intersection Summary	
Average Delay	2.2
Intersection Capacity Utilization	19.7%
ICU Level of Service	A
Analysis Period (min)	15

ELDERLY CARE & RESIDENTIAL DEV.
11: W Buchanan Dr & Belmont Dr

PM BUILD 2018
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Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Lane Configurations	↔			↔			↔			↔		
Volume (veh/h)	1	28	1	10	48	14	3	1	16	9	0	1
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	30	1	11	52	15	3	1	17	10	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)	445											
pX, platoon unblocked												
vC, conflicting volume	67			32			116	122	31	133	115	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	67			32			116	122	31	133	115	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	99	100	100
cM capacity (veh/h)	1534			1581			855	762	1043	820	769	1006

Direction/Lane	EB	WB	NB	SB
Volume Total	33	78	22	11
Volume Left	1	11	3	10
Volume Right	1	15	17	1
cSH	1534	1581	992	835
Volume to Capacity	0.00	0.01	0.02	0.01
Queue Length 95th (ft)	0	1	2	1
Control Delay (s)	0.3	1.1	8.7	9.4
Lane LOS	A	A	A	A
Approach Delay (s)	0.3	1.1	8.7	9.4
Approach LOS		A	A	

Intersection Summary	
Average Delay	2.7
Intersection Capacity Utilization	18.0%
ICU Level of Service	A
Analysis Period (min)	15



Movement	WB	EB	NB	SB	SB
Lane Configurations	4	1	1	5	4
Volume (veh/h)	5	7	52	2	48
Sign Control	Stop		Free		Free
Grade	0%		0%		0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	8	57	2	52
Pedestrians					
Lane Width (ft)					
Walking Speed (ft/s)					
Percent Blockage					
Right turn flare (veh)					
Median type			None		None
Median storage (veh)					
Upstream signal (ft)					
pX, platoon unblocked					
vC, conflicting volume	121	58		59	
vC1, stage 1 conf vol					
vC2, stage 2 conf vol					
vCu, unblocked vol	121	58		59	
tC, single (s)	6.4	6.2		4.1	
tC, 2 stage (s)					
tF (s)	3.5	3.3		2.2	
p0 queue free %	99	99		100	
cM capacity (veh/h)	872	1009		1545	

Direction/Lane	WB	EB	SB
Volume Total	13	59	58
Volume Left	5	0	5
Volume Right	8	2	0
cSH	947	1700	1545
Volume to Capacity	0.01	0.03	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.9	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	0.7
Approach LOS	A		

Intersection Summary		
Average Delay		1.2
Intersection Capacity Utilization	16.7%	ICU Level of Service: A
Analysis Period (min)		15



Movement	WBL	WBR	NBT	NBR	SB	SBL
Lane Configurations	3	5	84	6	10	98
Volume (veh/h)	3	5	84	6	10	98
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	5	91	7	11	107
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	223	95				98
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	223	95				98
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
IF (s)	3.5	3.3				2.2
p0 queue free %	100	99				99
cM capacity (veh/h)	760	862				1495

Direction/Lane	WBL	NBT	SBL
Volume Total	9	98	117
Volume Left	3	0	11
Volume Right	5	7	0
cSH	875	1700	1495
Volume to Capacity	0.01	0.06	0.01
Queue Length 95th (ft)	1	0	1
Control Delay (s)	9.2	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	0.7
Approach LOS	A		

Intersection Summary		
Average Delay		0.7
Intersection Capacity Utilization	22.4%	ICU Level of Service A
Analysis Period (min)		15



Movement	WBL	WBR	NB	NBR	SBL	SBL
Lane Configurations	W		T		T	L
Volume (veh/h)	2	1	53	4	1	52
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	58	4	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	118	60			62	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	60			62	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	877	1006			1541	

Direction	WBL	NB	SBL
Volume Total	3	62	58
Volume Left	2	0	1
Volume Right	1	4	0
cSH	916	1700	1541
Volume to Capacity	0.00	0.04	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.9	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	0.1
Approach LOS	A		

Intersection Summary	
Average Delay	0.3
Intersection Capacity Utilization	13.5%
ICU Level of Service	A
Analysis Period (min)	15



Movement	WB	WB	NB	NB	SB	SB
Lane Configurations	T		T		T	
Volume (veh/h)	5	2	88	5	2	99
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	2	86	5	2	108
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	210	98			101	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	210	98			101	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	777	958			1491	

Direction/Lane	WB	NB	SB
Volume Total	8	101	110
Volume Left	5	0	2
Volume Right	2	5	0
cSH	821	1700	1491
Volume to Capacity	0.01	0.06	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.4	0.0	0.2
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.2
Approach LOS	A		

Intersection Summary	
Average Delay	0.4
Intersection Capacity Utilization	16.8%
ICU Level of Service	A
Analysis Period (min)	15