

**Appendix C**  
**Existing Traffic Conditions**

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# **S-48 Columbia Avenue Corridor Study**

## **Addendum to Technical Memorandum No. 1 Existing Traffic Conditions**

November 8, 2005

Submitted to



**DRAFT**

Submitted by



in association with

**Sprague & Sprague Consulting Engineers**

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## **I. INTRODUCTION**

The purpose of the S-48 Columbia Avenue Corridor Study is to examine transportation and land use concerns in and around the S-48 Columbia Avenue Corridor, and identify what actions can be taken to make the most efficient use of the existing transportation system's finite capacity and capitalize on the corridor's unique qualities, in order to preserve, enhance, and focus community character in both the short- and long-term.

Technical Memorandum No. 1 documented existing conditions in the corridor. At the time that the memorandum was written in August 2005 current traffic counts that included school traffic were not available. Therefore, existing traffic counts and operations were not covered in the original memorandum and are the subject of this addendum. The study area for the S-48 Columbia Avenue Corridor Study is shown in **Figure 1.0-1**.

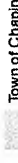

The purpose of this addendum is to analyze existing traffic volumes given existing roadway geometry and then to analyze future traffic volumes also with existing roadway geometry. These analyses will identify what traffic operation deficiencies exist now in the corridor and what additional deficiencies will occur in the future if roadway improvements are not made (i.e., design year of 2025). Once identified, these deficiencies, along with other existing conditions documented in Technical Memorandum No. 1, will assist in guiding the development of needed improvements in the next phases of the S-48 Columbia Avenue Corridor Study.

This addendum should be viewed as a "working" document that is open to revision prior to its inclusion in the final project documentation. Should any "gaps" be discovered in the content of this addendum, suggested revisions or edits are welcomed and will be verified and incorporated into the final report.

This memorandum is divided into five sections. Section 1 provides introductory information. Section 2 presents information on existing traffic volumes in the corridor. Projected traffic volumes for the design year of 2025 are included in Section 3. Section 4 outlines other traffic issues that warrant consideration, while Section 5 summarizes the findings of the addendum.

# S-48 Columbia Avenue Corridor Study

## LEGEND

-  Town of Chapin
-  Study Area

Source: CMCOG 2005; Parsons Brinckerhoff 2005  
Map Created: 06/25/05

This map is for conceptual presentation purposes only, and is believed to be fundamentally accurate; however, no guarantees as to its accuracy or completeness are expressed or implied.

0 0.15 0.3 0.6 Miles

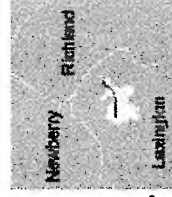


Figure 1.0-1  
Study Area





## **2. EXISTING TRAFFIC VOLUMES**

### **2.1 Traffic Counts**

Traffic counts, with turning movements and modal designation, were taken in the corridor August 30 and 31, 2005, and September 1, 7, and 8, 2005. Data from the counts are on file with Central Midlands Council of Governments (CMCOG) and available upon request. Turning movement counts were taken at six intersections:

- Columbia Avenue/I-26 westbound ramp;
- Columbia Avenue/I-26 eastbound ramp;
- Columbia Avenue/East Boundary Street;
- Columbia Avenue/Clark Street/Peak Street;
- Columbia Avenue/Lexington Avenue; and
- Columbia Avenue/Chapin Road/Amick's Ferry Road.

Traffic counts were taken at these intersections because these are the intersections that are most likely to be signalized in the future and, therefore, require more detailed traffic analysis. Turning movement counts were also taken at the intersection of Chapin and St. Peter's Church Roads in case that information is needed later in the study when alternatives are examined.

Twenty-four hour "tube" counts were obtained from the South Carolina Department of Transportation (SCDOT) at four locations:

- Columbia Avenue west of Woodthrush Road;
- Ellett Road north of Columbia Avenue;
- Northwest Columbia Avenue west of Columbia Avenue; and
- Woodthrush Road south of Columbia Avenue.

Traffic conditions in the corridor are heavily influenced by the location of Chapin High School east of East Boundary Street, and the start times for the school are different for Monday-Wednesday-Friday than for Tuesday-Thursday. It was necessary, therefore, to count traffic on two days - on a Wednesday and on a Tuesday or Thursday. Also, the afternoon peak period counts began earlier



than usual - at 3:00 PM - to include school dismissal traffic. For the purposes of taking the traffic counts, 7:00 AM to 9:00 AM and 3:00 PM to 6:00 PM were set as the AM Peak and PM Peak periods respectively.

Peak hours were identified from the counts, and peak hour traffic volumes are depicted in the following figures:

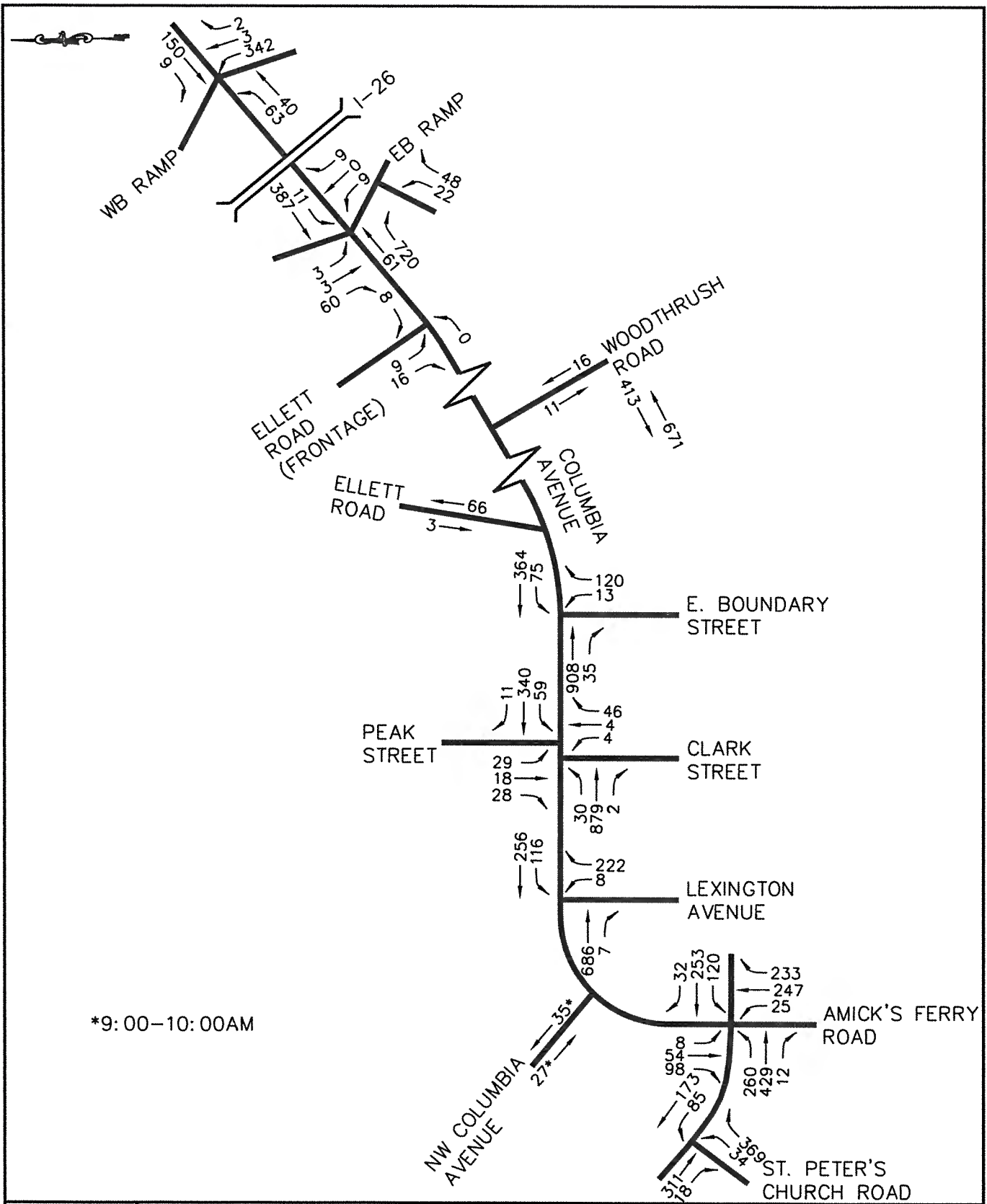
- **Figure 2.1-1:** Existing Traffic - Morning Peak Hour - Wednesday;
- **Figure 2.1-2:** Existing Traffic - School Dismissal - Wednesday;
- **Figure 2.1-3:** Existing Traffic - Afternoon Peak Hour - Wednesday;
- **Figure 2.1-4:** Existing Traffic - Morning Peak Hour - Tuesday/Thursday;
- **Figure 2.1-5:** Existing Traffic - School Dismissal - Tuesday/Thursday; and
- **Figure 2.1-6:** Existing Traffic - Afternoon Peak Hour - Tuesday/Thursday.

Twenty-four hour volumes obtained for the study were:

- Columbia Avenue: 13,503 vehicles per day;
- Ellett Road: 365 vehicles per day;
- Northwest Columbia Avenue: 903 vehicles per day; and
- Woodthrush Road: 329 vehicles per day.

The twenty-four hour counts at the locations shown above also included vehicle classification information. The classifications of vehicles used in those counts are described verbally and pictorially in Appendix A with information obtained from SCDOT. For the purposes of this study, heavy vehicles will be defined as Type 4-Bus and above. Percentage of trucks was also obtained in the turning movement counts and generally ranged from one to five percent with higher percentages for some lower-volume turns.

As shown in **Table 2.1-1**, the percentage of heavy vehicles obtained from the twenty-four hour counts is generally higher than the one to five percent obtained in the turning movement counts. This can result from such challenges as discerning two-axle four-tire vehicles from two-axle six-tire vehicles. For this study, the



<p>FIGURE <b>2.1-1</b> 10/24/05</p>	<p>EXISTING TRAFFIC—MORNING PEAK HOUR—WEDNESDAY EXISTING TRAFFIC CONDITIONS S-48 COLUMBIA AVENUE CORRIDOR STUDY CHAPIN, SOUTH CAROLINA</p>	<p><i>Sprague &amp; Sprague</i> CONSULTING ENGINEERS P.O. BOX 9192 GREENVILLE, S.C. 29604 (864) 242-3106</p>
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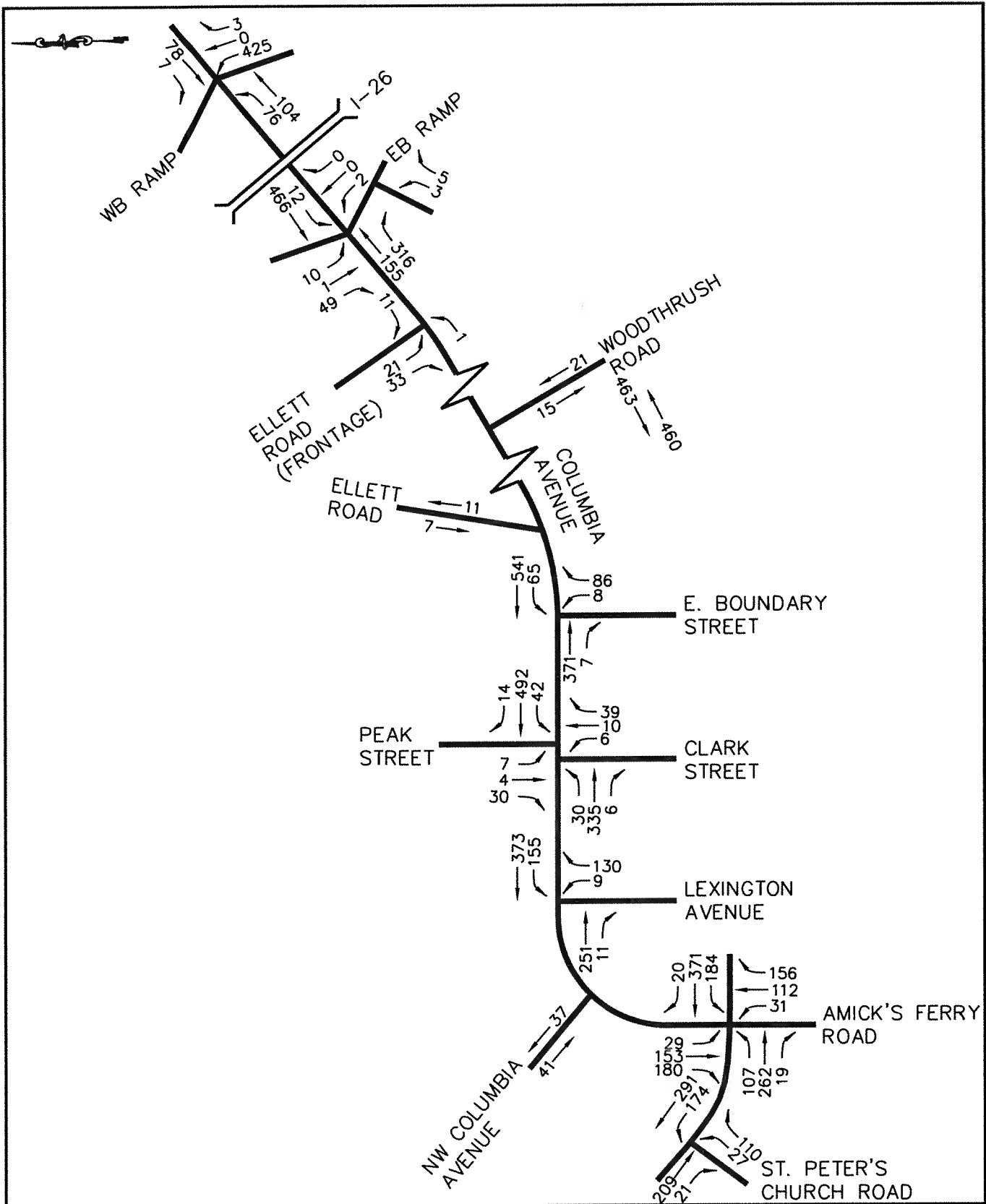


FIGURE  
2.1-2

EXISTING TRAFFIC-SCHOOL DISMISSAL-WEDNESDAY  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
CHAPIN, SOUTH CAROLINA

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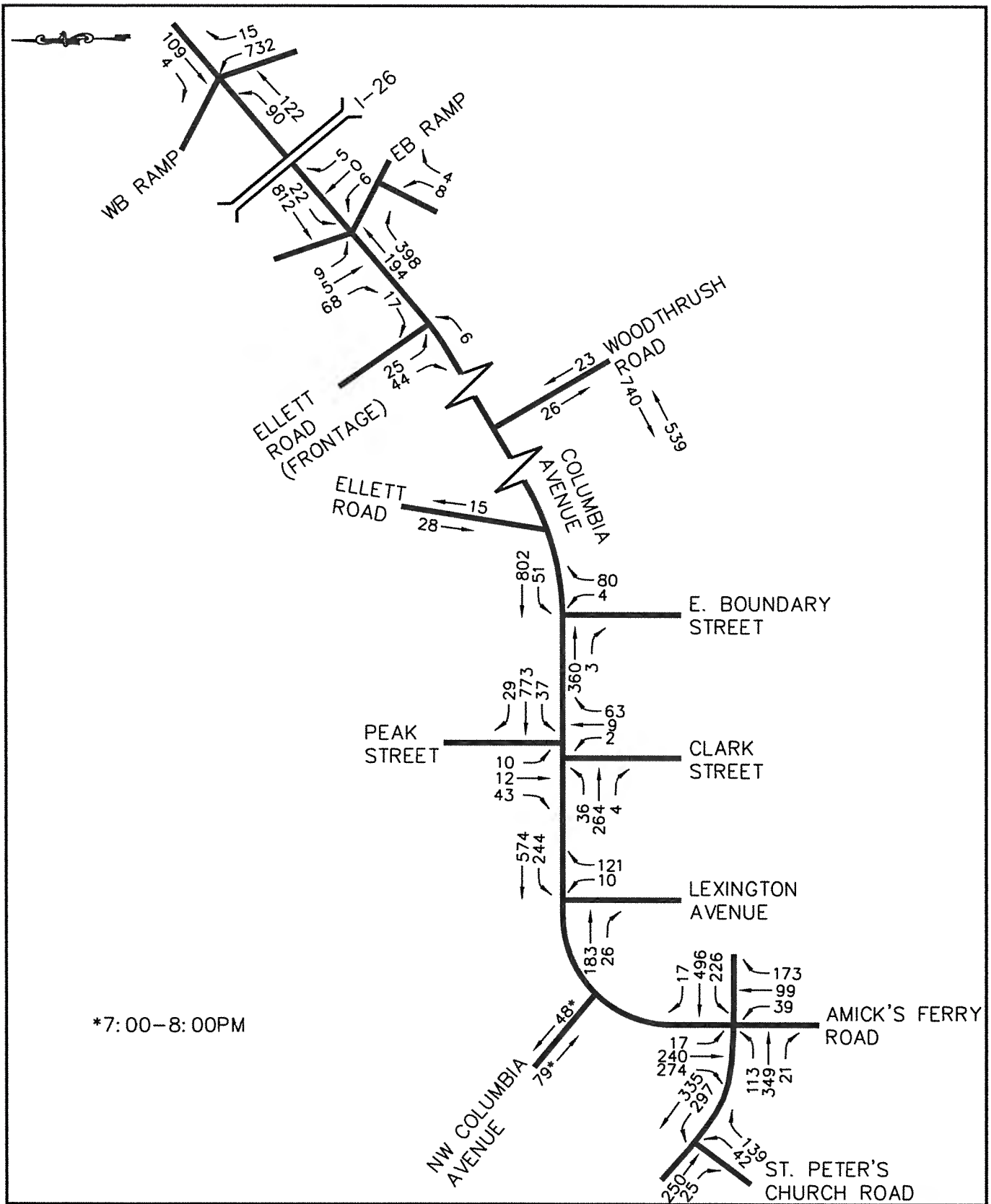


FIGURE  
2.1-3  
10 24 85

EXISTING TRAFFIC-AFTERNOON PEAK HOUR-WEDNESDAY  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
CHAPIN, SOUTH CAROLINA

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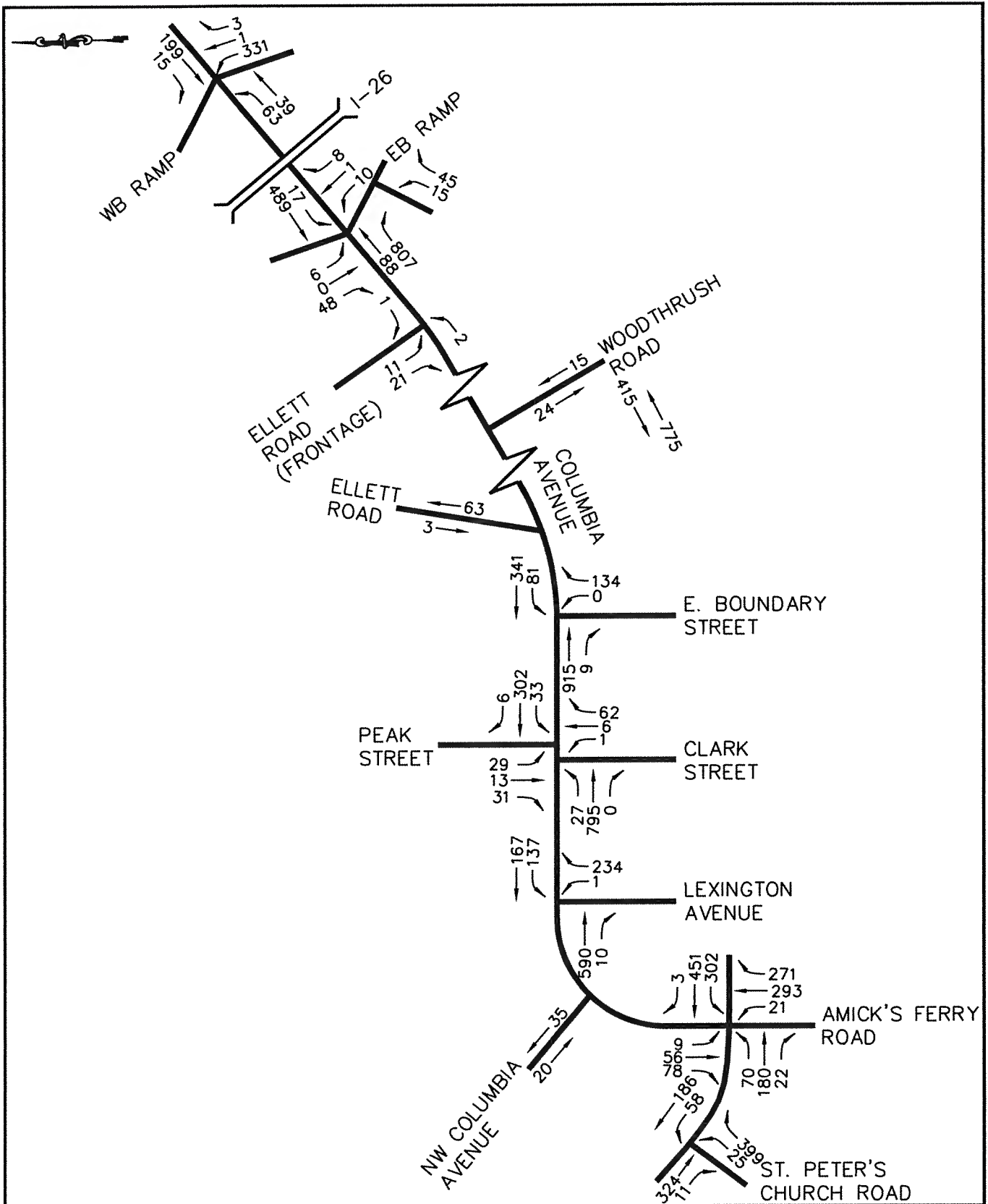


FIGURE  
2.1-4

EXISTING TRAFFIC-MORNING PEAK HOUR-TUES./THURS.  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
CHAPIN, SOUTH CAROLINA

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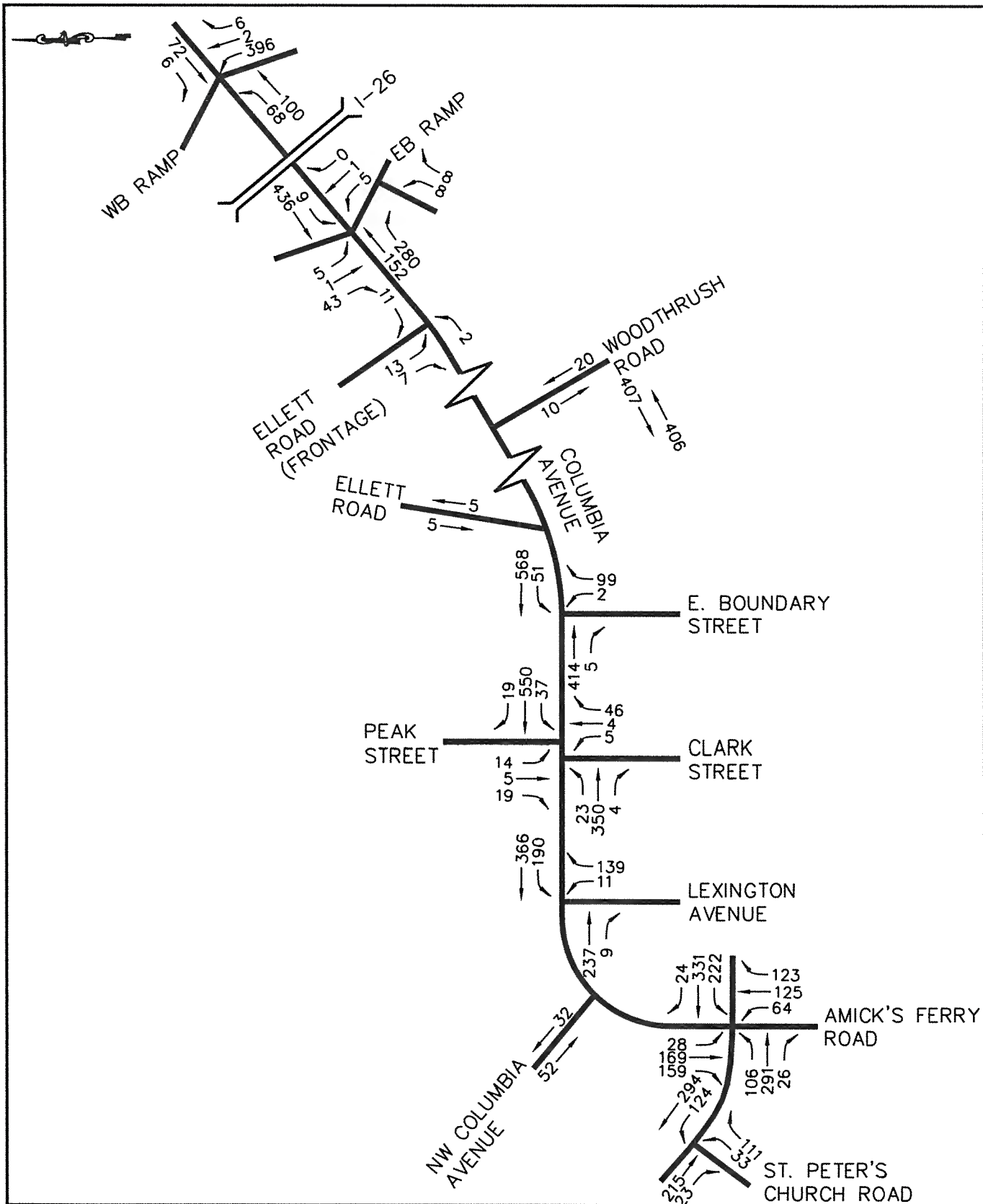


FIGURE  
2.1-5  
10/24/05

EXISTING TRAFFIC-SCHOOL DISMISSAL-TUES./THURS.  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
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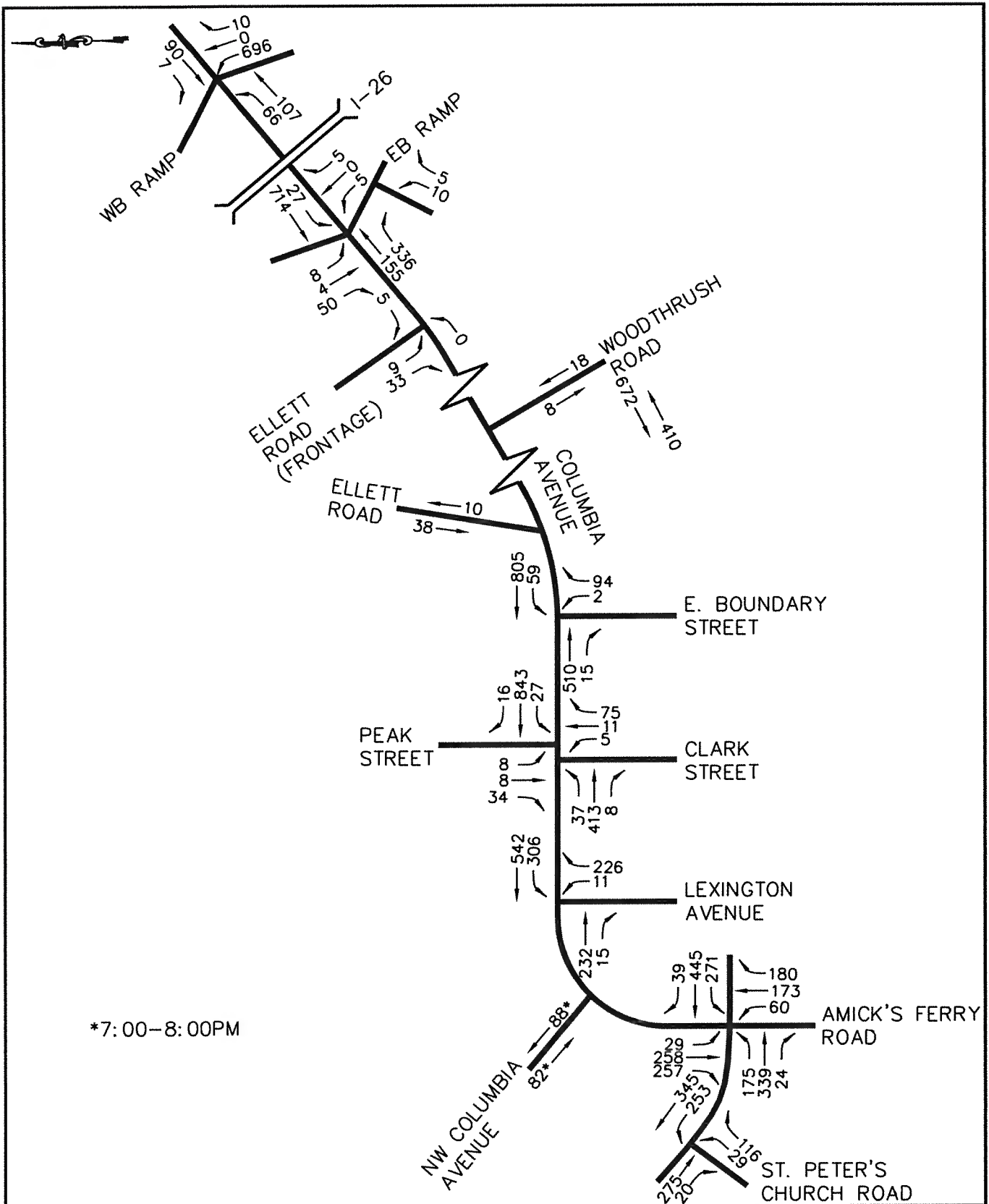


FIGURE 2.1-6 EXISTING TRAFFIC-AFTERNOON PEAK HOUR-TUES./THURS. EXISTING TRAFFIC CONDITIONS S-48 COLUMBIA AVENUE CORRIDOR STUDY CHAPIN, SOUTH CAROLINA

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## S-48 Columbia Avenue Corridor Study

### Addendum to Technical Memorandum No. 1: Existing Traffic Conditions

percentage of heavy vehicles for through movements on Columbia Avenue during the peak hours will be assumed to be seven percent. The percentage of heavy vehicles for all other movements at the study intersections will be taken from the turning movement count information.

**Table 2.1-1**  
Percentage of Heavy Vehicles

Location	Peak Hour	Wednesday		Tuesday/Thursday	
		NB or EB	SB or WB	NB or EB	SB or WB
Columbia Avenue	Morning	5%	10%	5%	11%
	School Dismissal	5%	10%	10%	11%
	Afternoon	6%	7%	8%	7%
Ellett Road	Morning	0%	2%	0%	0%
	School Dismissal	14%	18%	20%	0%
	Afternoon	0%	0%	0%	0%
Northwest Columbia Avenue	Morning	26%	26%	30%	26%
	School Dismissal	22%	14%	30%	6%
	Afternoon	57%	23%	41%	24%
Woodthrush Road	Morning	0%	0%	0%	0%
	School Dismissal	19%	13%	0%	0%
	Afternoon	26%	19%	0%	0%

Note: Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)

Source: SCDOT Twenty-four Hour Counts

## 2.2 Analysis of Existing Volumes

Existing traffic volumes were analyzed for two purposes. First, the analyses identified the existing traffic operations deficiencies in the corridor. Second, it is not necessary to project future volumes for all of the six different peak hours shown in Figures 2.1-1 through 2.1-6 if two or three peak hours per intersection include the "critical" operation for each movement. Therefore, the analysis of existing volumes also allowed the identification of the peak hours that will be used for existing design volumes.

To this point, this document has regarded the *quantity* of traffic flow, but the purpose of this addendum is to examine the *quality* of traffic flow. The methodology used in this study for assessing the quality of traffic flow is the methodology described in the *2000 Highway Capacity Manual (HCM)*, Transportation Research Board. The two types of transportation segments that exist in the S-48 Columbia Avenue Corridor are signalized and unsignalized intersections.

While methodologies for analyzing both of these types of transportation segments are included in the HCM, the analysis for unsignalized intersections provides less helpful information in a situation such as this because it only addresses the operation of the movements that must yield. If, therefore, an intersection were signalized in the future, the operation of the through movements would not be addressed if the intersection were analyzed as an unsignalized intersection. Further, if an intersection were analyzed as an unsignalized intersection for existing volumes and as a signalized intersection under future volumes, direct comparisons of the results would not be possible. Given these shortcomings of using the unsignalized analysis in this application, and given that it is likely that all study intersections will be signalized by the design year of 2025, all intersections have been analyzed as signalized intersections with both existing and future traffic volumes.

In general, the HCM expresses quality of flow in terms of Level of Service (LOS). The criteria for signalized intersection LOS is shown in **Table 2.2-1**. The variable used for both unsignalized and signalized intersection LOS criteria is control delay. This is the delay attributed to traffic control measures and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Typically, LOS D is considered the lowest acceptable LOS at a signalized intersection.

**Table 2.2-1**  
Signalized Intersection Level of Service Criteria

Level of Service	Control Delay Range
A	<10
B	>10 and <20
C	>20 and <35
D	>35 and <55
E	>55 and <80
F	>80

Each intersection was analyzed with existing geometrics for existing morning, school dismissal, and afternoon peak hours on Wednesday and Tuesday/Thursday. The results of the analyses are shown in Tables 2.2-2 through 2.2-7. Signal timings were opti-



## ***S-48 Columbia Avenue Corridor Study***

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### Addendum to Technical Memorandum No. 1: Existing Traffic Conditions

mized for at least one set of volumes, and lane widths and approach grades were assumed. Peak hour factors were obtained from existing counts, and the affect of upstream signals was not considered in the analyses. Printouts of the capacity analyses for existing volumes are on file with CMCOG and available upon request.

For each movement at each intersection, the critical day/time combination (i.e., the period with the highest delay for that movement) is highlighted in Tables 2.2-2 through 2.2-7. In addition, the day/time combinations selected as existing design volumes are designated with EDV.

**2.2.1 Columbia Avenue/Amick’s Ferry Road/Chapin Road**

The results shown in **Table 2.2-2** indicate that, while this intersection currently operates acceptably, individual movements are operating at LOS E, and the morning peak hour operates overall at LOS D. Each movement’s critical operation occurs in either the Wednesday morning peak hour or the Tuesday/Thursday afternoon peak hour with one exception. The westbound through/right has its highest delay of 31 seconds during the Tuesday/Thursday morning peak hour. Because this is the only critical movement during that day/time combination, and because the delay for the westbound through/right is only six seconds less during the Tuesday/Thursday afternoon peak hour, the two periods selected for existing design volumes are the Wednesday morning peak hour and the Tuesday/Thursday afternoon peak hour.

**Table 2.2-2**  
Columbia Avenue/Amick’s Ferry Road/Chapin Road – Existing Volumes

Movement		Morning Peak Hour		School Dismissal Peak Hour		Afternoon Peak Hour	
		Wednesday	Tues/Thurs	Wednesday	Tues/Thurs	Wednesday	Tues/Thurs
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
		EDV					EDV
EB	Left	D/50	C/20	B/19	B/18	C/24	D/52
	Thru/right	C/22	B/17	B/18	B/19	B/19	B/19
WB	Left	C/26	E/59	C/21	C/34	C/35	E/64
	Thru/right	B/19	C/31	C/20	B/19	C/26	C/25
NB	Left	B/15	B/14	B/15	B/16	B/16	B/19
	Thru/right	E/77	E/68	B/18	B/18	B/18	C/22
SB	Left	B/15	B/15	B/15	B/15	B/14	B/15
	Thru/right	B/16	B/16	C/21	B/20	C/35	D/39
Overall		D/42	D/44	B/19	C/21	C/26	C/33

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle
- Day/time combination selected as existing design volumes (EDV)

**S-48 Columbia Avenue Corridor Study**

Addendum to Technical Memorandum No. 1: Existing Traffic Conditions

**2.2.2 Columbia Avenue/Lexington Avenue**

As shown in **Table 2.2-3**, this intersection would operate acceptably as a signalized intersection under existing volumes, but individual movements would experience LOS E, and the afternoon peak hour would operate at LOS D on Tuesday/Thursday. The critical day/time combinations for all movements are covered by Tuesday/Thursday morning and afternoon peak hours. Therefore, those day/time combinations were selected for existing design volumes.

**Table 2.2-3**  
Columbia Avenue/Lexington Avenue – Existing Volumes

Movement		Morning Peak Hour		School Dismissal Peak Hour		Afternoon Peak Hour	
		Wednesday	Tues/Thurs	Wednesday	Tues/Thurs	Wednesday	Tues/Thurs
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
			EDV				EDV
EB	Thru/right	B/10	B/11	A/6	A/6	A/6	A/6
WB	Left/thru	C/24	D/44	A/10	B/14	C/28	D/50
NB	Left/right	D/48	E/79	C/32	D/36	C/31	E/80
Overall		C/22	D/36	B/12	B/16	C/24	D/48

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle
- Day/time combination selected as existing design volumes (EDV)



**2.2.3 Columbia Avenue/Clark Street/Peak Street**

As shown in **Table 2.2-4**, this intersection would operate acceptably as a signalized intersection under existing volumes although the northbound approach would operate at LOS E during the Tuesday/Thursday afternoon peak hour. The critical day/time combinations for all movements are covered by Wednesday morning and Tuesday/Thursday afternoon peak hours. Therefore, those day/time combinations were selected for existing design volumes.

**Table 2.2-4**  
Columbia Avenue/Clark Street/Peak Street – Existing Volumes

Movement		Morning Peak Hour		School Dismissal Peak Hour		Afternoon Peak Hour	
		Wednesday	Tues/Thurs	Wednesday	Tues/Thurs	Wednesday	Tues/Thurs
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
		EDV					EDV
EB	Left/thru/right	A/8	A/7	A/3	A/3	A/3	A/4
WB	Left/thru/right	A/5	A/4	A/4	A/4	A/7	A/9
NB	Left/thru/right	C/32	C/35	D/38	C/31	C/34	E/61
SB	Left/thru/right	D/36	D/42	C/31	C/31	C/34	C/31
Overall		A/9	A/10	A/7	A/6	A/9	B/12

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle
- Day/time combination selected as existing design volumes (EDV)

**2.2.4 Columbia Avenue/East Boundary Street**

As shown in **Table 2.2-5**, this intersection would operate acceptably as a signalized intersection under existing conditions although the northbound movement would operate at LOS F during the morning peak hour on Tuesday/Thursday. The overall intersection would operate at LOS D during the same period. The critical day/time combinations for all movements are covered by the Tuesday/Thursday morning peak hour with one exception. The eastbound through/right would experience two more seconds of delay during the Wednesday morning peak hour than during the Tuesday/Thursday morning peak hour. Because this difference is small, the Tuesday/Thursday morning peak will be used for existing design volumes. Although no movement experiences its critical operation during either day in the afternoon peak hour at this location, an analysis of the afternoon peak hour should be conducted. The Tuesday/Thursday afternoon peak would have one more second of delay overall than would Wednesday. Therefore, the Tuesday/Thursday afternoon peak was also selected for existing design volumes.

**Table 2.2-5**  
Columbia Avenue/East Boundary Street – Existing Volumes

Movement		Morning Peak Hour		School Dismissal Peak Hour		Afternoon Peak Hour	
		Wednesday	Tues/Thurs	Wednesday	Tues/Thurs	Wednesday	Tues/Thurs
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
			EDV				EDV
EB	Thru/right	B/15	B/13	A/5	A/5	A/5	A/6
WB	Left/thru	B/12	D/39	A/8	A/8	B/15	B/17
NB	Left/thru	D/54	F/151	C/32	C/31	C/31	C/34
Overall		B/19	D/39	A/10	A/9	B/14	B/15

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle
- Day/time combination selected as existing design volumes (EDV)

**2.2.5 Columbia Avenue/I-26 Eastbound Ramp**

Although the frontage road portion of Ellett Road intersects Columbia Avenue immediately adjacent to this intersection, it is likely that any improvements in the corridor would involve realignment of that intersection. Therefore, the intersection was examined as a basic four-legged intersection. Although it is also likely that any improvements in the corridor would eliminate the intersection on the eastbound entrance ramp and the two-way operation of that ramp, the westbound (northbound) approach traffic on the ramp was included in the analysis to reflect that this intersection is not a “normal” ramp intersection.

As shown in **Table 2.2-6**, the intersection could operate acceptably as a signalized intersection under existing traffic conditions. The critical day/time combinations for all movements are covered by Tuesday/Thursday morning and Wednesday afternoon peak hours. Therefore, those day/time combinations were selected for existing design volumes.

**Table 2.2-6**  
Columbia Avenue/I-26 Eastbound Ramp – Existing Volumes

Movement		Morning Peak Hour		School Dismissal Peak Hour		Afternoon Peak Hour	
		Wednesday	Tues/Thurs	Wednesday	Tues/Thurs	Wednesday	Tues/Thurs
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
			EDV			EDV	
EB	Left/thru/right	A/9	B/15	A/4	A/4	A/5	A/4
WB	Left/thru/right	A/4	A/5	A/4	A/3	A/7	A/5
NB	Left/thru/right	C/29	C/29	C/28	C/28	C/28	C/28
SB	Left/thru/right	D/36	D/36	C/31	C/30	C/35	C/32
Overall		A/10	B/12	A/6	A/5	A/8	A/7

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle
- Day/time combination selected as existing design volumes (EDV)

**2.2.6 Columbia Avenue/I-26 Westbound Ramp**

This intersection is currently signalized, and, as shown in **Table 2.2-7**, operates acceptably under existing volumes. The critical day/time combinations for all movements are covered by the Tuesday/Thursday afternoon peak hour with one exception. The eastbound left/thru experiences one more second of delay during the Wednesday afternoon peak hour than during the Tuesday/Thursday afternoon peak hour. Because this difference is small, the Tuesday/Thursday afternoon peak will be used for existing design volumes. Although no movement experiences its critical operation during either day in the morning peak hour at this location, an analysis of the morning peak hour should be conducted. The Tuesday/Thursday morning peak has four more seconds of delay overall than does Wednesday. Therefore, the Tuesday/Thursday morning peak was also selected for existing design volumes.

**Table 2.2-7**  
Columbia Avenue/I-26 Westbound – Existing Volumes

Movement		Morning Peak Hour		School Dismissal Peak Hour		Afternoon Peak Hour	
		Wednesday	Tues/Thurs	Wednesday	Tues/Thurs	Wednesday	Tues/Thurs
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
			EDV				EDV
EB	Left/thru	B/17	B/13	C/30	C/25	C/33	C/32
WB	Thru/right	B/18	B/14	B/20	B/19	C/21	C/24
NB	Left/thru/right	A/8	B/19	A/8	A/9	B/17	B/19
Overall		B/12	B/16	B/16	B/15	C/20	C/22

- Notes:
- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
  - Level of Service (LOS)
  - Delay is in seconds per vehicle
  - Day/time combination selected as existing design volumes (EDV)

### **2.3 Existing Design Volumes**

The existing design volumes selected for each intersection are shown in **Figure 2.3-1** for the morning peak hour and in **Figure 2.3-2** for the afternoon peak hour.



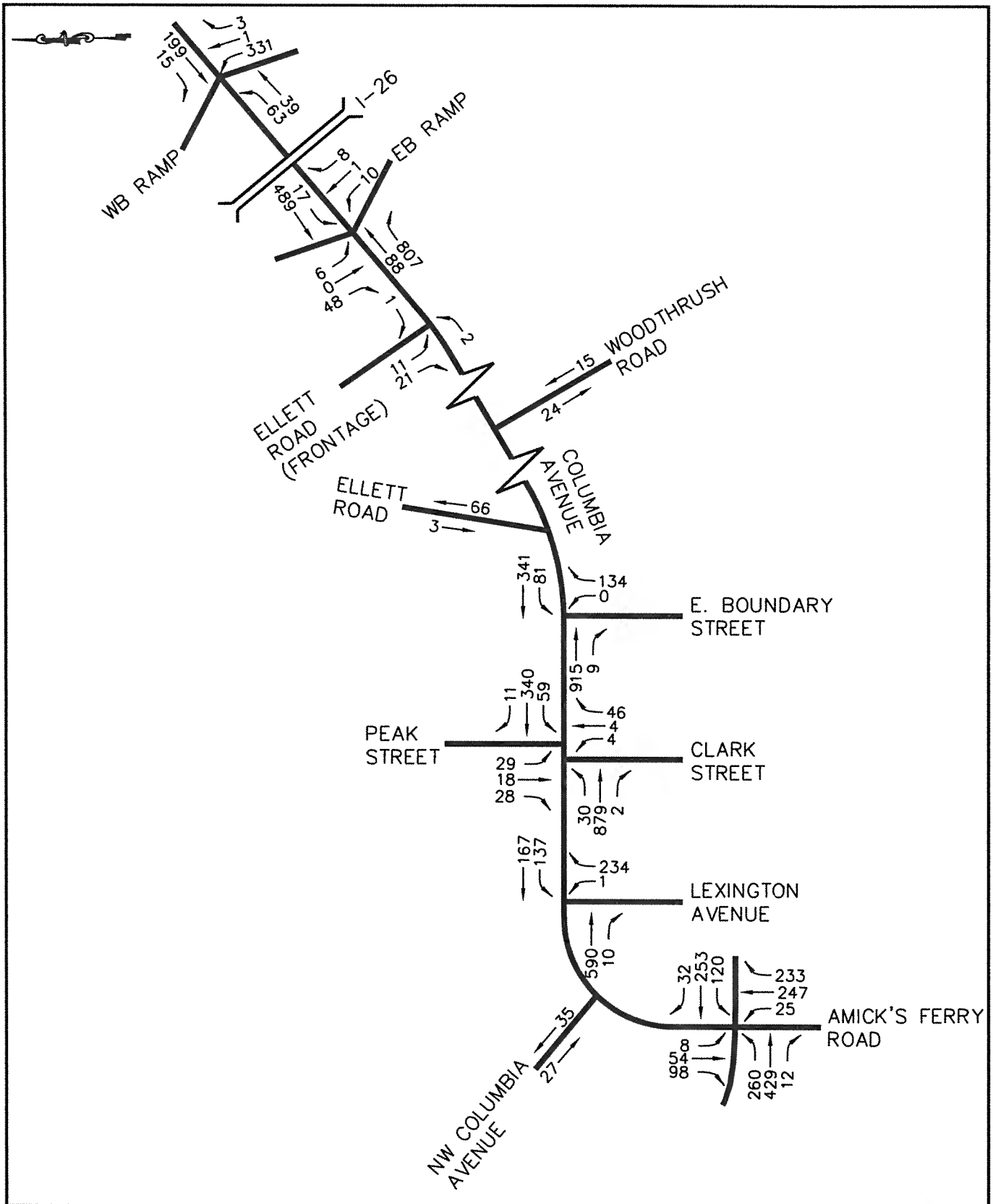


FIGURE  
2.3-1  
10 24 85

EXISTING DESIGN VOLUMES—MORNING PEAK HOUR  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
CHAPIN, SOUTH CAROLINA

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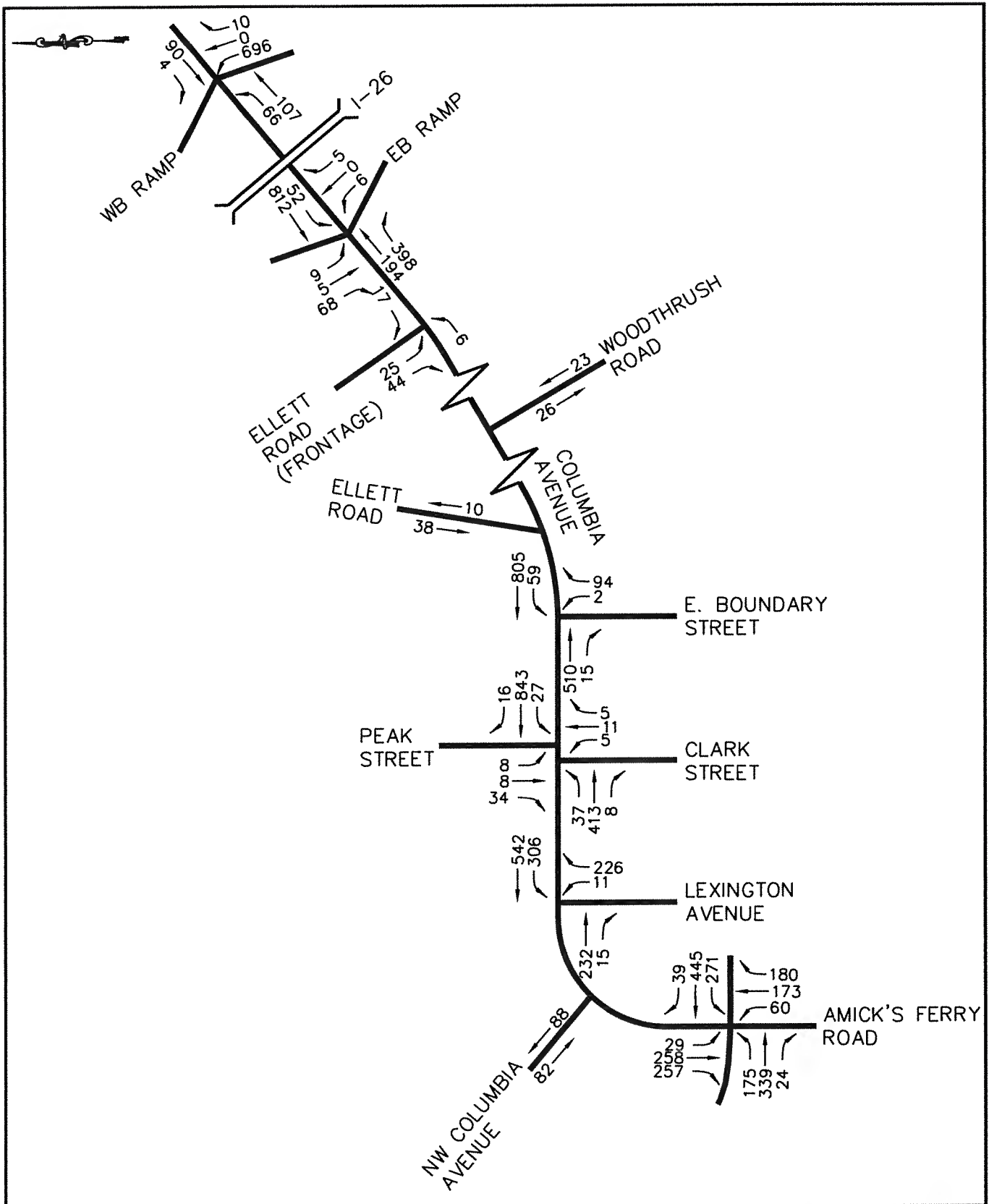


FIGURE  
2.3-2  
10/24/05

EXISTING DESIGN VOLUMES-AFTERNOON PEAK HOUR  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
CHAPIN, SOUTH CAROLINA

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### **3. 2025 DESIGN VOLUMES**

Projecting future turning movement volumes in an existing corridor requires a growth rate at which the volumes can be increased for the number of years between the current year and the design year. This growth rate can be obtained from historical traffic data. However, historical data may not account for the potential for current or anticipated intense development in the corridor. In order to account for that potential, the output from a regional transportation model, which is based on projections of future development and population characteristics, can be used.

In the Chapin area, regional transportation model information is available from CMCOG. The base year for the transportation model is 2000, and the design year is 2025. The base and 2025 volumes for the portion of the model network that includes Columbia Avenue are on file with CMCOG and available upon request. The volumes shown in the appendix include volumes for transportation network links, which represent actual roadway segments, as well as for other "connections" in the network. Although the projections for the other connections do not represent street volumes, they can be used as guidance in projecting future volumes where no volumes for street segments are given.

Because the volumes upon which this study is based are from 2005, a direct ratio of 2025 to 2000 model volumes cannot be used. Linear growth rates that can be applied to 2005 design volumes are needed. **Table 3.0-1** shows the development of those growth rates. The growth factors shown in Table 3.0-1 are the factors that a 2005 volume would be increased by to obtain 20 years of growth at the growth rate used. It must be noted that, if the growth rates shown in Table 3.0-1 for Columbia Avenue were applied to the current 24-hour volume for Columbia Avenue, the future model volume for 2025 would not be obtained. That projected volume would be less than the 2025 model volume. In order to obtain the 2025 model volume from the existing 24-hour volume, an annual growth rate of five percent would have to be applied. It is difficult for an area to sustain five percent growth per year for 20 years. Therefore, a growth rate of four percent, which is between the calculated growth rate of 3.2 and 3.3 percent and five percent, was used.

**S-48 Columbia Avenue Corridor Study**

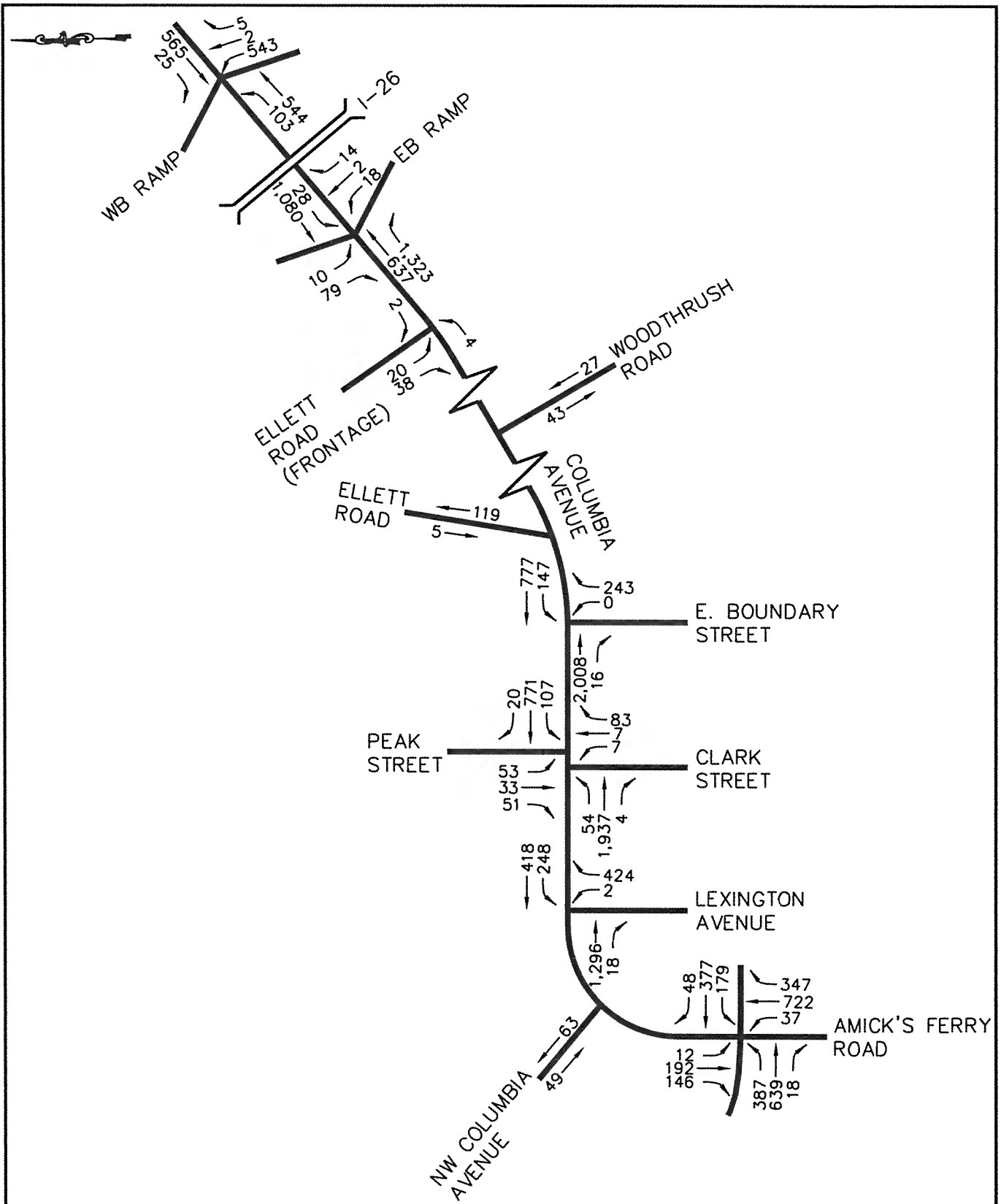
Addendum to Technical Memorandum No. 1: Existing Traffic Conditions

Because the volumes on S-48 east of I-26 are currently low, a higher growth rate such as the seven percent shown in Table 3.0-1 is possible but is difficult to predict. Therefore, the design volumes for the through movements on that end of the study area were developed by increasing the turns at the westbound ramp by the I-26 growth factors and then balancing the volumes with the eastbound ramp intersection.

**Table 3.0-1**  
Development of Linear Traffic Growth Rates  
Based on CMCOG Transportation Model Base (2000) and Projected (2025) Volumes

Road	Location	2000 Base	2025 Projected	Calculated Growth Rate	Growth Rate Used	Growth Factor
Amick's Ferry Road	South of Chapin Road	7,203	17,306	3.5%	4%	2.19
Chapin Road	West of Columbia Ave	13,235	20,385	1.7%	2%	1.49
	East of Columbia Ave	7,450	10,986	1.6%	2%	1.49
Columbia Avenue	East of NW Columbia Ave	16,947	36,958	3.2%	4%	2.19
	In vicinity of school	16,646	36,647	3.2%	4%	2.19
	Near I-26	16,336	36,871	3.3%	4%	2.19
Various	North of Columbia Ave	5,435	10,557	2.7%	3%	1.81
	South of Columbia Ave	3,343	6,670	2.8%	3%	1.81
I-26	East of Columbia Ave	45,735	87,269	2.6%	2.5%	1.64
	West of Columbia Ave	33,212	56,433	2.1%	2.5%	1.64
S-48	North of I-26	1,365	7,447	7%	Future thru volumes obtained by balancing volumes between the two ramps.	

The growth factors shown in Table 3.0-1 were applied to the existing design volumes to obtain the 2025 design volume shown in **Figure 3.0-1** for the morning peak hour and in **Figure 3.0-2** for the afternoon peak hour.



FIGURE

3.0-1

18 24 85

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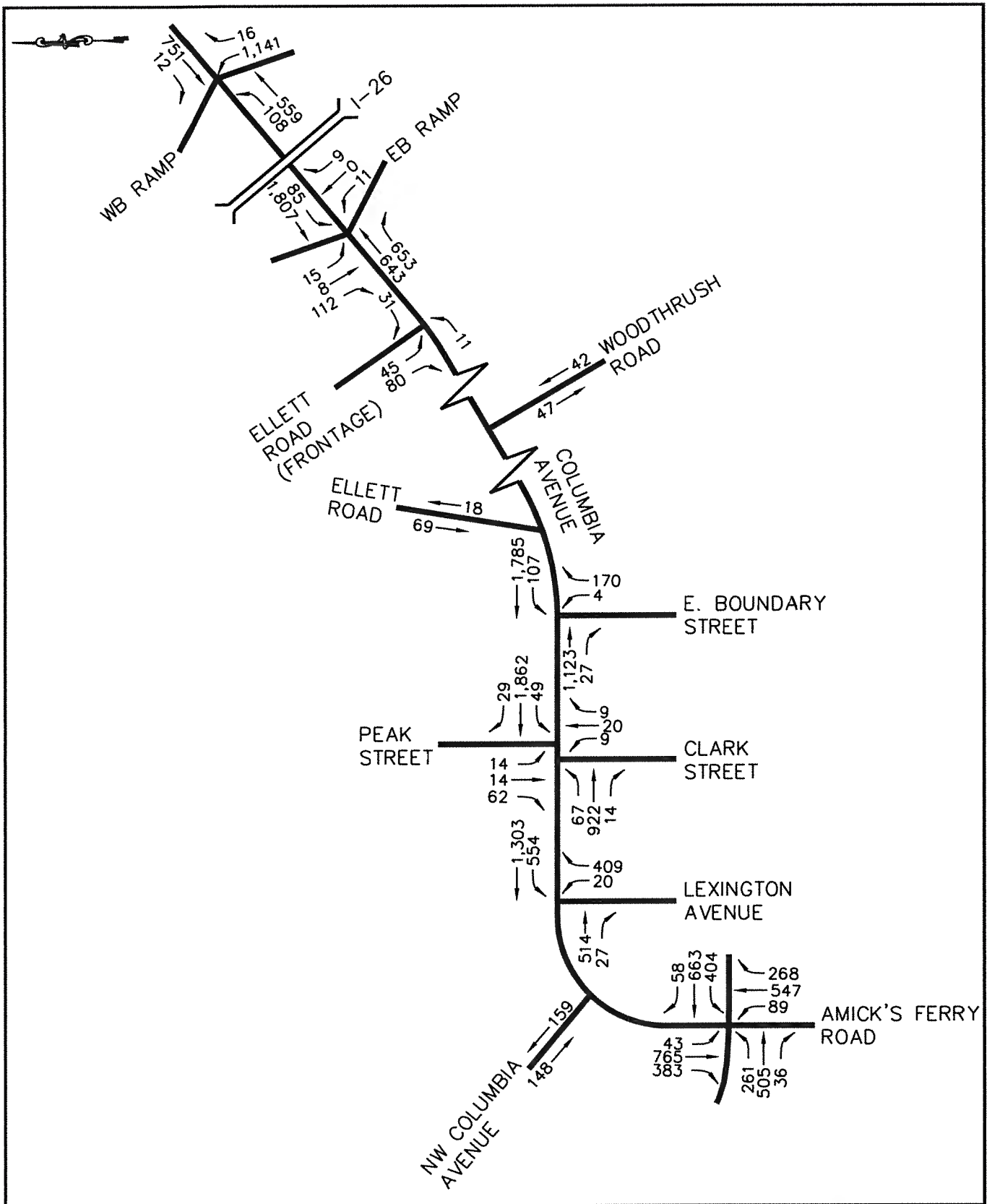


FIGURE  
3.0-2  
10/24/05

2025 DESIGN VOLUMES-AFTERNOON PEAK HOUR  
EXISTING TRAFFIC CONDITIONS  
S-48 COLUMBIA AVENUE CORRIDOR STUDY  
CHAPIN, SOUTH CAROLINA

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### **3.1 Analysis of 2025 Design Volumes**

The existing roadway geometrics were analyzed using 2025 design volumes and the same assumptions discussed previously for the analysis of existing volumes with one exception. As traffic volumes grow, peak hour factors usually increase. Therefore, the existing peak hour volumes were increased as follows:

- Existing peak hour factor of 0.90-0.99 - increased by 0.01;
- Existing peak hour factor of 0.80-0.89 - increased by 0.05;
- Existing peak hour factor of 0.70-0.79 - increased by 0.10;
- Existing peak hour factor of 0.60-0.69 - increased by 0.15; and
- Existing peak hour factor of 0.50-0.59 - increased by 0.20.

The results of the capacity analyses for 2025 design volumes are shown in **Tables 3.1-1 through 3.1-6** (i.e., corresponding print-outs are on file with CMCOG and available upon request). The results of the analyses for existing design volumes from Tables 2.2-2 through 2.2-7 are also shown in Tables 3.1-1 through 3.1-6 for comparison to future analysis results. The results shown in Tables 3.1-1 through 3.1-6 for 2025 design volumes indicate that the existing geometry on Columbia Avenue will be inadequate for future volumes. All intersections, with the addition of traffic signals at those intersections, which are currently unsignalized, will operate at LOS F with high delays.

**Table 3.1-1**  
Columbia Avenue/Amick's Ferry Road/Chapin Road – Existing and 2025 Design Volumes

Movement		Morning Peak Hour		Afternoon Peak Hour	
		Existing Design Volumes	2025 Design Volumes	Existing Design Volumes	2025 Design Volumes
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
EB	Left	D/50	F/390	D/52	F/116
	Thru/right	C/22	F/178	B/19	F/194
WB	Left	C/26	F/187	E/64	F/382
	Thru/right	B/19	E/67	C/25	F/396
NB	Left	B/15	C/25	B/19	F/340
	Thru/right	E/77	F/454	C/22	F/181
SB	Left	B/15	C/30	B/15	D/53
	Thru/right	B/16	C/33	D/39	F/373
Overall		D/42	F/271	C/33	F/293

- Notes:
- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
  - Level of Service (LOS)
  - Delay is in seconds per vehicle

**Table 3.1-2**  
Columbia Avenue/Lexington Avenue – Existing and 2025 Design Volumes

Movement		Morning Peak Hour		Afternoon Peak Hour	
		Existing Design Volumes	2025 Design Volumes	Existing Design Volumes	2025 Design Volumes
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
EB	Thru/left	B/11	F/127	A/6	A/5
WB	Left/thru	D/44	F/787	D/50	F/579
NB	Left/right	E/79	F/280	E/80	F/519
Overall		D/36	F/356	D/48	F/460

- Notes:
- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
  - Level of Service (LOS)
  - Delay is in seconds per vehicle

**S-48 Columbia Avenue Corridor Study**

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**Table 3.1-3**  
Columbia Avenue/Clark Street/Peak Street – Existing and 2025 Design Volumes

Movement		Morning Peak Hour		Afternoon Peak Hour	
		Existing Design Volumes	2025 Design Volumes	Existing Design Volumes	2025 Design Volumes
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
EB	Left/thru/right	A/8	F/257	A/4	E/80
WB	Left/thru/right	A/5	F/205	A/9	F/260
NB	Left/thru/right	C/32	F/139	E/61	D/47
SB	Left/thru/right	D/36	F/296	C/31	F/115
Overall		A/9	F/238	B/12	F/192

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle

**Table 3.1-4**  
Columbia Avenue/East Boundary Street – Existing and 2025 Design Volumes

Movement		Morning Peak Hour		Afternoon Peak Hour	
		Existing Design Volumes	2025 Design Volumes	Existing Design Volumes	2025 Design Volumes
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
EB	Thru/right	B/13	F/277	A/6	B/16
WB	Left/thru	D/39	F/821	B/17	F/331
NB	Left/right	F/151	F/688	C/34	F/368
Overall		D/39	F/491	B/15	F/220

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle

**Table 3.1-5**  
Columbia Avenue/I-26 Eastbound Ramp – Existing and 2025 Design Volumes

Movement		Morning Peak Hour		Afternoon Peak Hour	
		Existing Design Volumes	2025 Design Volumes	Existing Design Volumes	2025 Design Volumes
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
EB	Left/thru/right	B/15	F/217	A/5	D/41
WB	Left/thru/right	A/5	D/55	A/7	F/309
NB	Left/thru/right	C/29	D/47	C/28	D/45
SB	Left/thru/right	D/36	F/143	C/35	F/230
Overall		B/12	F/149	A/8	F/200

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle

**Table 3.1-6**  
Columbia Avenue/I-26 Westbound Ramp – Existing and 2025 Design Volumes

Movement		Morning Peak Hour		Afternoon Peak Hour	
		Existing Design Volumes	2025 Design Volumes	Existing Design Volumes	2025 Design Volumes
		LOS/Delay	LOS/Delay	LOS/Delay	LOS/Delay
EB	Left/thru	B/13	F/153	C/32	F/370
WB	Thru/right	B/14	B/18	C/24	E/58
NB	Left/thru/right	B/19	F/248	B/19	F/367
Overall		B/16	F/132	C/22	F/269

Notes:

- Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
- Level of Service (LOS)
- Delay is in seconds per vehicle



## **4. OTHER ISSUES**

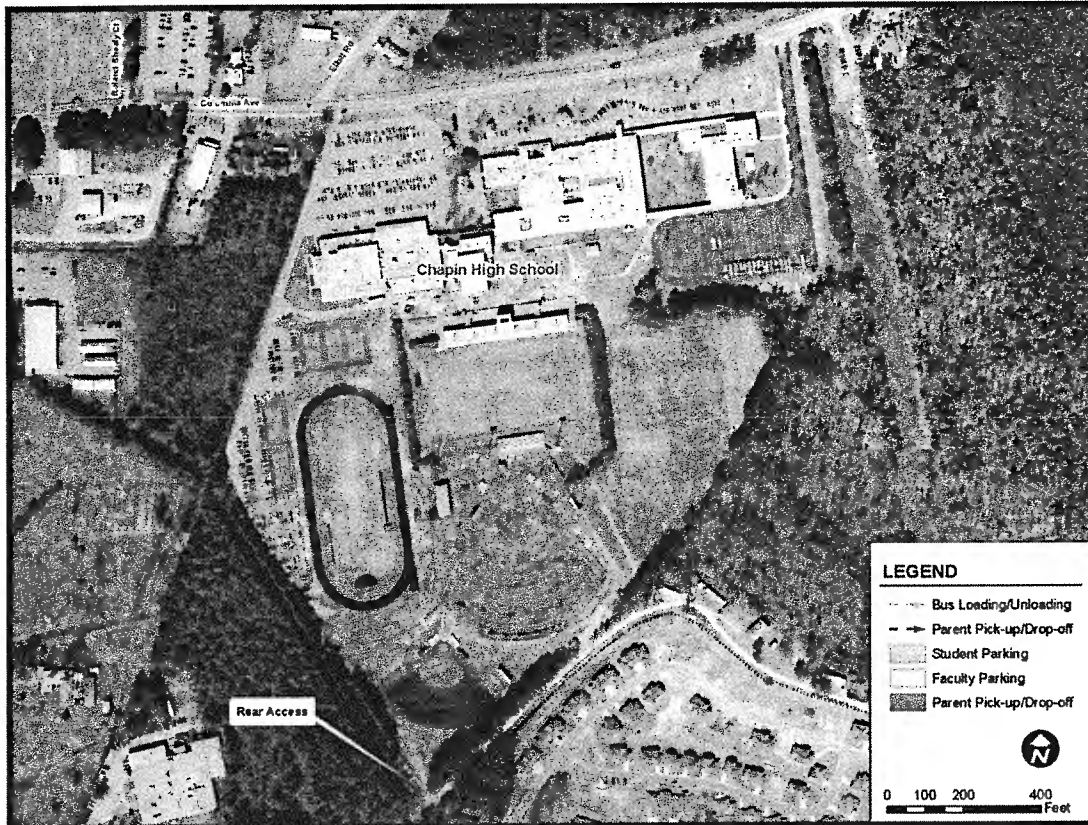
The capacity analyses for 2025 design volumes indicated that the existing geometrics of Columbia Avenue - a two-lane road without turn lanes for the majority of its length - are not adequate to accommodate the future volumes projected for the corridor. In addition to projected traffic volumes, there are other traffic-related issues in the corridor that must be considered in the development of improvements for Columbia Avenue.

### **4.1 Chapin High School**

One of the primary influences of traffic in the S-48 Columbia Avenue Corridor is the location of Chapin High School at the “center” of the corridor (see **Figure 3.1-1**). According to information obtained from the school district:

- Currently seven buses serve Chapin High School and utilize the “loop” driveway in front of the central portion of the school for drop-off and pick-up. When leaving the property the buses split almost evenly with four turning right and traveling east on Columbia Avenue and three turning left to travel west. The peak period for buses is estimated to be 8:00 to 8:20 a.m.
- Bus storage/operations were relocated from the property in 2003. No buses are currently stored on the high school property.
- Parent pick-up and drop-off is now conducted in the former bus storage area on the eastern end of the school. Left turns from this driveway onto Columbia Avenue can be difficult at times.
- It is estimated that roughly 400 personal automobiles park on-site each day.
- The school district is open to considering the utilization of the rear entry of the property as a primary entry point if it were improved to safely handle two-way traffic, which it is currently too narrow to accommodate. The school district would also be open to considering other access/mobility improvements to the high school property as long as the safety of students was maintained and/or improved.
- The Alternative Academy is also located in the S-48 Columbia Avenue Corridor on Northwest Columbia Avenue. Two buses

serve this school of roughly 100 students. Personal vehicles are minimal at this facility, and access has not been an issue.



**Figure 3.1-1: Chapin High School Traffic Operations**

## 4.2 Ellett Brothers

Ellett Brothers is a major wholesale distributor of sporting goods for mainly hunting and marine activities. It is a major employer for the Chapin area with 211 employees at the Chapin distribution center. The distribution center averages 20 to 25 tractor-trailer arrivals and departures per day. All tractor-trailer traffic accesses the distribution center via I-26 and Columbia Avenue, making right turns into the facility and delaying through traffic on Columbia Avenue. All tractor-trailer traffic makes a left turn onto Columbia Avenue when leaving the facility, which can be difficult. Ellett Brothers is in the process of considering consolidation of its operations at either the Chapin or Newberry facility. Traffic mitigation and safety issues will be major factors in the choice of location.

Other generators of more minor tractor-trailer traffic also exist in the corridor.

### **4.3 Miscellaneous Issues**

Several additional issues are of concern and will be taken into consideration during the planning for future roadway geometrics:

- **Peak Street/Clark Street Offset** - These two streets are offset enough to make their signalization as one intersection difficult and their signalization as two intersections virtually impossible.
- **Lack of Left Turn Lane on Columbia Avenue at Northwest Columbia Avenue** - When a vehicle stops in the through lane on Columbia Avenue to turn left onto Northwest Columbia Avenue, the queue behind the left turn vehicle can extend to the railroad. The lack of left turn lanes at all intersections on Columbia Avenue is also an issue.
- **Clark Street Streetscape** - A streetscape project for Clark Street is currently underway.
- **Ninety Degree Turn on Columbia Avenue North of Chapin Road** - This geometric feature complicates the operation of two closely spaced intersections with a railroad between them.

## **5. SUMMARY**

The following summarizes the findings of this addendum:

- All of the study intersections can operate acceptably under existing traffic volumes as signalized intersections, although some individual movements experience delay that is considered unacceptable.
- None of the study intersections can operate acceptably under 2025 traffic volumes as signalized intersections. Without major improvements in the corridor, delays will be high in 2025.
- Other traffic-related issues in the corridor must also be addressed:
  - Traffic associated with Chapin High School;
  - Ellett Brothers and other tractor-trailer trip generators in the corridor;
  - Geometric offset of Columbia Avenue's intersection with Peak Street and Clark Street;
  - Lack of a left turn lane on Columbia Avenue at Northwest Columbia Avenue and at other intersections on Columbia Avenue;
  - Coordination with the Clark Street streetscape, which is currently underway; and
  - Ninety degree turn on Columbia Avenue just north of Chapin Road.