ATTACHMENT A

A RESOLUTION RECEIVING A REPORT ON ESTIMATED TRAFFIC LEVEL OF SERVICE IMPACTS IN DOWNTOWN CARRBORO FROM A WEEKEND EVENT
Draft Resolution No. 80/2012-13

WHEREAS, *Vision 2020* Objective 4.0 states, in part: "The safe and adequate flow of bus, auto, bicycle and pedestrian traffic within and around Carrboro is essential"; and,

WHEREAS, the Comprehensive Bicycle Transportation Plan recommends the implementation of programs to increase the popularity of bicycling; and,

WHEREAS, a group including members of the Carrboro Bicycle Coalition and other citizens has submitted a street closure application for an Open Streets Day event in April 2013; and,

WHEREAS, Open Streets Days and *ciclovias* have been held around the U.S. and around the world to encourage active transportation by temporarily allowing bicyclists and pedestrians exclusive enjoyment of urban streets and parkways; and,

WHEREAS, in March 2012, the Board of Aldermen requested information on the traffic impact of opening Weaver St. to pedestrians and bicyclists;

NOW, THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that the Board receives the memorandum on traffic on Main St. when Weaver St. is closed to auto traffic.

This is the 22nd day in January in the year 2013.

TOWN OF CARRBORO

NORTH CAROLINA

MEMORANDUM

DELIVERED VIA: ☐ *HAND* ☐ *MAIL* ☐ *FAX* ☒ *EMAIL*

DATE: **January 22, 2013**

TO: **David Andrews, Town Manager**
Mayor and Board of Aldermen

CC: **Christina Moon, Planning Administrator**
Patricia McGuire, Planning Director
George Seiz, Public Works Director
Annette Stone, Economic and Community Development Director

FROM: **Jeff Brubaker, Transportation Planner** JSB

RE: **Traffic on Main St. when Weaver St. is closed to auto traffic**

Executive Summary

At its March 13, 2012 meeting, the Board of Aldermen requested information regarding the potential impact of closing Weaver Street to vehicular traffic for an Open Streets Day, or *ciclovia*-type event on a weekend day. The following memorandum provides a detailed analysis of findings from previous street closings in the downtown area for music events and for the reconstruction of Weaver Street during 2011. A summary of the findings, along with suggestions on how to limit the impact on traffic during a street closing event, is provided in this executive summary. More detailed analysis follows in the body of the memo, including specific traffic counts at different times and at different locations.

Weekend traffic data and the impact of the Carrboro Music Festival

Weekend traffic counts were conducted on Weaver St. and the 100 blocks of E. and W. Main St. in May and September 2012. The September weekend counts included Sunday, September 30, the day of the Carrboro Music Festival. During the festival, all of Weaver St. is closed to automobile traffic from 1pm to 6pm, and many visitors come from out of town. Compared with the baseline of Sunday, May 6, on September 30:

- 24-hour traffic increased by 21% on E. Main St. and 124% on W. Main St.
- Traffic from 1pm to 6pm increased by 41% on E. Main St. and 125% on W. Main St.
- Peak hour traffic between 1pm and 6pm increased by 56-60% on E. Main St. and 105-153% on W. Main St.

Weekday traffic data and the impact of the Weaver Street Reconstruction

To measure the impact on Main St. of closing Weaver St. to auto traffic, weekday traffic data was collected before, during, and after the Weaver Street Reconstruction (WSR) project. Traffic counts were conducted during four Tuesday-Wednesday 48-hour periods:

- November 30-December 1, 2010, before project
- April 19-20, 2011, during E. Weaver St. closure
- October 11-12, 2011, during W. Weaver St. Phase 3 (Center to Oak) closure
- February 14-15, 2012, after project

These counts were also compared with NCDOT's Average Annual Daily Traffic (AADT) data.

From this data a few summary points can be made about *daily* traffic:

- In general, Town counts pre- and post-WSR are at or below NCDOT AADT figures.
- Compared to the pre-WSR baseline, during the *East* Weaver St. phase of the WSR:
    - Traffic doubled on E. Main St.
    - Traffic increased by 35% on W. Main St.
- Compared to the pre-WSR baseline, during the *West* Weaver St. Phase 3 (Center to Oak closed) of the WSR:
    - Traffic increased by 38% on E. Main St.
    - Traffic increased by 50% on W. Main St.
- Saturday traffic volume on E. Main and E. Weaver Sts. is comparable to weekday traffic. It is lower than weekday traffic on W. Main St., but the Sat. 9/29 count suggests that a UNC home football game causes a significant increase, more pronounced on E. Weaver St. than on E. Main St.
- Sunday traffic is normally about 25-35% lower than Saturday traffic.
- The Music Festival produces Main St. traffic volumes on a Sunday that are comparable to a busy Saturday (e.g. for a football game).

Ciclovia*/Open Streets Day celebration*

The analysis is based on the assumption that Weaver St. would be the location for an Open Streets Day and that one of the following Open Streets Day setups would occur.

- Open Streets Day 1 (OSD1) – E. Weaver St.
- Open Streets Day 2 (OSD2) – W. Weaver St.
- Open Streets Day 3 (OSD3) – Both E. Weaver St. and W. Weaver St.

The analysis explores both Saturday and Sunday traffic impacts.

The memo estimates the traffic impact on Main St. – as the primary detour route – of the three alternatives. OSD1 and OSD2 impacts are based on the percentage increase in traffic during the

WSR. OSD3 is based on the peak hour percentage increase caused by the Music Festival. A few shortcomings of this approach are explained in the body of the memo.

East Main Street peak hour traffic changes due to WSR

AM peak hour traffic on E. Main St. was substantially higher in each direction during the WSR. Compared to pre-project volumes, AM peak traffic was between 13% and 125% higher. The highest increase was in the westbound direction (i.e. in front of Spotted Dog and Jade Palace) when E. Weaver St. was closed. This was at 11am, the start of the lunch peak.

Compared to pre-project volumes, PM peak hour traffic on E. Main St. was between 25% and 91% higher during the WSR. It can be seen that E. Weaver St. is a key parallel route to E. Main St. When E. Weaver St. was closed, AM peak hour (11am) traffic more than doubled going westbound, and PM peak hour (6pm) traffic almost doubled going eastbound. This is supported by PM peak intersection turning movement counts conducted by Town staff at the Main-Greensboro intersection in 2011 and 2012.

As can be expected, the impact to E. Main St. was lower when W. Weaver St. was closed and E. Weaver St. had been reopened, but there were still increases from 13% to 59%.

West Main Street peak hour traffic changes due to WSR

W. Main St. has higher daily and peak-hour traffic volumes than E. Main St. The impact of the WSR on W. Main St. was substantial, but generally less than on E. Main, ranging from a 9% increase in peak-hour traffic to a 76% increase – for westbound traffic when W. Weaver was closed. Keep in mind that the April and October 2011 PM peak traffic volumes include traffic for the Wednesday Farmers' Market, while the Nov./Dec. 2010 and Feb. 2012 pre- and post-project baselines do not.

Capacity of Main St.

The memo focuses on street segment, rather than intersection, capacity. The capacity is assumed to be 550 vehicles per lane per hour.

Weekend peak traffic projections

Weekend peak traffic on Main St. for OSD1 and OSD2 is estimated by increasing the observed peak traffic volumes proportionate to the percentage increase in peak weekday traffic due to Weaver St. closures. Weekend peak traffic on Main St. for OSD3 is estimated by using the Carrboro Music Festival peak traffic increase.

Because these may be overestimates, an alternative, transportation demand management (TDM) scenario with a 10% traffic volume reduction is also presented to reflect how the peak traffic could be mitigated by encouraging peripheral parking and satellite parking with a shuttle service; encouraging bicycling and walking to get to the event; and clearly conveying available parking lots/areas to reduce cruising for parking.

The scenarios most likely to cause congestion would be:

- OSD3 (both E. and W. Weaver Sts. closed to autos) during the 11am to 1pm time period on Saturday, causing congestion on W. Main St.
- OSD1 (E. Weaver St. closed) during 11am to Noon on a Saturday, causing slight congestion E. Main St.
- OSD2 (W. Weaver St. closed) during 11am on a Saturday, possibly causing slight congestion on W. Main St. if no TDM measures are pursued.

A well-planned Open Streets Day could likely be held on a weekend day on Weaver St. without causing major traffic congestion on Main St. Even if slight congestion results, this should be weighed against the potential benefits of the event, such as physical activity and public health, decreased air pollution, economic opportunity and increased business in stores, and greater social interaction among community members.

The following suggestions are offered to help lower the chances of experiencing congestion:

- Any Open Streets Day held on a Sunday should not lead to significant congestion on Main St.
- A Saturday Open Streets Day on E. Weaver St. (OSD1) would have less chance of causing congestion on E. Main St. if TDM measures are implemented or the event does not take place mid-day (11am to 1pm).
- A Saturday Open Streets Day on W. Weaver St. (OSD2) would not be likely to cause congestion on W. Main St., especially if TDM measures are implemented, except that traffic may come close or just exceed capacity from 11am to Noon, the time when Farmers' Market traffic is the heaviest.
- A W. Weaver St. event beginning at Noon would allow typical levels of motor vehicle access to the Farmers' Market. If the event started before Noon, this would make the parking lots on W. Weaver St. that are normally designated for Farmers' Market parking (Venable Building and PNC Bank) unavailable for a portion of the market. Planning the event to begin right after the Farmers' Market ends may also encourage people who come to Town for the Market to stay for the afternoon. Ending the event by 5pm may encourage people who come for the Open Streets Day to stay for dinner at local restaurants, which could be encouraged as part of the marketing of the event. Close coordination with the Farmers' Market and Weaver St. businesses is encouraged, and is already occurring by the group of citizens and organizations planning the April event. Overall, Open Streets events have been shown to have a positive impact on most adjacent businesses.
- Use of alternative transportation and satellite parking should be encouraged.
- Coordinate in advance with Chapel Hill Transit, in order to plan for rerouting of the CW Saturday route and the potential for shuttle bus service. This is already being done by the event planning group.

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Full Report

Background

On March 13, 2012, the Board of Aldermen requested information on the traffic impact of opening Weaver St. to pedestrians and bicyclists for a *ciclovia*-type event, or Open Streets Day, on a weekend day.

Weekend traffic counts

May 2012

In order to determine the potential impact to downtown traffic circulation, particularly for roads within the immediate vicinity, traffic counts were collected on Saturday, May 5, and Sunday, May 6, 2012, at four locations:

- E. Weaver St., at the Beehive Hair Studio/Jade Palace Driveway
- W. Weaver St., between Center St. and Lindsay St.
- E. Main St. (100 block), at Friendly Barber Shop
- W. Main St. (100 block), at Carrboro Animal Hospital

Count data for the W. Weaver St. location does not appear to have been adequately collected, suggesting a possible counter malfunction. The Saturday counts do not include traffic from the Carrboro Crafts Market, which was the following weekend.

Unless otherwise noted, all references to East and West Main Sts. mean specifically the 100 blocks of these streets.

September 2012 – Carrboro Music Festival

Traffic counts were collected on Saturday, September 29, and Sunday, September 30, the latter being the day of the Carrboro Music Festival, at the same locations along the 100 blocks of both East and West Main St. Comparing the Carrboro Music Festival count with the Sunday, May 6, count gives an idea of how traffic changes on Main St. when all of Weaver St. is closed to traffic and there is a large event. (Both counts were conducted when UNC and CHCCS were both in session.)

Carrboro Music Festival traffic impact

The Music Festival has a number of effects on traffic:

- All of Weaver St. is closed to autos from 1pm to 6pm, forcing motorists to use detours through or around downtown.
- Many more people than usual come to downtown, leading to more automobile traffic in general.

- While some choose to drive, others walk, bike, or take the Chapel Hill Transit festival shuttle from the Carrboro Plaza Park-and-Ride.
- Some who drive downtown park in peripheral areas, such as along Fidelity St., and do not create additional traffic on Main St. from cruising for parking.

During the festival, Greensboro St. remains open to auto traffic, with police officers directing traffic at the Greensboro-Weaver intersection.

Block	Date	Auto traffic, 1-6pm	Auto traffic, 24 hr.
100 East Main St.	Sun., 5/6/12	2125	6151
	Sun., 9/30/12 (Music Fest)	2995	7456
	% increase	*41%*	*21%*
100 West Main St.	Sun., 5/6/12	1570	3889
	Sun., 9/30/12 (Music Fest)	3535	8695
	% increase	*125%*	*124%*

Table 1. Increases in auto traffic on Main St. for the Carrboro Music Festival

As Table 1 indicates, traffic increases substantially on Main St. during the Music Festival. On W. Main St., it is more than double the May baseline.

Block	Date	Auto traffic, peak hour b/t 1-6pm	
		Eastbound	Westbound
100 East Main St.	Sun., 5/6/12	222	255
	Sun., 9/30/12 (Music Fest)	346	409
	% increase	*56%*	*60%*
100 West Main St.	Sun., 5/6/12	202	161
	Sun., 9/30/12 (Music Fest)	414	408
	% increase	*105%*	*153%*

Table 2. Increases in peak hour auto traffic between 1:00 and 6:00pm (Weaver St. closed to autos) on Main St. for the Carrboro Music Festival

Table 2 shows the effect on peak hour traffic. On W. Main St., peak hour traffic was 2 to 2.5 times higher when Weaver St. was closed to autos compared to the baseline.

Weaver Street Reconstruction weekday traffic counts

The Weaver Street Reconstruction (WSR) project was also an opportunity for the Town to measure the impact on Main St. of closing Weaver St. to auto traffic. Traffic counts were conducted during four Tuesday-Wednesday 48-hour periods:

- November 30-December 1, 2010, before project
- April 19-20, 2011, during E. Weaver St. closure
- October 11-12, 2011, during W. Weaver St. Phase 3 (Center to Oak) closure
- February 14-15, 2012, after project

While these counts reflect weekday, rather than weekend, counts, the important measurement is the percentage increase in traffic from the Nov./Dec. 2010 baseline. This also allows us to parse

out individual impacts of the East or West Weaver St. blocks being closed to auto traffic, as opposed to all of Weaver St. being closed.

Beginning on April 3, 2011, when E. Weaver St. was closed to vehicle traffic in both directions for the duration of the day, motorists needed to find alternate routes. Town press releases encouraged motorists to consider Estes Dr., Merritt Mill Rd., and NC-54 bypass as alternate routes. However, Main St. is the east-west alternative with the shortest detour.

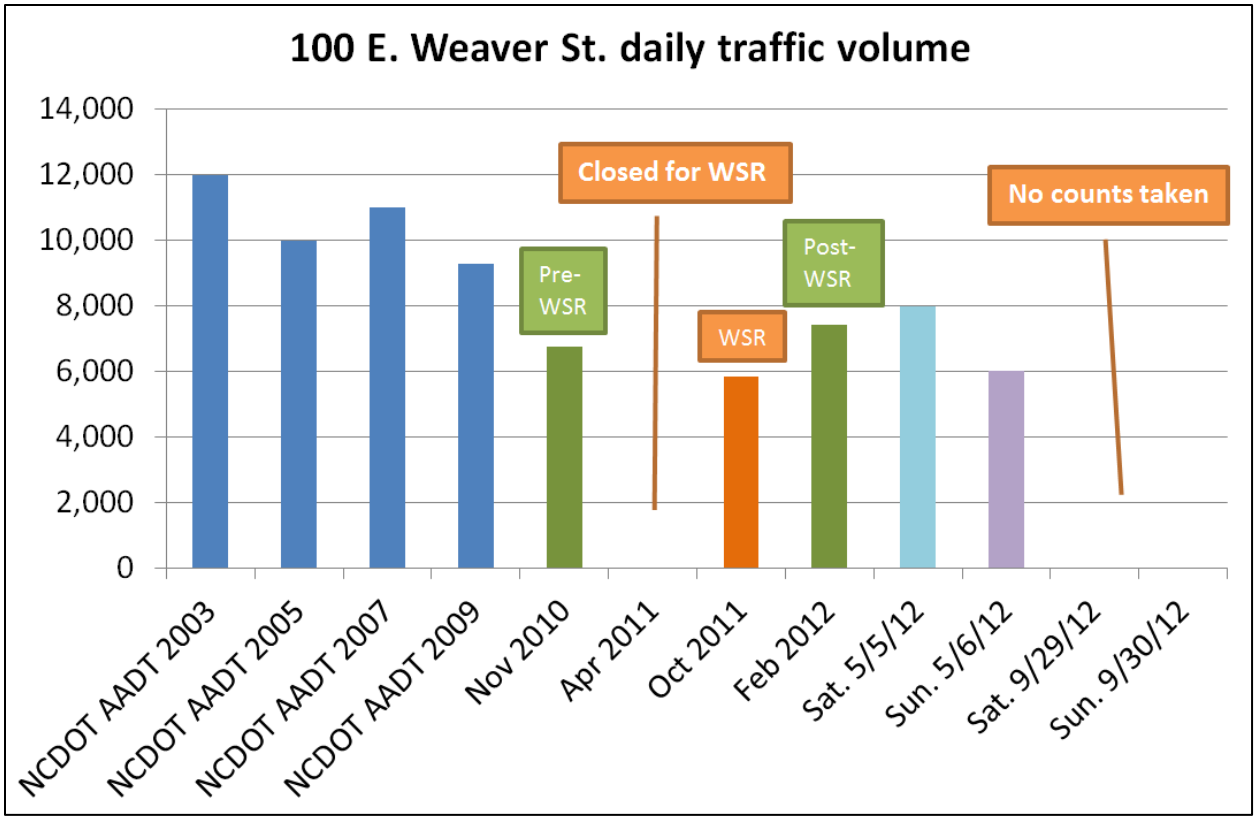
On July 5, 2011, the E. Weaver St. phase was completed and the street was fully reopened to motor vehicle traffic. At this point, Phase 2 of the project started and W. Weaver St. (Greensboro to Center) was closed to traffic. Motorists could once again use E. Weaver St. but if their normal route took them on W. Weaver St., they still had to find an alternative. The fact that E. Weaver St. traffic during the W. Weaver St. closure was 14 percent lower than pre-WSR traffic and 21 percent lower than post-WSR traffic is evidence of motorists using alternative routes.

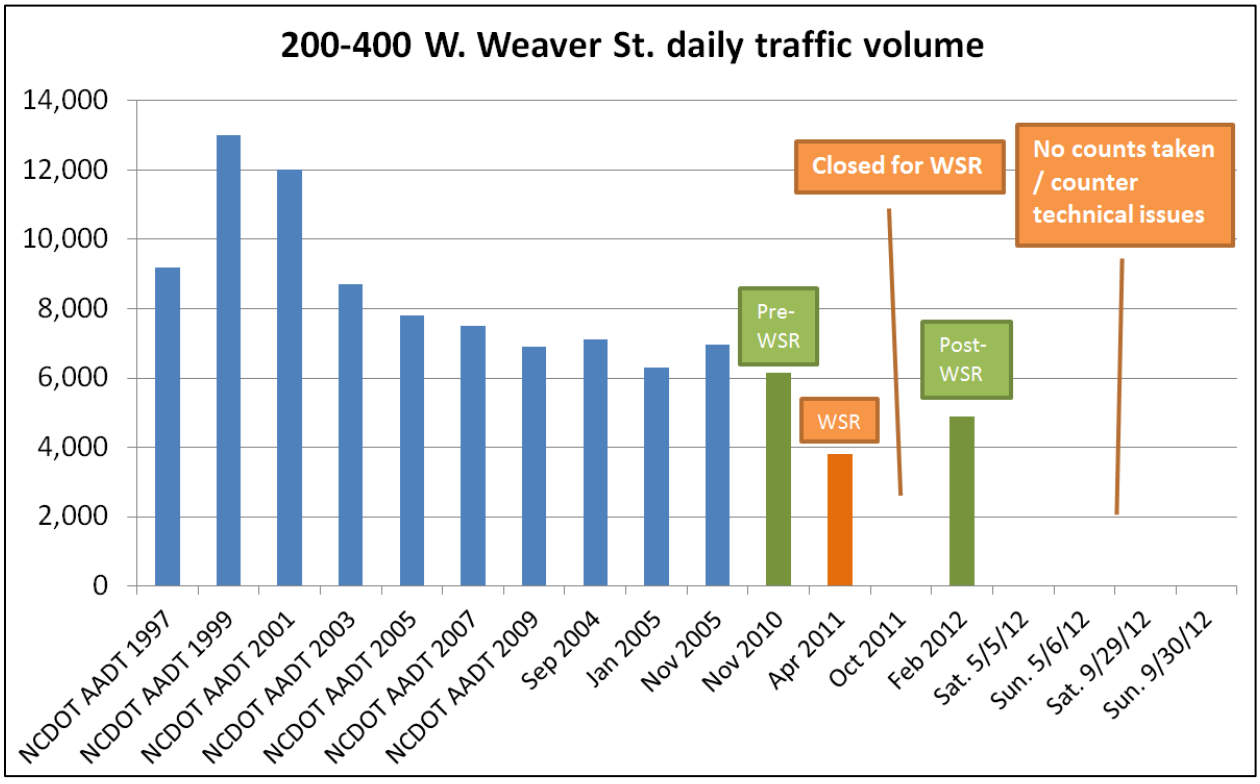
On January 23, 2012, W. Weaver St. fully reopened to vehicle traffic as the project was substantially completed.

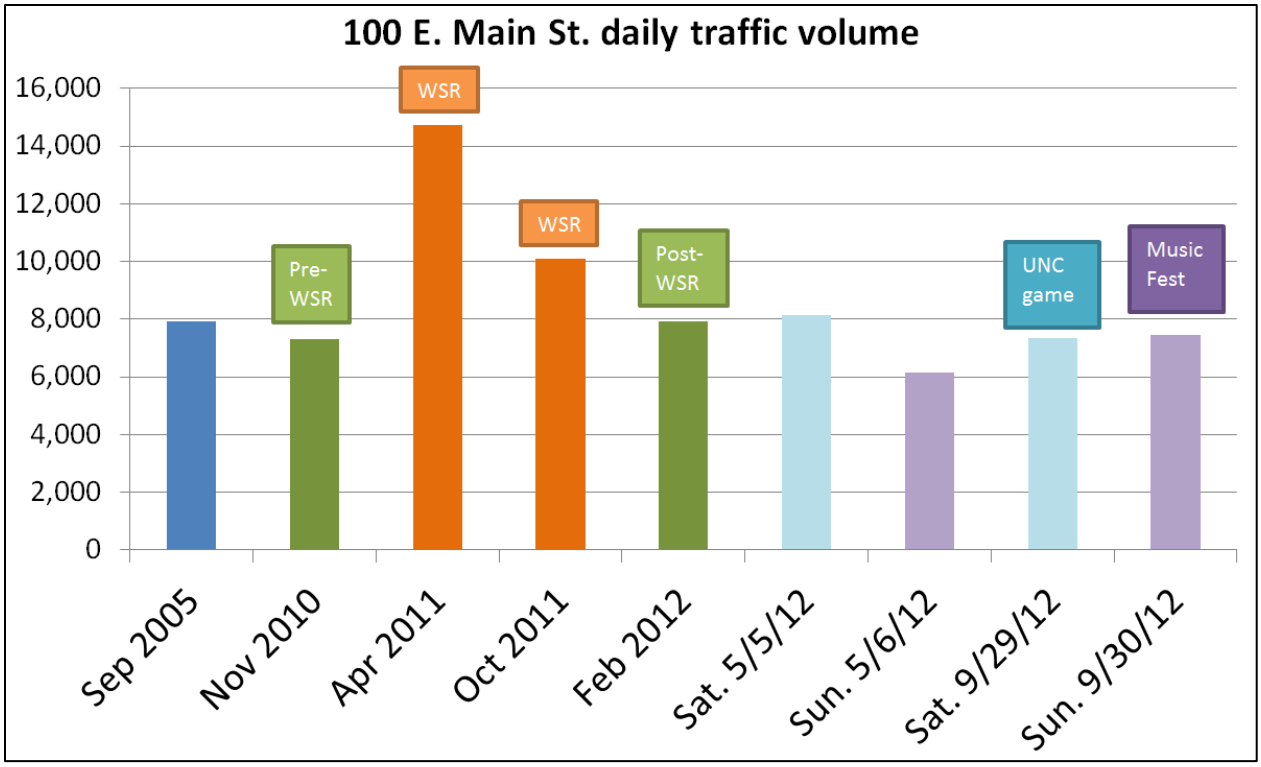
Average daily traffic on Weaver and Main Sts.

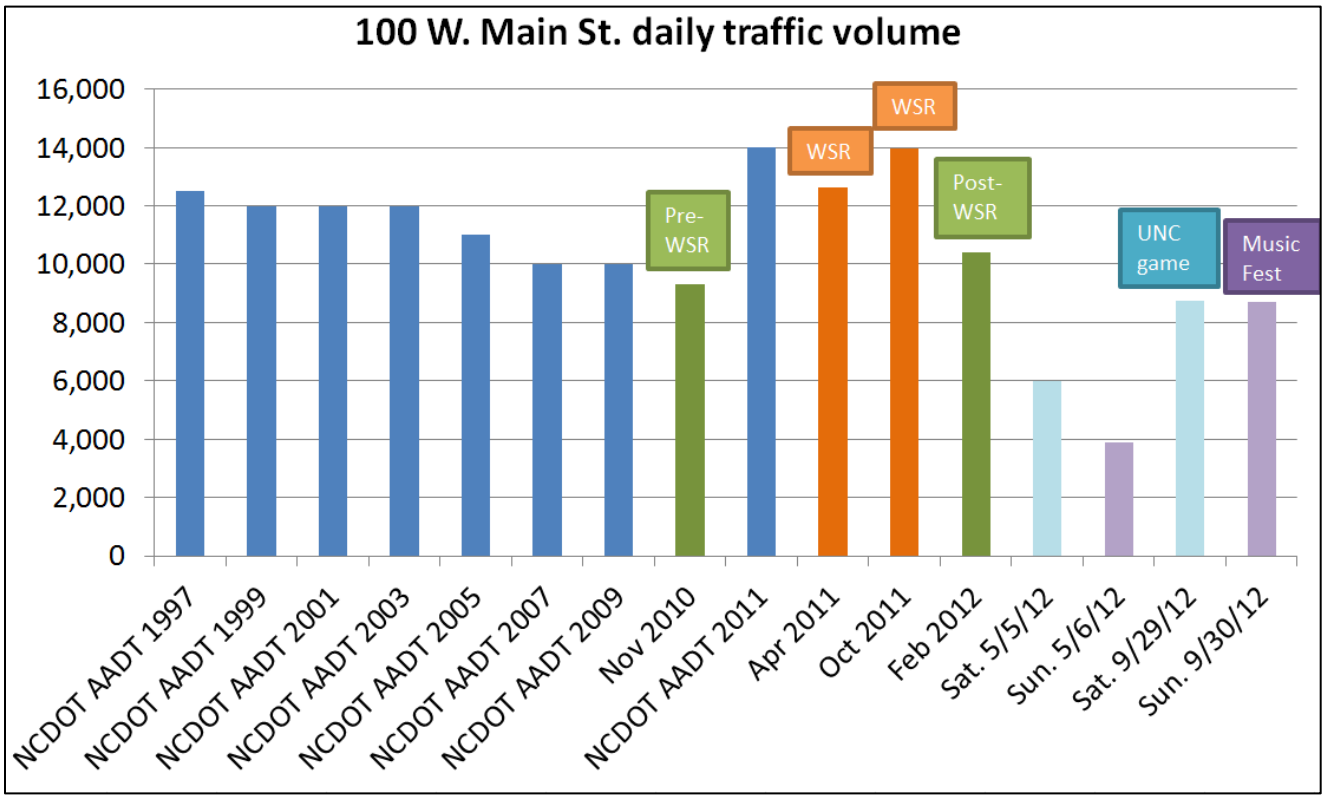
The charts below show how traffic has changed over time on these streets, and how weekday and weekend traffic compare. They incorporate NCDOT's Average Annual Daily Traffic (AADT) data. Collected in odd years stretching back to as early as 1997, the AADT figures are the average for all days of the year, the result of raw traffic counts with a number of correction factors applied.[1] The 100 east block of Main St. is not an AADT count location.

[1] For more info, see: http://www.ncdot.gov/doh/preconstruct/tpb/traffic_survey/.


100 E. Weaver St. daily traffic volume
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Closed for WSR
No counts taken
Pre-WSR
Post-WSR
WSR
NCDOT AADT 2003
NCDOT AADT 2005
NCDOT AADT 2007
NCDOT AADT 2009
Nov 2010
Apr 2011
Oct 2011
Feb 2012
Sat. 5/5/12
Sun. 5/6/12
Sat. 9/29/12
Sun. 9/30/12


200-400 W. Weaver St. daily traffic volume
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Closed for WSR
No counts taken / counter technical issues
Pre-WSR
Post-WSR
WSR
NCDOT AADT 1997
NCDOT AADT 1999
NCDOT AADT 2001
NCDOT AADT 2003
NCDOT AADT 2005
NCDOT AADT 2007
NCDOT AADT 2009
Sep 2004
Jan 2005
Nov 2005
Nov 2010
Apr 2011
Oct 2011
Feb 2012
Sat. 5/5/12
Sun. 5/6/12
Sat. 9/29/12
Sun. 9/30/12


100 E. Main St. daily traffic volume
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
WSR
WSR
Pre-WSR
Post-WSR
UNC game
Music Fest
Sep 2005
Nov 2010
Apr 2011
Oct 2011
Feb 2012
Sat. 5/5/12
Sun. 5/6/12
Sat. 9/29/12
Sun. 9/30/12


100 W. Main St. daily traffic volume
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
WSR
WSR
Pre-WSR
Post-WSR
UNC game
Music Fest
NCDOT AADT 1997
NCDOT AADT 1999
NCDOT AADT 2001
NCDOT AADT 2003
NCDOT AADT 2005
NCDOT AADT 2007
NCDOT AADT 2009
Nov 2010
NCDOT AADT 2011
Apr 2011
Oct 2011
Feb 2012
Sat. 5/5/12
Sun. 5/6/12
Sat. 9/29/12
Sun. 9/30/12

A few summary points can be made from the graphs:

- In general, Town counts pre- and post-WSR are at or below NCDOT AADT figures.
- Compared to the pre-WSR baseline, during the *East* Weaver St. phase of the WSR:
    - Traffic doubled on E. Main St.
    - Traffic increased by 35% on W. Main St.
- Compared to the pre-WSR baseline, during the *West* Weaver St. Phase 3 (Center to Oak closed) of the WSR:
    - Traffic increased by 38% on E. Main St.
    - Traffic increased by 50% on W. Main St.
- Saturday traffic volume on E. Main and E. Weaver Sts. is comparable to weekday traffic. It is lower than weekday traffic on W. Main St., but the Sat. 9/29 count suggests that a UNC home football game causes a significant increase, more pronounced than on E. Main St.
- Sunday traffic is normally about 25-35% lower than Saturday traffic.
- The Music Festival produces Main St. traffic volumes on a Sunday that are comparable to a busy Saturday (e.g. for a football game).

Ciclovia/Open Streets Day celebration

Location

The analysis is based on the assumption that Weaver St. would be the location for an Open Streets Day and that one of the following Open Streets Day setups would occur.

- Open Streets Day 1 (OSD1) – E. Weaver St.
- Open Streets Day 2 (OSD2) – W. Weaver St.
- Open Streets Day 3 (OSD3) – Both E. Weaver St. and W. Weaver St.

The analysis explores both Saturday and Sunday traffic impacts. A Saturday OSD2 event is currently being planned for April 2013 by citizens and organizations.

The memo estimates the traffic impact on Main St. – as the primary detour route – of the three alternatives. OSD1 and OSD2 impacts are based on the percentage increase in traffic during the WSR. OSD3 is based on the peak hour percentage increase shown in Table 2.

One shortcoming of this method of estimation is that the OSD1 and OSD2 increases are based on weekday traffic detour patterns. Weekend traffic has different trip purposes, peaking characteristics (Figure 1), and trip time flexibilities. The OSD3 estimation method also has a potential shortcoming: the Music Festival may represent a more drastic increase in traffic over a normal Sunday than an Open Streets Day would over a normal Saturday. The Music Festival is a large, established event that attracts people from all over the region, who come to see shows and spend the afternoon in downtown Carrboro. An Open Streets Day, especially if it starts immediately after the Farmers' Market, could attract people who already have driven in for the Market – and choose to stay. An Open Streets Day would also be focused on walking and

bicycling. With this focus, and with an effort to encourage those who live too far away to use a park-and-ride/shuttle option or park on the edge of downtown, the traffic impact on Main St. could be lessened.

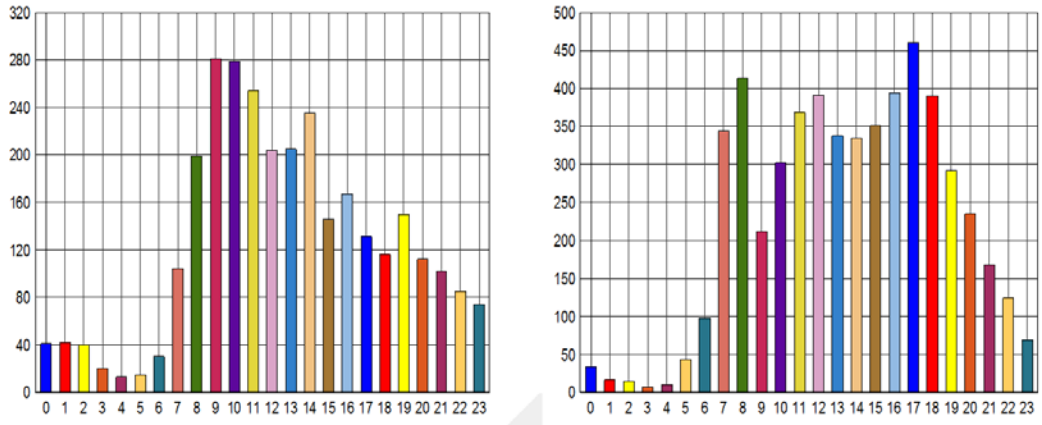


Figure 1. Example of weekend vs. weekday hourly traffic patterns, eastbound direction, 100 block of W. Main St. LEFT: Saturday, May 5, 2012. RIGHT: Tuesday, Feb. 14, 2012. Note the scales of the vertical axes are different: the peak hour on Tuesday is over 450, compared to the peak hour on Saturday of 280.

The Town acquired new traffic counters after the Nov./Dec. 2010 baseline counts. The old counter software recorded the peak hour as starting at any 15-minute period (e.g. 10:45 am to 11:45 am) whereas the new counter software only recorded the peak 15-minute period or the peak hour starting on the hour (e.g. 11:00 am to 12:00 pm). While it would be possible to format the new coutner software data to record peak hours starting on :15, :30, or :45, this would require a greater contribution of staff hours, and for efficiency, only the on-the-hour peaks are used.

East Main Street peak hour traffic changes due to WSR

AM peak hour traffic on E. Main St. was substantially higher in each direction during the WSR. Compared to pre-project volumes, AM peak traffic was between 13% and 125% higher (Table 3). The highest increase was in the westbound direction (i.e. in front of Spotted Dog and Jade Palace) when E. Weaver St. was closed. This was at 11am, the start of the lunch peak.

	AM peak hour						
Count date	**EB**	**Vol**	**% change from 11/10**	**WB**	**Vol**	**% change from 11/10**	**Status**
Nov 30-Dec 1, 2010	7:45 am	309	0%	10:45 am	198	0%	All of Weaver St. fully open
April 19-20, 2011	8 am	543	76%	11 am	445	125%	E. Weaver St. closed
October 11-12, 2011	8 am	348	13%	11 am	310	57%	W. Weaver (Center to Oak) closed
February 14-15, 2012	8 am	259	-16%	11 am	251	27%	All of Weaver St. fully open

Table 3. AM peak hour impact on E. Main St.

Compared to pre-project volumes, PM peak hour traffic on E. Main St. was between 25% and 91% higher during the WSR (Table 4). Interestingly, after the street was reopened to autos, the westbound traffic peak-hour volume was 42% higher than pre-project.

	PM peak hour						
Count date	**EB**	**Vol**	**% change from 11/10**	**WB**	**Vol**	**% change from 11/10**	**Status**
Nov 30-Dec 1, 2010	5:45 pm	282	0%	4:30 pm	301	0%	All of Weaver St. fully open
April 19-20, 2011	6 pm	538	91%	7 pm	534	77%	E. Weaver St. closed
October 11-12, 2011	5 pm	352	25%	5 pm	480	59%	W. Weaver (Center to Oak) closed
February 14-15, 2012	6 pm	270	-4%	5 pm	426	42%	All of Weaver St. fully open

Table 4. PM peak hour impact on E. Main St.

As can be seen from the tables, E. Weaver St. is a key parallel route to E. Main St. When E. Weaver St. was closed, AM peak hour (11am) traffic more than doubled going westbound, and PM peak hour (6pm) traffic almost doubled going eastbound. This is supported by PM peak intersection turning movement counts conducted by Town staff at the Main-Greensboro intersection in 2011 and 2012.

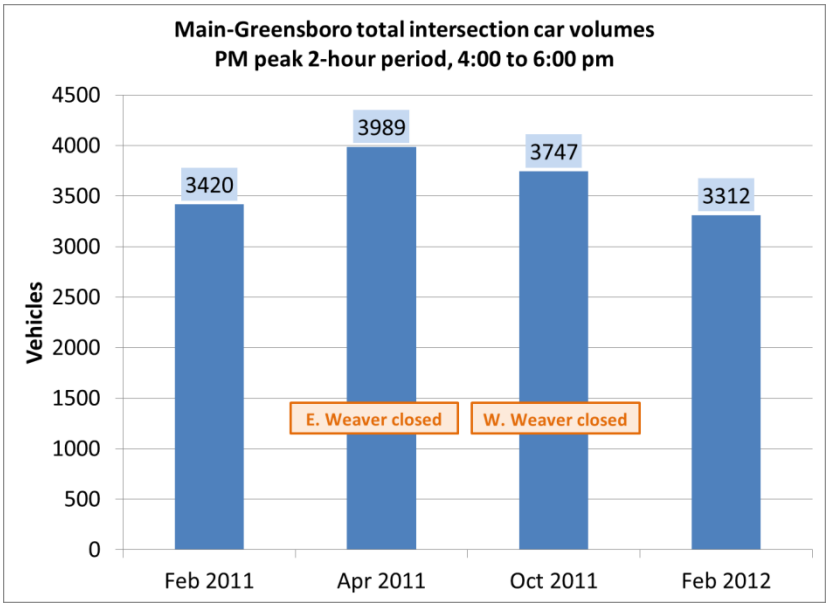


Figure 2. Main-Greensboro 2-hour intersection volumes, 2011-2012. Traffic increased 17% when E. Weaver was closed and 10% when W. Weaver was closed.

As can be expected, the impact to E. Main St. was lower when W. Weaver St. was closed and E. Weaver St. had been reopened, but there were still increases from 13% to 59%.

West Main Street peak hour traffic changes due to WSR

	AM peak hour						
Count date	**EB**	**Vol**	**% change from 11/10**	**WB**	**Vol**	**% change from 11/10**	**Status**
Nov 30-Dec 1, 2010	8:45 am	414	0%	10 am	237	0%	All of Weaver St. fully open
April 19-20, 2011	8 am	451	9%	11 am	353	49%	E. Weaver St. closed
October 11-12, 2011	8 am	552	33%	11 am	417	76%	W. Weaver (Center to Oak) closed
February 14-15, 2012	8 am	413	0%	11 am	299	26%	All of Weaver St. fully open

Table 5. AM peak hour impact on W. Main St.

	PM peak hour						
Count date	**EB**	**Vol**	**% change from 11/10**	**WB**	**Vol**	**% change from 11/10**	**Status**
Nov 30-Dec 1, 2010	3 pm	359	0%	4:30 pm	395	0%	All of Weaver St. fully open
April 19-20, 2011	6 pm	447	25%	4 pm	531	34%	E. Weaver St. closed
October 11-12, 2011	5 pm	534	49%	5 pm	629	59%	W. Weaver (Center to Oak) closed
February 14-15, 2012	5 pm	460	28%	5 pm	510	29%	All of Weaver St. fully open

Table 6. PM peak hour impact on W. Main St.

W. Main St. has higher daily and peak-hour traffic volumes than E. Main St. The impact of the WSR on W. Main St. was substantial, but generally less than on E. Main, ranging from a 9% increase in peak-hour traffic to a 76% increase – for westbound traffic when W. Weaver was closed. Keep in mind that the April and October 2011 PM peak traffic volumes include traffic for the Wednesday Farmers' Market, while the Nov./Dec. 2010 and Feb. 2012 pre- and post-project baselines do not.

Capacity of Main St.

Congestion and level of service can be measured as a function of either intersection or street segment capacity. This memo deals with segment capacity. Intersection capacity analysis would require turning movement counts be taken during the weekend during peak hours. At this time, staff are refining a model of downtown traffic using the software program Synchro, which is expected to be completed by the end of the year.

The capacity of an urban street lane is affected by many different factors. For this memo, a capacity of 550 vehicles per lane per hour is assumed. This is the number cited for a minor arterial in the Town of Chapel Hill's "Guidelines for Traffic Impact Analysis."[2]

Weekend peak traffic projections

Weekend peak traffic on Main St. for OSD1 and OSD2 is estimated by increasing the observed peak traffic volumes proportionate to the percentage increase in peak weekday traffic due to Weaver St. closures.

$$Vol_{OSD} = Vol_{WKD} * (1 + p_{WSR})$$

Vol_{OSD} = estimate of Main St. weekend peak lane volume
Vol_{WKD} = observed weekend peak lane volume
p_{WSR} = percentage increase (+) or decrease (-) in weekday peak traffic on Main St. during particular phase of Weaver Street Reconstruction project

Weekend peak traffic on Main St. for OSD3 is estimated by using the Carrboro Music Festival peak traffic increase presented in Table 2.

For the reasons stated above, the estimates are arguably more likely to be overestimates rather than underestimates. Therefore, an alternative, transportation demand management (TDM) scenario with a 10% traffic volume reduction is also presented to reflect how the peak traffic could be mitigated by:

- Setting up a shuttle service with Chapel Hill Transit to allow people to park-and-ride
- Encouraging people to bicycle or walk to get to and from downtown Carrboro the day of the event, which is bike-ped focused
- Encouraging people to park at peripheral areas (e.g. Fidelity St.) and avoid driving on Main St.
- Clearly conveying available parking lots/areas so that people do not spend a lot of time cruising for parking on Main St.

The reduction could be less or more than 10%, depending on the extent to which the above mitigations are pursued.

Tables showing the peak traffic estimates are included in the Appendix.

E. Main St.

Peak Saturday traffic on the 100 block of E. Main St. is between 11am and 1pm, with traffic between 255 and 287 vehicles per lane. Under OSD1 (E. Weaver St. closed), this traffic is estimated to increase to between 448 and 620 vehicles per lane. This highest figure, 620, is for 11am to Noon in the westbound direction. It exceeds the assumed capacity of the lane and would thus be expected to produce LOS F. From 12pm to 1pm, eastbound traffic volume (548)

[2] Available here: http://www.townofchapelhill.org/modules/ShowDocument.aspx?documentid=3175.

is almost exactly at capacity. No other Saturday traffic volume estimates for any OSD scenario are above the 550 capacity threshold for E. Main St. Under the 10% TDM reduction scenario, the 11am to Noon westbound peak is slightly over capacity, with 558 vehicles.

On Sunday, when traffic is ordinarily lower overall, peak traffic ranged from 142 to 248. The highest Sunday peak traffic estimate is 440, from 2pm to 3pm in the westbound direction. Therefore, no Sunday OSD scenarios would be expected to produce LOS F on Main St.

W. Main St.

Peak Saturday traffic on the 100 block of W. Main St. varies, with eastbound traffic peaking at 9:00 AM, with 271 vehicles, and westbound traffic peaking at 11:00 AM, with 322 vehicles, likely due in great part to Farmers' Market traffic.

With a peak of 480 vehicles, OSD1 would not be expected to cause traffic to reach capacity on W. Main St. Not surprisingly, OSD2 would have a greater impact on W. Main St., with westbound traffic expected to be slightly overcapacity if held during the peak of 11:00 AM. This would be reduced to below capacity assuming the 10% TDM reduction. If held between 11am and 1pm, OSD3 would be likely to cause significant congestion, primarily in the westbound direction, with traffic likely to be significantly over 550.

None of the Sunday OSD scenarios result in traffic volume exceeding capacity (LOS F).

Discussion

The above data provides a rough estimate of the traffic impact on Main St. of opening E. or W. Weaver St. to pedestrians and bicyclists and prohibiting motor vehicle traffic. The scenarios most likely to cause congestion would be:

- OSD3 (both E. and W. Weaver Sts. closed to autos) during the 11am to 1pm time period on Saturday, causing congestion on W. Main St.
- OSD1 (E. Weaver St. closed) during 11am to Noon on a Saturday, causing slight congestion E. Main St.
- OSD2 (W. Weaver St. closed) during 11am on a Saturday, possibly causing slight congestion on W. Main St. if no TDM measures are pursued.

Further analysis would be needed to determine the impact at intersections.

In general, it is likely that a well-planned Open Streets Day could be held on a weekend day on Weaver St. without causing major traffic congestion on Main St. Even if slight congestion results, this should be weighed against the potential benefits of the event.[3]

[3] According to the Street Plans Collaborative, benefits relate to physical activity and public health, decreased air pollution, economic opportunity and increased business in stores, and greater social interaction among community members. Source: Street Plans Collaborative and Alliance for Bicycling & Walking (2012). *The Open Streets Guide*. www.OpenStreetsProject.org.

The following suggestions would help lower the chances of experiencing congestion:

- **Any Open Streets Day held on a Sunday should not lead to significant congestion on Main St.**
- **A Saturday Open Streets Day on E. Weaver St. (OSD1) would have less chance of causing congestion on E. Main St. if TDM measures are implemented or the event does not take place mid-day (11am to 1pm).**
- **A Saturday Open Streets Day on W. Weaver St. (OSD2) would not be likely to cause congestion on W. Main St.**, especially if TDM measures are implemented, except that traffic may come close or just exceed capacity from 11am to Noon, the time when Farmers' Market traffic is the heaviest.
- **A W. Weaver St. event beginning at Noon would allow typical levels of motor vehicle access to the Farmers' Market.** If the event started before Noon, this would make the parking lots on W. Weaver St. that are normally designated for Farmers' Market parking (Venable Building and PNC Bank) unavailable for a portion of the market. Planning the event to begin right after the Farmers' Market ends may also encourage people who come to Town for the Market to stay for the afternoon. Ending the event by 5pm may encourage people who come for the Open Streets Day to stay for dinner at local restaurants, which could be encouraged as part of the marketing of the event. Close coordination with the Farmers' Market and Weaver St. businesses is encouraged, and is already occurring by the group of citizens and organizations planning the April event. Overall, Open Streets events have been shown to have a positive impact on most adjacent businesses.[4]
- **Use of alternative transportation and satellite parking should be encouraged.** Some participants would be able to walk or bike to the event, while many others would choose to drive. The Town could mitigate vehicle traffic in the downtown area by encouraging alternative transportation. Additionally, the Town could provide parking at peripheral lots served by shuttle buses or perhaps a bike rickshaw-type service. This is already done for events such as the Carrboro Music Festival (see map in the Appendix). A bike valet service would provide a convenience incentive for cyclists.
- **Coordinate in advance with Chapel Hill Transit**, in order to plan for rerouting of the CW Saturday route and the potential for shuttle bus service. The Saturday CW bus could play a key role in transporting people to Weaver St.

[4] As described in the *Open Streets Guide* (p. 5): "When located in downtown or neighborhood business districts, open streets offer new economic opportunities for many types of businesses. The inclusion of local vendors, artists, non-profit organizations, musicians, and other performers invites wider participation, which in turn provides increased opportunity for restaurants and retailers. This is especially true for those who do not regularly have the opportunity to share their food, wares, and products to hundreds, if not thousands, of people."

Appendix – Tables and Maps

100 E. Main St. weekend peak traffic estimates assuming Open Streets Day on Weaver St.

		AM peak hour				PM peak hour			
Count date / estimate	**24-hr**	**EB**	**Vol**	**WB**	**Vol**	**EB**	**Vol**	**WB**	**Vol**
Sat., May 5, 2012	8,139	11 am	255	11 am	276	12 pm	287	12 pm	281
OSD1			448		620		548		499
OSD2			287		432		358		448
OSD3			398		442		448		450
Sun., May 6, 2012	6,151	10 am	167	11 am	142	3 pm	216	2 pm	248
OSD1			293		319		412		440
OSD2			188		222		270		395
OSD3			261		227		337		397

With 10% reduction

		AM peak hour				PM peak hour			
Count date	**24-hr**	**EB**	**Vol**	**WB**	**Vol**	**EB**	**Vol**	**WB**	**Vol**
Sat., May 5, 2012	8,139	11 am	255	11 am	276	12 pm	287	12 pm	281
OSD1 (-10%)			403		558		493		449
OSD2 (-10%)			258		389		322		403
OSD3 (-10%)			358		397		403		405
Sun., May 6, 2012	6,151	10 am	167	11 am	142	3 pm	216	2 pm	248
OSD1 (-10%)			264		287		371		396
OSD2 (-10%)			169		200		243		356
OSD3 (-10%)			234		204		303		357

100 W. Main St. weekend peak traffic estimates assuming Open Streets Day on Weaver St.

		AM peak hour				PM peak hour			
Count date	**24-hr**	**EB**	**Vol**	**WB**	**Vol**	**EB**	**Vol**	**WB**	**Vol**
Sat., May 5, 2012	5,976	9 am	271	11 am	322	2 pm	235	12 pm	275
OSD1			295		480		293		370
OSD2			361		567		350		438
OSD3			556		815		482		696
Sun., May 6, 2012	3,889	11 am	140	11 am	117	1 pm	197	5 pm	161
OSD1			153		174		245		216
OSD2			203		206		293		256
OSD3			287		296		404		407

With 10% reduction

		AM peak hour				PM peak hour			
Count date	**24-hr**	**EB**	**Vol**	**WB**	**Vol**	**EB**	**Vol**	**WB**	**Vol**
Sat., May 5, 2012	5,976	9 am	271	11 am	322	2 pm	235	12 pm	275
OSD1 (-10%)			266		432		263		333
OSD2 (-10%)			325		510		315		394
OSD3 (-10%)			500		733		434		626
Sun., May 6, 2012	3,889	11 am	140	11 am	117	1 pm	197	5 pm	161
OSD1 (-10%)			137		157		221		195
OSD2 (-10%)			183		185		264		231
OSD3 (-10%)			258		266		363		367

Example of Carrboro Music Festival Shuttle route, 2010. Source: Chapel Hill Transit.