Traffic Impact Study
Smithville School District
Smithville, Missouri

Prepared by:

R^3C DESIGN GROUP, LLC

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2 Introduction

The Smithville School District is proposing to convert the South Driveway to the school property from Route 92 from morning-only access to an all-day access. In addition, the school district proposes to add a school bus storage facility at this site. This driveway is gated during the afternoon hours to prevent access to Route 92. This site has three schools. Their hours of operation and approximate enrollment are noted below:

1. Smithville High School (7:42 AM to 2:42 PM; 930 students)
2. Smithville Middle School (7:35 AM to 2:35 PM; 630 students) and
3. Smithville Horizon Elementary School (8:45 AM to 3:45 PM; 433 students).

This report documents the analysis completed by R^3C Design Group, LLC. The purpose is to determine the traffic impacts of these improvements. Exhibit 1 shows the site location in relation to the adjoining roadways.

3 Existing conditions

The study area includes the following intersections:

1. Commercial Avenue at:
    a. Main School Driveway
    b. North School Driveway
2. Route 92 at:
    a. Commercial Avenue
    b. South School Driveway

Route 92 is a regional highway that connects various communities in Missouri. At this location, it is a two-lane roadway with a posted speed limit of 35 miles per hour (mph) to approximately 270-feet west of the South Driveway intersection. The speed limit changes to 45 mph.

Commercial Avenue functions as a minor arterial street. It too is a two-lane roadway, and the posted speed limit is 25 mph. The Route 92/Commercial Avenue intersection is a single-lane roundabout, while all other intersections in the study area are two-way stop-controlled intersections.

3.1 Traffic counts

Existing peak-hour traffic counts at the study intersections are obtained by TJ Brown and Associates. Each intersection's morning and afternoon peak hour counts are collected between the hours of 6:00 and 9:30 AM and 2:00 and 5:00 PM.

Four unique traffic flow peaks occur at the study area intersections. The middle and high school traffic enters the site around 7:30 AM and exits around 2:45 PM. The elementary school traffic enters the site around 8:45 AM and exits around 3:45 PM. Analysis is completed for all four peak hours experienced in the study area.

Exhibit 2 summarizes the middle/high school traffic peak hour data while Exhibit 3 summarizes the elementary school peak hour data. Further, the total traffic entering and/or exiting the site during the four peak hours is shown in the exhibits.

3.1.1 Peak hour factors

The Peak Hour Factor (PHF) is a ratio of the total hourly traffic volume compared to the maximum 15-minute traffic volume within the hour. PHF represents the flow variation within a given hour. Because substantial short-term fluctuations are typical within the peak hours, the level of service analysis is based on peak rate of flow occurring within the peak hour. The relationship between the 15-minute peak flow rate and the full hourly volume is given by the following equation:

$PHF = V/(4*V_{15})$

Where:

V = peak-hour volume (vehicles per hour)

V_{15} = volume during the peak 15 minutes of flow (vehicles per 15 minutes)

- PHF = 1, the maximum possible PHF) indicates that traffic volumes are evenly distributed over the hour. Traffic approaches the intersection at a constant rate for the entire peak hour.
- PHF = 0.25, the minimum possible PHF, indicates that the total hourly traffic flow approaches the intersection within a single 15-min period.

The peak hour factors are calculated for the four peak hours. Exhibit 4 shows the middle/high school PHFs; while Exhibit 5 shows the elementary school PHFs.

4 Traffic volumes

The study is conducted in two stages:

1. Determine the afternoon peak hour anticipated volumes to identify impacts of full-day access at the South Driveway.
2. Determine traffic impacts of the bus-storage facility on the adjacent street.

4.1 Full-day access:

The methodology used to determine the full day access impacts during the four peak hours is as follows:

a. Identify the entering and exiting volumes to the school site.
   i. Exhibit 2 shows the entering and exiting counts for the middle/high school peak hours.
   ii. Exhibit 3 shows the entering and exiting counts for the elementary school peak hours.
b. Compute the morning distribution percentages for the entering and exiting traffic. It is assumed that similar traffic flow patterns occur during the morning and afternoon for each school. The percentages are computed based on the total entering/exiting traffic at each of the school driveways.
   i. Exhibit 6 shows the distribution percentages for the middle/high school peak hours.
   ii. Exhibit 7 shows the distribution percentages for the elementary school peak hours.
c. Assign afternoon entering and exiting totals to morning entering and exiting distribution percentages. The afternoon total entering/exiting traffic is multiplied by the distribution percentages to determine entering/exiting volume estimates at the school driveways. This identifies the reallocated school-only traffic volumes.
   i. Exhibit 8 shows the reallocated school-only volumes for the middle/high school peak hours.

ii. Exhibit 9 shows the reallocated school-only volumes for the elementary school peak hours.

d. Remove afternoon school traffic from the counts data.
   i. Exhibit 10 shows this calculation for the middle/high school peak hours.
   ii. Exhibit 11 shows this calculation for the elementary school peak hours.

e. Add the reallocated traffic volumes (Exhibits 8 and 9) to the traffic volumes without the school traffic (Exhibits 10 and 11) to determine the estimate of reallocated volumes.
   i. Exhibit 12 shows the reallocated volumes for the middle/high school peak hours.
   ii. Exhibit 13 shows the reallocated volumes for the elementary school peak hours.

4.2 Bus-storage facility

The additional traffic volume generated by the proposed bus storage facility is determined and used for further analysis. The school district provided the following pertinent information:

- The transportation facility will store 15 buses.
- Of the 15 buses, five (5) serve south and east, while ten (10) serve west and north of the school complex.
- Morning:
  - Buses will leave the facility at 6:15 AM in the morning. The west and north service route buses would use the internal driveway. The five south and east service route buses will use the South Driveway.
  - Upon dropping students at school, the buses would use the internal driveway to return to the facility.
- Afternoon:
  - Buses will use the internal driveway to go to the schools to pick up students at 2:00 PM.
  - Buses will return to the facility at around 4:30 PM. The south and east service route buses would use the South Driveway intersection, while the north and west service route buses would probably use the Main Driveway intersection.

It is noted that the middle/high school peak hour is between 7:00 and 8:00 AM. Buses leaving the facility would not impact the middle/high school morning peak hour. At the finish of the morning routes, the buses would use the internal driveway upon dropping students off at the elementary school. Therefore, there will be no impact on the street system.

School bus traffic between the middle/high school drop-off and return to pick-up students from their residences is already accounted for in the traffic counts.

In the afternoon, buses will go to the schools to pick up students using the internal driveway. Therefore, there will be no impact to the street system. The elementary school afternoon peak hour extends until 4:45 PM. Therefore, when buses return to the storage facility at 4:30 PM, they will impact the street system during the hour.

School bus traffic between the middle/high-school pick-up and return to elementary school for pick-up is already accounted for in the traffic counts. No changes to this operation are anticipated.

Based on the above, only the afternoon elementary school peak hour will have additional traffic volumes due to the bus storage facility.

The trip generation and distribution from the bus storage facility is shown in Exhibit 14.

4.2.1 Site volumes

The anticipated elementary school afternoon peak hour site volumes are computed by adding the reallocated traffic volumes (Exhibit 13) to the trip distribution volumes (Exhibit 14). This is shown in Exhibit 15.

4.3 Turn lanes

The Missouri Department of Transportation (MoDOT) provides left and right-turn treatment guidelines in the MoDOT Engineering Policy Guide (EPG), modified on March 15, 2019. The EPG is available online at: http://epg.modot.org/index.php/Main_Page. The existing (Exhibits 2 and 3), reallocated (Exhibits 12 and 13) and site (Exhibit 15) volumes are used to determine the need for a left turn lane at the South Driveway intersection. The criteria from the EPG are reproduced in Exhibit 16 for left turn lanes.

Exhibit 16 shows the turning volume estimates for the peak hours for each scenario. It is noted that the volumes barely meet the criteria for the existing and the reallocated middle/high school morning peak hour. The criteria are not met for the other scenarios.

During the existing morning peak hours, observations made by the school district and verified by R^3C Design Group engineers indicate that there is no spillback from the South Driveway to the roundabout. The queues at the South Driveway were minimal and no excessive delays were noticed.

4.4 Capacity analysis

Based on the lane geometry, a capacity analysis is completed. The methods used for analysis are prescribed by the Highway Capacity Manual (HCM) and published by the Transportation Research Board (TRB), 6th edition. The HCM ranks operations at intersections based on the delays experienced by the users. The ranking ranges from A through F, where Level-of-Service (LOS) A represents free-flow traffic conditions, and drivers experience minimal delays. LOS F represents a breakdown in the roadway system. Most agencies desire LOS D or better for operations during the peak hours.

The software Synchro + Simtraffic, version 11, released by Trafficware Corporation, incorporates HCM methodology and is used to complete the analysis at the two-way stop-controlled intersections. The software SIDRA, released by Akcelik & Associates, version 9.1, is used to complete the analysis at the roundabout.

Capacity analysis results are summarized in Exhibit 17 for the morning peak hours and Exhibit 18 for the afternoon peak hours. From the analysis, it is noted that all movements, except for westbound left at the Main Driveway, are expected to operate at a LOS D or better. The Missouri Department of Transportation (MoDOT) considers a LOS D to be the minimum acceptable LOS during a peak hour.

The westbound left turn movement at the main driveway during the middle/high morning peak hour is traffic exiting the school after dropping students off at school. This movement and the associated back-ups occur within the school site and do not impact the public street system.

The South Driveway eastbound left (into the school site), on Route 92, operates at a LOS A during the existing middle/high school morning peak hour. During the afternoon peak hours, the worst LOS anticipated is LOS C with average delays of 17 seconds per vehicle, approximately.

4.5 Queue lengths

The software Simtraffic can show anticipated queue lengths for each movement at an intersection. The middle/high school morning peak hour queue lengths on Route 92, between the roundabout and the South Driveway intersection, is shown in Exhibit 19. It is noted that the anticipated queues do not spill to the downstream intersections.

4.6 Speed zone

During field observations it is noted that Route 92 is posted at 35 mph between the roundabout at Commercial Avenue and to approximately 270-feet west of the South Driveway intersection. These observations are noted in Exhibit 20.

Further, it was also observed that no school zone signing is installed on Route 92. If the South Driveway intersection is made full-day access, the 35-mph speed zone should be extended to include the South Driveway intersection. Further, appropriate school zone speed reduction and signing per the Manual of Uniform Control Devices (MUTCD), published by the Federal Highway Administration (FHWA), latest edition, should be installed on Route 92.

5 Suggestions for improvements

The Smithville School District is proposing to open the South Driveway/Route 92 intersection to full-day access. Currently, the intersection operates only during the morning and is gated during the afternoon hours. Further, the school district desires to construct a school bus storage facility at this site.

Traffic volumes are reallocated to the street system during the afternoon peak hours using the morning peak hour distributions. The trips generated by the school bus storage facility are determined based on district provided data.

Left turn lane requirements at the South Driveway are evaluated using methods prescribed by MoDOT in the Engineering Policy Guide (EPG). The eastbound left turn lane barely meets criteria during the middle/high morning peak hour.

Capacity analysis is completed using methods prescribed in the Highway Capacity Manual, published by the Transportation Research Board (TRB), 6th edition. Capacity analysis indicates that for the existing and proposed configuration and traffic volumes, all intersections, and movements (except for the westbound left turn movement out of the school during the middle/high school morning peak hour) in the study area are projected to operate at a Level-of-Service (LOS) D or better. The Missouri Department of Transportation (MoDOT) and the City of Smithville require LOS D or better for all traffic movements at an intersection.

Queue lengths at the roundabout and the South Driveway intersection are evaluated using the Simtraffic software. The anticipated maximum queue lengths will not hinder traffic flow in the downstream intersection.

Because the turn lane criteria are barely met; no known existing spillbacks to the roundabout are observed during the morning peak hours; and the queue lengths are minimal, it is suggested to not construct the eastbound left turn lane at the South Driveway. After the South Driveway is converted to full-day access, and the bus storage facility is constructed, it is suggested that traffic flow be observed during all four peak hours to ensure that roundabout operations are not impacted.

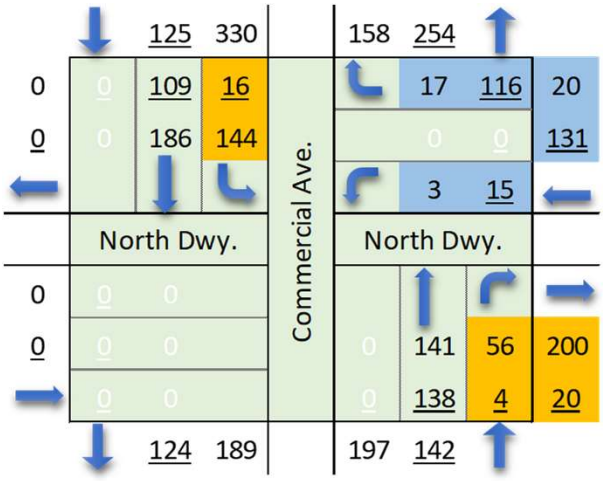
During field observations, it is observed that the 45 miles per hour (mph) speed zone for eastbound Route 92 traffic starts 270-feet west of the South Driveway intersection. It is suggested that the 45-mph speed zone start east of the South Driveway intersection. Further, appropriate school zone signing, including speed reductions, per the Manual of Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration (FHWA) be installed on Route 92 at the South Driveway intersection. The school zone speed reduction would further reduce the need for the eastbound left turn lane.

6 Exhibits

List of Exhibits

Image source: Google Earth

R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	N W E S No scale	**Exhibit 1:** **Project location**



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Afternoon peak	
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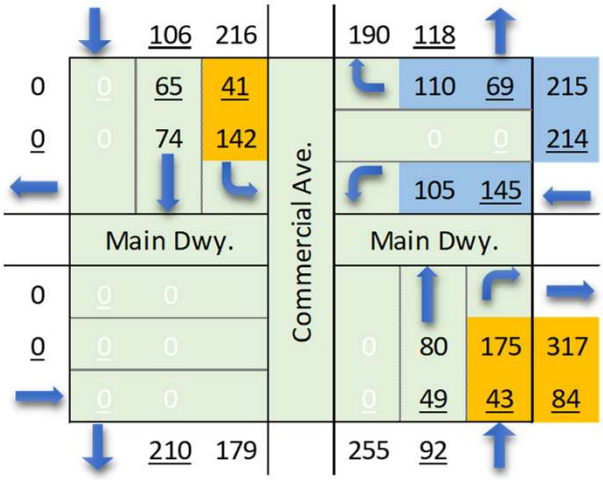
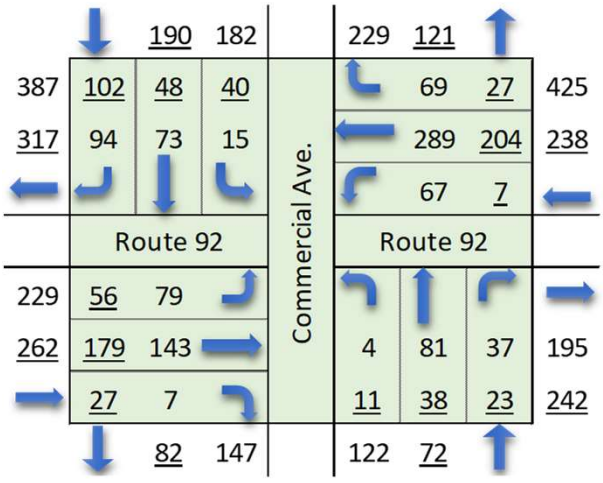
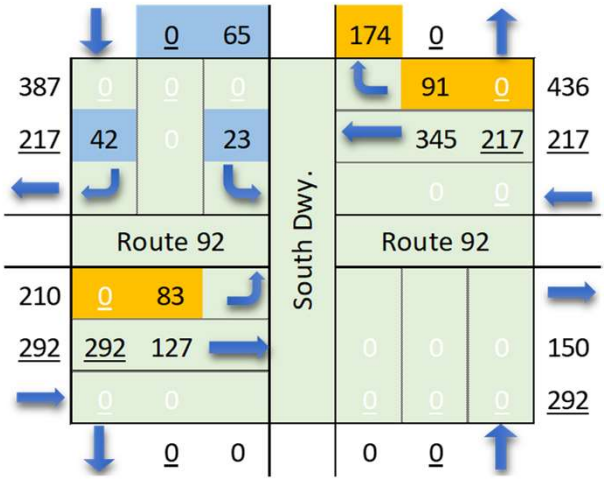
Exit	345



Legend	
30	Morning peak hour count
30	Afternoon peak hour count
	Movement direction

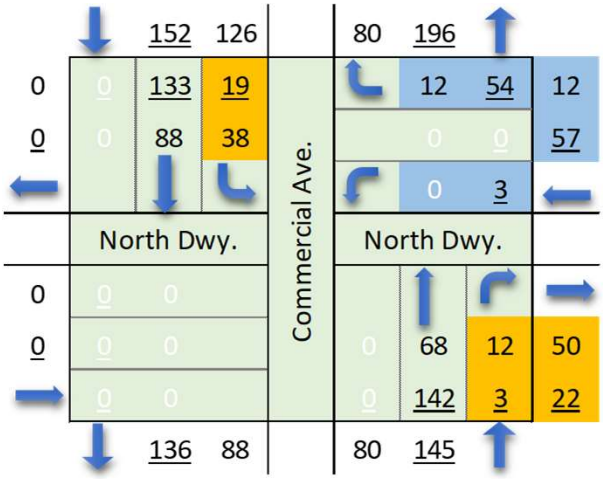
Morning peak hour: 7:00 to 8:00 AM
Afternoon peak hour: 2:30 to 3:30 PM





Data source: TJ Brown & Associates

R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	N W E S No scale	**Exhibit 2:** **Traffic counts – Middle/High School peak**



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Afternoon peak	
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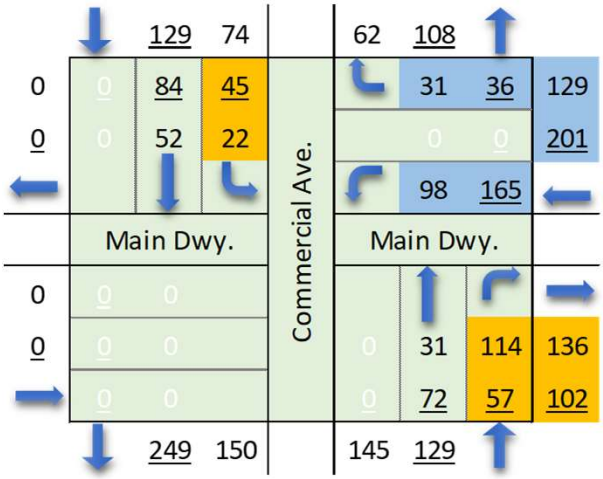
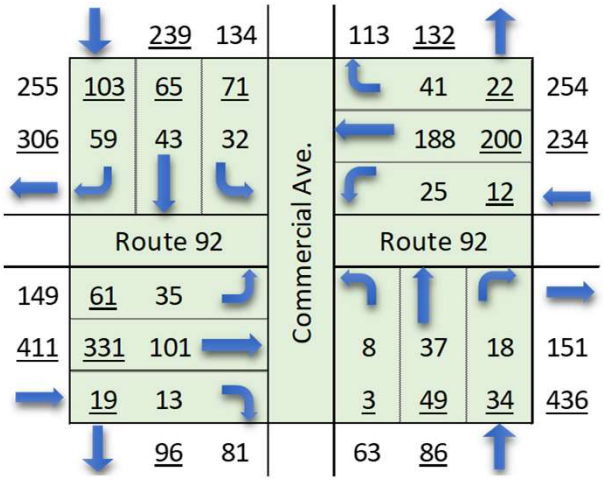
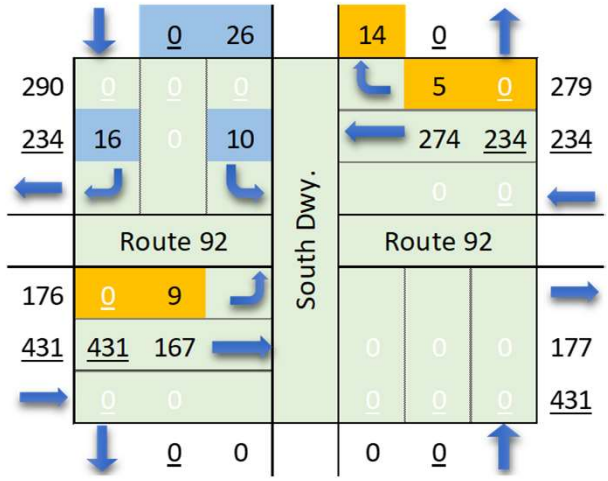
Exit	258



Legend	
30	Morning peak hour count
30	Afternoon peak hour count
→	Movement direction

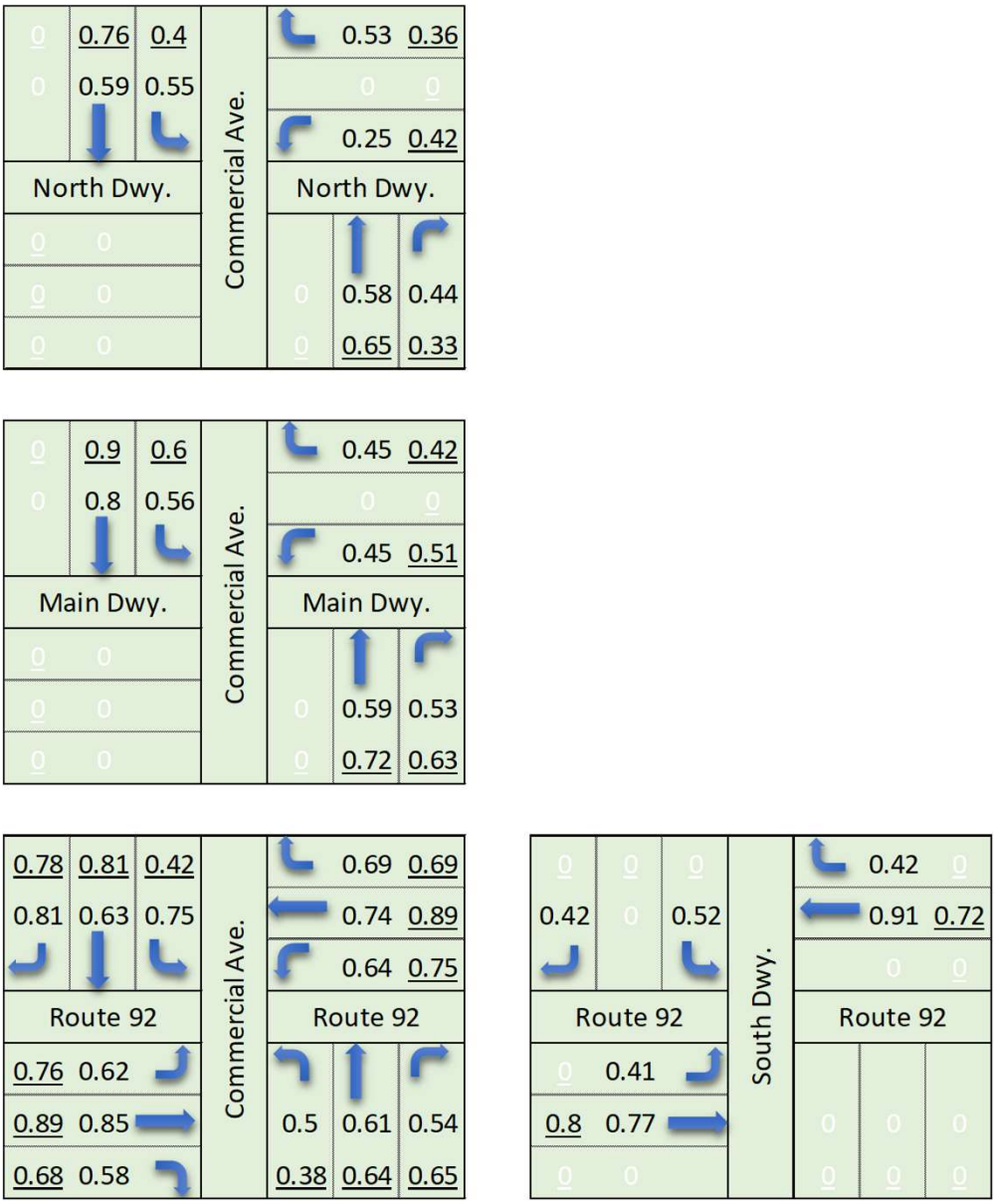
Morning peak hour: 8:15 to 9:15 AM
Afternoon peak hour: 3:45 to 4:45 PM





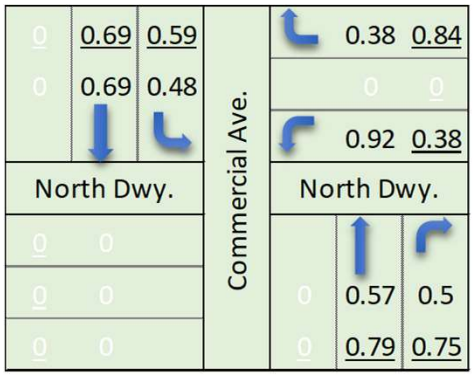
Data source: TJ Brown & Associates

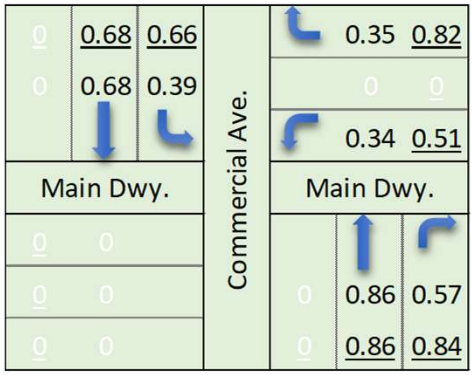
R^3C DESIGN GROUP	**Project:** Smithville Schools Smithville School District	N W E S No scale	**Exhibit 3: Traffic counts – Elementary School peak**

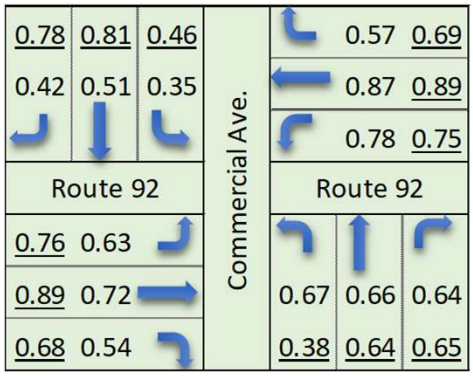


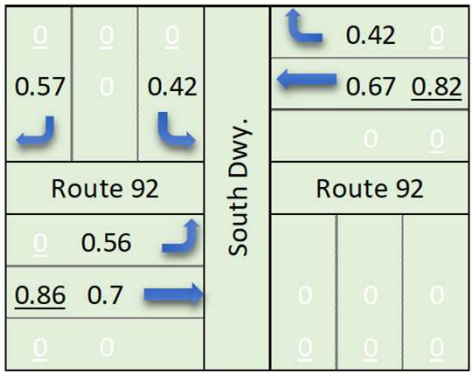
Legend	
30	Morning peak hour factor (PHF)
30	Afternoon peak hour factor (PHF)
→	Movement direction

R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	N W E S No scale	**Exhibit 4:** **Peak hour factors – Middle/High School peak**









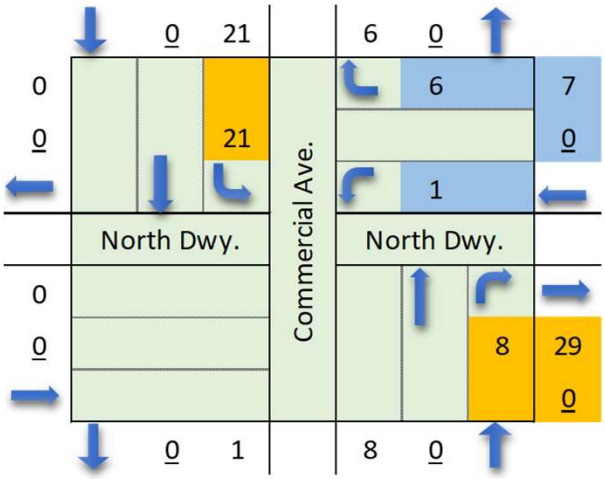
Legend	
30	Morning peak hour factor (PHF)
30	Afternoon peak hour factor (PHF)
→	Movement direction

R^3C DESIGN GROUP

Project:
Smithville Schools
Smithville School District

N W E S
No scale

Exhibit 5:
Peak hour factors – Elementary School peak



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Afternoon peak	
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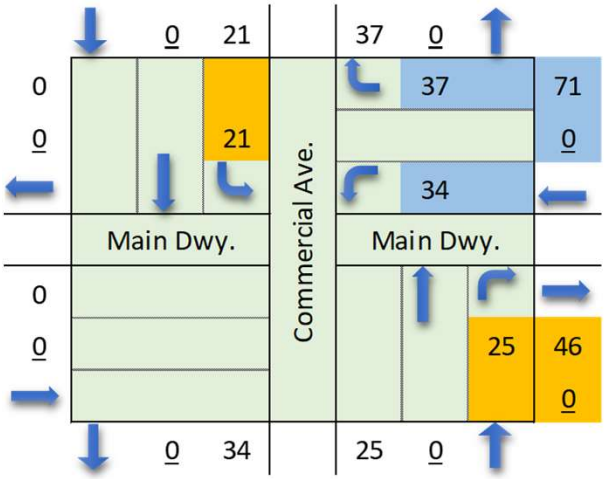
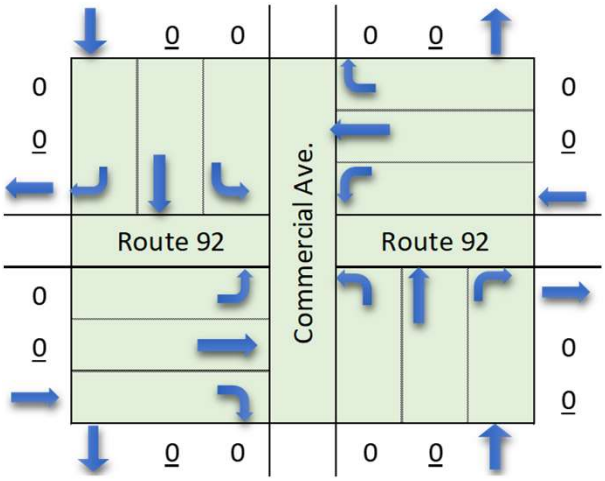
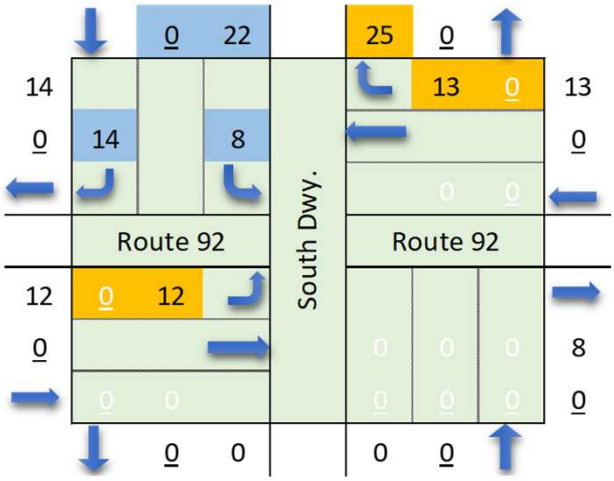
Exit	0



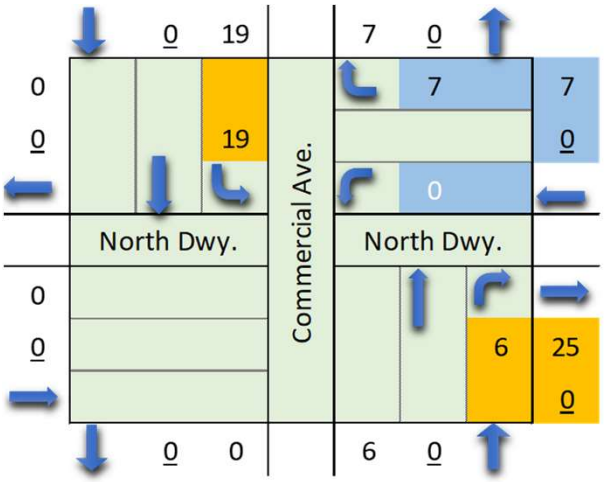
Legend	
30	Morning peak hour percentage
30	Afternoon peak hour percentage
	Movement direction

Note: All numbers are percentages in this graphic





R^3C DESIGN GROUP	**Project:** Smithville Schools Smithville School District	N W E S No scale	**Exhibit 6: Morning traffic distribution - Middle/High School**



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Exit	101
Afternoon peak	
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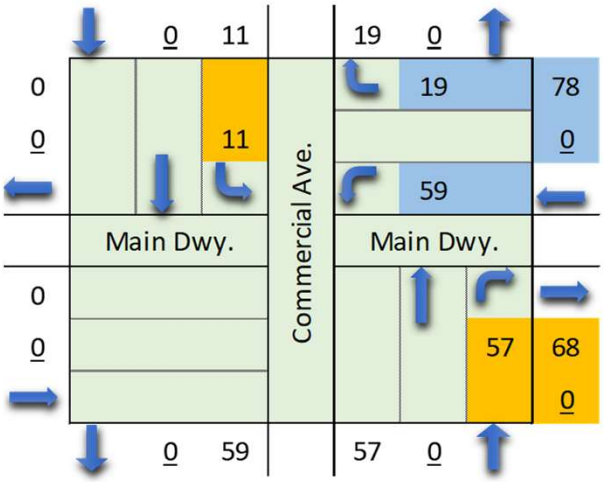
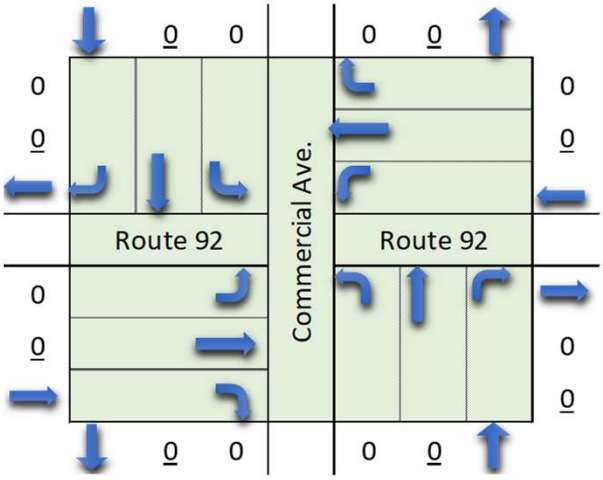
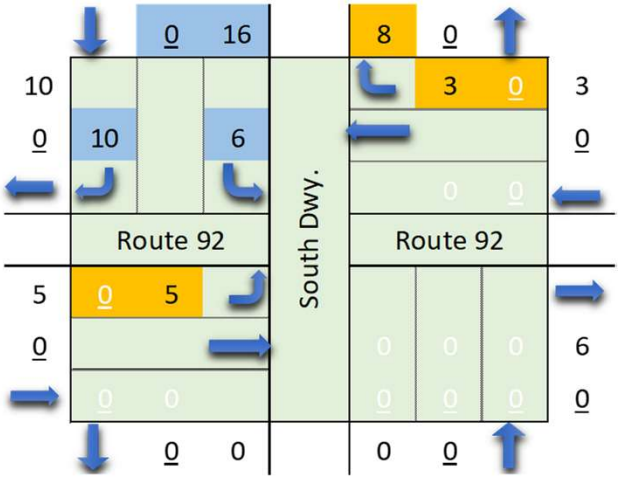
Exit	0



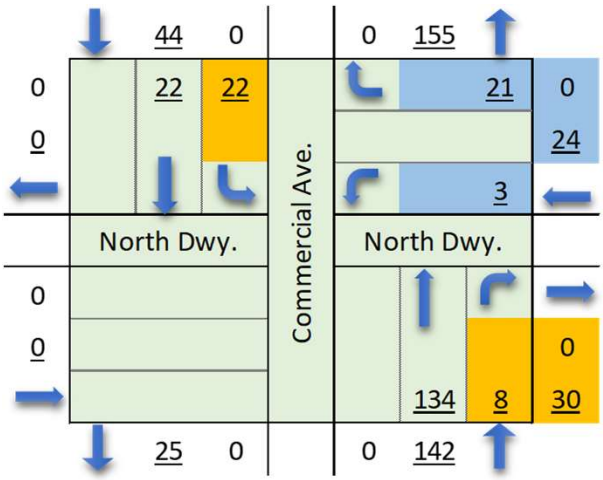
Legend	
30	Morning peak hour percentage
30	Afternoon peak hour percentage
→	Movement direction

Note: All numbers are percentages in this graphic





R^3C DESIGN GROUP	**Project:** Smithville Schools Smithville School District	N W E S No scale	**Exhibit 7:** Morning traffic distribution - Elementary School



Morning peak	
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Exit	0
Afternoon peak	
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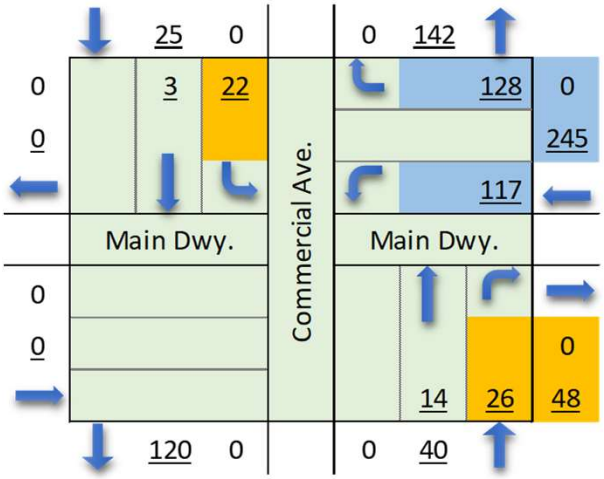
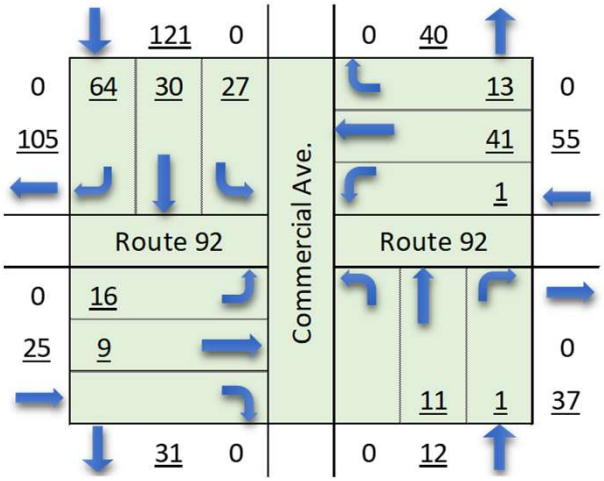
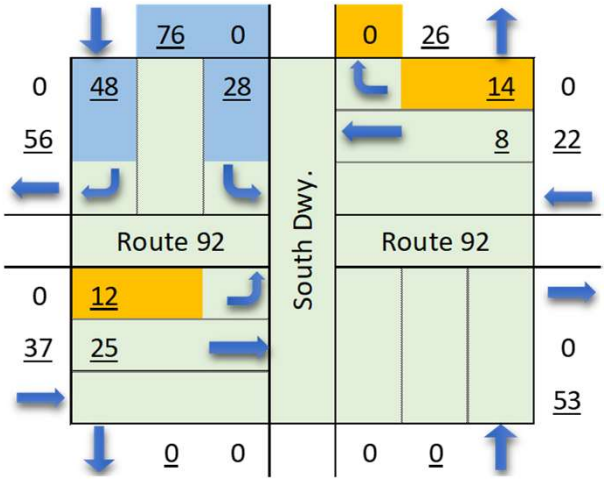
Exit	345



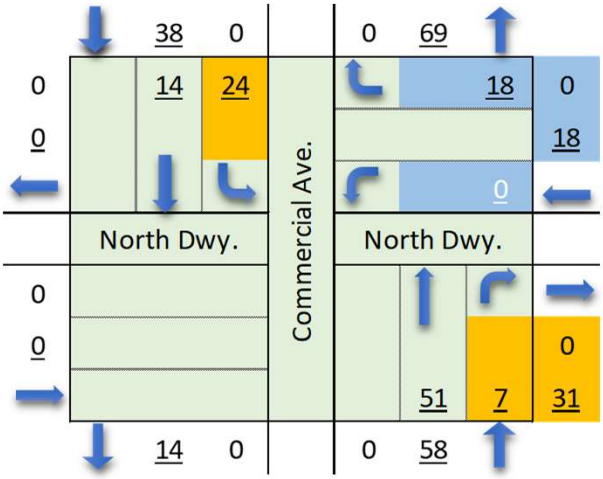
Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
	Movement direction





R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	No scale

Exhibit 8:
Afternoon traffic assignment
- Middle/High School



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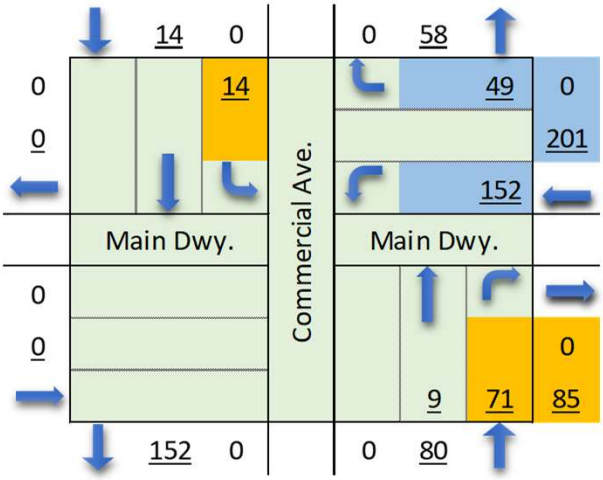
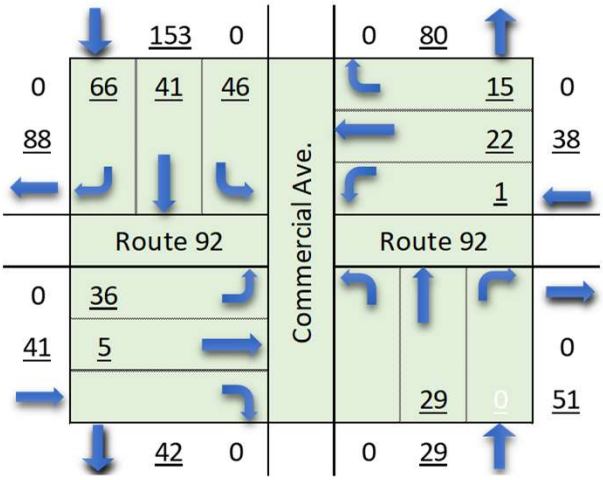
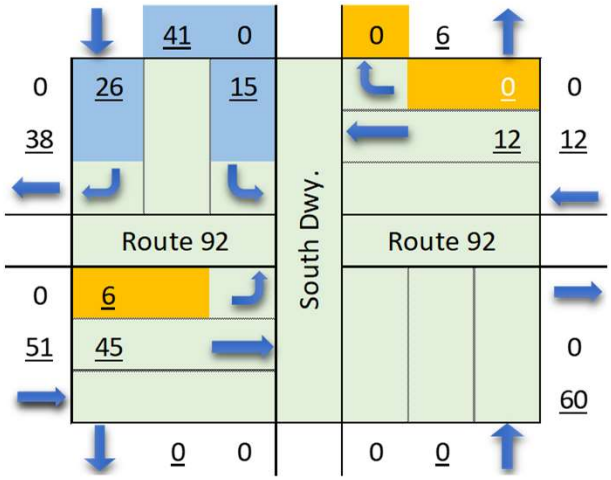
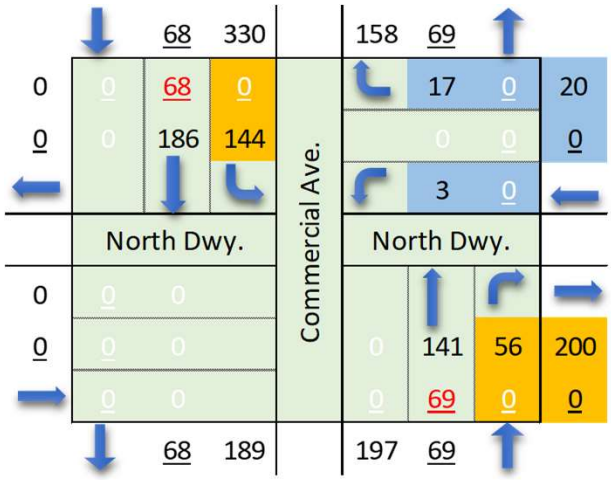


Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
	Movement direction

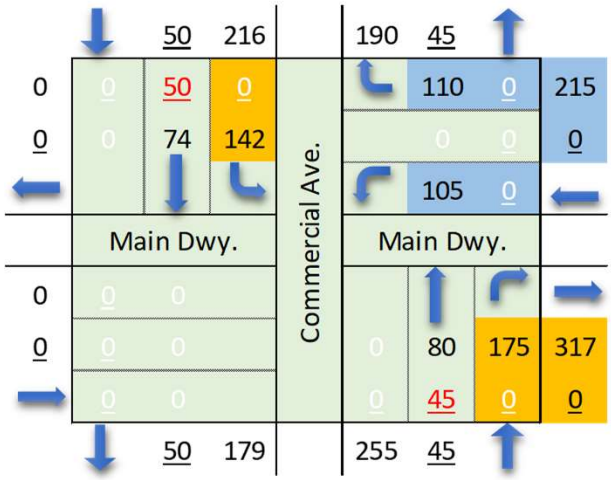




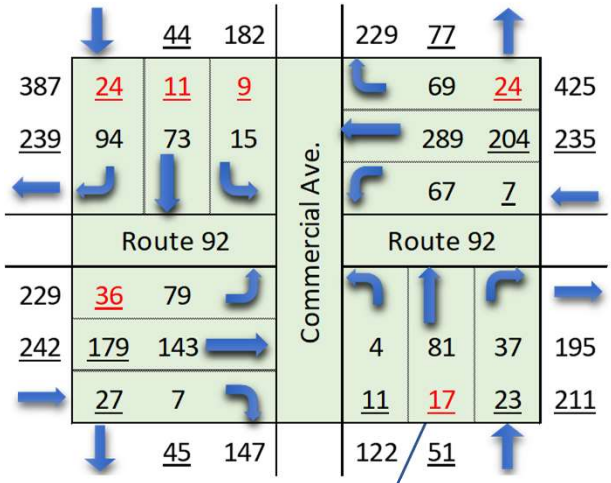
R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	N W E S No scale	**Exhibit 9:** **Afternoon traffic assignment** **- Elementary School**

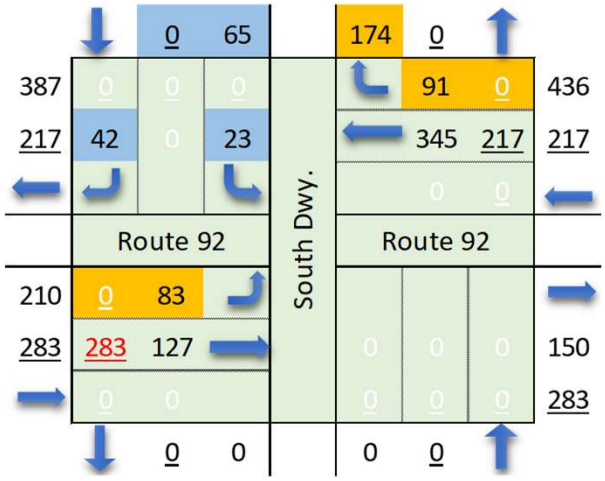


Morning peak	
Enter	691
Exit	300
Afternoon peak	
Enter	0
Exit	0



Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
→	Movement direction

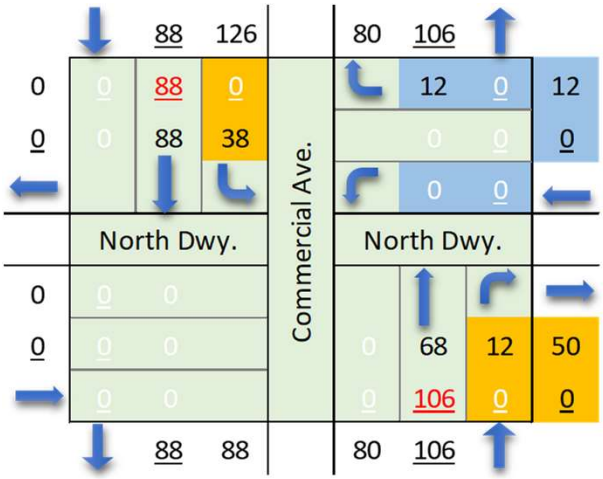




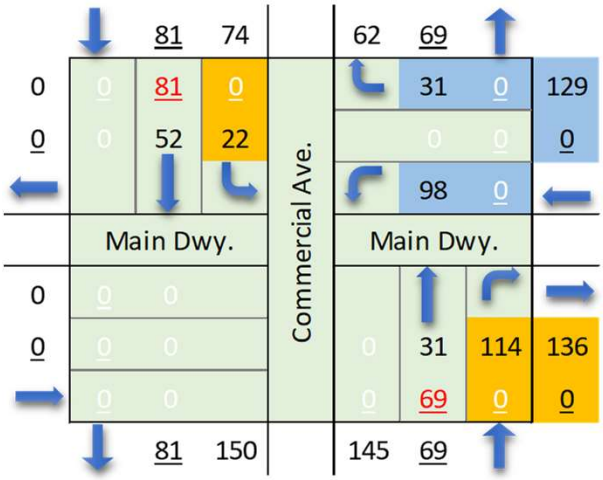
Red numbers indicate where afternoon school traffic is removed

R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	No scale

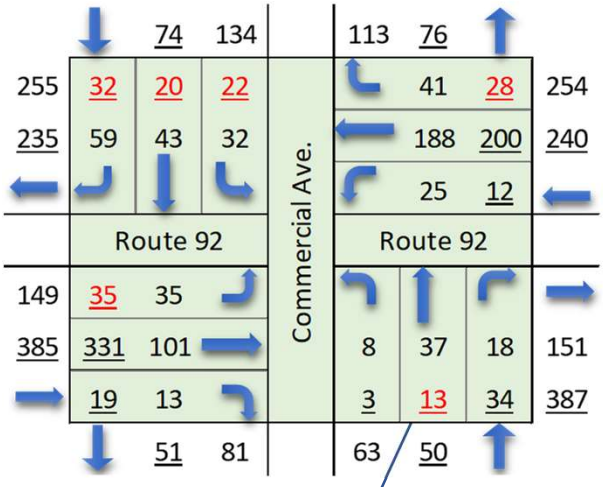
Exhibit 10:
Remove afternoon Middle/High School traffic



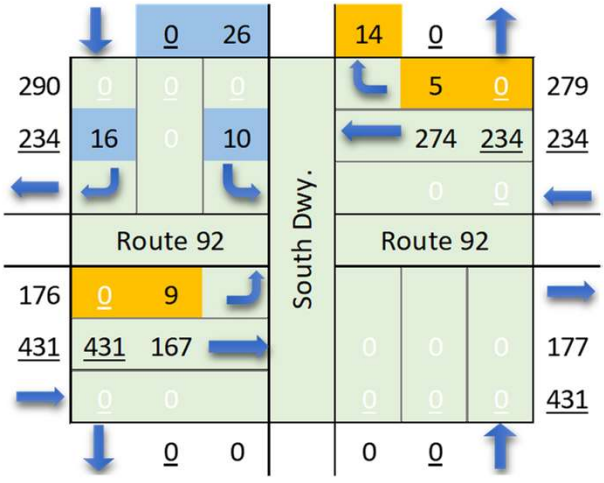
Morning peak	
Enter	200
Exit	167
Afternoon peak	
Enter	0
Exit	0



Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
→	Movement direction

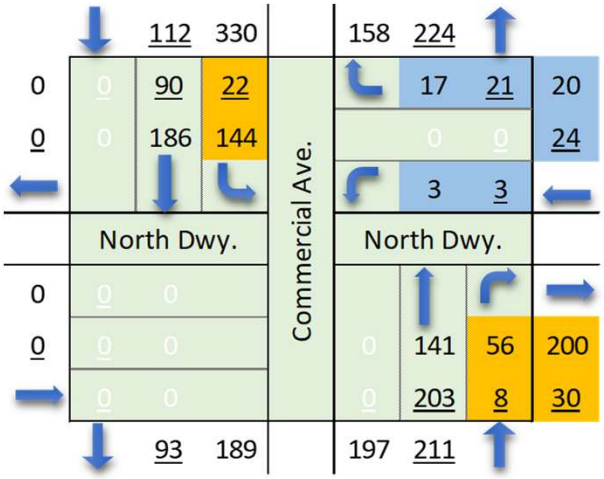


Red numbers indicate where afternoon school traffic is removed

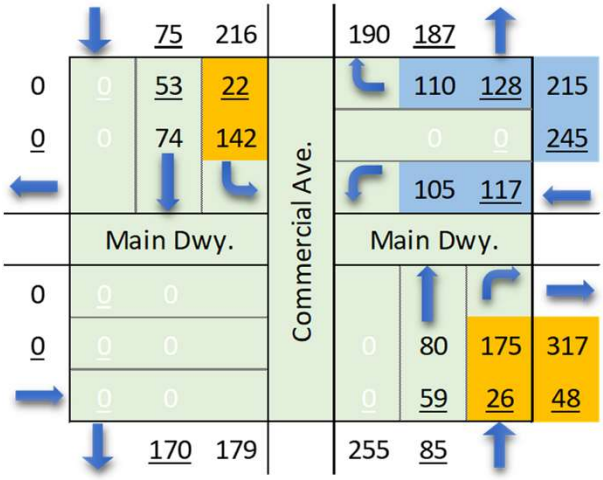


R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	No scale

Exhibit 11:
Remove afternoon Elementary School traffic

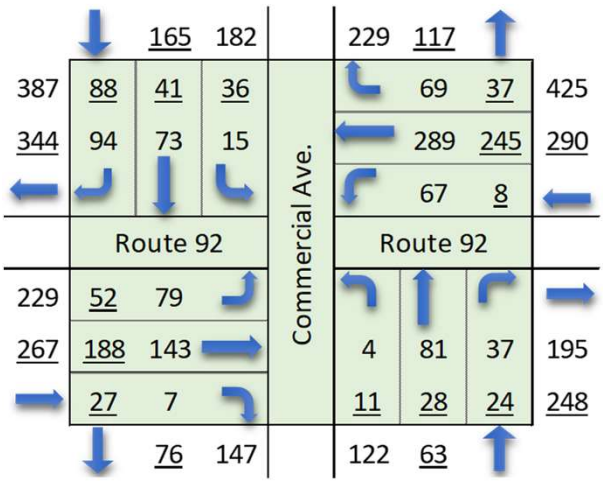


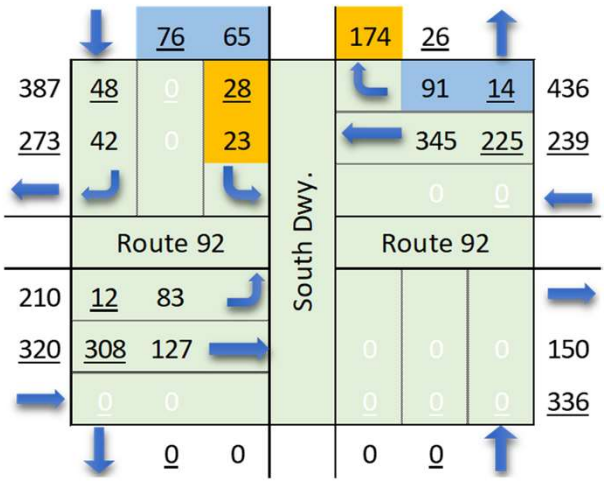
Morning peak	
Enter	691
Exit	300
Afternoon peak	
Enter	104
Exit	345



Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
➡	Movement direction

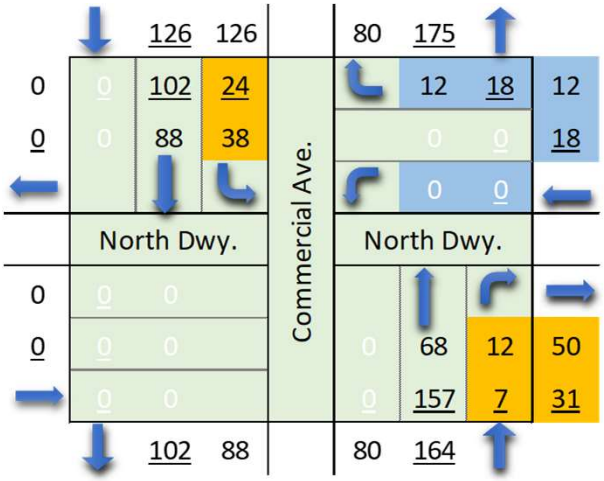
Note: Reallocated volumes computed by adding no school traffic volumes (Exhibit 10) to the afternoon assignment volumes (Exhibit 8)



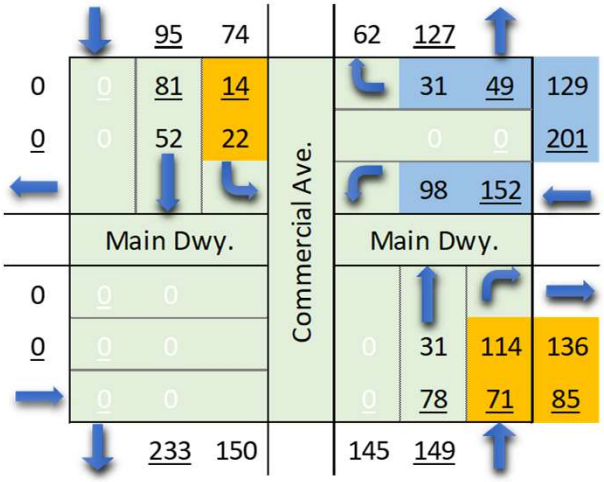


R^3C DESIGN GROUP	**Project:** Smithville Schools Smithville School District	N W E S No scale

Exhibit 12: Reallocated volumes – Middle/High School peak

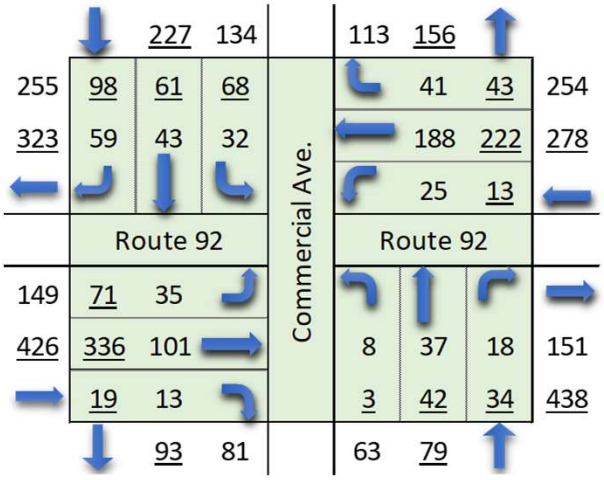


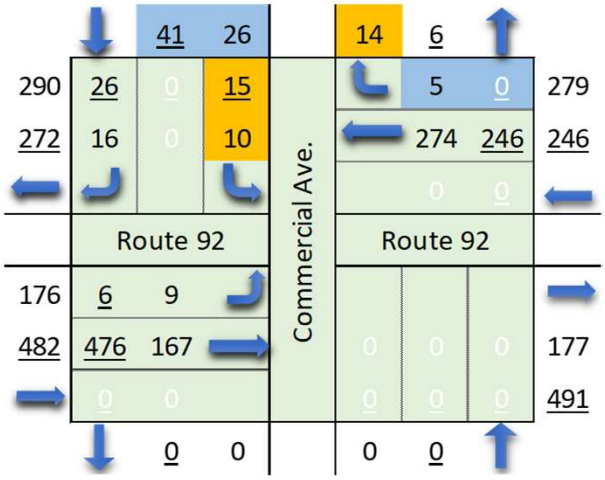
Morning peak	
Enter	200
Exit	167
Afternoon peak	
Enter	122
Exit	260



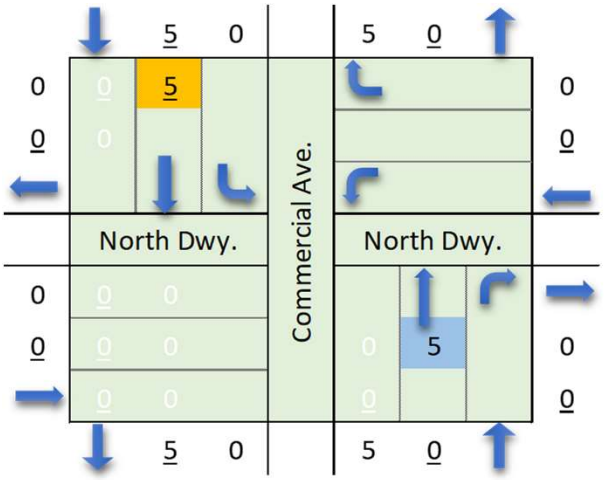
Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
→	Movement direction

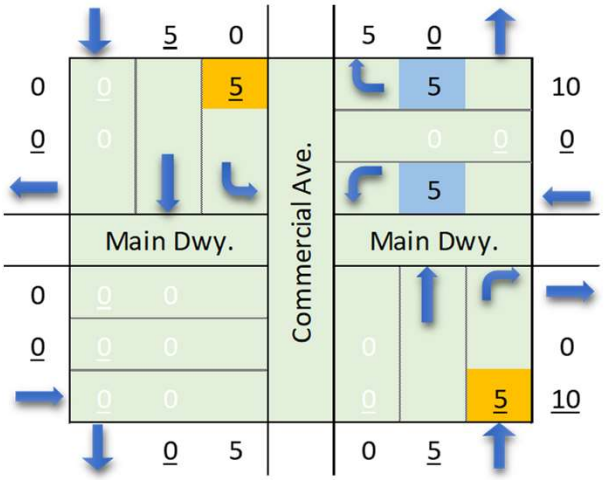
Note: Reallocated volumes computed by adding no school traffic volumes (Exhibit 11) to the afternoon assignment volumes (Exhibit 9)

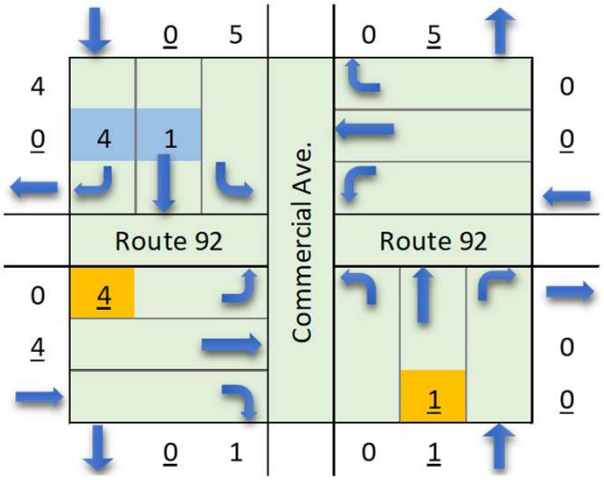


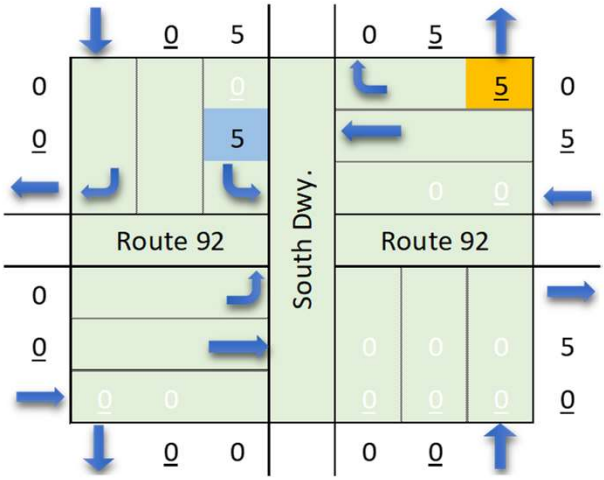


R^3C DESIGN GROUP	**Project:** Smithville Schools Smithville School District	N W E S No scale	**Exhibit 13:** Reallocated volumes – Elementary School peak









Notes:

1. Total buses = 15
2. 10 busses serve north and west
3. 5 busses serve south and east
4. Morning peak hour
   a. Depart at 6:15 AM (outside peak hour)
   b. Return at 9:00 AM - using internal driveways
5. Afternoon peak hour
   a. Depart at 2:00 PM - using internal driveways
   b. Return at 4:30 PM
6. Bus volumes between middle/high school and elmentary school drop-off/pick-up are included in traffic counts
7. Only afternoon (4:30 PM) return busses will impact elementary school dismissal peak hour.

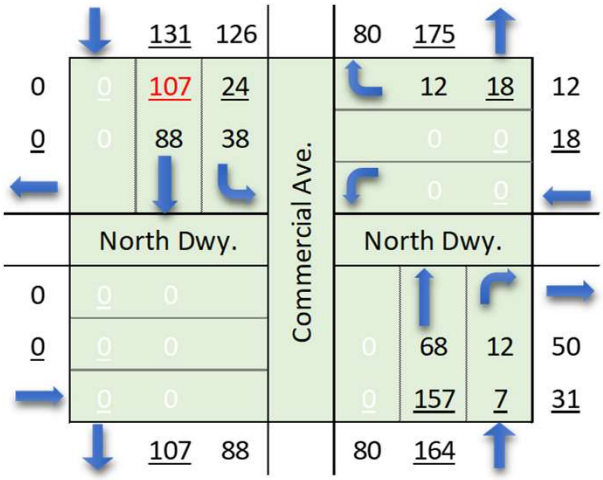
Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
→	Movement direction

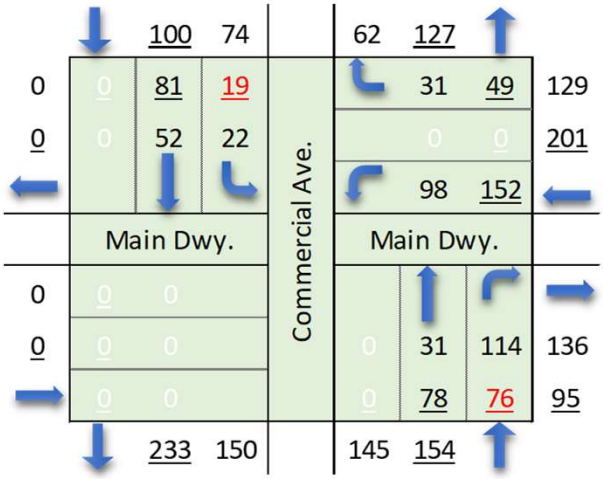
R^3C DESIGN GROUP

Project:
Smithville Schools
Smithville School District

No scale

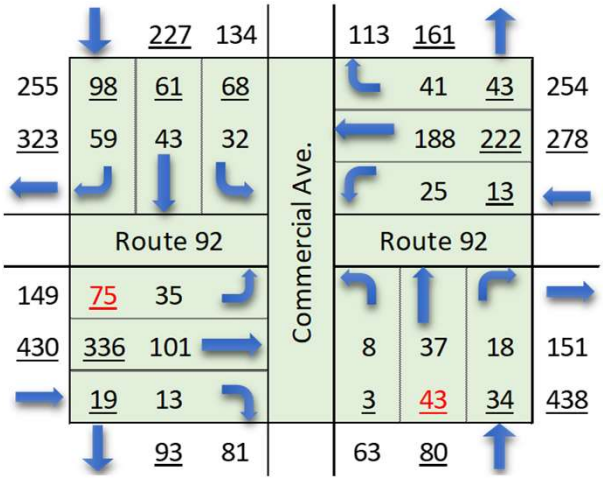
Exhibit 14:
Bus facility – trip generation & distribution

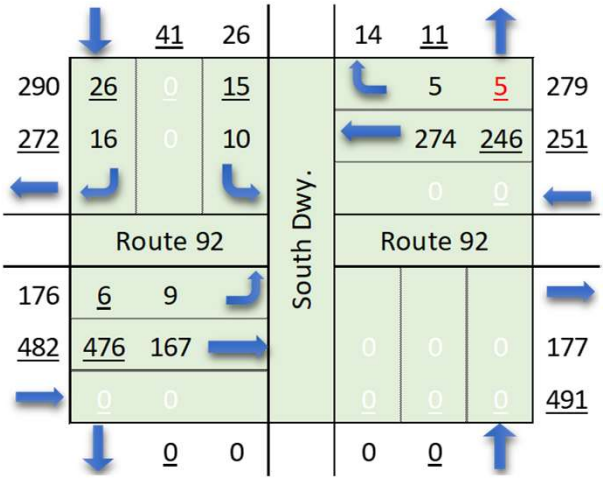




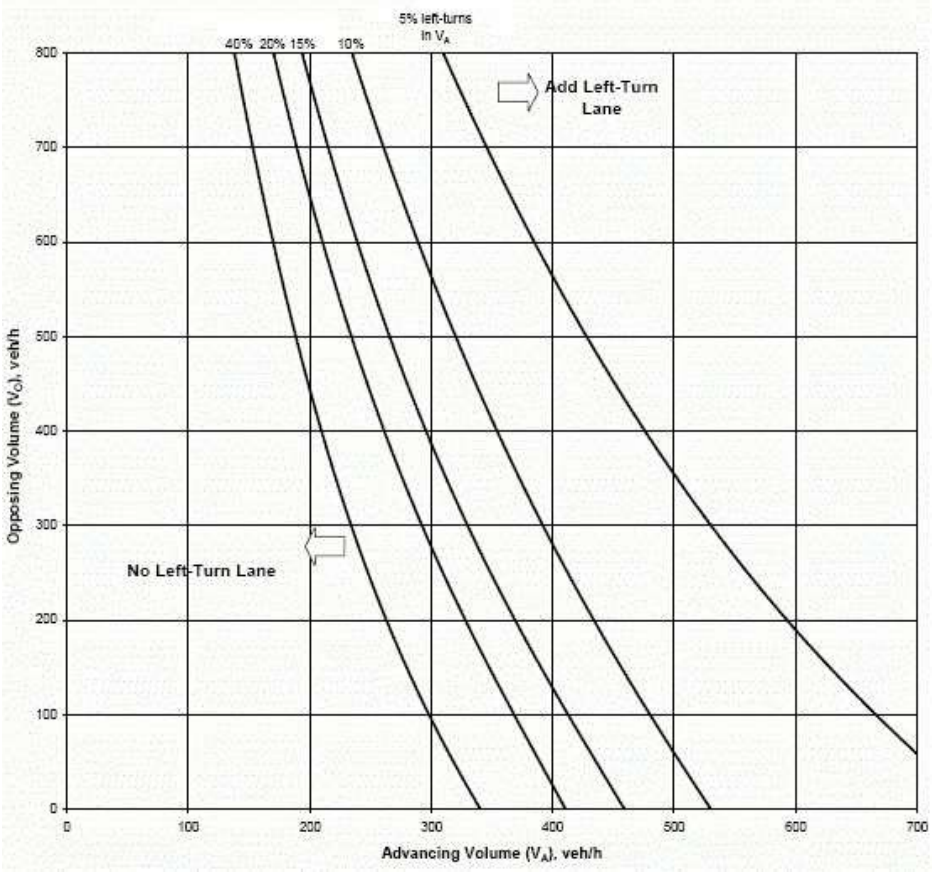
Legend	
30	Morning peak hour volume
30	Afternoon peak hour volume
→	Movement direction

Note: Site volumes computed by adding reallocated traffic volumes (Exhibit 13) to the bus facility distribution volumes (Exhibit 14)





R^3C DESIGN GROUP	**Project:** Smithville Schools Smithville School District	N W E S No scale	**Exhibit 15:** Site volumes – Elementary School afternoon peak



940.9.2 Left Turn Guidelines for Two-Lane Roadways, 45 mph

Source: MoDOT Engineering Policy Guide (EPG)

Scenario	Mvmt.	Peak hour	School	Opposing volume (Vo)	Advancing Volume (VA)	Operating speed (mph)	Left turn volume	% of left turns in VA	Criteria met? (Fig. 940.9.2)
Existing	EB Left	AM	Mid/High	436	210	45	83	40%	Yes
			Elem.	279	176	45	9	5%	No
		PM	Mid/High	217	292	45	0	0%	No
			Elem.	234	431	45	0	0%	No
Existing reallocated		AM	Mid/High	436	210	45	83	40%	Yes
			Elem.	279	176	45	9	5%	No
		PM	Mid/High	239	320	45	12	4%	No
			Elem.	246	482	45	6	1%	No
Site		AM	Mid/High	No change					
			Elem.	No change					
		PM	Mid/High	No change					
			Elem.	251	482	45	5	1%	No

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Project:
Smithville Schools
Smithville School District

N W E S
No scale

Exhibit 16:
Turn lane analysis

Peak hour	Scenario	Int.		Item	Eastbound			Westbound			Northbound			Southbound			Int.
					LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Mid/High School Morning	Existing	Commercial Ave. at	North Dwy.	Delay				15.9				0.0	0.0	8.9	0.0		3.0
				LOS				C				A	A	A	A		*
			Main Dwy.	Delay				104.2		12.3		0.0	0.0	9.3	0.0		23.0
				LOS				F		B		A	A	A	A		*
		Route 92 at	South Dwy	Delay	9.6	0.0								25.1		11.3	3.8
				LOS	A	A								D		B	*
			Commercial Ave. [1]	Delay	5.2			7.5			4.6			6.2			6.3
				LOS	A			A			A			A			A
Elementary School Morning	Existing	Commercial Ave. at	North Dwy.	Delay				9.1				0.0	0.0	7.6	0.0		2.3
				LOS				A				A	A	A	A		*
			Main Dwy.	Delay				15.1		9.4		0.0	0.0	7.8	0.0		7.6
				LOS				C		A		A	A	A	A		*
		Route 92 at	South Dwy	Delay	8.2	0.0								14.3		10.9	1.1
				LOS	A	A								B		B	*
			Commercial Ave. [1]	Delay	4.1			4.9			3.7			4.7			4.5
				LOS	A			A			A			A			A

Notes:

* Intersection LOS is not computed for a two-way stop control intersection

1. Roundabout analysis completed using SIDRA. All other analysis completed using Synchro+Simtraffic

R^3C DESIGN GROUP

Project:
Smithville Schools
Smithville School District

No scale

Exhibit 17:
Capacity analysis results – morning peak hour

Peak hour	Scenario	Int.		Item	Eastbound			Westbound			Northbound			Southbound			Int.
					LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Mid/High School Afternoon	Existing	Commercial Ave. at	North Dwy.	Delay				13.4				0.0	0.0	7.8	0.0		6.7
				LOS				B				A	A	A	A		*
			Main Dwy.	Delay				14.8		9.6		0.0	0.0	7.6	0.0		8.7
				LOS				B		A		A	A	A	A		*
		Route 92 at	South Dwy	Delay													0.0
				LOS													*
			Commercial Ave. [1]	Delay	5.0			4.9			4.3			5.2			5.0
				LOS	A			A			A			A			A
	Reallocated	Commercial Ave. at	North Dwy.	Delay				10.9				0.0	0.0	8.1	0.0		2.0
				LOS				B				A	A	A	A		*
			Main Dwy.	Delay				12.1		10.6		0.0	0.0	7.5	0.0		8.3
				LOS				B		B		A	A	A	A		*
		Route 92 at	South Dwy	Delay	8.0	0.0								15.1		10.3	1.4
				LOS	A	A								C		B	*
			Commercial Ave. [1]	Delay	5.0			5.3			4.3			5.3			5.1
				LOS	A			A			A			A			A
Elementary School Afternoon	Existing	Commercial Ave. at	North Dwy.	Delay				9.9				0.0	0.0	7.6	0.0		2.0
				LOS				A				A	A	A	A		*
			Main Dwy.	Delay				18.2		9.0		0.0	0.0	7.6	0.0		9.6
				LOS				C		A		A	A	A	A		*
		Route 92 at	South Dwy	Delay	0.0	0.0								0.0		0.0	0.0
				LOS	A	A								A	A	A	*
			Commercial Ave. [1]	Delay	7.1			4.9			5.7			5.7			6.1
				LOS	A			A			A			A			A
	Reallocated	Commercial Ave. at	North Dwy.	Delay				9.4				0.0	0.0	7.7	0.0		1.2
				LOS				A				A	A	A	A		*
			Main Dwy.	Delay				14.2		9.2		0.0	0.0	7.6	0.0		7.4
				LOS				B		A		A	A	A	A		*
		Route 92 at	South Dwy	Delay	7.9	0.0								16.9		10.1	0.7
				LOS	A	A								C		B	*
			Commercial Ave. [1]	Delay	7.2			5.3			5.7			5.8			6.3
				LOS	A			A			A			A			A
	Site	Commercial Ave. at	North Dwy.	Delay				9.4				0.0	0.0	7.7	0.0		1.2
				LOS				A				A	A	A	A		*
			Main Dwy.	Delay				14.7		9.2		0.0	0.0	7.6	0.0		7.5
				LOS				C		A		A	A	A	A		*
		Route 92 at	South Dwy	Delay	7.9	0.0								16.9		10.1	0.7
				LOS	A	A								C		B	*
			Commercial Ave. [1]	Delay	7.3			5.4			5.7			5.8			6.3
				LOS	A			A			A			A			A

Notes:

* Intersection LOS is not computed for a two-way stop control intersection

1. Roundabout analysis completed using SIDRA. All other analysis completed using Synchro+Simtraffic

R^3C DESIGN GROUP

Project:

Smithville Schools
Smithville School District

N W E S

No scale

Exhibit 18:
Capacity analysis results – afternoon peak hour

Queue lengths for existing and existing reallocated morning Mid/High School peak hour volumes

Queue Lengths
All Intervals

Color	Queue Type
	Average
	95th Percentile
	Max Observed

R^3C DESIGN GROUP	**Project:** **Smithville Schools** **Smithville School District**	N W E S No scale	**Exhibit 19:** **Queue lengths**

Looking east along Route 92

Looking west along Route 92

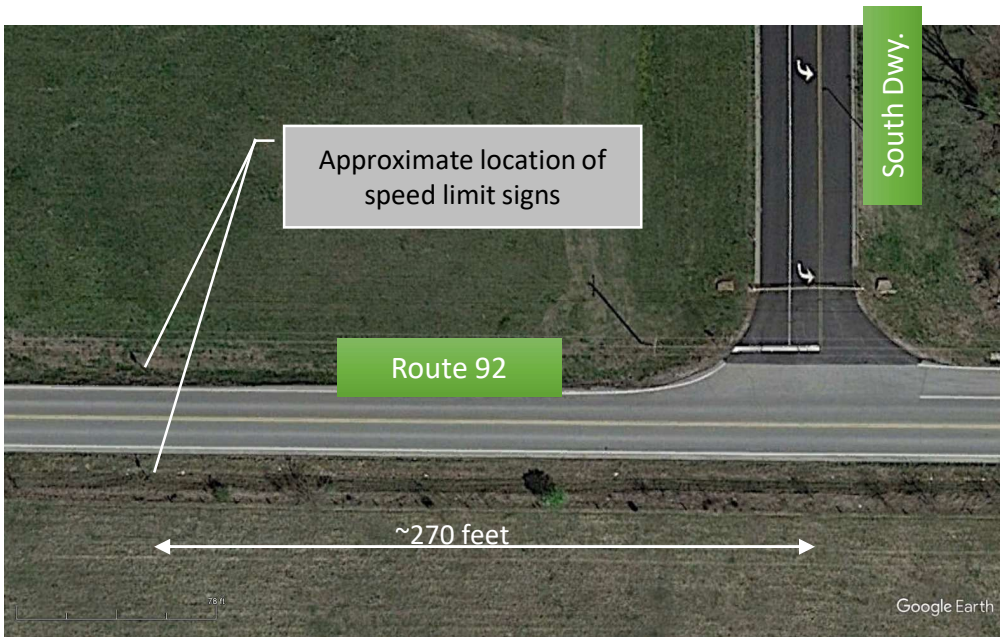

Image source: Google Earth

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Project:
Smithville Schools
Smithville School District

N W E S
No scale

Exhibit 20:
Speed zones

Appendix to the Traffic Impact Study Smithville School District Smithville, Missouri

Prepared by:

R^3C DESIGN GROUP, LLC

Shashi Gannavaram, P.E., PTOE, AICP, PTP
PMB #127, 233 SW Greenwich Drive
Lee's Summit, MO 64082

Date: May 9, 2023

1 Contents

2 Capacity analysis reports

2.1 Existing Middle/High School

2.1.1 Morning peak hour

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	17	141	56	144	186
Future Vol, veh/h	3	17	141	56	144	186
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	53	58	44	55	59
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	32	243	127	262	315

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1146	307	0	0	370	0
Stage 1	307	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	220	733	-	-	1189	-
Stage 1	746	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	161	733	-	-	1189	-
Mov Cap-2 Maneuver	161	-	-	-	-	-
Stage 1	746	-	-	-	-	-
Stage 2	311	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.9	0	4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	373	1189	-
HCM Lane V/C Ratio	-	-	0.118	0.22	-
HCM Control Delay (s)	-	-	15.9	8.9	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.8	-

Intersection	
Int Delay, s/veh	23

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	105	110	80	175	142	74
Future Vol, veh/h	105	110	80	175	142	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	45	45	59	53	56	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	233	244	136	330	254	93

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	902	301	0	0	466	0
Stage 1	301	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	308	739	-	-	1095	-
Stage 1	751	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 233	739	-	-	1095	-
Mov Cap-2 Maneuver	~ 233	-	-	-	-	-
Stage 1	751	-	-	-	-	-
Stage 2	413	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	57.2	0	6.8
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	233	739	1095	-
HCM Lane V/C Ratio	-	-	1.001	0.331	0.232	-
HCM Control Delay (s)	-	-	104.2	12.3	9.3	0
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	9.4	1.4	0.9	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	83	127	345	91	23	42
Future Vol, veh/h	83	127	345	91	23	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	41	77	91	42	52	42
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	202	165	379	217	44	100

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	596	0	-	0	948	379
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	569	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	980	-	-	-	289	668
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	566	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	980	-	-	-	223	668
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	566	-

Approach	EB	WB	SB
HCM Control Delay, s	5.3	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	980	-	-	-	223	668
HCM Lane V/C Ratio	0.207	-	-	-	0.198	0.15
HCM Control Delay (s)	9.6	0	-	-	25.1	11.3
HCM Lane LOS	A	A	-	-	D	B
HCM 95th %tile Q(veh)	0.8	-	-	-	0.7	0.5

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Exist Mid/High AM (Site Folder: General)]

Exist Mid/High AM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	4	2.0	4	2.0	0.128	4.6	LOS A	0.6	14.2	0.41	0.28	0.41	35.1
8	T1	81	2.0	88	2.0	0.128	4.6	LOS A	0.6	14.2	0.41	0.28	0.41	35.1
18	R2	37	2.0	40	2.0	0.128	4.6	LOS A	0.6	14.2	0.41	0.28	0.41	34.1
Approach		122	2.0	133	2.0	0.128	4.6	LOS A	0.6	14.2	0.41	0.28	0.41	34.8
East: Route 92														
1	L2	67	2.0	73	2.0	0.411	7.5	LOS A	2.5	62.8	0.46	0.31	0.46	33.3
6	T1	289	2.0	314	2.0	0.411	7.5	LOS A	2.5	62.8	0.46	0.31	0.46	33.3
16	R2	69	2.0	75	2.0	0.411	7.5	LOS A	2.5	62.8	0.46	0.31	0.46	32.4
Approach		425	2.0	462	2.0	0.411	7.5	LOS A	2.5	62.8	0.46	0.31	0.46	33.1
North: Commercial Ave.														
7	L2	15	2.0	16	2.0	0.220	6.2	LOS A	1.0	25.2	0.53	0.45	0.53	34.1
4	T1	73	2.0	79	2.0	0.220	6.2	LOS A	1.0	25.2	0.53	0.45	0.53	34.1
14	R2	94	2.0	102	2.0	0.220	6.2	LOS A	1.0	25.2	0.53	0.45	0.53	33.2
Approach		182	2.0	198	2.0	0.220	6.2	LOS A	1.0	25.2	0.53	0.45	0.53	33.6
West: Route 92														
5	L2	79	2.0	86	2.0	0.219	5.2	LOS A	1.1	27.2	0.36	0.23	0.36	33.9
2	T1	143	2.0	155	2.0	0.219	5.2	LOS A	1.1	27.2	0.36	0.23	0.36	33.9
12	R2	7	2.0	8	2.0	0.219	5.2	LOS A	1.1	27.2	0.36	0.23	0.36	33.0
Approach		229	2.0	249	2.0	0.219	5.2	LOS A	1.1	27.2	0.36	0.23	0.36	33.9
All Vehicles		958	2.0	1041	2.0	0.411	6.3	LOS A	2.5	62.8	0.44	0.31	0.44	33.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

2.1.2 Afternoon peak hour

Intersection	
Int Delay, s/veh	6.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	116	138	4	16	109
Future Vol, veh/h	15	116	138	4	16	109
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	42	36	65	33	40	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	322	212	12	40	143

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	441	218	0	0	224	0
Stage 1	218	-	-	-	-	-
Stage 2	223	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	574	822	-	-	1345	-
Stage 1	818	-	-	-	-	-
Stage 2	814	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	556	822	-	-	1345	-
Mov Cap-2 Maneuver	556	-	-	-	-	-
Stage 1	818	-	-	-	-	-
Stage 2	788	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	1.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	785	1345	-
HCM Lane V/C Ratio	-	-	0.456	0.03	-
HCM Control Delay (s)	-	-	13.4	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	2.4	0.1	-

Intersection	
Int Delay, s/veh	8.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	145	69	49	43	41	65
Future Vol, veh/h	145	69	49	43	41	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	51	42	72	63	60	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	284	164	68	68	68	72

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	310	102	0	0	136	0
Stage 1	102	-	-	-	-	-
Stage 2	208	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	682	953	-	-	1448	-
Stage 1	922	-	-	-	-	-
Stage 2	827	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	649	953	-	-	1448	-
Mov Cap-2 Maneuver	649	-	-	-	-	-
Stage 1	922	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	3.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	649	953	1448	-
HCM Lane V/C Ratio	-	-	0.438	0.172	0.047	-
HCM Control Delay (s)	-	-	14.8	9.6	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	2.2	0.6	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	292	217	0	0	0
Future Vol, veh/h	0	292	217	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	80	72	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	365	301	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	301	0	-	0	666	301
Stage 1	-	-	-	-	301	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1260	-	-	-	425	739
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	702	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1260	-	-	-	425	739
Mov Cap-2 Maneuver	-	-	-	-	425	-
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	702	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1260	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0	0
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	-	-

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Exist Mid/High PM (Site Folder: General)]

Exist Mid/High PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	11	2.0	12	2.0	0.079	4.3	LOS A	0.3	8.3	0.42	0.29	0.42	34.9
8	T1	38	2.0	41	2.0	0.079	4.3	LOS A	0.3	8.3	0.42	0.29	0.42	34.9
18	R2	23	2.0	25	2.0	0.079	4.3	LOS A	0.3	8.3	0.42	0.29	0.42	33.9
Approach		72	2.0	78	2.0	0.079	4.3	LOS A	0.3	8.3	0.42	0.29	0.42	34.6
East: Route 92														
1	L2	7	2.0	8	2.0	0.215	4.9	LOS A	1.1	27.2	0.29	0.16	0.29	35.0
6	T1	204	2.0	222	2.0	0.215	4.9	LOS A	1.1	27.2	0.29	0.16	0.29	34.9
16	R2	27	2.0	29	2.0	0.215	4.9	LOS A	1.1	27.2	0.29	0.16	0.29	34.0
Approach		238	2.0	259	2.0	0.215	4.9	LOS A	1.1	27.2	0.29	0.16	0.29	34.8
North: Commercial Ave.														
7	L2	40	2.0	43	2.0	0.196	5.2	LOS A	0.9	23.2	0.42	0.30	0.42	34.2
4	T1	48	2.0	52	2.0	0.196	5.2	LOS A	0.9	23.2	0.42	0.30	0.42	34.2
14	R2	102	2.0	111	2.0	0.196	5.2	LOS A	0.9	23.2	0.42	0.30	0.42	33.3
Approach		190	2.0	207	2.0	0.196	5.2	LOS A	0.9	23.2	0.42	0.30	0.42	33.7
West: Route 92														
5	L2	56	2.0	61	2.0	0.234	5.0	LOS A	1.2	30.4	0.28	0.15	0.28	34.4
2	T1	179	2.0	195	2.0	0.234	5.0	LOS A	1.2	30.4	0.28	0.15	0.28	34.3
12	R2	27	2.0	29	2.0	0.234	5.0	LOS A	1.2	30.4	0.28	0.15	0.28	33.4
Approach		262	2.0	285	2.0	0.234	5.0	LOS A	1.2	30.4	0.28	0.15	0.28	34.3
All Vehicles		762	2.0	828	2.0	0.234	5.0	LOS A	1.2	30.4	0.33	0.20	0.33	34.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

2.2 Existing Elementary School

2.2.1 Morning peak hour

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	12	68	12	38	88
Future Vol, veh/h	0	12	68	12	38	88
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	38	57	50	48	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	32	119	24	79	128

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	417	131	0	0	143	0
Stage 1	131	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	592	919	-	-	1440	-
Stage 1	895	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	557	919	-	-	1440	-
Mov Cap-2 Maneuver	557	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	919	1440	-
HCM Lane V/C Ratio	-	-	0.034	0.055	-
HCM Control Delay (s)	-	-	9.1	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-

Intersection	
Int Delay, s/veh	7.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	98	31	31	114	22	52
Future Vol, veh/h	98	31	31	114	22	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	34	35	86	57	39	68
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	288	89	36	200	56	76

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	324	136	0	0	236	0
Stage 1	136	-	-	-	-	-
Stage 2	188	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	670	913	-	-	1331	-
Stage 1	890	-	-	-	-	-
Stage 2	844	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	641	913	-	-	1331	-
Mov Cap-2 Maneuver	641	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	807	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	3.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	641	913	1331	-
HCM Lane V/C Ratio	-	-	0.45	0.097	0.042	-
HCM Control Delay (s)	-	-	15.1	9.4	7.8	0
HCM Lane LOS	-	-	C	A	A	A
HCM 95th %tile Q(veh)	-	-	2.3	0.3	0.1	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	167	274	5	10	16
Future Vol, veh/h	9	167	274	5	10	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	56	70	67	42	42	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	239	409	12	24	28

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	421	0	-	0	680	409
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	271	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1138	-	-	-	417	642
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	775	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1138	-	-	-	410	642
Mov Cap-2 Maneuver	-	-	-	-	410	-
Stage 1	-	-	-	-	660	-
Stage 2	-	-	-	-	775	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1138	-	-	-	410	642
HCM Lane V/C Ratio	0.014	-	-	-	0.058	0.044
HCM Control Delay (s)	8.2	0	-	-	14.3	10.9
HCM Lane LOS	A	A	-	-	B	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0.1

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Exist Elem AM (Site Folder: General)]

Exist Elem AM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	8	2.0	9	2.0	0.061	3.7	LOS A	0.3	6.5	0.32	0.18	0.32	35.3
8	T1	37	2.0	40	2.0	0.061	3.7	LOS A	0.3	6.5	0.32	0.18	0.32	35.3
18	R2	18	2.0	20	2.0	0.061	3.7	LOS A	0.3	6.5	0.32	0.18	0.32	34.3
Approach		63	2.0	68	2.0	0.061	3.7	LOS A	0.3	6.5	0.32	0.18	0.32	35.0
East: Route 92														
1	L2	25	2.0	27	2.0	0.223	4.9	LOS A	1.1	28.8	0.26	0.12	0.26	34.8
6	T1	188	2.0	204	2.0	0.223	4.9	LOS A	1.1	28.8	0.26	0.12	0.26	34.8
16	R2	41	2.0	45	2.0	0.223	4.9	LOS A	1.1	28.8	0.26	0.12	0.26	33.8
Approach		254	2.0	276	2.0	0.223	4.9	LOS A	1.1	28.8	0.26	0.12	0.26	34.6
North: Commercial Ave.														
7	L2	32	2.0	35	2.0	0.138	4.7	LOS A	0.6	15.6	0.40	0.27	0.40	34.5
4	T1	43	2.0	47	2.0	0.138	4.7	LOS A	0.6	15.6	0.40	0.27	0.40	34.5
14	R2	59	2.0	64	2.0	0.138	4.7	LOS A	0.6	15.6	0.40	0.27	0.40	33.5
Approach		134	2.0	146	2.0	0.138	4.7	LOS A	0.6	15.6	0.40	0.27	0.40	34.0
West: Route 92														
5	L2	35	2.0	38	2.0	0.134	4.1	LOS A	0.6	15.6	0.26	0.13	0.26	34.8
2	T1	101	2.0	110	2.0	0.134	4.1	LOS A	0.6	15.6	0.26	0.13	0.26	34.8
12	R2	13	2.0	14	2.0	0.134	4.1	LOS A	0.6	15.6	0.26	0.13	0.26	33.8
Approach		149	2.0	162	2.0	0.134	4.1	LOS A	0.6	15.6	0.26	0.13	0.26	34.7
All Vehicles		600	2.0	652	2.0	0.223	4.5	LOS A	1.1	28.8	0.30	0.17	0.30	34.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

2.2.2 Afternoon peak hour

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	54	142	3	19	133
Future Vol, veh/h	3	54	142	3	19	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	84	79	75	59	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	64	180	4	32	193

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	439	182	0	0	184	0
Stage 1	182	-	-	-	-	-
Stage 2	257	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	575	861	-	-	1391	-
Stage 1	849	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	560	861	-	-	1391	-
Mov Cap-2 Maneuver	560	-	-	-	-	-
Stage 1	849	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	1.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	813	1391	-
HCM Lane V/C Ratio	-	-	0.089	0.023	-
HCM Control Delay (s)	-	-	9.9	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	9.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	165	36	72	57	45	84
Future Vol, veh/h	165	36	72	57	45	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	51	82	86	84	66	68
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	324	44	84	68	68	124

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	378	118	0	0	152	0
Stage 1	118	-	-	-	-	-
Stage 2	260	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	624	934	-	-	1429	-
Stage 1	907	-	-	-	-	-
Stage 2	783	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	592	934	-	-	1429	-
Mov Cap-2 Maneuver	592	-	-	-	-	-
Stage 1	907	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.1	0	2.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	592	934	1429	-
HCM Lane V/C Ratio	-	-	0.547	0.047	0.048	-
HCM Control Delay (s)	-	-	18.2	9	7.6	0
HCM Lane LOS	-	-	C	A	A	A
HCM 95th %tile Q(veh)	-	-	3.3	0.1	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	431	234	0	0	0
Future Vol, veh/h	0	431	234	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	86	82	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	501	285	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	285	0	-	0	786	285
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	501	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1277	-	-	-	361	754
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	609	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1277	-	-	-	361	754
Mov Cap-2 Maneuver	-	-	-	-	361	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	609	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1277	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0	0
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	-	-

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Exist Elem PM (Site Folder: General)]

Exist Elem PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	3	2.0	3	2.0	0.117	5.7	LOS A	0.5	12.1	0.54	0.47	0.54	34.5
8	T1	49	2.0	53	2.0	0.117	5.7	LOS A	0.5	12.1	0.54	0.47	0.54	34.5
18	R2	34	2.0	37	2.0	0.117	5.7	LOS A	0.5	12.1	0.54	0.47	0.54	33.6
Approach		86	2.0	93	2.0	0.117	5.7	LOS A	0.5	12.1	0.54	0.47	0.54	34.1
East: Route 92														
1	L2	12	2.0	13	2.0	0.214	4.9	LOS A	1.1	26.9	0.30	0.17	0.30	34.9
6	T1	200	2.0	217	2.0	0.214	4.9	LOS A	1.1	26.9	0.30	0.17	0.30	34.9
16	R2	22	2.0	24	2.0	0.214	4.9	LOS A	1.1	26.9	0.30	0.17	0.30	33.9
Approach		234	2.0	254	2.0	0.214	4.9	LOS A	1.1	26.9	0.30	0.17	0.30	34.8
North: Commercial Ave.														
7	L2	71	2.0	77	2.0	0.245	5.7	LOS A	1.2	30.4	0.43	0.31	0.43	33.8
4	T1	65	2.0	71	2.0	0.245	5.7	LOS A	1.2	30.4	0.43	0.31	0.43	33.7
14	R2	103	2.0	112	2.0	0.245	5.7	LOS A	1.2	30.4	0.43	0.31	0.43	32.9
Approach		239	2.0	260	2.0	0.245	5.7	LOS A	1.2	30.4	0.43	0.31	0.43	33.4
West: Route 92														
5	L2	61	2.0	66	2.0	0.390	7.1	LOS A	2.3	58.9	0.43	0.28	0.43	33.5
2	T1	331	2.0	360	2.0	0.390	7.1	LOS A	2.3	58.9	0.43	0.28	0.43	33.5
12	R2	19	2.0	21	2.0	0.390	7.1	LOS A	2.3	58.9	0.43	0.28	0.43	32.6
Approach		411	2.0	447	2.0	0.390	7.1	LOS A	2.3	58.9	0.43	0.28	0.43	33.4
All Vehicles		970	2.0	1054	2.0	0.390	6.1	LOS A	2.3	58.9	0.41	0.28	0.41	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

2.3 Reallocated Middle/High School

2.3.1 Afternoon peak hour

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	21	203	8	22	90
Future Vol, veh/h	3	21	203	8	22	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	42	36	65	33	40	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	58	312	24	55	118

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	552	324	0	0	336	0
Stage 1	324	-	-	-	-	-
Stage 2	228	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	495	717	-	-	1223	-
Stage 1	733	-	-	-	-	-
Stage 2	810	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	471	717	-	-	1223	-
Mov Cap-2 Maneuver	471	-	-	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	771	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	2.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	678	1223	-
HCM Lane V/C Ratio	-	-	0.097	0.045	-
HCM Control Delay (s)	-	-	10.9	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	8.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	117	128	59	26	22	53
Future Vol, veh/h	117	128	59	26	22	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	51	42	72	63	60	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	229	305	82	41	37	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	236	103	0	0	123	0
Stage 1	103	-	-	-	-	-
Stage 2	133	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	752	952	-	-	1464	-
Stage 1	921	-	-	-	-	-
Stage 2	893	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	732	952	-	-	1464	-
Mov Cap-2 Maneuver	732	-	-	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	870	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	2.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	732	952	1464	-
HCM Lane V/C Ratio	-	-	0.313	0.32	0.025	-
HCM Control Delay (s)	-	-	12.1	10.6	7.5	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	1.3	1.4	0.1	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	308	225	14	28	48
Future Vol, veh/h	12	308	225	14	28	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	80	72	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	385	313	15	30	52

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	328	0	-	0	724	313
Stage 1	-	-	-	-	313	-
Stage 2	-	-	-	-	411	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1232	-	-	-	393	727
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	669	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1232	-	-	-	388	727
Mov Cap-2 Maneuver	-	-	-	-	388	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	669	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1232	-	-	-	388	727
HCM Lane V/C Ratio	0.011	-	-	-	0.078	0.072
HCM Control Delay (s)	8	0	-	-	15.1	10.3
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0.2

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Reallocated Mid/High PM (Site Folder: General)]

Reallocated Mid/High PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	11	2.0	12	2.0	0.069	4.3	LOS A	0.3	7.3	0.42	0.29	0.42	34.9
8	T1	28	2.0	30	2.0	0.069	4.3	LOS A	0.3	7.3	0.42	0.29	0.42	34.9
18	R2	24	2.0	26	2.0	0.069	4.3	LOS A	0.3	7.3	0.42	0.29	0.42	33.9
Approach		63	2.0	68	2.0	0.069	4.3	LOS A	0.3	7.3	0.42	0.29	0.42	34.5
East: Route 92														
1	L2	8	2.0	9	2.0	0.258	5.3	LOS A	1.4	34.5	0.29	0.15	0.29	34.8
6	T1	245	2.0	266	2.0	0.258	5.3	LOS A	1.4	34.5	0.29	0.15	0.29	34.7
16	R2	37	2.0	40	2.0	0.258	5.3	LOS A	1.4	34.5	0.29	0.15	0.29	33.8
Approach		290	2.0	315	2.0	0.258	5.3	LOS A	1.4	34.5	0.29	0.15	0.29	34.6
North: Commercial Ave.														
7	L2	36	2.0	39	2.0	0.179	5.3	LOS A	0.8	20.5	0.45	0.34	0.45	34.2
4	T1	41	2.0	45	2.0	0.179	5.3	LOS A	0.8	20.5	0.45	0.34	0.45	34.2
14	R2	88	2.0	96	2.0	0.179	5.3	LOS A	0.8	20.5	0.45	0.34	0.45	33.3
Approach		165	2.0	179	2.0	0.179	5.3	LOS A	0.8	20.5	0.45	0.34	0.45	33.7
West: Route 92														
5	L2	52	2.0	57	2.0	0.236	5.0	LOS A	1.2	30.8	0.27	0.13	0.27	34.4
2	T1	188	2.0	204	2.0	0.236	5.0	LOS A	1.2	30.8	0.27	0.13	0.27	34.4
12	R2	27	2.0	29	2.0	0.236	5.0	LOS A	1.2	30.8	0.27	0.13	0.27	33.5
Approach		267	2.0	290	2.0	0.236	5.0	LOS A	1.2	30.8	0.27	0.13	0.27	34.3
All Vehicles		785	2.0	853	2.0	0.258	5.1	LOS A	1.4	34.5	0.32	0.19	0.32	34.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

2.4 Reallocated Elementary School

2.4.1 Afternoon peak hour

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	18	157	7	24	102
Future Vol, veh/h	0	18	157	7	24	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	84	79	75	59	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	199	9	41	148

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	434	204	0	0	208	0
Stage 1	204	-	-	-	-	-
Stage 2	230	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	579	837	-	-	1363	-
Stage 1	830	-	-	-	-	-
Stage 2	808	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	560	837	-	-	1363	-
Mov Cap-2 Maneuver	560	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	1.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	837	1363	-
HCM Lane V/C Ratio	-	-	0.026	0.03	-
HCM Control Delay (s)	-	-	9.4	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	7.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	152	49	78	71	14	81
Future Vol, veh/h	152	49	78	71	14	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	51	82	86	84	66	68
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	298	60	91	85	21	119

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	295	134	0	0	176	0
Stage 1	134	-	-	-	-	-
Stage 2	161	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	696	915	-	-	1400	-
Stage 1	892	-	-	-	-	-
Stage 2	868	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	685	915	-	-	1400	-
Mov Cap-2 Maneuver	685	-	-	-	-	-
Stage 1	892	-	-	-	-	-
Stage 2	854	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	685	915	1400	-
HCM Lane V/C Ratio	-	-	0.435	0.065	0.015	-
HCM Control Delay (s)	-	-	14.2	9.2	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	2.2	0.2	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	476	246	0	15	26
Future Vol, veh/h	6	476	246	0	15	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	86	82	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	553	300	0	16	28

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	300	0	-	0	867	300
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	567	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1261	-	-	-	323	740
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1261	-	-	-	320	740
Mov Cap-2 Maneuver	-	-	-	-	320	-
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1261	-	-	-	320	740
HCM Lane V/C Ratio	0.005	-	-	-	0.051	0.038
HCM Control Delay (s)	7.9	0	-	-	16.9	10.1
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0.1

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Reallocated Elem PM (Site Folder: General)]

Reallocated Elem PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	3	2.0	3	2.0	0.109	5.7	LOS A	0.4	11.2	0.54	0.48	0.54	34.5
8	T1	42	2.0	46	2.0	0.109	5.7	LOS A	0.4	11.2	0.54	0.48	0.54	34.5
18	R2	34	2.0	37	2.0	0.109	5.7	LOS A	0.4	11.2	0.54	0.48	0.54	33.6
Approach		79	2.0	86	2.0	0.109	5.7	LOS A	0.4	11.2	0.54	0.48	0.54	34.1
East: Route 92														
1	L2	13	2.0	14	2.0	0.255	5.3	LOS A	1.3	33.4	0.32	0.18	0.32	34.7
6	T1	222	2.0	241	2.0	0.255	5.3	LOS A	1.3	33.4	0.32	0.18	0.32	34.7
16	R2	43	2.0	47	2.0	0.255	5.3	LOS A	1.3	33.4	0.32	0.18	0.32	33.7
Approach		278	2.0	302	2.0	0.255	5.3	LOS A	1.3	33.4	0.32	0.18	0.32	34.5
North: Commercial Ave.														
7	L2	68	2.0	74	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	33.7
4	T1	61	2.0	66	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	33.7
14	R2	98	2.0	107	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	32.8
Approach		227	2.0	247	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	33.3
West: Route 92														
5	L2	71	2.0	77	2.0	0.402	7.2	LOS A	2.4	61.7	0.42	0.27	0.42	33.4
2	T1	336	2.0	365	2.0	0.402	7.2	LOS A	2.4	61.7	0.42	0.27	0.42	33.4
12	R2	19	2.0	21	2.0	0.402	7.2	LOS A	2.4	61.7	0.42	0.27	0.42	32.5
Approach		426	2.0	463	2.0	0.402	7.2	LOS A	2.4	61.7	0.42	0.27	0.42	33.3
All Vehicles		1010	2.0	1098	2.0	0.402	6.3	LOS A	2.4	61.7	0.41	0.28	0.41	33.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

2.5 Site Elementary School

2.5.1 Afternoon peak hour

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	18	157	7	24	107
Future Vol, veh/h	0	18	157	7	24	107
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	84	79	75	59	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	199	9	41	155

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	441	204	0	0	208	0
Stage 1	204	-	-	-	-	-
Stage 2	237	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	574	837	-	-	1363	-
Stage 1	830	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	555	837	-	-	1363	-
Mov Cap-2 Maneuver	555	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	776	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	1.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	837	1363	-
HCM Lane V/C Ratio	-	-	0.026	0.03	-
HCM Control Delay (s)	-	-	9.4	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	7.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	152	49	78	76	19	81
Future Vol, veh/h	152	49	78	76	19	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	51	82	86	84	66	68
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	298	60	91	90	29	119

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	313	136	0	0	181	0
Stage 1	136	-	-	-	-	-
Stage 2	177	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	680	913	-	-	1394	-
Stage 1	890	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	665	913	-	-	1394	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	835	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	1.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	665	913	1394	-
HCM Lane V/C Ratio	-	-	0.448	0.065	0.021	-
HCM Control Delay (s)	-	-	14.7	9.2	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	2.3	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	476	246	5	15	26
Future Vol, veh/h	6	476	246	5	15	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	200	140	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	86	82	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	553	300	5	16	28

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	305	0	-	0	867	300
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	567	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1256	-	-	-	323	740
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1256	-	-	-	320	740
Mov Cap-2 Maneuver	-	-	-	-	320	-
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1256	-	-	-	320	740
HCM Lane V/C Ratio	0.005	-	-	-	0.051	0.038
HCM Control Delay (s)	7.9	0	-	-	16.9	10.1
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0.1

MOVEMENT SUMMARY

Site: 101 [Route 92 at Commercial Ave - Site Elem PM (Site Folder: General)]

Site Elem PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Commercial Ave.														
3	L2	3	2.0	3	2.0	0.110	5.7	LOS A	0.4	11.3	0.55	0.48	0.55	34.5
8	T1	43	2.0	47	2.0	0.110	5.7	LOS A	0.4	11.3	0.55	0.48	0.55	34.5
18	R2	34	2.0	37	2.0	0.110	5.7	LOS A	0.4	11.3	0.55	0.48	0.55	33.5
Approach		80	2.0	87	2.0	0.110	5.7	LOS A	0.4	11.3	0.55	0.48	0.55	34.1
East: Route 92														
1	L2	13	2.0	14	2.0	0.256	5.4	LOS A	1.3	33.6	0.33	0.19	0.33	34.6
6	T1	222	2.0	241	2.0	0.256	5.4	LOS A	1.3	33.6	0.33	0.19	0.33	34.6
16	R2	43	2.0	47	2.0	0.256	5.4	LOS A	1.3	33.6	0.33	0.19	0.33	33.7
Approach		278	2.0	302	2.0	0.256	5.4	LOS A	1.3	33.6	0.33	0.19	0.33	34.5
North: Commercial Ave.														
7	L2	68	2.0	74	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	33.7
4	T1	61	2.0	66	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	33.7
14	R2	98	2.0	107	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	32.8
Approach		227	2.0	247	2.0	0.239	5.8	LOS A	1.1	29.2	0.45	0.33	0.45	33.3
West: Route 92														
5	L2	75	2.0	82	2.0	0.406	7.3	LOS A	2.5	62.6	0.43	0.27	0.43	33.3
2	T1	336	2.0	365	2.0	0.406	7.3	LOS A	2.5	62.6	0.43	0.27	0.43	33.3
12	R2	19	2.0	21	2.0	0.406	7.3	LOS A	2.5	62.6	0.43	0.27	0.43	32.5
Approach		430	2.0	467	2.0	0.406	7.3	LOS A	2.5	62.6	0.43	0.27	0.43	33.3
All Vehicles		1015	2.0	1103	2.0	0.406	6.3	LOS A	2.5	62.6	0.42	0.28	0.42	33.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.