

Traffic Impact Analysis

Howard Bishop Transition School



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1. EXECUTIVE SUMMARY

Alachua County Public Schools has requested traffic studies to be performed at the following three school sites that are being considered to house a transition school for the 2020/2021, 2021/2022, and 2022/2023 school years.

- Howard Bishop Middle School
- Westwood Middle School
- Marjorie K. Rawlings Elementary School

CHW has prepared this traffic impact analysis to review the traffic operational issues of the proposed transition school located at Howard Bishop Middle School.

The following schedule is anticipated by Alachua County Public Schools under a Howard Bishop transition school scenario:

- 2020/2021 – Improvements occur at Howard Bishop Middle School (Howard Bishop). Howard Bishop faculty, staff, and students would utilize the Howard Bishop transition school with staff parking and parent/student drop-off parking located off of NE 12th Street near the east side of the school property. The existing bus loop would be used as normal.
- 2021/2022 – Improvements occur at Westwood Middle School (Westwood). Westwood faculty, staff, and students would utilize the Howard Bishop transition school using the access off of NE 12th Street. Westwood would share the existing bus loop with Howard Bishop.
- 2022/2023 – Improvements occur at Littlewood Elementary School (Littlewood). Littlewood faculty, staff, and students would utilize the Howard Bishop transition school using the access off of NE 12th Street. Littlewood would share the existing bus loop with Howard Bishop.

2. STUDY AREA

The Study Area, as provided in **Figure 1**, consists of the following intersections:

- NE 9th Street at NE 16th Avenue
- NE 9th Street at NE 18th Avenue
- NE 9th Street at Parent/student Drop-off Loop Entry
- NE 9th Street at Parent/student Drop-off Loop Exit
- Bus Loop Entry at NE 19th Place
- Bus Loop Exit at NE 19th Place
- NE 12th Street at NE 19th Place
- NE 12th Street at NE 16th Avenue

Figure 1 | Study Area



3. DATA COLLECTION

Turning movement counts were performed at all study area intersections during the arrival and departure peak hours. The counts were performed on January 28th, 2020 (Tuesday) and January 30th, 2020 (Thursday). Kimley-Horn and Associates Inc. provided turning movements at the parent/student drop-off parking lots of Littlewood and Westwood, which were used to determine the number of trips generated to and from these schools under a Howard Bishop Transition School scenario. **Appendix A** provides the raw turning movement count data used for this study.

The count data was adjusted based on the peak season factor published by FDOT and by the growth rate, to determine the background and build-out conditions during the 2020/2021, 2021/2022 and 2022/2023 school years see **Appendix B**. If the historical growth rate was less than 1%, a minimum 1% growth rate was applied and in cases where no historical ADT was available, a growth rate of 2% was applied.

Site visits were made to Howard Bishop to provide an understanding of the vehicular and pedestrian traffic circulation and operational issues to the adjacent roadways. Additionally, site visits were made to Littlewood and Westwood to obtain the number of utilized parking spaces, queued buses, and queued parent/student drop-off vehicles during peak times which was used to determine the needed vehicular infrastructure of the transition school.

Alachua County Public Schools provided information regarding the number of existing and anticipated buses serving each school as well as the bus arrival and departure times, see **Appendix C**.

4. HOWARD BISHOP TO HOWARD BISHOP TRANSITION

The proposed Howard Bishop Transition School is expected to be available during the 2020/2021 school year. Howard Bishop would utilize the transition school during the 2020/2021 school year. The following analysis uses forecasted traffic volumes during year 2021.

4.1. Intersection Analysis

The study area intersections were analyzed with and without the Howard Bishop transition school rerouted project trips. The rerouted project trips include all vehicles entering and exiting Howard Bishop but excludes vehicles entering and exiting the bus loop during the peak 15 minutes. These vehicles are excluded because the bus loop will remain open and the vehicles using the bus loop will not be rerouted. The analysis is based on the turning movement counts during the AM peak 15 minutes (8:30 AM) and the PM peak 15 minutes (3:45 PM). The peak 15-minute traffic volumes were multiplied by four so that they can be analyzed as hourly traffic using traffic modeling software.

Existing traffic patterns, obtained from the turning movement counts, were used to determine how the Howard Bishop vehicular trips would be rerouted. **Figure 2** provides the calculations used to determine the rerouted Howard Bishop traffic with the transition school access along NE 12th Street. This figure illustrates the expected origin and destination percentages of the existing school traffic based on the turning movement counts, shown in red text. The origin and destination percentages are applied to the rerouted project trips, however, the rerouted project trips take different routes to access the Howard Bishop transition school, as shown in blue text. The forecasted turning movements at all study area intersections are provided in **Appendix E**.

Tables 1 and 2 provide a comparison of the study area intersections under a no-build scenario and under a build-out scenario to demonstrate the impacts of providing the transition school at Howard Bishop. The stop-controlled intersections were analyzed using HCS 7 and the signalized intersection of NE 16th Avenue and NE 9th Street was analyzed using Synchro 9. The delay, LOS, V/C, and 95th percentile queue length of each intersection movement, as well as the intersection as a whole, were reviewed with the analysis.

The following intersection movement deficiencies are highlighted in **Tables 1 and 2**:

- Movements operating with a LOS of F
- V/C ratios exceeding 1.0
- 95th percentile queue lengths exceeding the available storage

Figure 2 | Howard Bishop to Howard Bishop Transition – Trip Distribution

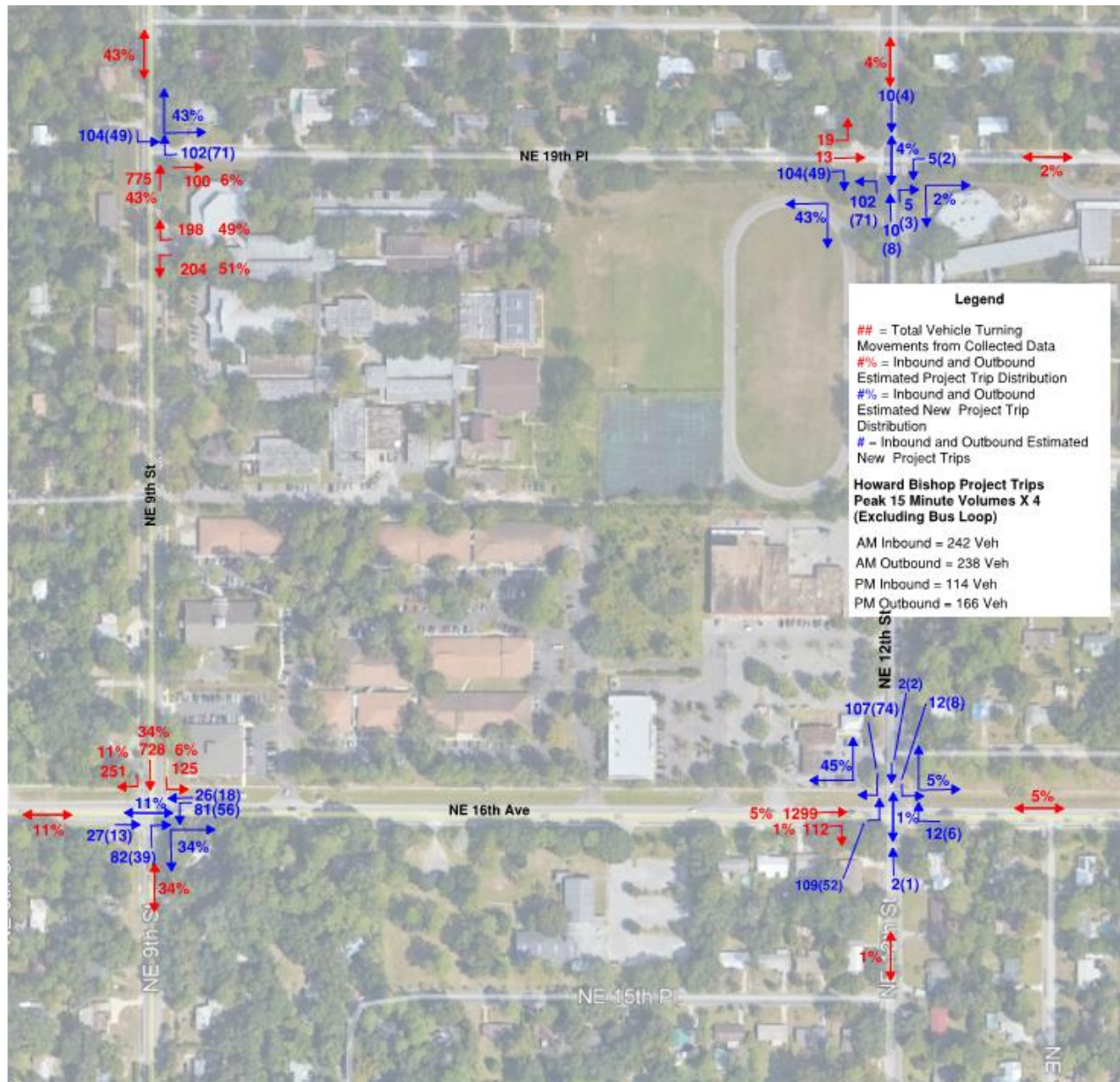


Table 1 - AM Intersection Analysis Summary – Howard Bishop to Howard Bishop Transition										
Intersection	Movement	Available Storage (ft)	2020/2021 - No-build				2020/2021 Howard Bishop to Howard Bishop - With Project			
			LOS	Delay(s)	v/c	95% Queue (ft)	LOS	Delay(s)	v/c	95% Queue (FT)
Signalized Intersections										
NE 9th Street at NE 16th Avenue	EBL	112	B	10.3	0.20	50	B	12	0.29	50
	EBT	N/A	B	10.3	0.41	125	B	14	0.6	150
	WBL	112	A	9.2	0.10	25	B	13.8	0.39	75
	WBT	N/A	B	10.9	0.42	150	B	14.9	0.62	150
	NBL	195	B	12.4	0.25	50	B	12.7	0.26	50
	NBT	N/A	B	12.4	0.47	100	B	14.1	0.62	125
	SBL	107	B	10.8	0.13	25	B	11.3	0.15	25
	SBT	N/A	B	13.0	0.51	125	B	13.5	0.53	125
	Total		B	11.4			B	13.9		
Non-signalized Intersections										
NE 9th Street at North of Drop off Loop	WBT	N/A	B	13.7	0.35	50				
	Total			4.1						
NE 9th Street at South of Drop off Loop	SBL	N/A	A	8.2	0.08	25				
	Total			1.5						
NE 16th Avenue at NE 12th Street	EBL	N/A	A	8.1	0.01	0	A	8.4	0.1	25
	WBL	N/A	A	7.8	0.00	0	A	7.8	0.00	0
	NBT	N/A	B	14.6	0.07	25	C	22.3	0.13	25
	SBT	N/A	B	13.1	0.13	25	C	16.5	0.37	50
	Total			2.0				5.2		
NE 9th Street at NE 18th Ave	EBT	N/A	A	10	0.01	0				
	WBT	N/A	C	15.1	0.05	25				
	NBL	N/A	A	7.9	0.00	0				
	SBL	N/A	A	8.1	0.01	0				
	Total			0.6						
NE 19th Place at East Bus Loop Exit	NBT	N/A	A	9.1	0.00	0				
	Total			1.0						
NE 19th Place at West Bus Loop Entrance	WBL	N/A	A	7.3	0.00	0				
	Total									
NE 12th Street at NE 19th Place	EBT	N/A	A	8.8	0.01	0	A	9.1	0.12	25
	WBT	N/A	A	9.4	0.01	0	B	11.8	0.03	25
	NBL	N/A	A	7.3	0.00	0	A	7.5	0.07	25
	SBL	N/A	A	7.3	0.00	0	A	7.3	0.00	0
	Total			2.4				6.2		

Yellow highlight = deficiency occurring without project traffic

Red highlight = deficiency occurs due to added project trips

Table 2 - PM Intersection Analysis Summary – Howard Bishop to Howard Bishop Transition										
Intersection	Movement	Available Storage (ft)	2020/2021 - No-build				2020/2021 Howard Bishop to Howard Bishop - With Project HCS			
			LOS	Delay(s)	v/c	95% Queue (ft)	LOS	Delay(s)	v/c	95% Queue (FT)
Signalized Intersections										
NE 9th Street at NE 16th Avenue	EBL	112	A	8.6	0.13	50	A	8.6	0.13	50
	EBT	N/A	B	11.0	0.53	175	B	11	0.54	200
	WBL	112	A	9.4	0.18	50	B	11.5	0.32	75
	WBT	N/A	B	10.7	0.47	175	B	10.8	0.48	175
	NBL	195	B	15.0	0.31	50	B	15.7	0.30	50
	NBT	N/A	B	13.9	0.49	100	B	15	0.54	125
	SBL	107	B	12.6	0.17	50	B	13.7	0.16	50
	SBT	N/A	B	13.3	0.50	100	B	14.1	0.48	100
Total		B	11.7			B	12.2			
Non-signalized Intersections										
NE 9th Street at North of Drop off Loop	WBT	N/A	B	11.4	0.20	25				
	Total			2.9						
NE 9th Street at South of Drop off Loop	SBL	N/A	A	7.8	0.04	25				
	Total			0.9						
NE 16th Avenue at NE 12th Street	EBL	N/A	A	8.2	0.02	25	A	8.3	0.06	25
	WBL	N/A	A	8.2	0.01	0	A	8.1	0.01	0
	NBT	N/A	C	20.5	0.14	25	D	25.6	0.19	25
	SBT	N/A	D	25.3	0.42	50	D	31.6	0.62	100
	Total			4.4				7.7		
NE 9th Street at NE 18th Ave	EBT	N/A	B	11.4	0.04	25				
	WBT	N/A	C	16.5	0.07	25				
	NBL	N/A	A	7.9	0.01	0				
	SBL	N/A	A	8.5	0.00	0				
	Total			1.4						
NE 19th Place at East Bus Loop Exit	NBT	N/A	B	10.3	0.05	25				
	Total			2.8						
NE 19th Place at West Bus Loop Entrance	WBL	N/A	A	7.4	0.01	0				
	Total			0.9						
NE 12th Street at NE 19th Place	EBT	N/A	B	10.1	0.11	25	A	9.8	0.16	25
	WBT	N/A	A	9.9	0.02	0	B	11	0.02	25
	NBL	N/A	A	7.5	0.01	0	A	7.4	0.06	25
	SBL	N/A	A	7.4	0.00	0	A	7.4	0.00	0
	Total			4.7				5.7		

Yellow highlight = deficiency occurring without project traffic

Red highlight = deficiency occurs due to added project trips

Tables 1 and 2 indicate that all intersections operated without deficiencies during the AM and PM peak school times under the no-build and buildout scenarios.

Though the analyses demonstrate that no deficiencies occur, the site observation did indicate an operational issue occurring during the school departure time. On two separate days parent/student drop off vehicles were observed filling their dedicated drop-off lane and spilling onto NE 9th Street as shown in **Figure 3**.

Figure 3 | Parent/Student Drop-off Spillover at Howard Bishop



This spillover would be corrected by providing sufficient parking for parent/student drop-off vehicles and ensuring vehicles are able to quickly pick-up/drop-off their child and exit the school. This should be considered with the Howard Bishop school and transition school design.

5. WESTWOOD TO HOWARD BISHOP TRANSITION

The following analysis provides a comparison between a build and no-build option at the Howard Bishop transition school, during the 2021/2022 year. Westwood would utilize the Howard Bishop transition school during the 2021/2022 school year. The following analysis uses forecasted traffic volumes during year 2022.

5.1. Intersection Analysis

Similar to the 2021 analysis, the 2022 analysis is based on the turning movement counts during the AM peak 15 minutes (8:30 AM) and the PM peak 15 minutes (3:45 PM) of Howard Bishop. The peak 15-minute traffic volumes are multiplied by four so that they can be analyzed as hourly traffic using traffic modeling software.

Some of the Westwood project trips will be pedestrian trips and some of the current pedestrian Westwood trips will be replaced by bus trips under a Howard Bishop transition school scenario. However, the analysis assumes that all pedestrian trips accessing Westwood are replaced by parent/student drop-off vehicles. This is a conservative approach, considering that additional buses are expected to be provided for the Westwood students. The study does not consider the additional buses and instead assumes that only additional parent/student drop-off vehicles are added, which causes higher than expected traffic volumes. The calculations used to determine the number of Westwood project vehicles accessing the Howard Bishop transition school site are provided in **Appendix D**.

The trip distribution is based on the location of the Westwood school zone boundary related to the Howard Bishop transition school site. As illustrated in **Figure 4**, about 61% and 33% are expected to access the Howard Bishop transition school via NE 23rd Avenue and NE 16th Avenue, respectively, while the remaining 6% will access the transition school along NE 9th Street and NE 12th Street. **Figure 5** provides the anticipated project turning movements that would result from the trip distribution percentages. The forecasted turning movements at all study area intersections are provided in **Appendix E**.

Tables 3 and 4 provide a comparison of the study area intersections under a no-build scenario and under a build-out scenario to demonstrate the impacts of providing the transition school at Howard Bishop during the 2021/2022 year with project trips from Westwood. All intersection movement deficiencies are highlighted.

Figure 4 | Westwood to Howard Bishop Transition – Trip Distribution (1 of 2)

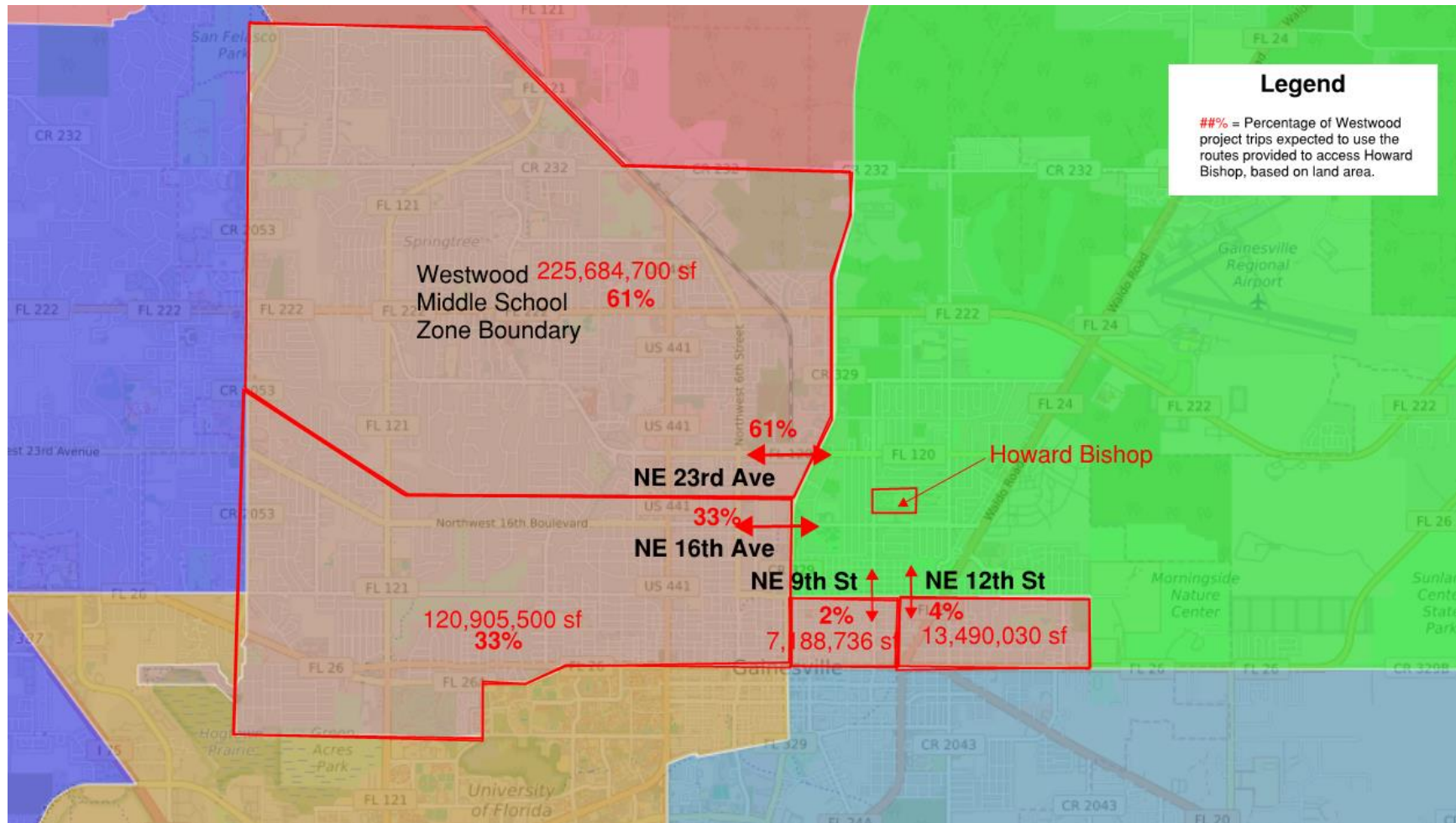


Figure 5 | Westwood to Howard Bishop Transition – Trip Distribution (2 of 2)



Table 3 - AM Intersection Analysis Summary – Westwood to Howard Bishop Transition										
Intersection	Movement	Available Storage (ft)	2021/2022 - No-build				2021/2022 Westwood to Howard Bishop - With Project			
			LOS	Delay(s)	v/c	95% Queue (ft)	LOS	Delay(s)	v/c	95% Queue (ft)
Signalized Intersections										
NE 9th Street at NE 16th Avenue	EBL	112	B	10.3	0.2	50	B	12.4	0.32	50
	EBT	N/A	B	10.3	0.41	125	B	16.6	0.70	200
	WBL	112	A	9.2	0.1	25	B	10.5	0.19	50
	WBT	N/A	B	10.9	0.43	150	B	15.9	0.68	200
	NBL	195	B	12.6	0.26	50	B	14.0	0.28	50
	NBT	N/A	B	12.6	0.48	100	B	14.4	0.52	100
	SBL	107	B	10.9	0.13	25	B	12.0	0.15	25
	SBT	N/A	B	13.1	0.52	125	B	15.2	0.56	125
	Total		B	11.5			B	15.2		
Non-signalized Intersections										
NE 9th Street at North of Drop off Loop	WBT	N/A	B	13.8	0.35	50				
	Intersection Total			4.1						
NE 9th Street at South of Drop off Loop	SBL	N/A	A	8.2	0.08	25				
	Intersection Total			1.5						
NE 16th Avenue at NE 12th Street	EBL	N/A	A	8.1	0.01	0	A	8.5	0.12	25
	WBL	N/A	A	7.8	0.00	0	A	7.8	0.00	0
	NBT	N/A	B	14.7	0.08	25	C	23.4	0.19	25
	SBT	N/A	B	13.3	0.13	25	C	19.3	0.24	25
	Total			2.1				4.7		
NE 9th Street at NE 18th Ave	EBT	N/A	A	10	0.01	0				
	WBT	N/A	C	15.2	0.05	25				
	NBL	N/A	A	7.9	0.00	0				
	SBL	N/A	A	8.1	0.01	0				
	Total			0.6						
NE 19th Place at East Bus Loop Exit	NBT	N/A	A	9.1	0.00	0				
	Total			1.0						
NE 19th Place at West Bus Loop Entrance	WBL	N/A	A	7.3	0.00	0				
	Total									
NE 12th Street at NE 19th Place	EBT	N/A	A	8.8	0.02	0	B	10.9	0.02	25
	WBT	N/A	A	9.4	0.01	0	B	12.6	0.02	25
	NBL	N/A	A	7.3	0.00	0	A	7.8	0.00	0
	SBL	N/A	A	7.3	0.00	0	A	7.6	0.00	0
	Total			2.5				0.6		

Yellow highlight = deficiency occurring without project traffic

Red highlight = deficiency occurs due to added project trips

Table 4 - PM Intersection Analysis Summary – Westwood to Howard Bishop Transition										
Intersection	Movement	Available Storage (ft)	2021/2022 - No-build				2021/2022 Westwood to Howard Bishop - With Project			
			LOS	Delay(s)	v/c	95% Queue (ft)	LOS	Delay(s)	v/c	95% Queue (ft)
Signalized Intersections										
NE 9th Street at NE 16th Avenue	EBL	112	A	8.6	0.13	50	A	9.1	0.16	50
	EBT	N/A	B	11.1	0.54	200	B	13.5	0.62	325
	WBL	112	A	9.5	0.18	50	B	10.5	0.25	50
	WBT	N/A	B	10.7	0.48	175	B	13.3	0.61	325
	NBL	195	B	15.1	0.32	50	B	17.9	0.33	50
	NBT	N/A	B	14.0	0.49	100	B	17.1	0.53	100
	SBL	107	B	12.7	0.17	50	B	15.2	0.18	50
	SBT	N/A	B	13.4	0.50	100	B	16.4	0.52	100
	Total		B	11.8			B	14.2		
Non-signalized Intersections										
NE 9th Street at North of Drop off Loop	WBT	N/A	B	11.5	0.20	25				
	Total			2.8						
NE 9th Street at South of Drop off Loop	SBL	N/A	A	7.8	0.04	25				
	Total			0.9						
NE 16th Avenue at NE 12th Street	EBL	N/A	A	8.2	0.02	25	A	8.6	0.14	25
	WBL	N/A	A	8.2	0.01	0	A	8.2	0.01	0
	NBT	N/A	C	20.8	0.15	25	F	58.8	0.47	75
	SBT	N/A	D	26.0	0.43	75	F	163.8	1.21	400
	Total			4.5				43.4		
NE 9th Street at NE 18th Ave	EBT	N/A	B	11.6	0.04	25				
	WBT	N/A	C	16.6	0.07	25				
	NBL	N/A	A	7.9	0.01	0				
	SBL	N/A	A	8.6	0.00	0				
	Total			1.5						
NE 19th Place at East Bus Loop Exit	NBT	N/A	B	10.3	0.05	25				
	Total			2.8						
NE 19th Place at West Bus Loop Entrance	WBL	N/A	A	7.4	0.01	0				
	Total			0.9						
NE 12th Street at NE 19th Place	EBT	N/A	B	10.2	0.12	25	B	14.9	0.20	25
	WBT	N/A	A	9.9	0.02	0	B	14.9	0.03	25
	NBL	N/A	A	7.5	0.01	0	A	8.0	0.01	0
	SBL	N/A	A	7.4	0.00	0	A	8.1	0.00	0
	Total			4.7				2.2		
Yellow highlight = deficiency occurring without project traffic										
Red highlight = deficiency occurs due to added project trips										

Tables 3 and 4 indicate that all intersections operated without deficiencies during the AM and PM peak school times under the no-build and buildout scenarios, except for the northbound and southbound movements of NE 16th Avenue at NE 12th Street under the PM build-out scenario. Due the added southbound trips and added eastbound left-turning trips, the delay of the northbound and southbound vehicles causes a level-of-service of F for these two movements.

Because the delay is expected to occur only during the school peak hours, it is recommended that a crossing guard be used to stop the mainline traffic and allow northbound and southbound vehicles to flow through the intersection without significant delay.

6. LITTLEWOOD TO HOWARD BISHOP TRANSITION

The following analysis provides a comparison between a build and no-build option at the Howard Bishop transition school, during the 2022/2023 year. Littlewood will utilize the Howard Bishop transition school during the 2022/2023 school year. The following analysis uses forecasted traffic volumes during year 2023.

6.1. Intersection Analysis

Littlewood has peak traffic times that occur earlier than Howard Bishops' peak times. With the goal of the study being to determine the impact of the new project trips, the 15-minute AM and PM peaks for Littlewood are used for the analysis. These 15-minute peaks occur at 7:30 AM and 2:00 PM. The peak 15-minute traffic volumes are multiplied by four so that they can be analyzed as hourly traffic using traffic modeling software.

Based on review of the number parent/student drop off trips, the 11 buses serving the school, and the school enrollment of approximately 790 students, there are expected to be a low volume of pedestrians that access Littlewood. The analysis uses the number of inbound and outbound vehicles at the Littlewood and SW 8th Avenue access as the Littlewood project trips that would access the Howard Bishop transition school. This is a conservative approach, considering that additional buses are expected to be provided for the Littlewood students. The study does not consider the additional buses and instead maintains the number of parent/student drop-off vehicles, which should forecast higher than expected traffic volumes. The calculations used to determine the number of Littlewood project vehicles accessing the Howard Bishop transition school site are provided in **Appendix D**.

The trip distribution is based on the location of the Littlewood school zone boundary related to the Howard Bishop transition school site. As illustrated in **Figure 6**, about 57% are expected to access the Howard Bishop transition school via NE 16th Avenue and 43% are expected to access through NE 9th Street. **Figure 7** provides the anticipated project turning movements that would result from the trip distribution percentages. The forecasted turning movements at all study area intersections are provided in **Appendix E**.

Tables 5 and 6 provide a comparison of the study area intersections under a no-build scenario and under a build-out scenario to demonstrate the impacts of providing the transition school at Howard Bishop during the 2022/2023 year with project trips from Littlewood. All intersection movement deficiencies are highlighted.

Figure 6 | Littlewood to Howard Bishop Transition – Trip Distribution (1 of 2)

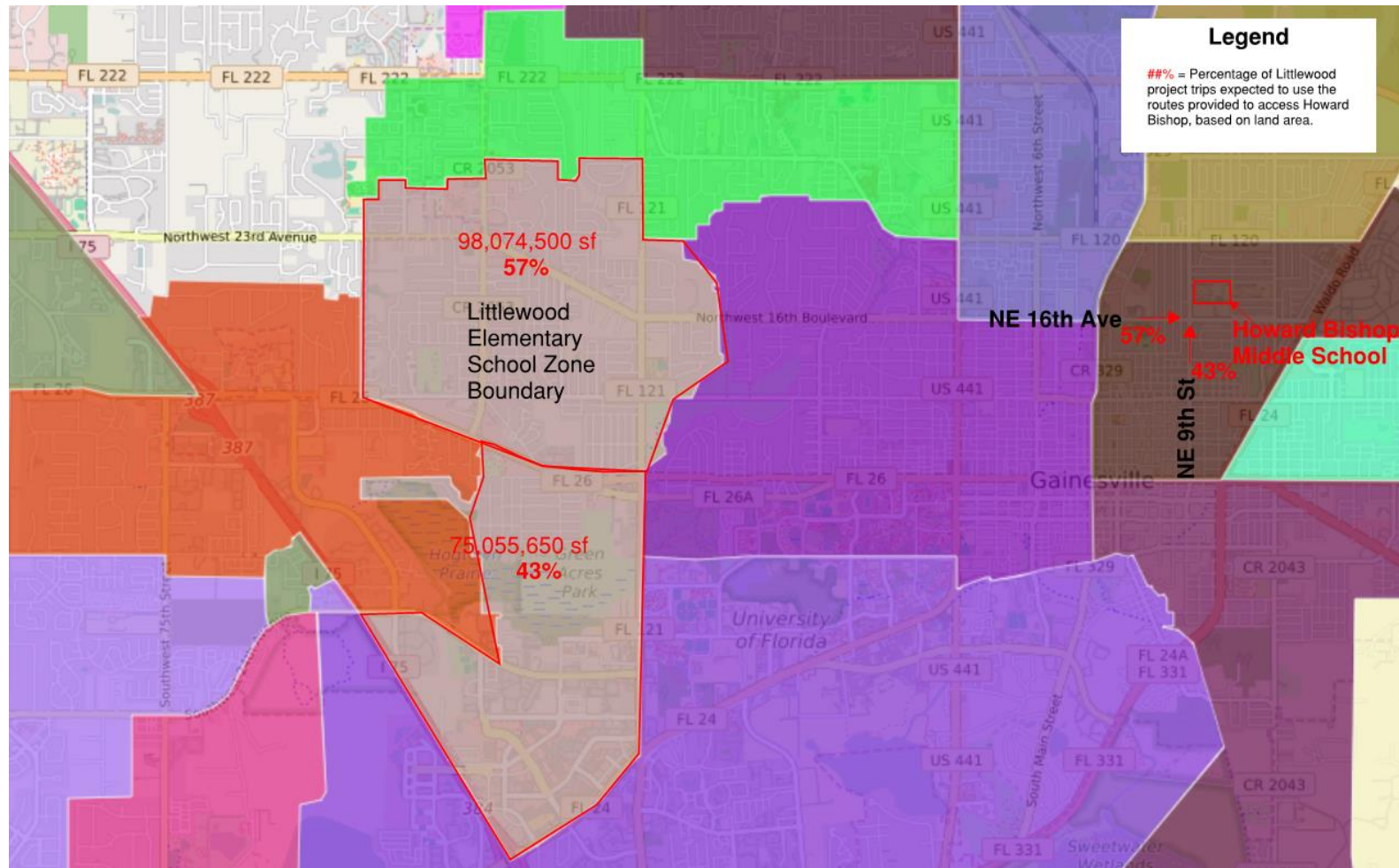


Figure 7 | Littlewood to Howard Bishop Transition – Trip Distribution (2 of 2)



Traffic Impact Analysis

Howard Bishop Transition School

Table 5 - AM Intersection Analysis Summary – Littlewood to Howard Bishop Transition										
Intersection	Movement	Available Storage (ft)	2022/2023 - No-build				2022/2023 Littlewood to Howard Bishop - With Project HCS			
			LOS	Delay(s)	v/c	95% Queue (ft)	LOS	Delay(s)	v/c	95% Queue (ft)
Signalized Intersections										
NE 9th Street at NE 16th Avenue	EBL	112	B	10.3	0.2	50	A	9.0	0.10	25
	EBT	N/A	B	10.4	0.42	125	B	14.4	0.65	200
	WBL	112	A	9.2	0.1	25	C	26.0	0.70	150
	WBT	N/A	B	10.9	0.43	150	B	16.7	0.71	225
	NBL	195	B	12.6	0.26	50	B	18.5	0.41	75
	NBT	N/A	B	12.7	0.48	100	B	17.5	0.68	150
	SBL	107	B	10.9	0.13	25	B	12.8	0.02	25
	SBT	N/A	B	13.2	0.52	125	B	15.5	0.41	100
Intersection Total		B	11.6			B	17.2			
Non-signalized Intersections										
NE 9th Street at North of Drop off Loop	WBT	N/A	B	13.9	0.35	50				
	Intersection Total			4.1						
NE 9th Street at South of Drop off Loop	SBL	N/A	A	8.2	0.08	25				
	Intersection Total			1.5						
NE 16th Avenue at NE 12th Street	EBL	N/A	A	8.1	0.01	0	A	9.2	0.31	50
	WBL	N/A	A	7.8	0.00	0	A	7.6	0.00	0
	NBT	N/A	B	14.8	0.08	25	F	81.1	0.54	75
	SBT	N/A	B	13.4	0.14	25	F	159.3	1.25	575
	Intersection Total			2.1				66.3		
NE 9th Street at NE 18th Ave	EBT	N/A	A	10	0.01	25				
	WBT	N/A	C	15.3	0.05	25				
	NBL	N/A	A	7.9	0.00	0				
	SBL	N/A	A	8.1	0.01	25				
	Intersection Total			0.6						
NE 19th Place at East Bus Loop Exit	NBT	N/A	A	9.2	0.00	0				
	Intersection Total			1.0						
NE 19th Place at West Bus Loop Entrance	WBL	N/A	A	7.3	0.00	0				
	Intersection Total									
NE 12th Street at NE 19th Place	EBT	N/A	A	8.8	0.02	0				
	WBT	N/A	A	9.4	0.01	0				
	NBL	N/A	A	7.3	0.00	0				
	SBL	N/A	A	7.3	0.00	0				
	Intersection Total			2.5						

Yellow highlight = deficiency occurring without project traffic

Red highlight = deficiency occurs due to added project trips

Table 6 - PM Intersection Analysis Summary – Littlewood to Howard Bishop Transition										
Intersection	Movement	Available Storage (ft)	2022/2023 - No-build				2022/2023 Littlewood to Howard Bishop - With Project HCS			
			LOS	Delay(s)	v/c	95% Queue (ft)	LOS	Delay(s)	v/c	95% Queue (ft)
Signalized Intersections										
NE 9th Street at NE 16th Avenue	EBL	112	A	8.5	0.13	50	A	6.9	0.09	25
	EBT	N/A	B	10.8	0.53	200	A	9.0	0.47	175
	WBL	112	A	9.3	0.19	50	B	11.1	0.42	100
	WBT	N/A	B	10.5	0.47	175	B	10.4	0.55	225
	NBL	195	B	16.2	0.32	50	B	17.9	0.28	50
	NBT	N/A	B	15.3	0.50	100	B	12.7	0.49	75
	SBL	107	B	13.7	0.17	50	B	15.2	0.07	25
	SBT	N/A	B	14.7	0.51	125	B	16.7	0.39	100
	Intersection Total		B	12.1			B	11.2		
Non-signalized Intersections										
NE 9th Street at North of Drop off Loop	WBT	N/A	B	11.5	0.20	25				
	Intersection Total			2.8						
NE 9th Street at South of Drop off Loop	SBL	N/A	A	7.8	0.04	25				
	Intersection Total			0.9						
NE 16th Avenue at NE 12th Street	EBL	N/A	A	8.2	0.02	25	A	8.4	0.13	25
	WBL	N/A	A	8.2	0.01	0	A	8.0	0.00	0
	NBT	N/A	C	21	0.15	25	E	45.8	0.28	50
	SBT	N/A	D	26.9	0.45	75	D	26.9	0.75	175
	Intersection Total			4.7				11.7		
NE 9th Street at NE 18th Ave	EBT	N/A	B	11.6	0.04	25				
	WBT	N/A	C	16.7	0.07	25				
	NBL	N/A	A	7.9	0.01	0				
	SBL	N/A	A	8.6	0.00	0				
	Intersection Total			1.5						
NE 19th Place at East Bus Loop Exit	NBT	N/A	B	10.3	0.05	25				
	Intersection Total			2.7						
NE 19th Place at West Bus Loop Entrance	WBL	N/A	A	7.4	0.01	0				
	Intersection Total			0.9						
NE 12th Street at NE 19th Place	EBT	N/A	B	10.2	0.12	25				
	WBT	N/A	A	10	0.02	25				
	NBL	N/A	A	7.5	0.01	0				
	SBL	N/A	A	7.4	0.00	0				
	Intersection Total			4.8						

Yellow highlight = deficiency occurring without project traffic

Red highlight = deficiency occurs due to added project trips

Tables 5 and 6 indicate that all intersections operated without deficiencies during the AM and PM peak school times under the no-build and buildout scenarios, except for the northbound and southbound movements of NE 16th Avenue at NE 12th Street under the AM build-out scenario. Similar to the Westwood project trips, the added southbound trips and added eastbound left-turning trips create delay of the northbound and southbound vehicles causing a level-of-service of F for these two movements.

Because the delay is expected to occur only during the school peak hours, it is recommended that a crossing guard be used to stop the mainline traffic and allow northbound and southbound vehicles to flow through the intersection without significant delay.

7. PARKING UTILIZATION

The parking utilization and stacking at the three schools proposed to use the transition school were recorded during the site visits. The maximum number of parked vehicles including vehicles queued in the parent/student drop-off lanes and excluding buses, are provided in **Table 7**. Parking utilization figures are provided in **Appendix G**.

Table 7 | Parking Utilization

School	Maximum Number of Parked Vehicles
Howard Bishop	125
Westwood	132
Littlewood	185

These volumes should be considered when designing the parking for the transition school. Providing 125 spaces for faculty and staff and parent/student drop-off would provide sufficient parking for the 2020/2021 Howard Bishop transition phase.

During the 2021/2022 scenario the parking demand for Westwood, with a much larger enrollment of 1,200 compared to 770 students and fewer students within walking range to school, would require additional parking. It is difficult to estimate the number of additional parent/student drop off vehicles that would be generated by Westwood when transitioning to Marjorie K Rawlings.

Based on the available count and bus data, Littlewood students access the school primarily via bus and parent/student drop-off. Since an additional 6 buses will be provided to serve the Littlewood students under a Marjorie K Rawlings transition school scenario, more students are expected to take a bus to access the school. Therefore, the number of parent/student drop-off vehicles and the parking demand for Littlewood is not expected to increase. Providing 185 spaces for faculty, staff and parent/student drop-off is expected to provide sufficient parking for the 2021/2022 Westwood transition and 2022/2023 Littlewood transition.

Howard Bishop has a capacity to hold 12 buses within the existing bus loop. Though Howard Bishop and Westwood are anticipated to use staggered arrival and departure times, Westwood is expecting 15 buses and Littlewood is expecting 17 buses, which exceed the capacity of the bus loop. In addition to the school's arrival and departure times being staggered, the bus schedules of each of these two schools should be staggered to ensure that the maximum number of buses at a single time does not exceed 12.

8. NON-VEHICULAR MULTI-MODAL TRAFFIC

Under existing conditions at Howard Bishop, the turning movement counts indicate that approximately 103 students during the AM and 215 students during the PM walk or use some other non-vehicular mode of transportation to access Howard Bishop. The following observations were noted based on the site visits and data collection.

- The majority of the non-vehicular traffic was pedestrian traffic. The cyclists that were observed, stayed on the sidewalk alongside the pedestrians.
- During the PM peak a high volume of pedestrians were observed exiting Howard Bishop just after the final bell, whereas the AM peak pedestrian traffic was more sporadic.
- NE 19th Place has sidewalk on the north side of the road but does not on the south side of the road. Some students were observed walking along the south side of the road. Consideration should be given to providing sidewalks on the south side of NE 19th Place, as this roadway provides the closest east/west connection to both Howard Bishop and Metcalfe Elementary School.
- The turning movement counts indicate that a high volume of pedestrian traffic heads south on NE 9th Street. Some of these pedestrians cross the signalized intersection of NE 9th Street and NE 16th Avenue. Under the Howard Bishop transition scenario, crossing of NE 16th Avenue at this intersection would still be expected though some of this traffic would be diverted to NE 12th Street, where a crossing guard is present. Possible pedestrian safety improvements at NE 9th Street at NE 16th Avenue worth consideration are provided below:
 - Provide a crossing guard to facilitate students crossing the intersection, currently there are none.
 - Provide signalization improvements such as a pedestrian only phase and/or “No Right on Red” during school peaks to reduce the chances of pedestrian and vehicular conflicts.

9. CONCLUSIONS AND RECOMMENDATIONS

This traffic study reviewed a proposed Howard Bishop transition school during the 2020/2021, 2021/2022, and 2022/2023 school years located on the east side of the Howard Bishop campus. The study provides an intersection analysis, parking utilization review, and a review of the non-vehicular multi-modal traffic to determine the needed improvements to support a Howard Bishop transition school. Additionally, the study reviews possible improvements at Howard Bishop, regardless of the location of the transition school.

The study indicates that a transition school, located at Howard Bishop, can be provided without any major traffic impacts within the study area. Based on the finding of the study the following improvements should be provided if the transition school is located at Howard Bishop:

- Traffic at the intersection of NE 16th Place and NE 12th Street needs to be controlled during the school peak hours when Westwood and Littlewood students attend the transition school. It is recommended that this is accomplished by using crossing guard(s) to direct traffic.
- During the 2020/2021 school year 125 parking spaces should be provided for faculty, staff, and parent/student drop-off parking. During the 2021/2022 and 2022/2023 school years, 185 parking spaces should be provided for Westwood and Littlewood faculty, staff and parent/student drop-off. Restriping NE 12th Street from NE 16th Avenue to NE 20th Place, to provide off-street parking, would provide approximately 85 parking spaces.
- Bus schedules should be staggered such that the number of buses in the Howard Bishop bus loop at a specific time does not exceed 12 buses.

Regardless of whether the transition school is provided at Howard Bishop, the following improvements should be considered to improve traffic operations and/or safety near Howard Bishop Middle School.

- Additional parking should be added to provide a total of approximately 125 spaces to prevent vehicles from blocking traffic along NW 9th Street and prevent vehicles from parking at unintended locations.
- Some students were observed walking along the roadway of NE 19th Place, which connects Howard Bishop to Metcalfe Elementary School. Providing sidewalks along the south side of this road should be considered.
- Students were observed crossing the signalized intersection of NE 16th Avenue and NE 9th Street where no crossing guard was present. The following improvements should be considered at this intersection:
 - Provide a crossing guard to assist pedestrian crossings.
 - Provide an all pedestrian phase to reduce the chances of permitted left-turn/pedestrian conflicts.
 - Provide "No Right on Red" during school peak hours to reduce the chances of right-turn/pedestrian conflicts.