



MEMORANDUM

DATE: March 15, 2023
TO: File
FROM: Clint Pletzer, P.E.
RE: **Site 97-E-SE-2 Elementary School**
Preliminary Traffic Impact Analysis Study

INTRODUCTION

Orange County Public Schools (OCPS) is considering a new elementary school, currently known as Site 97-E-SE-2. The new school is proposed to be located on an 11-acre greenfield site in the Storey Park Planned Development (PD) in the City of Orlando, Florida. (See below.) The purpose of this Preliminary Traffic Impact Analysis Study memorandum is to provide recommendations for site access, drop-off/pick-up queue storage length, school bus loop queue storage length, parking spaces for the school, and a preliminary level-of-service (LOS) operational analysis.



EXISTING CONDITIONS

Many of the adjacent roadways and intersections that will provide access to Site 97-E-SE-2 in the Storey Park PD are either in the design/planning phase, under construction, or have not been constructed yet. Meridian High School (Site 50-H-SE-2) is currently under construction in the Starwood Property PD approximately 0.75 miles north of this project on Dowden Road. The following studies prepared for Site 50-H-SE-2 contain information that is still relevant to the Site 97-E-SE-2 project.

- Traffic Operations Analysis Study, OCPS Relief High School Site 50-H-SE-2, Traffic Planning and Design, Inc. (TPD), November 2020.
- Program Verification Report, Site 50-H-SE-2, DAO Consultants, Inc., October 2020.
- Project Alpha, Starwood Roadway Network Analysis, Vanasse Hangen Brustlin, Inc. (VHB), April 21, 2015.

A request and search for Storey Park PD studies yielded minimal results, including the following:

- Storey Park Master Utility Plan, Poulos & Bennett, September 2014.
- Storey Park Apartments, Vanasse Hangen Brustlin, Inc. (VHB), July 2022.

Neither study contained traffic data that would be useful for modeling the Storey Park PD intersections on Dowden Road. Trips generated for the proposed subdivisions may approximate traffic entering and exiting a specific subdivision; however, background traffic from the Starwood Property to the north would likely account for the majority of trips to the north and impact trips to the south since both PDs share Dowden Road as their primary arterial.

The exhibit on the following page shows the overall site plan for the Storey Park PD from the Year 2014 Storey Park Master Utility Plan at that time:



Proposed Site Conditions

Arterials and collectors identified within a two-mile radius of the school site include:

- Burrows St.
- De Haven St.
- Dowden Rd.
- Introduction Way
- John Wycliffe Blvd.
- Moss Park Rd.
- Mossy Oak Dr.
- N. Shore Golf Club Blvd.
- Park Commons Dr.
- Philosophy Way
- Prologue Ave.
- Pulitzer Pl.
- SR 528
- SR 417
- Stanza Way
- Storey Park Blvd.
- Wewahootee Rd.

The proposed subdivisions have numerous local roadways that are generally two-lane, urban roads with curb and gutter, and sidewalks.

Per Orange County's Code of Ordinances, Chapter 38, Article XVII, Section 38-1754 (http://orangecounty-fl.elaws.us/code/coor_ch38_artxviii_sec38-1754), "Elementary schools shall not be located on arterials but shall be located on local streets or on residential collector streets situated within residential neighborhoods..." The proposed elementary school meets the code requirement since it is located on a local and/or residential collector street.

Proposed School Description

The proposed Site 97-E-SE-2 Elementary School is to be a prototype school located on a greenfield site. According to OCPS, the elementary school is planned to accommodate 837 students initially with an ultimate capacity of 1,101 with portables.

Proposed Traffic Data

Introduction Way is a completed two-lane, local, collector road running in an east-west direction north of the proposed school site. It has curb and gutter and sidewalks on both sides and would tie directly into the school bus entrance with additional connections to the neighborhood north of the school. An unnamed, east-west, local, urban roadway connecting to Dowden Road is currently proposed on the south side of Site 97-E-SE-2.

At the time of this study, the preliminary site plan showed the school buses entering/exiting the proposed school directly on Introduction Way. Some of the advantages of using Introduction Way for the school buses include:

- The property to the north of the school site is primarily residential with driveways that may be negatively impacted by cars driving or queuing through the neighborhoods,
- More passenger vehicles in the neighborhoods may lead to more conflicts and reduced safety for pedestrians on the local neighborhood roads.
- Many residents do not want increased traffic in their neighborhoods and often purchase property in less traveled areas.
- Increased traffic increases noise and reduces air quality in neighborhoods.
- Parcel shape and road network layout is more conducive to a shorter driveway on Introduction Way.

A potential disadvantage of using Introduction Way for school buses instead of for the parent access is that is that parents to the immediate north of the school site may have to access the proposed the parent loop/parking lot driveway via Dowden Road; however, all of the planned residences north of the proposed school are within the two-mile "no-busing" zone.

The proposed parent loop/parking lot driveway for Site 97-E-SE-2 Elementary would be on the new unnamed east-west connector road at the southeast corner of the property. New trips for the school will be distributed to the adjacent roadways for future driveway operational analyses.

Vehicular Access

The proposed concept site plan below shows one driveway for the combined parent loop/parking lot and one school bus loop driveway. A combined parent loop/parking lot driveway is proposed for the southeast corner of the school parcel. This driveway could be accessed by the proposed new east-west road to Dowden Road and by the proposed new north-south to Introduction Way. As noted, the school bus driveway is currently proposed for Introduction Way. The majority of existing OCPS elementary schools start at around 8:45 AM and end at 3:00 PM (MTTF) (2:00 PM W), which will be the peak periods for school access.



Conceptual Site Plan

Pedestrian/Bicyclist Access

One of the primary design goals is to minimize students crossing vehicle paths – both on-site and off-site. Pedestrian/bicyclist accommodations at the school site must be considered during design. Based on the existing and planned developments in the two-mile “no-busing” zone, it is expected that there may be significant pedestrian/bicyclist traffic to the school. Proposed pedestrian and bicyclist entrances should be located to avoid unnecessary crossings at the school driveways.

Existing new subdivisions within the two miles have sidewalks in the neighborhoods. New planned subdivisions should also include sidewalks. If any new roadway or signalized intersections are constructed within the two-mile radius, then marked crosswalks and relevant signing and STOP bars should be added for pedestrian/bicyclist crossing safety.

Otherwise, mid-block crossings and other pedestrian routes should be considered. Safety at mid-block crossings could be improved using one or more of the following: pedestrian traffic signals, rectangular rapid flashing beacons (RRFB), pedestrian hybrid beacons (aka H.A.W.K.), reduced school zone speed limits, and/or crossing guards.

Proposed Trip Generation

Since the start and end times for the school do not necessarily occur during the AM and PM peak hours of the adjacent roads, school traffic studies generally use rates for the AM peak hour and PM peak hour of the generator (the school). These rates more accurately portray increases in school-related traffic that may occur off-peak for the adjacent street.

Trip generation for Site 97-E-SE-2 was conducted using ITE's Trip Generation, 11th Edition. Land Use Code 520, Elementary School, was used for this study. The independent variable for this use is "students." The proposed relief school will have a maximum capacity of 1,101 students. Fitted curve equations were not available for all measurement periods of this land use; therefore, average rates were used resulting in the trips shown in the table below.

Site 97-E-SE-2 Elementary School - ITE Trip Generation									
Land Use	Land Use Code	Size	Avg Daily	AM Peak Hour			PM Peak Hour		
			Trips	Total	Enter	Exit	Total	Enter	Exit
Elementary School	520	1,101	2,500	826	446	380	496	228	268

Source: Trip Generation Manual, 11th Edition, Institute of Transportation Engineers, September 2021.

Proposed On-Site Pick-Up/Drop-Off Queue

Providing on-site pick-up/drop-off queue storage, or stacking, minimizes dropping-off/picking-up students on the surrounding roadways, which can result in safety hazards and traffic delays. The OCPS Design Standards have pick-up/drop-off queue guidelines for a prototypical elementary school. One additional method based on the average of other OCPS schools was developed to create a recommendation for the on-site pick-up/drop-off queue using the average rate. The proposed on-site pick-up/drop-off queue analysis is discussed for the school below.

Design Queue Based on OCPS Design Standards

The OCPS Design Standards for a prototypical elementary school indicate that the pick-up/drop-off loop should provide on-site storage for 20% of the planned school capacity. Using the 20% standard,

the planned capacity of 1,101 student stations would require on-site pick-up/drop-off queue storage for 220 vehicles.

Design Queue Based on Similar OCPS Elementary School Counts and Observations

On-site pick-up/drop-off queue storage for the proposed school was also estimated using counts and observations for similar elementary schools in Orange County, Florida, as shown in the table below.

Aggregated Elementary Schools On-Site Queue								
School	Enrollment	Program Capacity	AM Peak 15-Min Exit	PM Peak 15-Min Exit	Min. Peak 15-Min Exit	Min. Peak 15-Min Exit Rate	Max. Peak 15-Min Exit	Max. Peak 15-Min Exit Rate
Dommerich ES	612	488	157	113	113	0.18	157	0.26
Dream Lake ES	829	460	125	97	97	0.12	125	0.15
Frangus ES	664	541	88	105	88	0.13	105	0.16
Millennia ES	1,039	732	135	108	108	0.10	135	0.13
Oak Hill ES	503	322	73	71	71	0.14	73	0.15
Riverside ES	642	741	63	67	63	0.10	67	0.10
Sum or Average	<u>4,289</u>	<u>3,284</u>	NA	NA	<u>540</u>	<u>0.13</u>	<u>662</u>	<u>0.15</u>

Applying the maximum average on-site queue storage length rate of 15% would result in an on-site pick-up/drop-off queue storage length of 166 vehicles, or approximately 3,320-ft. of vehicle queue storage for the planned 1,101 students at the elementary school.

Proposed On-Site School Bus Queue

OCPS Design Standards for a prototypical elementary school simply state, “The two-lane bus loop drop-off area shall be sized to fit the specific school need.” No other guidance is provided; therefore, the number of school buses needed for the proposed elementary school was estimated using observations from similar OCPS elementary schools, as shown in the table below.

Aggregated Elementary Schools Observed Buses			
School	Students	Buses	Bus Rate
Avalon ES	950	1	0.001
Dommerich ES	612	3	0.005
Dream Lake ES	829	5	0.006
Lake Weston ES	595	1	0.002
Riverside ES	642	3	0.005
Sum or Average	<u>3,628</u>	<u>13</u>	<u>0.004</u>

Based on the average school bus-per-student rate of 0.4% shown above, at least 5 school buses would be required for the planned 1,101 students at the elementary school. The number of buses seems reasonable since the majority of residences are within a 2-mile straight-line radius of the new school.

School buses range anywhere from 20 to 45-ft. in length. In general, school buses that are 20-25-ft. long are considered mini or short, school buses that are 25-35-ft. long fall into the mid-size category, and school buses over 35-ft. are full-sized. Assuming that a large school bus is 40-ft. long, then the OCPS requirement for 5 school buses would require approximately 200-ft. of school bus queue storage.

Proposed On-Site Parking

On-site parking is required for faculty and staff as well as visitors to the school. OCPS Design Standards for a prototypical elementary school state to “Provide staff member, visitor, and accessible parking spaces as required by the Florida Building Code. Provide seventy-five (75) spaces minimum as space allows.”

As a general guideline, one parking space should be allotted for each staff member and one visitor parking space per one hundred students. The number of staff members for the proposed school was estimated using staff-per-student rates from similar OCPS elementary schools, as shown in the table below.

Aggregated Elementary Schools Staff Rate			
School	Students	Staff	Staff Rate
Avalon ES	850	94	0.11
Dream Lake ES	810	95	0.12
Lake Weston ES	542	65	0.12
Millennia ES	1,075	102	0.09
Oak Hill ES	518	58	0.11
Riverside ES	584	63	0.11
<u>Sum or Average</u>	<u>4,379</u>	<u>477</u>	<u>0.11</u>

Based on the average staff-per-student rate of 11% shown above, at least 121 staff members would be required for the planned 1,101 students at the elementary school. If one parking space is allotted to each faculty and staff member and one visitor parking space per one hundred students, then at least 132 parking spaces would be needed for Site 97-E-SE-2. The conceptual plan shows a parking lot within the parent loop at the school.

Preliminary Operational Analysis

This introductory operational analysis will focus on intersections on Dowden Road that would serve the proposed school traffic and future background residential and commercial traffic – specifically Dowden

Road at Introduction Way and Dowden Road at the new east-west connector roadway further south on Dowden Road.

Background Traffic

New traffic data on Introduction Way and Dowden Road has been collected and is being compiled to determine the current background traffic for the analysis. It will be included in a future draft of the study.

Synchro Analysis

Most existing OCPS elementary schools start at around 8:45 AM and end at 3:00 PM (MTTF) (2:00 PM W). The Orange County Transportation Planning Division Traffic Operational Analysis Methodology for Schools states “that the AM peak hour analysis is required instead of the PM since school hours coincide more with the typical 7-9 AM peak hour.” The two intersections on Dowden Road will be analyzed for the AM peak hour using Synchro to determine the LOS and queue length upon receipt of the latest background traffic data.

PRELIMINARY CONCLUSIONS

This Preliminary Traffic Impact Analysis Study memorandum was prepared for a proposed elementary school, currently known as Site 97-E-SE-2, to be located on a greenfield site in the Storey Park Planned Development in the City of Orlando, Florida. The elementary school is planned to ultimately accommodate up to 1,101 students (including portables).

Proposed On-Site Pick-Up/Drop-Off Queue

Based on the OCPS Design Standards 20% rate, Site 97-E-SE-2 Elementary School would require on-site pick-up/drop-off queue storage length for 220 vehicles for the planned 1,101 student stations. Assuming 20-ft. per vehicle, then that would require approximately 4,400-ft. of vehicle queue storage. Using the average rate for other OCPS elementary schools would require an on-site pick-up/drop-off queue storage length for 166 vehicles, or approximately 3,320-ft. of vehicle queue storage.

Proposed On-Site School Bus Queue

OCPS Design Standards for prototypical elementary schools require that “the two-lane bus loop drop-off area shall be sized to fit the specific school need.” Based on the average similar school calculations, the school bus loop for the proposed school would need to provide on-site queue storage for at least 5 school buses. Assuming that a large school bus is 40-ft. long, then the OCPS requirement for 5 school buses would require approximately 200-ft. of school bus queue storage.

Proposed Staff and On-Site Parking

As a general guideline, one parking space should be provided per staff member and one visitor parking space per one hundred students. For Site 97-E-SE-2, it is expected that there will be 121 staff for the 1,101 students. This would result in at least 132 parking spaces for Site 97-E-SE-2.

All analyses contained in this memorandum are based on the Site 97-E-SE-2 Elementary School planned students and site location as indicated at the time of data collection. If the planned students, site location, or other developments change, then the existing and proposed conditions would need to be reevaluated.

END OF MEMORANDUM