MODELING/TRAFFIC IMPACT ANALYSIS of

UNIVERSITY OF FLORIDA CAMPUS MASTER PLAN

Technical Memorandum

Prepared for

The University of Florida

Prepared by

THE CORRADINO GROUP

5200 NW 33rd Ave Suite 203

Fort Lauderdale, FL 33309

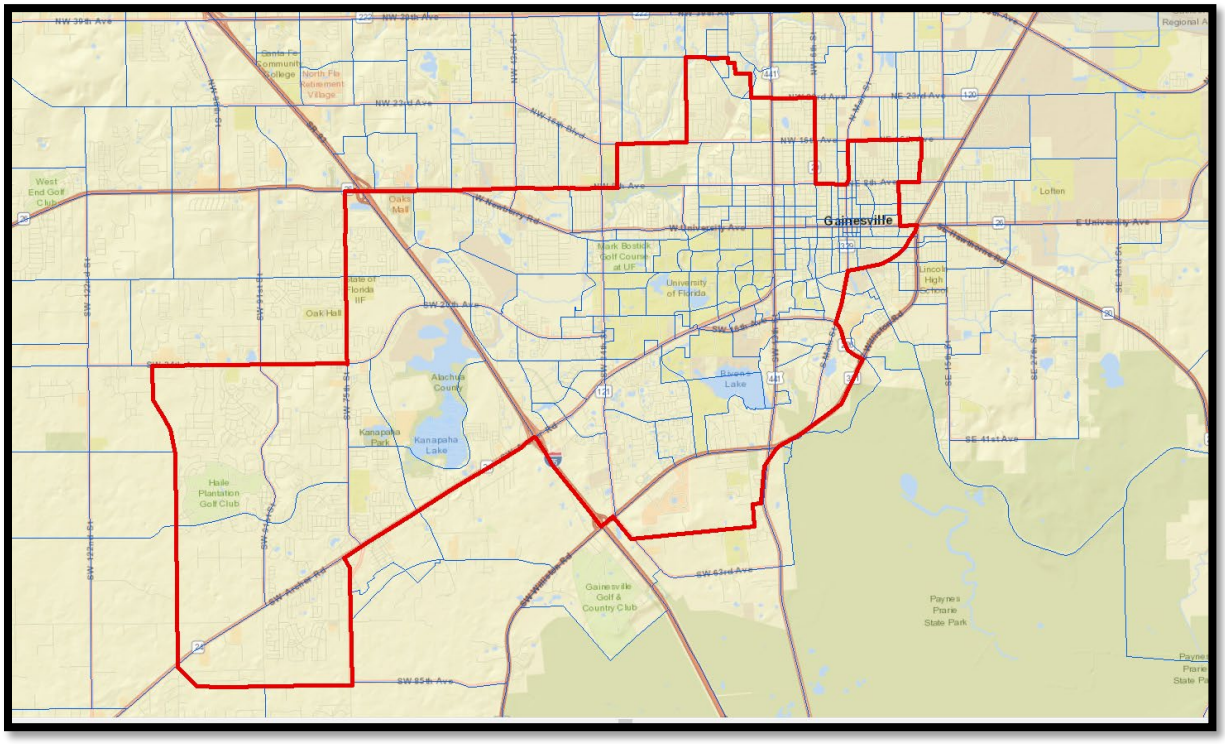
1.0 Introduction

This technical memorandum provides summary of the travel demand modeling/forecasting results and traffic impact analyses conducted as part of the University of Florida (UF) 2030 Campus Master Plan update. The Gainesville Metropolitan Planning Organization (MTPO) is updating Gainesville Urbanized Area Transportation Study Model (GUATS) to 2015 base year, as part of the 2045 Long Range Transportation Plan (LRTP) update. The Campus Master Plan Modeling scenarios development uses 2015 base year validation and 2045 Existing-plus-committed scenarios approved by the MTPO and the Project Working Group (WG).

2.0 Develop the Masterplan Context Area

At the September 16, 2019 coordination meeting with the City of Gainesville, Alachua County, FDOT D2 and UF, the Context Area shown in the Figure 1 was approved for the Campus Master Plan traffic impact analysis. The Context Area was formally approved in October 2019.

Figure 1: UF Master Plan Context Area



Using this Context Area boundary, the modeling analysis for the Master Plan was initiated. In this task, the UF Context Area boundary was overlaid on the GUATS model networks (2015, E+C, 2030 Baseline and Build scenarios). The roadway links that are within or intersected by the subarea as the context area links were flagged. A subarea reporting procedure was implemented using this boundary to report both system wide and link-level model outputs.

3.0 Develop and review the Master Plan subarea model output summaries

The highway and transit networks, and the 2015 and 2045 TAZ data, within the subarea, were reviewed. The regional and subarea-level base and future year (E+C) model outputs were reviewed for reasonable growth. Table 1 documents the highway evaluation statistics comparison for base and future years.

Table 1: Comparison of Highway Evaluation Statistics - Base Year and E+C Scenario

	Regional		Subarea Area	
	2015 Base Year	E+C Scenario	2015 Base Year	E+C Scenario
Total Number of Links	4,974	5,019	1,796	1,841
Total Lane Miles	2,167.15	2,175.31	360.47	366.36
Total Directional Miles	1,664.88	1,675.35	244.28	252.07
Total Volumes All Links	25,865,834	35,990,150	12,350,123	17,113,085
Total VMT All Links	7,741,868	10,931,012	1,953,043	2,675,291
Total VHT All Links	191,192	313,648	61,360	103,581
Original Speed (MPH)	40.03	40	35.19	35.2
Congested Speed (MPH)	38.76	36.79	31.84	28.06

The VMT growth and congested speed reduction at both regional and subarea level for base and future scenarios indicate that the model is producing reasonable results and is sensitive to the TAZ data changes.

4.0 Develop 2030 baseline and 2030 Build scenarios

The model TAZ data consists of UF TAZ attributes and non-UF TAZ attributes.

a. **Non-UF TAZ Data:** The non-UF TAZ attributes are common for both baseline and build scenarios and were developed by the following assumption. The 2030 TAZs socioeconomic data was developed using interpolation between 2015 and 2045 socioeconomic for non-UF data variables, in coordination with UF staff. The 2030 TAZ interpolated data was normalized to the Bureau of Economic and Business Research (BEBR) 2030 population projections. In addition, all model input files such as employment, external/truck model data, school enrollment, hotel/motel data, and the special generator data were developed using the interpolation between 2015 and 2045.
b. **UF TAZ Data:** The UF TAZ attributes are unique to each scenario, and these were provided by the UF staff for 2020 and 2030 conditions. This data includes classroom capacity data (Seats), student population (dorms and off campus students), UF parking spaces, and UF employment data. The 2020 UF data was used for the **Campus Master Plan 2030 Baseline Scenario**. The 2030 UF data was used for the **Campus Masterplan 2030 Build scenario**.

The combined TAZ data (a+b) were created in model input format for both Baseline and Build scenarios. Table 2 shows comparison of socioeconomic data control totals by scenario years. The 2010 and 2040 data in the table was retrieved from the old GUATS model and is used for comparison purposes only.

Table 2 Comparison of socioeconomic data control totals by scenario years

Variable	Description	Old Model (2010 - 2040)			Update Model (2015 - 2045)				
		2010	2040	Growth	2015	2030 Baseline	2030 Build	2045	Growth
TOTPOP	Total Population	247,336	305,400	0.78%	253,317	288,600	288,600	309,800	0.74%
SFDU	Single-family Dwelling Units	59,846	68,951	0.51%	62,365	71,051	71,051	71,614	0.49%
SPOP	Single-family Population	142,868	168,225	0.59%	148,609	169,308	169,308	170,649	0.49%
MFDU	Multi-family Dwelling Units	52,920	65,579	0.80%	53,414	60,854	60,854	70,985	1.10%
MFPOP	Multi-family Population	104,468	137,175	1.04%	104,707	119,292	119,292	139,151	1.10%
HMDU	Hotel-Motel Dwelling Units	4,765	5,884	0.78%	4,806	5,368	5,368	5,931	0.78%
SCHENR	School Enrollment	32,968	40,707	0.78%	34,978	39,070	39,070	43,163	0.78%
TOTEMP	Total Employment	137,594	191,980	1.32%	154,646	185,266	185,266	215,886	1.32%
UF_EMP	UF Employment	**28,255**	**34,761**	0.77%	**25,525**	**25,393**	**25,737**	**25,944**	0.05%
UF_DORM_ST	UF Dorm Students	**10,065**	**11,234**	0.39%	**10,509**	**10,734**	**11,670**	**11,790**	0.32%
UF_OC_ST	UF off-campus Students	**21,503**	**21,503**	0.00%	**33,063**	**35,998**	**34,747**	**34,556**	0.00%
UF_PARKING	UF Parking	**14,597**	**16,241**	0.38%	**15,957**	**16,835**	**18,571**	**19,962**	0.75%
SEATS (UF)	Capacity	**28,336**	**28,336**	0.00%	**28,336**	**28,336**	**28,336**	**28,336**	0.00%

5.0 Model Runs and Reasonableness checks

For this study, the same transportation networks were assumed for 2030 baseline and 2030 build scenarios. The MTPO's E+C networks were used both the scenarios. The baseline and build model runs were performed, and the results were reviewed for reasonableness. Table 3 compares the trip generation summary by scenario. The trip generation is sensitive to socioeconomic data changes.

Table 3: Trip Generation Summary by Scenario

	2015	E+C	2030 No-Build	2030 Build
Permanent Population	253,316	309,825	288,322	288,322
Total Population	258,663	315,248	293,707	293,707
Permanently Occupied Dwelling Units	92,431	115,364	106,631	106,631
Transient and Permanently Occupied Dwelling Units	95,362	115,398	109,807	109,807
Total Service Employment	101,801	150,761	126,405	126,405
Total Commercial Employment	37,354	46,168	41,863	41,863
Total Manufacturing Employment	4,614	6,250	5,523	5,523
Total Other Industrial Employment	10,827	12,641	11,831	11,831
Total Employment	154,596	215,820	185,622	185,622
Permanent Population per Permanently Occupied Dwelling Unit	2.74	2.69	2.7	2.7
Total Population per Total Occupied Dwelling Unit	2.712	2.732	2.675	2.675
Total Employment per Permanent Population	0.61	0.697	0.644	0.644
Service to Total Employment	0.658	0.699	0.681	0.681
Commercial to Total Employment	0.242	0.214	0.226	0.226
Manufacturing to Total Employment	0.03	0.029	0.03	0.03
Other Industrial to Total Employment	0.07	0.059	0.064	0.064
Internal Person Trips per Permanently Occupied Dwelling Unit	11.84	12.01	11.42	11.43
Internal Person Trips per Total Occupied Dwelling Units	11.47	12	11.09	11.09
Internal Person Trips per Employee	7.078	6.419	6.56	6.563
Internal Person Trips per Person	4.319	4.471	4.224	4.225

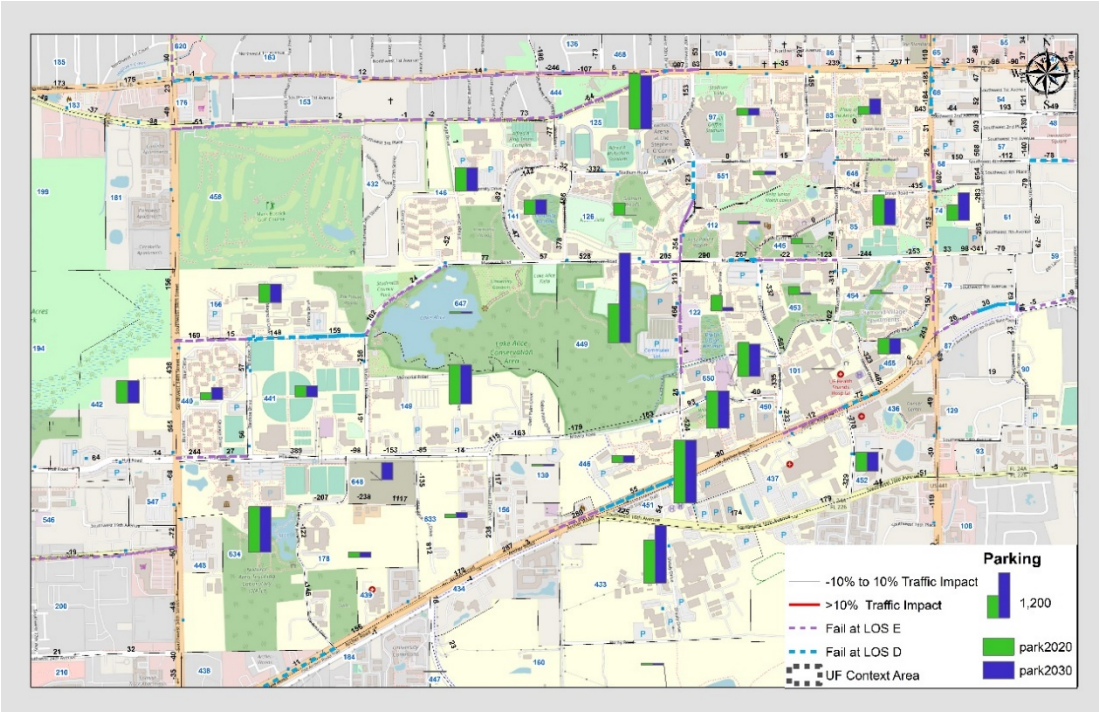
Table 4 compares the highway evaluation statistics (regional and subarea level) for 2030 Baseline and 2030 Build model runs.

Table 4: Comparison of Highway Evaluation Statistics by Scenario

	Regional		Subarea Area		Growth	
	UF 2030 Baseline	UF 2030 Build Scenario	UF 2030 Baseline	UF 2030 Build Scenario	Regional	Context Area
Total Number of Links	5,019	5,019	1841	1841	0.00%	0.00%
Total Lane Miles	2,175.31	2175.31	366.36	366.36	0.00%	0.00%
Total Directional Miles	1,675.35	1675.35	252.07	252.07	0.00%	0.00%
Total Volumes All Links	30,596,778	30,597,847	13,233,977	13,236,642	0.00%	0.02%
Total VMT All Links	9,421,281	9,422,072	2,011,023	2,011,896	0.01%	0.04%
Total VHT All Links	236,974	237,038	62,713	62,773	0.03%	0.10%
Original Speed (MPH)	40	40	35.2	35.2	0.00%	0.00%
Congested Speed (MPH)	38.03	38.03	31.47	31.46	0.00%	-0.03%

Figures 2- 4 depict the link level differences in traffic (Delta) between 2030 baseline and build scenarios within the context area. The link-level traffic differences are well-correlated to UF parking, employment and On-campus housing changes between baseline and build scenarios. The results show that the 2030 Baseline and 2030 Build scenario AADT volumes differences are within 10% margin.

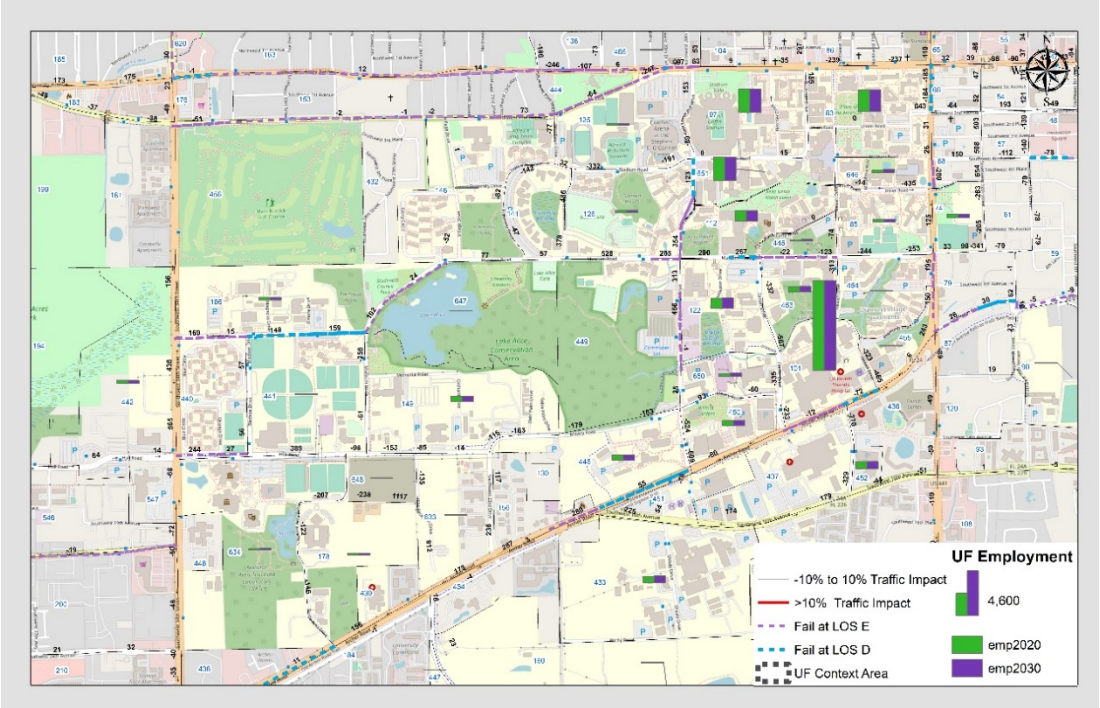
Figure 2: UF Parking Changes between 2030 Baseline and Build Scenario



Note: Two-way Build minus No-build volumes (Delta) are labeled

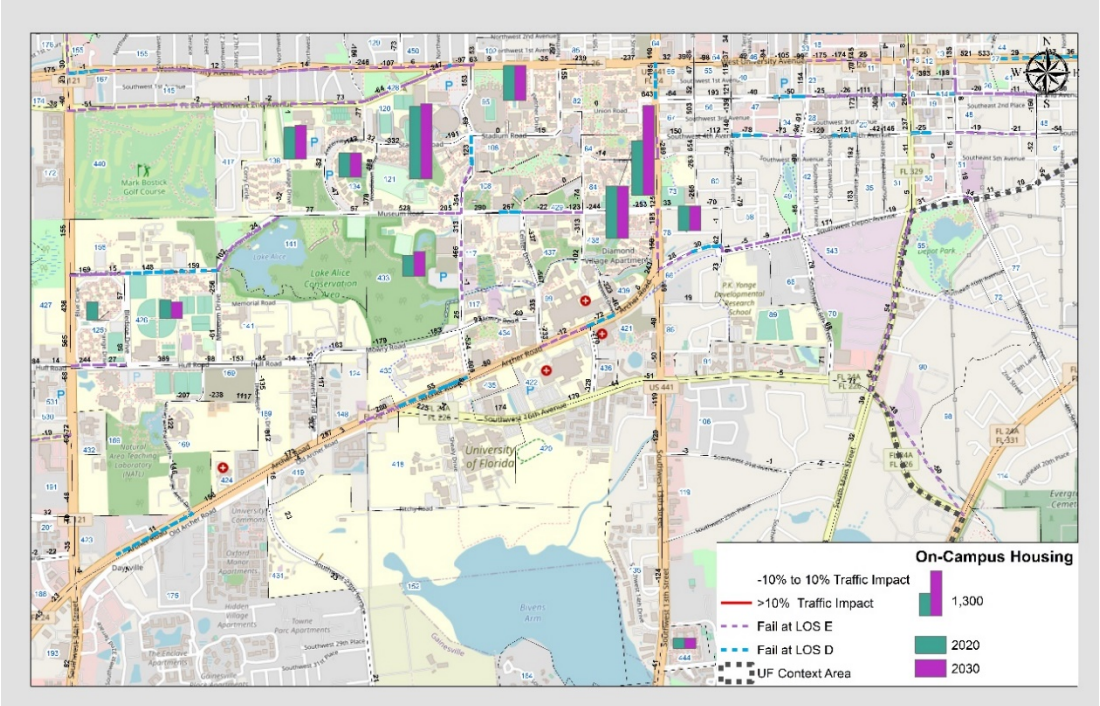
The Corradino Group
5200 NW 33 AVE, Suite 203, Fort Lauderdale, FL 33309

Figure 3: Employment Changes between 2030 Baseline and Build Scenario



Note: Two-way Build minus No-build volumes (Delta) are labeled

Figure 4: On-campus Housing changes between 2030 Baseline and Build Scenario



Note: Two-way Build minus No-build volumes (Delta) are labeled

The Corradino Group
5200 NW 33 AVE, Suite 203, Fort Lauderdale, FL 33309

6.0 Traffic Impact Analysis

This section documents percent differences of AADT projections between the 2030 Baseline and 2030 Build scenarios. In addition, these roads segments Level-of-Service (LOS) were determined using the 2012 FDOT Planning-level Quality Level of Service Tables. The entire process of the LOS analysis was scripted as a post-processor application to the travel demand model, so that it can be used in any future studies in the region, with minor adjustments as needed. This LOS tool was applied to evaluate the traffic impacts.

6.1 Roadway Level of Service (LOS) Standards within the UF Context Area

The 2012 FDOT Quality Level of Service Handbook capacities, the capacity thresholds for various LOS standards were tagged to the network links within the Context Area. This QLOS capacity values are determined by the facility type, posted speed, signals and area type. These variables were coded to the network links and a CUBE Voyager script was developed that tags the capacity thresholds of various Levels of Service to the network links. This LOS tool was used to determine the LOS of each link within the Context area by comparing the model volumes against corresponding capacities.

As discussed in the Project advisory committee (PAC) meetings, the following assumptions agreed to be made for each agency roadways:

1. FDOT facilities that are urban roadways, LOS D standards should be used. For FDOT facilities that are rural, LOS C standards should be used
2. For the City of Gainesville roadways, LOS E criteria should be used
3. For the Alachua County roadways, the County collectively measures the impact on a system wide basis. LOS D criteria should used for the county roadways as well.

During the traffic impact analysis, it was determined to map roadway segments failing at LOS E and LOS D conditions for all agency-owned roadways, by providing more comprehensive picture of the LOS. The links failing at LOS C was not mapped since none of the links are rural state road facilities.

Figure 5 depicts the roadway segments traffic impact analysis. The 2030 Build and Baseline AADT projections were compared. The percent change in AADT projections between the 2030 Build and 2030 Baseline scenarios were estimated. All segments 2030 Build AADTs of the context area are within the 10% difference margin, when compared to the 2030 Baseline AADTs. In addition to the traffic impacts, the figure also documents the LOS of the roadways within the context area.

This effort involved bi-weekly virtual progress meetings with University of Florida staff. In addition, there were three virtual meeting presented to the project advisory committee. The project advisory committee includes the representatives from other local agencies. The following are the dates of virtual project advisory committee meetings and list of invitees.

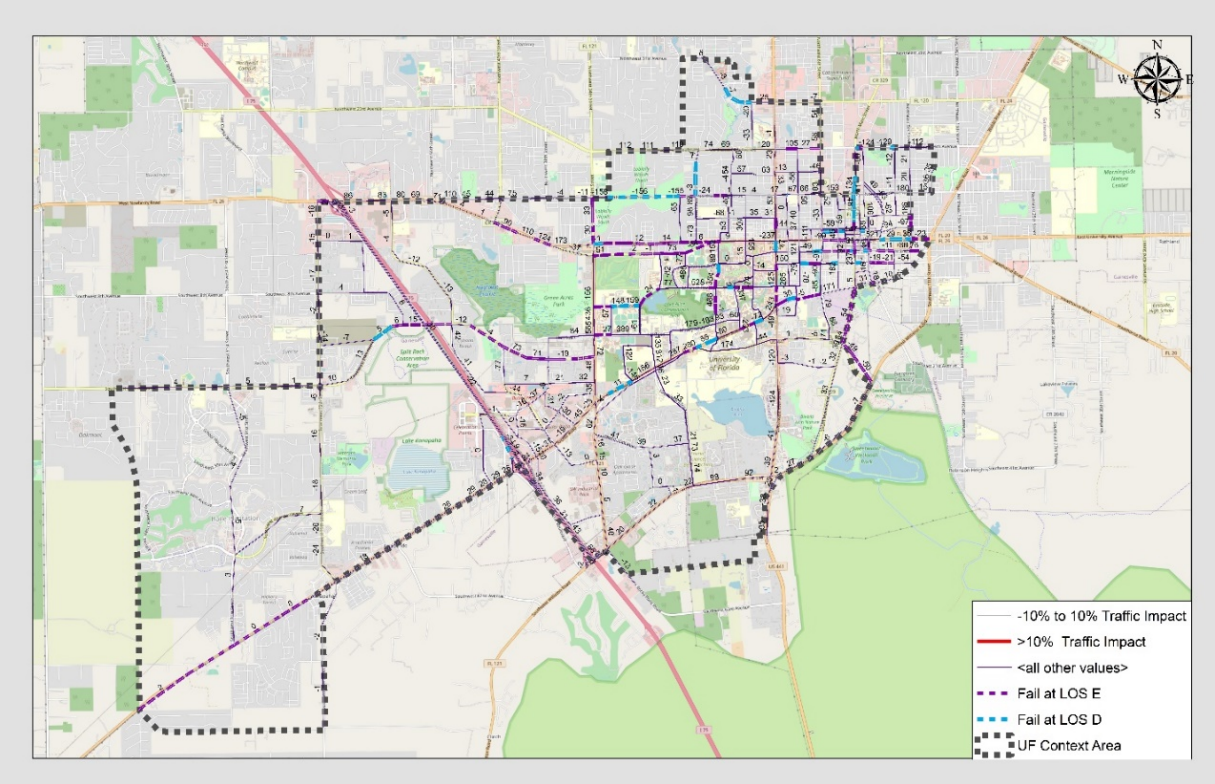
- University of Florida Master Plan Project Advisory Committee Kick-off Meeting on September 16, 2019 1:00 PM EDT
- University of Florida Master Plan Project Advisory Committee Meeting on June 5, 2020 1:30 PM EDT
- University of Florida Master Plan Project Advisory Committee Meeting on June 19, 2020 2:30 PM EDT

- University of Florida Campus Master Plan Transportation Analysis on August 26, 2020 3:00 PM EDT

List of Invitees

- Aditya Katragadda
- Andrew W. Persons
- Brian Austin
- Chris Dawson
- Deborah L. Leistner
- Erik T. Lewis
- James Flegert
- Jeffrey L. Hays
- Jesus M. Gomez
- Ken Kaltenbach
- Linda Dixon
- Malisa A. McCreedy
- Mari Schwabacher
- Mike Castine
- Scott Clem
- Scott Fox
- Srinivas Varanasi

Figure 5: Roadway Traffic Impact Analysis



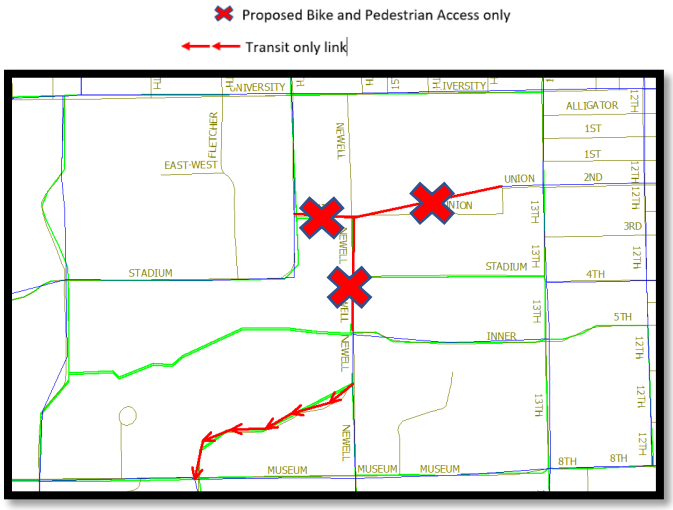
Note: Two-way Build minus No-build volumes (Delta) are labeled

6.2 Transit Routes – Realignment Impact

This analysis section is supplemental and is not to be used to evaluate the impacts of University of Florida's projected growth.

In the 2030 scenarios Union Rd and part of Newell Drive were converted into Bike and Pedestrian only facilities. As a result, the transit routes needed to be realigned via SW 13th Street, Newell Drive, Stadium Road, Inner Road and Museum Road. Figure 6 shows the new Bike and Pedestrian only facilities.

Figure 6: Bike and Pedestrian Facilities



The Project Advisory Committee (PAC) member recommended to evaluate LOS threshold on these facilities because of the additional buses that will travel due to realignment.

It is not a standard practice for travel demand model to report the actual link level transit vehicles trips, as part of the total traffic. Thus, to evaluate the total AADT that includes the transit vehicles, post-processing adjustment was performed by manually adding the transit vehicles to the model AADTs. The transit vehicles trips were extracted from the RTS Spring 2019 schedule and route hours of operation. Table 5 below lists the route and number of transit vehicles trips extracted from the schedule.

- **Routes** indicate route name from the regional model
- **Flag**=1 indicate route that impact SW 13th Street, Newell Drive and Museum Road.
- **Flag**=1,2 indicate that impact SW 13th Street, Newell Drive, Stadium Road and Museum Road.
- **Trips** indicate number of transit vehicles trips

Table 5: Impacted Transit Routes

Routes	Flag	Trips
RTS 25 EB	1	10
RTS 25 WB	1	10
RTS 29 SB	1	16
RTS 33 SB	1,2	61
RTS 38 WB	1,2	72
RTS 46 EB	1	36
RTS 46 WB	1	36
UF Commuter Lot 121	1,2	66
UF East Circ 127 NB	1	36
UF EW Circ 126 EB	1,2	48
UF Lakeside 125 WB	1,2	40
UF West Circ 120 EB	1,2	72
Total		**503**

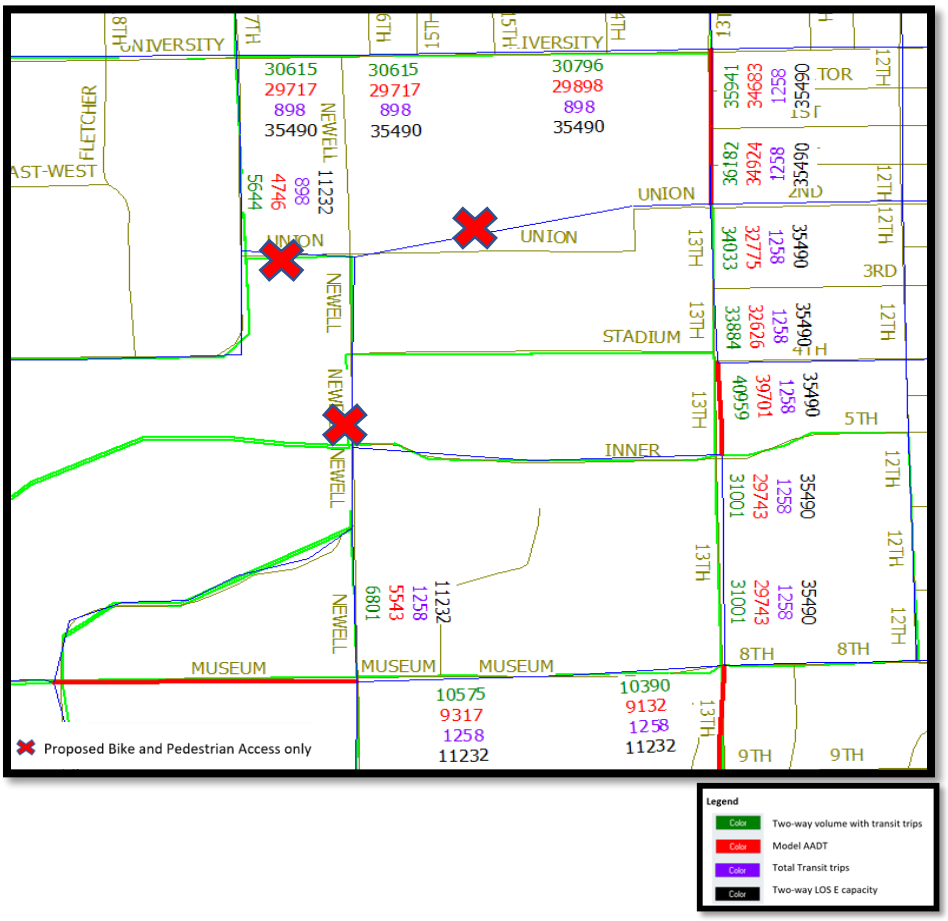
The average transit buses are usually 40 ft and cars are about 15-16 ft long. Therefore, the transit vehicle trips were converted to passenger car equivalent (PCE) trips using a 2.5 factor. The resulting volumes is added to the model two-way AADT for the impacted corridors.

Table 6: Transit vehicle to PCE conversion

Corridor	Transit Vehicle Trips	PCE Factor	Vehicle Trips
1	144	2.5	360
1,2	359	2.5	898
Total	503	2.5	1,258

The adjusted 2030 AADTs and their comparison to the roadway capacities are presented in Figure 7. Some of the facilities like SW 13th Street and Museum Road are operating at or slightly above capacity. This LOS condition is expected in both the Baseline and Build scenarios. Hence, future transit operational improvements can be considered to relieve some of this congestion. In addition, it should be noted that this analysis reflects the worst case scenario, as some of the transit vehicles may operate on Inner Road in future conditions and that will improve the operations on the south end of the SW 13th Street and Museum Road.

Figure 7: Transit Routes Realignment



The Corradino Group
5200 NW 33 AVE, Suite 203, Fort Lauderdale, FL 33309

7.0 Conclusions and Recommendations:

The University of Florida Campus TAZ data between the 2030 Baseline and Build scenarios has relatively less significant growth. This is shown in the socioeconomic data comparison (table 2). Consequently, the 2030 model volume results comparison between the Baseline and Build scenario AADT volumes did not show significant differences. The differences in volumes (delta) between the 2030 Baseline and Build alternatives results are presented in various figures (Figures 2-4), by overlaying the campus socioeconomic data.

The traffic impact analysis was conducted to identify any roadway segments that have more than 10% AADT difference between the 2030 Build and Baseline scenarios. This analysis resulted in a conclusion that all roadway links within the study Context Area are within the 10% AADT difference margin.

Furthermore, the roadway level of service (LOS) analysis was conducted on the 2030 AADT projections. This analysis indicated that there are several roadway segments operating at failing conditions using the LOS D and LOS E conditions. These facilities are graphically depicted in Figure 5. These roadway congestion issues were identified commonly in both the model scenarios.

Per Project Advisory committee recommendations, additional diversion analysis was conducted on Union Road and Newell road roadway pedestrian only conversion. While the automobile traffic diversion is captured by the travel demand model outputs, the transit buses diversion was not resulted from the original model outputs. Additional post-processing adjustment were performed for this effect, and it was determined that a maximum of 1258 passenger car equivalent transit trips will be diverted to major roadways such as SW 13th Street. Nonetheless, this diversion happens regardless of the Campus growth and was considered part of both Baseline and Build scenarios.

Notwithstanding the insignificant traffic impact caused by the campus growth, even in 2030 Baseline conditions, there are several roadway segments that can merit future roadway congestion mitigation measures (identified in Figure 5). The study team recommends additional transit operational improvements along SW 13th Street, University Avenue and Museum Road.