AIM Engineering \& Surveying, Inc.

Tampa Office
3802 Corporex Park Drive, Suite 225
Tampa, Florida 33619
(T) 813-627-4144 / (F) 813-664-1899
www.aimengr.com

| Date: | March 2, 2018 |
| :--- | :--- |
| To: | Andy Getch, PE - Lee County Department of Community Development |
| From: | Greg Root |
| Subject | Environmental Enhancement \& Preservation Communities Overla y (EEPC O) Study, <br> Lee County <br> Contract No. 7530 <br> Tasks 4.0 and 5.0 - Future Year Traffic Projec tions and Levels of Service |

## Introduction

The purpose of this memorandum is to document the methodology that was used to develop the future yeardaily and peak hour traffic volumes for Lee County's Environmental Enhancement and Preservation Communities Overlay (EEPCO) Study, as well as the results of this methodology. This memorandum discusses the future year land use data and roadway network that were used as inputs for the future year travel demand model, as well as the travel demand model output (i.e., daily volumes). This memorandum also disc usses the future year roadway segment level of service a nalysis that was conducted in support of the EEPCO study.

## 2026 EEPCO Travel Demand Model Land Use Data

The primary objectives of the EEPCO study are to:
a.) Quantify the combined impact of the traffic volumes that are expected to be generated by four future developments located along Corkscrew Road and Alico Road on the study area roadway network;
b.) Determine the additional roadway widening improvements that are necessary to provide sufficient capacity to accommodate the increased traffic volumes at acceptable levels of service;
c.) Develop preliminary construction cost estimates for the needed roadway widening improvements; and
d.) Conduct a proportionate share analysis to estimate the total cost that each of the four future developments should be required to pay Lee County to help fund the needed roadway improvements.

The four future developments that are the primary focus of this study are WildBlue, Corkscrew Farms (also known as The Place), Pepperland Ranch and Verdana. The EEPCO boundary and the locations of the four future developments are graphically illustrated in Figure 1. The completion of the construction of the last of the four future developments (i.e., Verdana) is currently scheduled for 2025 . Therefore, for the puposes of this study, it was decided that traffic projections would be developed for a future year of 2026.


Figure 1: EEPCO Boundaries and Future Developments

The District One Districtwide travel demand model (also referred to as the District One Regional Planning Model - D1RPM) was used to obtain estimates of the Average Annual Daily Traffic (AADT) volumes for the study area roadways. The D1RPM is a computer model that includes all 12 counties that comprise District One and was originally developed by Traf-O-Data, Corp. (TOD) under an FDOTDistrictwide Travel Demand Modeling contract to help support the most recent updates of the various Metropolitan Planning Organization and Transportation Planning Organization (MPO/TPO) Cost Feasible Long Range Transportation Plans (to reflect the new planning horizon year of 2040). The D1RPM consists of Traffic Analysis Zones (TAZs) and a roadway network. Each TAZ contains forecasted socioeconomic data for the year 2040 which may ormay not include all of the following:

- Dwelling units (single fa mily and/or multi-family)
- Population (single family and/or multi-fa mily)
- Industrial employees
- Commercial employees
- Service employees
- Hotel/Motel rooms
- School enrollment (elementary, middle and/or high school)
- University enrollment

In accordance with state law, long range transportation planning is required to be based on countywide population projections developed by the state (i.e., the Bureau of Economic and Business Research). As stated previously, the curent D1RPM has a planning horizon year of 2040 and therefore, the land use data that is included in this version of the model is also associated with the year 2040. As a result, it was necessary to develop a 2026 land use data set for use with the EEPCO study. The first step in the development of the 2026 land use data involved conducting a review of the 2010 and 2040 model land use data for 28 Traffic Analysis Zones (TAZs) located within or in close proximity to the study area. These TAZs are graphically illustrated in Appendix A. In addition, the existing (2016) la nd use data for these 28 TAZs was also reviewed and compared to both the 2010 and 2040 model data. The 2016 land use data review was based in part on aerial photography, as well as information provided by the Lee County Department of Community Development (DCD) and information obtained from the Lee County Property Appraiser's website.

The existing (2016) and approved future land use data provided by Lee County staff included the following developments:

- Stoneybrook DRI (Stoneybrook, Miromar Square)
- Timberland \& Tiburon DRI (Grandezza and Miromar Outlet Mall)
- Wildcat Run
- The Preserve at Corkscrew
- Bella Terra
- Corkscrew Shores
- Monte Cristo
- Estero C rossings
- Corkscrew Crossings (a.k.a. Plaza Del Sol)
- Florida Gulf Coast University
- MiromarLakes
- Centerplace
- Alico Interchange Park
- Alico Crossroads
- Gulf Coast Town Center
- Airport Intersta te Commerce Park
- University Highla nds

Based on this review it was determined that some modifications to the 2040 model land use data were required. Several examples where adjustments to the 2040 model land use data were required include the following TAZs:

- TAZNo. 3654
- TAZNo. 3655

TAZ No. 3654 encompasses the Wildcat Run development. The 2040 D1RPM included 323 single family dwelling units and 79 multi-family dwelling units. Based on a review of 2016 aerial photography it was detemmined that there are no more remaining vacant lots and the existing development consists of 330 single family dwelling units and 58 multi-family dwelling units. Consequently, the 2040 model land use data for this TAZ was revised to reflect 330 single family dwelling units and 58 multi-family dwelling units. TAZ No. 3655 encompasses the following four developments:

- The Preserve at Corkscrew
- Bella Terra
- Monte Cristo
- Corkscrew Shores

The 2040 D1RPM included 1,386 single family dwelling units and 354 multi-family dwelling units, resulting in a total of 1,740 dwelling units. Based on information provided by Lee County, there were a total of 2,578 dwelling units in 2016. In addition, the total development order approval for this TAZ is 3,034 dwelling units while the total zoning approval is 4,014 dwelling units. The 2040 model land use data for this TAZ was revised to reflect 2,088 single family dwelling units and 1,140 multi-family dwelling units, resulting in a total of 3,128 dwelling units.

After the appropriate modifications were made to the 2040 land use data, a 2026 land use data set was estimated using interpolation. The 2026 data for the 28 TAZs within or adjacent to the study area was estimated by interpolating between the 2016 and 2040 land use data. The 2026 land use data for these TAZ's was compared to the approved future land uses to detemine whether the interpolated data accounted for the approved future land uses. Additional adjustments were made to those TAZ's where the 2026
interpolated land use data was less than the approved future land use data. Table A-1 in Appendix A summarizes the 2026 land use data for these 28 TAZs.

The 2026 data for all of the other TAZs contained within the 12 -county D1RPM was estimated by interpolating between the 2010 and 2040 land use data. Intepolations were also conducted for the following tra vel demand model files:

- EEIRIPS file (the Extemal-Extemal Trips)
- INTEXT file (the Intemal-Extemal Trips)
- SPECGEN file (the Special Generators)
- The Truck Trip Matrix
- The Southwest Florida Intemational Airport Enplanements File


## 2026 EEPCO Travel Demand Model Roadway Network

As stated previously, the curent D1RPM has a planning horizon year of 2040. Therefore, the roadway network that is included in this version of the model is also associated with the year 2040. As a result, it was necessary to develop a 2026 roadway network in the vic inity of the study area for use with the EEPCO study. A review of the 2040 D1RPM roadway network was conducted for the study a rea vicinity to identify the future roadway improvements that are included in the DIRPM. A review was then conducted of the Lee County MPO's Cost Feasible Long Range Transportation Plan (LRTP), as well as the Lee County Capital Improvement Plan (CIP). The 2026 roadway network in the vicinity of the study area reflects roadway improvement projects that are in the "existing plus committed" network (as defined in Lee County AC-13-16 (III)(D)(4)) with full funding for construction in the first five years of an adopted local or state work program. The 2040 D1RPM roadway improvements that were removed from the 2026 EEPCO model network included the following:

- Four-laning of Corkscrew Road from Ben Hill Griffin Parkway to Alico Road
- The Alico Road Connector from Alico Road to SR 82
- Four-laning of Alico Road from Aiport Haul Road to the Alic o Connector
- Airport Haul Road extension over to Treeline Avenue
- Four-laning of SR 82 from Homestead Road to the Lee/Hendry County line
- Six-laning of Daniels Parkway from Gateway Boulevard to SR 82
- Four-laning of Homestead Road from SR 82 to Sunrise Boulevard

The funds that are shown in the first five years of the Lee County CIP for the proposed Alico Connector are for advanced right-of-way acquisition (not construction); therefore, this future improvement was not included in the 2026 EEPCO model roadway network.

The committed roadway improvements that were included in the 2026 EEPCO model network consisted of the following:

- Four-laning of Alico Road from Ben Hill Griffin Parkway to Airport Haul Road
- Six-laning of SR 82 from Daniels Parkway to Homestead Road

The 2040 roadway improvements that were not included in the 2026 EEPCO model were disc ussed with Lee County staff on July 11, 2017 to obtain their concurrence prior to running the 2026 model.

## 2026 Traffic Volumes and Levels of Senvice - Without WildBlue, Corkscrew Fanms, Pepperland Ranch and Verdana

The following methodology was utilized to estimate the 2026 peak hour traffic volumes on the study area roadway network without the four future developments (WildBlue, Corkscrew Fams, Pepperland Ranch and Verdana).

Step 1: The 2026 EEPCO travel demand model was run and the 2026 Peak Season Weekday Average Daily Traffic (PSWADT) volumes were obtained. The 2026 PSWADT volumes a re also provided in Appendix A. The 2026 PSWADT volumes were multiplied by the appropriate Model Output Conversion Factor (MOCF) to obtain the 2026 AADT volumes. The MOCF's that were used for this study were obtained from the FDOTs 2016 Peak Season Factor Category Report and are as follows:

- 0.92 for Alico Road, Ben Hill Griffin Parkway, Corkscrew Road and Estero Parkway
- 0.91 forl-75
- 0.95 for SR 82

The 2016 Peak Season Factor Category Report is also provided in Appendix A. The 2026 daily volumes obtained from the EEPCO model are provided in Table 1 . Table 1 also provides the existing AADT volumes, as well as the calculated growth in daily volumes (expressed both in terms of the AADT volume differences and the average yearly growth rates).

Table 1: Existing and Future Year (2026) AADT Volume Comparison

| ROADWAY | FROM | TO | $\begin{gathered} 2026 \\ \text { MODEL } \\ \text { PSWADT } \end{gathered}$ |  | 2026 <br> MODEL <br> AADT ${ }^{(2)}$ | EXISTING AADT | AADT DIFF | GROWTH RATE | AVG. GROWTH RATE | $\begin{gathered} \text { FINAL } \\ 2026 \\ \text { AADT } \\ \hline \end{gathered}$ | $\begin{gathered} \text { FINAL } \\ 2026 \\ \text { AADT }^{(2)} \\ \hline \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Alico Rd | Three Oaks Pkwy | 1-75 | 64,468 | 59,311 | 59,300 | 43,800 | 15,500 | 3.54\% | 3.80\% | 59,311 | 59,300 |
|  | 1-75 | Ben Hill Griffin Pkwy | 35,391 | 32,560 | 32,600 | 24,300 | 8,300 | 3.42\% |  | 32,560 | 32,600 |
|  | Ben Hill Griffin Pkwy | Airport Haul Rd | 5,614 | 5,165 | 5,200 | 5,400 | -200 |  |  | 7,452 | 7,500 |
|  | Airport Haul Rd | WildBlue Entrance | 5,614 | 5,165 | 5,200 | 5,400 | -200 |  |  | 7,452 | 7,500 |
|  | WildBlue Entrance | Green Meadows Rd | 5,614 | 5,165 | 5,200 | 5,400 | -200 |  |  | 7,452 | 7,500 |
|  | Green Meadows Rd | Corkscrew Rd | 4,234 | 3,895 | 3,900 | 2,700 | 1,200 | 4.44\% |  | 3,895 | 3,900 |
| Ben Hill Griffin Pkwy | Corkscrew Rd | Estero Pkwy | 24,550 | 22,586 | 22,600 | 19,700 | 2,900 | 1.47\% | 1.97\% | 22,586 | 22,600 |
|  | Estero Pkwy | FGCU Entrance | 20,482 | 18,843 | 18,800 | 20,800 | -2,000 |  |  | 24,960 | 25,000 |
|  | FGCU Entrance | College Club Dr | 23,838 | 21,931 | 21,900 | 21,300 | 600 |  |  | 25,560 | 25,600 |
|  | College Club Dr | Alico Rd | 43,420 | 39,946 | 39,900 | 32,000 | 7,900 | 2.47\% |  | $\begin{array}{r} 39,946 \\ 29,645 \\ \hline \end{array}$ | $\begin{array}{r} 39,900 \\ 29,600 \\ \hline \end{array}$ |
|  | Alico Rd | SWFIA Access Rd | 32,223 | 29,645 | 29,600 | 19,800 | 9,800 | 4.95\% | 4.95\% |  |  |
| Corkscrew Rd | Three Oaks Pkwy | 1-75 | 51,861 | 47,712 | 47,700 | 36,000 | 11,700 | 3.25\% | 3.25\% | 47,712 | 47,700 |
|  | 1-75 | Ben Hill Griffin Pkwy (EB) | 20,166 | 18,553 | 18,550 | 15,500 | 3,050 | 1.97\% | 1.97\% | 18,553 | 18,550 |
|  | Ben Hill Griffin Pkwy (WB) | 1-75 | 20,166 | 18,553 | 18,550 | 15,500 | 3,050 | 1.97\% | 1.97\% | 18,553 | 18,550 |
|  | Ben Hill Griffin Pkwy | Grande Oak Wy | 21,602 | 19,874 | 19,900 | 19,000 | 900 | 0.47\% | 0.76\% | 20,900 | 20,900 |
|  | Grande Oak Wy | Wildcat Run Dr | 18,189 | 16,734 | 16,700 | 15,100 | 1,600 | 1.06\% |  | 16,734 | 16,700 |
|  | Wildcat Run Dr | WildBlue West Entrance | 14,136 | 13,005 | 13,000 | 13,600 | -600 | 0.74\% |  | 14,960 | 15,000 |
|  | WildBlue West Entrance | Cypress Shadows Blvd | 14,136 | 13,005 | 13,000 | 13,600 | -600 |  |  | 14,960 | 15,000 |
|  | Cypress Shadows Blvd | Bella Terra Blvd/WildBlue East Entrang | 14,136 | 13,005 | 13,000 | 12,100 | 900 |  |  | 13,310 | 13,300 |
|  | Bella Terra Blvd/WildBlue East Entrand | Alico Rd | 5,110 | 4,701 | 4,700 | 4,600 | 100 |  |  | 5,060 | 5,100 |
|  | Alico Rd | Corkscrew Farms Entrance | 3,957 | 3,640 | 3,600 | 4,600 | -1,000 |  |  | 5,060 | 5,100 |
|  | Corkscrew Farms Entrance | 6 L's Farm Rd | 3,957 | 3,640 | 3,600 | 4,600 | -1,000 |  |  | 5,060 | 5,100 |
|  | 6 L's Farm Rd | Pepperland Entrance | 3,311 | 3,046 | 3,000 | 3,500 | -500 |  |  | 3,850 | 3,900 |
|  | Pepperland Entrance | Verdana Entrance | 3,311 | 3,046 | 3,000 | 3,500 | -500 |  |  | 3,850 | 3,900 |
|  | Verdana Entrance | TPI Rd | 3,311 | 3,046 | 3,000 | 3,500 | -500 |  |  | 3,850 | 3,900 |
|  | TPI Rd | SR 82 | 2,876 | 2,646 | 2,600 | 3,500 | -900 |  |  | 3,850 | 3,900 |
| Estero Pkwy | Three Oaks Pkwy | Ben Hill Griffin Pkwy | 19,689 | 18,114 | 18,100 | 16,500 | 1,600 | 0.97\% | 0.97\% | 18,114 | 18,100 |
| I-75 | Bonita Beach Road | Corkscrew Road | 101,170 | 92,065 | 92,100 | 100,500 | -8400 |  | $2.72 \%{ }^{(3)}$ | 127,836 | 127,800 |
|  | Corkscrew Rd | Alico Rd | 101,565 | 92,424 | 92,400 | 100,500 | -8100 |  | 2.92\% ${ }^{(3)}$ | 129,846 | 129,800 |
| SR 82 | Daniels Pkwy | 40th St SW | 64,746 | 61,509 | 61,500 | 28,100 | 33,400 | 11.89\% | 11.89\% | 61,509 | 61,500 |
|  | 40th St SW | Alabama Rd | 50,041 | 47,539 | 47,500 |  |  |  |  | 47,539 | 47,500 |
|  | Alabama Rd | Parkdale Blvd | 48,453 | 46,030 | 46,000 |  |  |  |  | 46,030 | 46,000 |
|  | Parkdale Blvd | Jaguar Blvd | 35,731 | 33,944 | 33,900 |  |  |  |  | 33,944 | 33,900 |
|  | Jaguar Blvd | Homestead Rd | 12,651 | 12,018 | 12,000 |  |  |  |  | 12,018 | 12,000 |
|  | Homestead Rd | Bell Blvd | 18,578 | 17,649 | 17,600 | 10,200 | 7,400 | 7.25\% | 7.25\% | 17,649 | 17,600 |
|  | Bell Blvd | Columbus Blvd | 22,230 | 21,119 | 21,100 | 11,400 | 9,700 | 8.51\% | 8.51\% | 21,119 | 21,100 |
|  | Columbus Blvd | Corkscrew Road | 24,410 | 23,190 | 23,200 | 12,300 | 10,900 | 8.86\% | 8.86\% | 23,190 | 23,200 |

${ }^{(1)} 2026$ Model AADT $=2026$ Model PSWADT $\times$ MOCF (MOCF $=0.91$ for $1-75,0.95$ for SR 82 and 0.92 for Alico Road, Ben Hill Griffin Parkway, Corkscrew Road and Estero Parkway)
${ }^{\text {(2) }}$ Rounded to nearest 100 vehicles.
${ }^{(3)}$ These growth rates were calculated based on growth trend analyses conducted using historic AADT volumes for the period 2002-2016.
Step 2: A majority of the 2026 AADT volumes obtained from the EEPCO model showed reasonable growth when compared to the existing AADT volumes; however, there were some 2026 model volumes that were less than or only slightly greater than the existing AADT volumes. The locations where this occurred were the following:

- Alico Road from Ben Hill Griffin Parkway to Green Meadows Road
- Ben Hill G riffin Parkway from Estero Parkway to College Club Drive
- Corkscrew Road from Wildcat Run Drive to SR 82
- I-75 from Bonita Beach Road to Alico Road

The 2026 AADT volumes for these locations were derived by applying growth rates to the existing AADTvolumes. The following growth rates were used:

- 3.80\% per year - Alico Road from Ben Hill G riffin Pa rkway to Green Meadows Road
- $2.00 \%$ per year - Ben Hill G riffin Pa rkway from Estero Pa rkway to College Club Drive
- $1.00 \%$ per year - Corksc rew Road from Ben Hill Griffin Parkway to SR 82
- $2.72 \%$ per year-I-75 from Bonita Beach Road to Corkscrew Road
- $2.92 \%$ peryear-l-75 from Corkscrew Road to Alico Road

The growth rates used for the portions of Alico Road, Ben Hill Griffin Parkway and Corkscrew Road were based on the average growth rates calculated using the growth rates where future growth in AADT volumes was projected to occur. The 3.8\% per year growth rate for the portion of Alico Road from Ben Hill Griffin Parkway to Green Meadows Road is comparable to the 4\% per year growth rate used previously for Alico Road from Ben Hill Griffin Parkway to Aiport Haul Road in both the Wild Blue and Corkscrew Fams Traffic Impact Studies. The $2 \%$ per year growth rate for the portion of Ben Hill Griffin Parkway from Estero Parkway to College Club Drive matches the growth rate used for Ben Hill Griffin Parkway in the Verdana Traffic Impact Study. The $1 \%$ per year growth rate used for Corkscrew Road from Ben Hill G riffin Parkway to SR 82 matches the growth rate used for this portion of Corkscrew Road in the WildBlue Traffic Impact Study, as well as the portion of Corkscrew Road from Alico Road to SR 82 in both the Corkscrew Farms and Verdana Traffic Impact Studies.

Step 3: The growth rates used to obtain the 2026 AADT volumes for the two $1-75$ segments were based on the results of growth trend analyses conducted using the FDOT's Traffic Trends software and historic AADT volumes for the years 2002 to 2016. This method is consistent with FDOT future traffic forecasting procedures and is often used when travel demand model projections are less than existing volumes. The historic growth trend a nalyses are provided in Appendix B. A review of the project traffic growth rate information documented in the January 2017 I-75/Corkscrew Road Design Traffic Technical Memorandum indicates that historic traffic growth rates of $2.93 \%$ per year and $2.50 \%$ per year were calculated for I-75 south of Corkscrew Road and north of Corkscrew Road, respectively. However, it should be noted that the growth trend analyses conducted for the I-75/Corkscrew Road interchange study did not include 2016 AADTvolumes because these volumes were not a vailable at the time of the I-75/C orkscrew Road interchange study.

Step 4: The 2026 roadway segment level of service analysis conducted for the background traffic scenario was very similar to the existing conditions roadway segment analysis conducted previously and documented in the EEPCO Existing Conditions Level of Service Analysis Memorandum (dated February 12, 2018). The 2026 peak season peak hour twoway volumes were derived by multiplying the 2026 AADT volumes by a K-factor. The 2026 peak season peak hour peak direction volumes were subsequently derived by multiplying the two-way peak hour volumes by a D-factor. The $\mathrm{K}_{100}$ and $\mathrm{D}_{100}$-factors that were used in the 2026 level of service analysis conducted for the Lee County roadways are the exact same factors that were used in the existing conditions level of service analysis and were obtained from the following Lee County Permanent Count Stations:

- PCSNo. 10 - Alico Road West of I-75
- PCSNo. 15-Corkscrew Road West of I-75
- PCSNo. 53 - Alic o Road West of Ben Hill Griffin Parkway
- PCSNo. 70 - Corkscrew Road West of Ben Hill Griffin Parkway
- PCS No. 71 - Ben Hill Griffin Parkway North of Estero Parkway

Similarly, the K- and D-factors that were used in the 2026 level of service a nalysis conducted for the FDOTroadways are the exact same factors that were used in the existing conditions level of service analysis and were obtained from the following FDOTCount Stations:

- Station No. 120054 - I-75 between Bonita Beach Road and Corkscrew Road
- Station No. 120055 - I-75 between Corkscrew Road and Alico Road
- Station No. 126021 - SR 82 east of Gunnery Road/Da niels Parkway
- Station No. 120068 - SR 82 west of Bell Boulevard
- Station No. 125074 - SR 82 east of Bell Boulevard
- Station No. 070040 - SR 82 east of the Lee County line

A K-factor of $9.0 \%$ and a D-factor of $56.1 \%$ was used to estimate the peak hour peak direction volumes for the two segments of Ben Hill Griffin Parkway between College Club Drive and the Southwest Florida Intemational Airport (SWFIA) access road. These same Kand D-factors were used in the existing conditions level of service analysis.

The Level of Service (LOS) standard for the Lee County study area roadways is LOSE, while LOS D is the standard for $\mathrm{I}-75$ and SR 82. The maximum peak hour peak direction LOS E service volumes for the Lee County roadways were based on the April 2016 Generalized Peak Hour Peak Directional Service Volumes obtained from the Lee County website (www.leegov.com/dcd/infraplanning/traffic). A copy of the Lee County generalized level of service volumes is provided in Appendix C. The maximum peak hour peak direction LOS D service volumes were obtained from the FDOTs 2012 Generalized Peak Hour Directional Volumes for Florida's Urbanized Areas that are documented in the FDOT Quality/Level of Service Handbook. A copy of the FDOT's generalized level of service volumes is also provided in Appendix C.
The ratio of the peak hour peak direction volume to the maximum peak hour peak direction level of service volume was calculated for each of the study area roadway segments and these ratios are summarized in Table 2. A ratio greater than 1.00 indicates the roadway segment is not operating at an acceptable level of service. Table $\mathbf{2}$ indicates that the following roadway segments are projected to have ratios greater than 1.00:

- Alico Road from Three Oaks Parkway to I-75
- Corkscrew Road from Three Oaks Parkway to I-75
- Corkscrew Road from Ben Hill Griffin Parkway to Grande Oak Way
- I-75 from Bonita Beach Road to Corkscrew Road
- I-75 from Corkscrew Road to Alico Road
- SR 82 from Da niels Parkwa y to $40^{\text {th }}$ Street SW
- SR 82 from the Hendry/Collier County line to Corkscrew Road Ranch and Verdana）

|  | N |  |  |  |  |  |  |  |  |  |  | $\stackrel{\circ}{\circ}$ |  |  | ก ก |  |  |  |  |  |  |  |  |  |  |  |  |  | $\stackrel{7}{\circ}$ | ¢\％． | $\stackrel{\infty}{\circ}$ |  |  |  |  |  |  |  | $\stackrel{\stackrel{1}{\circ}}{\circ}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & \text { Bu } \\ & \vdots \end{aligned}$ |  |  |  |  |  |  |  |  |  |  | $\stackrel{\substack{\mathrm{g} \\ \stackrel{y}{*}}}{ }$ |  |  | \％ |  |  |  |  |  |  |  |  |  |  |  |  |  | $\left.\begin{gathered} \underset{\sim}{2} \\ \end{gathered} \right\rvert\,$ | $\begin{aligned} & \stackrel{\sim}{2} \\ & \end{aligned}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{4} \\ & \underset{\sim}{2} \end{aligned}$ |  |  |  |  |  |  |  | $\underset{\sim}{\text { ¢ }}$ |
|  | $\infty$ |  |  |  |  |  |  |  |  |  |  | $\bigcirc$ |  |  | ¢ |  |  |  |  |  |  |  |  |  |  |  |  |  | Q | $\infty$ | $\infty$ |  |  |  |  |  |  |  | \％ |
|  | 2 | $\stackrel{\breve{y}}{\sim}$ | $\stackrel{\sim}{\square}$ | $\stackrel{\text { ¢ }}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{y}{\sim}$ | $\stackrel{\square}{\sim}$ | $\stackrel{\sim}{\square}$ | $\stackrel{y}{\square}$ | $\stackrel{\sim}{\sim} \stackrel{\square}{\sim}$ | $\stackrel{\breve{\sim}}{\sim}$ | 2 | $\stackrel{\square}{\square}$ | $\stackrel{\text { ® }}{\sim}$ | 2 | $\stackrel{y}{x}$ | $\stackrel{\square}{\sim}$ | $\stackrel{\square}{\nu}$ | $\stackrel{\sim}{\square}$ | $\stackrel{\breve{0}}{\sim}$ | $\stackrel{\Perp}{\chi}$ | $\stackrel{y}{\nu}$ | $\stackrel{\square}{\sim}$ | $\stackrel{\text { ® }}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\square}{\square}$ | $\stackrel{\text { ¢ }}{\sim}$ | $\stackrel{\breve{4}}{\sim}$ | 2 | 2 | $\stackrel{\circ}{2}$ | $\stackrel{4}{\sim}$ | $\stackrel{\breve{0}}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\breve{0}}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{0}{2}$ |
|  | $0$ | $\begin{gathered} \underset{H}{U} \\ 0 . \end{gathered}$ | $\stackrel{9}{0}$ | $\stackrel{\tilde{\circ}}{\tilde{\circ}}$ | $\underset{0}{\tilde{j}}$ | $\underset{\substack{\mathrm{N}}}{ }$ | $\stackrel{\rightharpoonup}{\mathbf{O}}$ | $\underset{\sim}{\mathrm{i}}$ | $\begin{array}{l\|l} n \\ \underset{j}{n} \\ \underset{0}{2} \end{array}$ | N\|O. | $\begin{aligned} & 0 \\ & \dot{o} \end{aligned}$ | $\underset{\sim}{\sim}$ | $\stackrel{\hat{o}}{\hat{o}}$ | $\underset{\dot{O}}{\hat{N}}$ | $\underset{\sim}{\mathrm{r}}$ | 잉 | $\stackrel{\ddots}{\circ}$ | $\stackrel{\infty}{\infty}$ | $\left\lvert\, \begin{gathered} \infty \\ \substack{\infty \\ \hline} \end{gathered}\right.$ | $\stackrel{0}{\hat{0}}$ | $\begin{gathered} 0 \\ \substack{0 \\ 0} \\ \hline \end{gathered}$ |  | $\begin{array}{\|c} 0 \\ 0 \\ 0 \end{array}$ | $\underset{0}{\pi}$ | $\underset{0}{7}$ | $\underset{0}{\sim}$ | त | $\left\|\begin{array}{c} \stackrel{\circ}{\circ} \\ \dot{\circ} \end{array}\right\|$ | $\left\|\begin{array}{c} \underset{\sim}{N} \end{array}\right\|$ | $\underset{\sim}{\sim}$ | $\begin{gathered} \hat{+} \\ \underset{i}{\mid} \end{gathered}$ | $\left\|\begin{array}{c} \sim \\ \infty \\ 0 \end{array}\right\|$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} 0 \\ 0 \\ 0 \end{gathered}$ | $\underset{\sim}{\underset{0}{7}}$ | $\left\lvert\, \begin{gathered} \infty \\ \underset{o}{\circ} \end{gathered}\right.$ | $\stackrel{\stackrel{\rightharpoonup}{\mathrm{o}}}{\stackrel{\circ}{+}}$ | $\stackrel{9}{3}$ | $\stackrel{\sim}{\circ}$ |
|  | $\stackrel{y}{\infty}$ | $\begin{gathered} \stackrel{i}{2} \\ \underset{\sim}{-} \end{gathered}$ | ～ | ～／ | $\stackrel{\sim}{\sim}$ | $\underset{\sim}{*}$ | $\underset{\underset{\sim}{7}}{\underset{\sim}{n}} \mid$ | $\underset{\sim}{\underset{\sim}{\sim}}$ | $\begin{gathered} \underset{\sim}{0} \\ \underset{\sim}{2} \end{gathered}$ |  | $\stackrel{\oplus}{0}$ | $\stackrel{i}{n} \underset{\sim}{n}$ | $\underset{\sim}{\sim}$ | $\underset{\sim}{\underset{\sim}{n}}$ | $\stackrel{\sim}{\infty}$ | O | 8 | © | $\left\|\begin{array}{c} \infty \\ \mathbf{6} \end{array}\right\|$ |  | $\stackrel{m}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\square}$ | $\stackrel{\sim}{\sim}$ | \％ | $\stackrel{\sim}{0}$ | $\left\|\begin{array}{l} 0 \\ \infty \end{array}\right\|$ | $\left\|\begin{array}{l} 9 \\ \underset{\infty}{9} \\ \underset{\sim}{2} \end{array}\right\|$ | $\begin{gathered} \tilde{\sim} \\ \underset{子}{\infty} \end{gathered}$ | $\stackrel{\underset{\sim}{\sim}}{\underset{\sim}{n}}$ | $\left\|\begin{array}{l} \infty \\ \underset{\sim}{\infty} \end{array}\right\|$ | $\left\|\begin{array}{c} \vec{N} \\ \underset{\sim}{2} \end{array}\right\|$ | $\left\|\begin{array}{c} n \\ \underset{\sim}{n} \end{array}\right\|$ | 桨 | ก | 䍗 | ת̃ | ন |
|  | Bix | $\begin{gathered} \hat{N} \\ \underset{\sim}{n} \end{gathered}$ | \％ | $\stackrel{\sim}{e}$ | $\stackrel{e}{\infty}$ | $\underset{\sim}{\infty}$ | $\left\lvert\, \begin{gathered} \infty \\ \underset{\sim}{\sim} \\ \hline \end{gathered}\right.$ | $\stackrel{\rightharpoonup}{\underset{\sim}{7}}$ | $\begin{gathered} \underset{\sim}{\underset{\sim}{2}} \\ \hline \end{gathered}$ |  | $\stackrel{\circ}{g}$ | $\begin{gathered} \underset{\sim}{N} \\ \underset{\sim}{n} \end{gathered}$ | $\begin{aligned} & \infty \\ & \infty \\ & \underset{\sim}{\infty} \end{aligned}$ | $\begin{aligned} & \infty \\ & \vec{n} \\ & \underset{\sim}{n} \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & \stackrel{\rightharpoonup}{-} \end{aligned}$ | \％ | ¢ | $\stackrel{\text { ¢ }}{ }$ | $\stackrel{\text { ¢ }}{ }$ | $\stackrel{\circ}{0}$ | $\stackrel{\text { a }}{\sim}$ | $\stackrel{\rightharpoonup}{0}$ | $\stackrel{\rightharpoonup}{0}$ | 잇 | $\stackrel{\sim}{\circ}$ | － | － | $\left\|\begin{array}{c} \infty \\ \Omega \end{array}\right\|$ | $\left\|\begin{array}{l} \infty \\ \stackrel{0}{0} \\ \dot{0} \end{array}\right\|$ | $\begin{gathered} \hat{\infty} \\ \hat{\omega} \end{gathered}$ | $\underset{\sim}{\underset{\sim}{2}} \mid$ | $\left\|\begin{array}{c} \infty \\ \underset{\sim}{\infty} \\ \sim \end{array}\right\|$ | $\left\lvert\, \begin{gathered} \underset{\substack{~ \\ \underset{\sim}{2}}}{ } \mid \end{gathered}\right.$ | $\stackrel{\underset{\sim}{0}}{\underset{\sim}{\wedge}} \mid$ | ั． | ～ | $\left\|\begin{array}{c} \stackrel{n}{0} \\ \underset{\sim}{2} \end{array}\right\|$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ |
| $\begin{array}{l\|l\|} \hline \text { 交部 } \\ \hline \end{array}$ | $0$ | $\begin{aligned} & 0 \\ & \tilde{N} \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { 일 } \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline \text { Nे} \\ & \text { N } \\ & \hline \end{aligned}$ | $\begin{gathered} 0 \\ \\ 0 \end{gathered}$ | $\begin{aligned} & \text { in } \\ & \text { in } \end{aligned}$ | $\begin{array}{\|c} 0 \\ \\ 0 \\ 0 \end{array}$ | $\begin{aligned} & \text { 율 } \\ & 0 \\ & \hline \end{aligned}$ | $\begin{array}{c\|c} 0 \\ n & 0 \\ 0 & \tilde{n} \\ 0 & 0 \\ \hline \end{array}$ | $$ | $\begin{aligned} & \stackrel{5}{0} \\ & 0 \\ & 0 \end{aligned}$ | $$ | $\begin{aligned} & \text { in } \\ & \text { in } \end{aligned}$ | $\begin{aligned} & \text { in } \\ & \text { Un } \\ & \hline \end{aligned}$ | $\begin{aligned} & 0 \\ & \hat{n} \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { in } \\ & 0 \\ & 0 \end{aligned}$ |  | $\begin{aligned} & \text { în } \\ & 0 \\ & 0 \end{aligned}$ | $\begin{array}{\|l\|} \hline \hat{0} \\ \hat{i} \\ 0 \end{array}$ | $\begin{array}{\|c} 0 \\ 0 \\ 0 \\ 0 \end{array}$ | $\begin{gathered} 0 \\ \substack{n \\ 0 \\ \hline} \end{gathered}$ | $\begin{array}{\|l} \hline \text { in } \\ 0 \\ 0 \end{array}$ | $\begin{aligned} & 0 \\ & \hat{n} \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { î } \\ & \text { مٌ } \\ & \hline \end{aligned}$ | $\begin{gathered} 0 \\ \hat{n} \\ 0 \\ \hline \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \hat{n} \\ & 0 \end{aligned}$ | $\begin{aligned} & \mathrm{g} \\ & \mathrm{i} \\ & 0 \end{aligned}$ | $\left.\begin{array}{\|c\|c} \overrightarrow{0} \\ 0 \\ 0 \end{array} \right\rvert\,$ | $\begin{aligned} & \stackrel{8}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { ~n } \\ & \sim \\ & 0 \end{aligned}$ | $\begin{array}{\|c\|} \sim \\ \sim \\ 0 \\ 0 \end{array}$ | $\begin{array}{\|c} \sim \\ \\ 0 \\ \hline \end{array}$ | $\begin{gathered} \tilde{0} \\ 0 \\ 0 \\ \hline \end{gathered}$ | $\begin{array}{\|l\|l} \tilde{\sim} \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{array}{\|c} \tilde{\infty} \\ 0 \\ 0 \\ \hline \end{array}$ | N | ～ | ～ |
|  |  | $\begin{aligned} & \tilde{N} \\ & \underset{\sim}{n} \end{aligned}$ | $\stackrel{\circ}{6}$ | $\stackrel{\infty}{6}$ | $\stackrel{\circ}{6}$ | ¢ | $\left.\begin{array}{c} \underset{n}{n} \\ \underset{\sim}{n} \end{array}\right)$ | $\begin{aligned} & \stackrel{n}{0} \\ & \underset{\sim}{n} \end{aligned}$ |  | $\begin{array}{c\|c} \infty & \vec{n} \\ 0 & 0 \\ & 0 \\ \end{array}$ | $\begin{gathered} \underset{~}{\mathbf{~}} \\ \stackrel{y}{*} \end{gathered}$ | $\begin{aligned} & \hat{n} \\ & \stackrel{\sim}{f} \end{aligned}$ | $\begin{gathered} 0 \\ \underset{\sim}{n} \\ \end{gathered}$ | $\begin{aligned} & \substack{n \\ n \\ \hline} \\ & \hline \end{aligned}$ | $\underset{\sim}{\underset{\sim}{*}}$ | $\overbrace{\sim}^{\sim}$ | $\underset{\sim}{n}$ | $\underset{\sim}{\sim}$ | $\left\|\begin{array}{c} \underset{\sim}{0} \\ \underset{\sim}{2} \end{array}\right\|$ | $\left.\left\lvert\, \begin{array}{c} \hat{\sim} \\ \underset{\sim}{n} \end{array}\right.\right)$ | 寺 | 寺 | $\underset{\gamma}{\star}$ | $\stackrel{\sim}{0}$ | ¢ | ® | \％ |  | $\left\|\begin{array}{l} \text { 冗} \\ 0 \\ \underset{\sim}{2} \end{array}\right\|$ | $\begin{aligned} & \tilde{\sim} \\ & \stackrel{0}{7} \end{aligned}$ | $\left.\begin{aligned} & \sim \\ & \tilde{n} \\ & n_{n} \end{aligned} \right\rvert\,$ | $\left\|\begin{array}{c} n \\ \underset{\sim}{n} \end{array}\right\|$ | $\begin{array}{\|c\|} \substack{g \\ \vec{f}} \end{array}$ | $\left.\begin{gathered} \vec{i} \\ \underset{n}{n} \\ \hline \end{gathered} \right\rvert\,$ | $\stackrel{\otimes}{\infty}$ | $\underset{\substack{\underset{\sim}{\infty} \\ \underset{\sim}{2} \\ \hline}}{ }$ | $\stackrel{\sim}{\circ}$ | $\stackrel{\text { N }}{\substack{\text { N }}}$ | $\underset{\sim}{\text { N }}$ |
|  | $\begin{array}{ll} \hline 0 \\ \hline 0 \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{aligned} & n \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} 0 \\ \hline 0 \\ \hline 0 \end{gathered}$ | $\begin{aligned} & \hline 0 \\ & \hline 0 \\ & \hline 0 \end{aligned}$ | $0$ | $\begin{aligned} & \hline 0 \\ & 0 . \\ & 0 . \\ & \hline \end{aligned}$ | $$ | $\begin{aligned} & \text { n } \\ & \underset{O}{0} \\ & \hline \end{aligned}$ |  | $$ |  | $\begin{aligned} & \infty \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { mo } \\ & \text { ó } \end{aligned}$ | $$ | $\begin{aligned} & \text { no } \\ & 0 . \end{aligned}$ |  | $$ | $\begin{aligned} & \hline 0 \\ & \hline 0 \\ & 0 . \end{aligned}$ | $\begin{array}{\|l\|} \hline 0 \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{aligned} & \hline \begin{array}{c} n \\ 0 . \\ 0 \end{array} \\ & \hline \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { m } \\ & \hline 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { n} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { No } \\ & \text { O. } \end{aligned}$ | $\begin{aligned} & \hline 0 \\ & 0 \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline 0 \\ & 0.0 \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { No } \\ & \text { O. } \end{aligned}$ | $\begin{array}{\|l\|} \hline \infty \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{array}{\|l\|} \hline 0 \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{array}{\|l} \hline \text { 앙 } \\ \hline 0 \end{array}$ | $\begin{aligned} & \hline \stackrel{\circ}{0} \\ & 0 . \\ & \hline \end{aligned}$ | $\begin{array}{\|l\|} \hline 0 \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{array}{\|c\|} \hline 0 \\ \hline 0 \\ 0 \end{array}$ | $\begin{aligned} & \hline 8 \\ & \hline 0 \\ & \hline 0 \end{aligned}$ | $\begin{array}{\|c} \hline 8 \\ \hline 0 \\ \hline 0 \end{array}$ | $\begin{aligned} & \hline 0 \\ & \hline 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | － | L |
| $\stackrel{5}{4}$ | $\left(\begin{array}{c} 0 \\ 0 \\ n_{i} \end{array}\right)$ | $\left\lvert\, \begin{gathered} 0 \\ 0_{i} \\ \dot{m} \end{gathered}\right.$ | $\begin{aligned} & \text { o } \\ & \end{aligned}$ | $\begin{aligned} & \circ \\ & \text { 웃 } \\ & \hline \end{aligned}$ | $\begin{aligned} & \circ \\ & \text { 罂 } \end{aligned}$ |  | $\left\|\begin{array}{l} 0 \\ 0 \\ \underset{\sim}{i} \end{array}\right\|$ | $\begin{aligned} & 0 \\ & 0 \\ & \text { in } \end{aligned}$ | $\begin{array}{l\|l} 0 \\ 0 \\ 0 \\ 0 \\ \mathbf{0} \end{array}$ | $\begin{array}{l\|l} \hline 8 & 0 \\ 0 \\ \hline \end{array}$ |  | $\begin{aligned} & \circ \\ & \stackrel{\circ}{2} \\ & \stackrel{y}{2} \end{aligned}$ | $\begin{aligned} & \text { in } \\ & \text { م } \end{aligned}$ | $\begin{gathered} 0 \\ 0 \\ \\ \hline \end{gathered}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{2} \\ & \underset{i}{2} \end{aligned}$ |  |  | $\begin{aligned} & \mathrm{O} \\ & \stackrel{\rightharpoonup}{n} \end{aligned}$ | $\left\|\begin{array}{c} o \\ 0 \\ \stackrel{y}{n} \end{array}\right\|$ | $\left\|\begin{array}{l} 0 \\ \underset{\sim}{n} \\ \underset{\sim}{2} \end{array}\right\|$ | $\begin{array}{\|c} 0 \\ 0 \\ \stackrel{\rightharpoonup}{n} \\ \hline \end{array}$ |  | $\begin{aligned} & 0 \\ & i \\ & i n \end{aligned}$ | $\stackrel{\circ}{\circ}$ | $\left\|\begin{array}{c} \stackrel{\circ}{2} \\ \underset{m}{2} \end{array}\right\|$ | $\left\|\begin{array}{c} \stackrel{\circ}{\mathrm{a}} \\ \underset{m}{ } \end{array}\right\|$ | $\begin{gathered} \stackrel{\circ}{\mathbf{a}} \\ \underset{\sim}{2} \end{gathered}$ | $\left\lvert\, \begin{gathered} 0 \\ 0 \\ \underset{\sim}{\infty} \\ \hline \end{gathered}\right.$ | $\begin{array}{\|l\|} \hline 0 \\ 0 \\ \\ \text { N } \end{array}$ | $\begin{aligned} & \hline 0 \\ & \infty \\ & \text { N } \\ & \text { N } \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{l} \circ \\ 0 \\ \underset{f}{n} \end{array}\right\|$ | $\left\|\begin{array}{l} \mathrm{O} \\ 0 \\ \text { g } \end{array}\right\|$ | $\left.\begin{gathered} \stackrel{\rightharpoonup}{\mathrm{O}} \\ \underset{\mathrm{~m}}{ } \end{gathered} \right\rvert\,$ |  | $\stackrel{\square}{0}$ | － |  | $\stackrel{\text { cin }}{\text { n }}$ |
| $\begin{gathered} i \\ 0 \\ 0 \\ 0 \end{gathered}$ | 0 | ก | n | ก | ก | ก | 차자N | N | ミス | ミス | 각 | ヘ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | P | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\stackrel{ }{\circ}$ | $\bigcirc$ | ヘ | $\begin{array}{\|l\|} \hline \underset{\text { H}}{ } \\ 0 \\ \text { O} \\ \hline \end{array}$ | $\begin{aligned} & \text { N } \\ & 0 \\ & 0 \\ & \text { On } \end{aligned}$ | $\begin{array}{\|l\|} \hline \text { İ } \\ \text { O} \\ \text { an } \end{array}$ | $\left\|\frac{x}{z}\right\|$ | $\stackrel{4}{2}$ | $\frac{4}{z}$ | $\stackrel{\text { ¢ }}{2}$ | $$ | N | － | O |
|  |  | $\begin{gathered} o \\ \underset{\sim}{2} \\ \sim \end{gathered}$ | $\stackrel{\circ}{\circ}$ | － | － | $\stackrel{\circ}{\infty}$ | $\stackrel{\circ}{\circ}$ | $\begin{aligned} & \stackrel{\circ}{\circ} \\ & \underset{\sim}{2} \end{aligned}$ | $\underset{\sim}{\circ}$ | o\|co | $$ | $\begin{aligned} & \stackrel{\circ}{\circ} \\ & \underset{-}{2} \end{aligned}$ | $\begin{gathered} \stackrel{\circ}{\circ} \\ \underset{\sim}{2} \end{gathered}$ | $\begin{gathered} 0 \\ 0 \end{gathered}$ | \％ | 앙 | \％ | $\stackrel{\circ}{\infty}$ | － | ） | － | $\stackrel{\stackrel{\rightharpoonup}{o}}{\substack{2 \\ \hline}}$ |  | $\stackrel{\stackrel{\rightharpoonup}{\mathrm{O}}}{\substack{2}}$ | $\begin{gathered} \stackrel{0}{0} \\ \underset{\sim}{n} \end{gathered}$ | $\begin{aligned} & \stackrel{O}{\stackrel{\rightharpoonup}{2}} \\ & \underset{\sim}{2} \end{aligned}$ | $\stackrel{\stackrel{O}{t}}{\substack{2 \\ \hline}}$ | $\left\|\begin{array}{l} \circ \\ \underset{\sim}{\circ} \end{array}\right\|$ | $\left\|\begin{array}{c} o \\ 0 \\ i n \\ i n \end{array}\right\|$ | $\begin{gathered} 0 \\ i \\ i n \\ i n \end{gathered}$ | $\begin{aligned} & \stackrel{0}{2} \\ & \stackrel{n}{n} \end{aligned}$ | $\left\|\begin{array}{c} 0 \\ \tilde{i} \\ \underset{n}{2} \end{array}\right\|$ | $\left\lvert\, \begin{gathered} 0 \\ \underset{\sim}{2} \\ \underset{m}{2} \end{gathered}\right.$ | $\left\|\begin{array}{c} 0 \\ 0 \\ 0 \\ m \end{array}\right\|$ | Oiz | $\left\|\begin{array}{c} \underset{\sim}{g} \\ \underset{\sim}{2} \end{array}\right\|$ | $\stackrel{\text { 구N }}{\sim}$ |  | － |
|  | ш | ш | ш | ш | ш | ш | ш | 山 | 山 | 山 | ш | 山 | 山 | 山 | 山 | 山 | 山 | ш | ш | ш | ш | ш | ш | ш | ш | ш | ш | ш | $\bigcirc$ | － | － | － | $\bigcirc$ | $\bigcirc$ | － | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | $\begin{array}{\|c\|c} \substack{1 \\ \ddot{u} \\ \underset{\sim}{4} \\ \hline} \end{array}$ | $$ |  |  |  |  |  |  |  | 号 |  |
|  | 0 | $\bigcirc$ | \％ | 入 | 入 | 入 | \％ | \％ | 子 | 子 0 | \％ | \％ | \％ | \％ | ～ | N | i | 入 | 入 | ふ | 入 | 入 | 入 | 入 | 入 | 入 | $\cdots$ | \％ | Q | 8 | $\bigcirc$ | $\bigcirc$ | Q | 6 | Q | 9 | \％ | ¢ | N |
|  | $\stackrel{i n}{i}$ |  |  |  |  |  |  |  |  |  |  | $\xrightarrow{n}$ |  |  | $\begin{aligned} & \text { 3 } \\ & \frac{2}{0} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ |  |  |  |  |  |  |  |  |  |  | $\begin{aligned} & \stackrel{o}{c} \\ & \stackrel{\rightharpoonup}{ } \\ & \hline \end{aligned}$ | $\stackrel{\sim}{\infty}$ |  | $\begin{aligned} & 0 \\ & 0 \\ & 3 \\ & 3 \\ & 0 \\ & 0 \\ & 0 \\ & \vdots \\ & \vdots \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { o } \\ & \frac{0}{c} \\ & \frac{0}{4} \end{aligned}$ | $\begin{array}{\|l\|} \hline 3 \\ \vdots \\ \tilde{n} \\ \tilde{y} \\ \vdots \\ \hline \end{array}$ |  | $\begin{array}{\|c} \frac{0}{2} \\ \frac{0}{0} \\ \frac{0}{n} \\ \frac{0}{0} \\ \frac{2}{2} \\ \hline 0 \\ \hline \end{array}$ |  |  | $\begin{aligned} & \frac{0}{0} \\ & \frac{0}{\overline{0}} \\ & \overline{\ddot{\omega}} \end{aligned}$ | $\begin{aligned} & \frac{0}{0} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \frac{e}{3} \\ & \frac{3}{0} \\ & \hline \end{aligned}$ |  |  |
| $\begin{gathered} \text { E } \\ \stackrel{\rightharpoonup}{4} \\ \hline \end{gathered}$ | $\begin{array}{\|c} \frac{3}{3} \\ \frac{3}{2} \\ \frac{2}{n} \\ \frac{2}{0} \\ 0 \\ 0 \\ \vdots \\ \\ \hline \end{array}$ | $\begin{gathered} \mathrm{n} \\ \underline{i} \\ \hline \end{gathered}$ |  |  |  |  | $\begin{array}{\|l} \hline 0 \\ 0 \\ 3 \\ \vdots \\ 0.0 \\ \vdots \\ \vdots \\ \hline 0 \\ \hline \end{array}$ |  |  |  |  |  | $\stackrel{i n}{\stackrel{i}{s}}$ |  |  |  |  |  |  |  |  | 을 <br> 8 |  |  |  | Verdana Entrance | $\stackrel{\text { 온 }}{2}$ |  |  |  | $\begin{array}{\|l\|l} \frac{3}{3} \\ \frac{3}{2} \\ \frac{u}{0} \\ \stackrel{y}{0} \\ 0 \\ \hline 0 \end{array}$ | $\begin{array}{\|l} 3 \\ n \\ \tilde{n} \\ \tilde{5} \\ \vdots \\ \hline \end{array}$ |  | $\begin{aligned} & \frac{0}{0} \\ & \frac{0}{0} \\ & \frac{0}{5} \\ & \frac{0}{5} \\ & \frac{2}{5} \\ & \hline \mathbf{c} \\ & \hline \end{aligned}$ |  |  |  | 0 0 0 0 0 0 0 $\underline{5}$ 0 0 0 | \％ |
|  |  |  |  | $\begin{aligned} & \text { 요 } \\ & \stackrel{0}{i} \end{aligned}$ |  |  |  |  |  | $\frac{\sum_{2}^{2}}{2}$ |  |  |  |  |  |  |  |  |  | $\begin{aligned} & \text { 후 } \\ & \text { z } \\ & \stackrel{y}{4} \\ & \stackrel{\rightharpoonup}{4} \end{aligned}$ |  |  |  |  |  |  |  |  |  | $\stackrel{\text { ñ }}{\text { ¢ }}$ |  |  |  |  | $\stackrel{\infty}{\sim}$ |  |  |  |  |

[^0]LOS standard for $1-75$ and SR 82 is based on FDOT＇s SIS LOS standard．
Maximum directional service volumes for Lee County roadways are based the April 2016 Generalized Peak Hour Peak Directional Service Volumes obtained from the Lee County website（www．leegov．com／drd／infraplanning／traffic）．
Maximal service volumes for l－75 and SR 82 are based on the FDOT＇s 2012 Quality／Level of Service Handbook． Maximum directional service volumes for I－75 and SR 82 are based on the FDOT＇s 2012 Quality／Level of Service Handbook．
PCS No．＝Lee County Permanent Count Station ID number for Lee County Roadways and FDOT Count Station ID number for I－75 and SR 82 ．
K（100）－Factor and D（100）－Factor for Lee County roadways were obtained from the 2016 Lee County Permanent Count Station data．


Page 10 of 17

Based strictly on the results of the specific roadway segment level of service analysis conducted for this project, the following roadway improvements would be required to alleviate the projected level of service deficiencies:

- Eight lanes on Alico Road from Three Oaks Parkway to I-75;
- Six lanes on Corkscrew Road from Three Oaks Parkway to I-75;
- Four lanes on Corkscrew Road from Ben Hill Griffin Parkway to Grande Oak Way;
- Eight lanes on I-75 from Bonita Beach Road to Corkscrew Road;
- Eight lanes on I-75 from Corkscrew Road to Alico Road;
- Eight la nes on SR 82 from Daniels Parkway to 40th Street SW; and
- Four lanes on SR 82 from the Hendry/Collier County line to Corkscrew Road

The improvements that would be required to alleviate the projected level of service defic iencies are graphically illustrated in Appendix D. It should be noted that the following improvements are included in the Lee County MPO's 2040 LRTP Needs Plan:

- Six-laning of Corkscrew Road from US 41 to Ben Hill Griffin Parkway
- Four-laning of Corkscrew Road from Ben Hill Griffin Parkway to Alico Road
- Eight-laning of I-75 from the Collier/Lee County line to Luckett Road

In contrast, the eight-laning of Alico Road from Three Oaks Parkway to I-75 is not included in the Lee County MPO's 2040 LRTP. Although the portion of Alic o Road between Three Oaks Parkway and I-75 is projected to operate at Level of Service F in 2026, it is important to note that the estimated peak hour peak direction volume on this roadway segment is only 113 vehic les higher (approximately $4.0 \%$ ) than the maximum Level of Service E service volume. The peak hour peak direction volume for this segment was estimated using a $\mathrm{K}_{100}$-factor equal to 0.099 based on the data associated with PCSNo. 10. This yielded a two-way peak hour volume equal to 5,871 , which is 788 vehic les higher than the highest hourly volume recorded at this permanent count station in 2016. This K-factor is a pproximately $6.5 \%$ higher than the K-factor used for the portion of Alico Road to the east of I-75 (i.e., 0.093). Consequently, if a K-factor value of 0.093 was used to estimate the peak hour peak direction volume for the portion of Alico Road between Three Oaks Parkway and I-75, the resulting volume would be equal to 2,868 vehicles which is 72 vehicles less than the maximum Level of Service Eservice volume. K-factors usually decrease over time as AADT volumes increase and six-la ne signalized arterials with existing AADT volumes approaching 60,000 vpd usually have K 100 -factors that are much lower than 0.10. Taking into consideration the sensitivity of the a nalysis results with respect to the $K$-100-factor value used to derive the peak hour volume, as well as the margin of error associated with future year travel demand model projections, the strength of the need for eight lanes on this segment of Alico Road in the year 2026 appears marginal.

Construction funding for the widening (six-laning) of SR 82 from Colonial Boulevard to Homestead Road is included in the FDOTs work program and is programmed to be completed by 2026. Therefore, this roadway improvement was included in the 2026 EEPCO model roadway network and was taken into account during the level of service analysis.

The 2026 AADT volume on SR 82 between Daniels Parkway/Gunnery Road and 40th Street SW is projected to be approximately 61,500 vehic les per day (vpd). This 2026 AADT volume is significantly higher than the existing AADT volume ( $28,100 \mathrm{vpd}$ ) and is the result of not including the Alico Road Connector in the 2026 roadway network. This cost feasible improvement is included in the Lee County MPO's 2040 LRTP; however, it is included in the 2031-2040 timeframe. The implementation of the Alico Road Connector is expected to reduce the future AADTvolumes on the portion of SR 82 between Daniels Parkway/Gunnery Road and the northem terminus of the Connector and allow the future six-lane SR 82 to operate at an acceptable level of service; therefore, eliminating the need for eight lanes on this portion of SR 82.

Although the widening (i.e., four-laning) of SR 82 from the Hendry/Collier County line to SR 29 is currently under design, construction funding is not included in the FDOT District One Five-Year Transportation Improvement Program (TIP). Consequently, this roadway improvement was not included in either the 2026 EEPCO model or the 2026 level of service analysis. Similar to the portion of SR 82 from Daniels Parkway/Gunnery Road to SW $40^{\text {th }}$ Street, the level of service deficiency projected to occur in 2026 for SR 82 from the Hendry/Collier County line to Corkscrew Road will be alleviated once the planned roadway improvement is construc ted.

It should also be noted that FDOT District One conducted a study to evaluate potential geometric improvements for the I-75/Corkscrew Road interchange. The recommended improvements for this interchange include adding a second eastbound and westbound left-tum lane on Corkscrew Road for vehicles tuming onto the northbound and southbound i-75 ramps. The addition of a second eastbound and westbound left-tum lane on Corkscrew Road at the $1-75$ interchange is programmed for construction in the District One Five-Year Transportation Improvement Program (TIP) in FY 2019.

## 2026 Traffic Volumes and Levels of Senvice - With WildBlue, Corkscrew Fams, Peppenland Ranch and Verdana

The following methodology was utilized to estimate the 2026 peak hour traffic volumes on the study area roadway network after the four future developments (WIld Blue, Corkscrew Farms, Pepperland Ranch and Verdana) are constructed:

Step 1: Additional TAZs were included in the 2026 EEPCO model to represent the four additional future developments. The future land use associated with each of these four developments was obtained from the corresponding Traffic Impact Studies and included in the model. The land use data included the following:

- WildBlue - 1,000 single family dwelling units and 40,000 square feet of commercial retail (i.e., 100 commercial employees)
- Corkscrew Farms-1,325 single family dwelling units
- Pepperland Ranch - 700 single family dwelling units
- Verdana - 1,460 single family dwelling units and 60,000 square feet of commercial
retail (i.e., 150 commercial employees)
Three of the four future developments will only have access via Corkscrew Road; however, the Wild Blue development will have access via both Alico Road and Corkscrew Road. The primary portion of the WildBlue development located between Corkscrew Road and Alico Road will include 618 single family dwelling units; however, there is also a separate parcel on the north side of Corkscrew Road that will contain 382 single family units and will only have access to Corkscrew Road. A separate TAZwas used to represent this parcel.

Step 2: The 2026 EEPCO model was run and select zone trace assignments were conducted for each of the four future developments. These select zone trace assignments illustrate the travel demand model's estimated distribution of each of the future development's total daily traffic volumes throughout the model roadway network. The select zone trace assignment percentages are provided in Appendix E.

Step 3: The extemal inbound and outbound peak hour traffic volumes that were previously estimated for each of the four future developments through the use of the Institute of Transportation Engineers (ITE) Trip Generation Handbook were obtained from the following Traffic Impact Study documents:

- Wild Blue Rezoning Traffic Study - Case \# DCI2014-00009 (March 11, 2014)
- Corkscrew Farms Rezoning Traffic Study - Case \# DCI2015-0004 (May 20, 2015)
- Pepperland Ranch Comprehensive Plan Amendment/Rezoning Traffic Study - Case \# DCI2016-00003 (March 2, 2016)
- Verdana Rezoning Traffic Study - CASE \# DCI2016-00018 (September 20, 2016)

These peak hour traffic volumes were assigned to each roadway segment in the study area based on the percentage of the total daily traffic volume that was assigned to each roadway segment by the travel demand model. The peak hour traffic volumes for each of the four future developments were individually distributed throughout the roadway network and then the peak hour volumes on each roadway segment were summed to obtain the combined total peak hour volume on each roadway segment for all four future developments. Table E-1 and Table E-2 in Appendix Esummarize the study area roadway network peak hour volumes for the four future developments.

Step 4: The 2026 peak hour background traffic volumes estimated previously were added to the combined future development peak hour volumes to obtain the 2026 total peak hour volumes for each roadway segment.

Table 3 summanizes the 2026 total peak hour peak direction volumes and the ratios of the peak hour peak direction volume to the maximum peak hour peak direction level of service volume for each of the study area roadway segments. As stated previously, a ratio greater than 1.00 indicates that the roadway segment is not operating at an acceptable level of senvice. A review of Table $\mathbf{3}$ indicates that the following roadways are projected to have ratios greater than 1.00 :

- Alico Road from Three Oaks Parkway to I-75;
- Alico Road from Airport Haul Road to the WildBlue entrance;
- Corkscrew Road from Three Oaks Parkway to Alico Road;
- I-75 from Bonita Beach Road to Corkscrew Road;
- I-75 from Corkscrew Road to Alico Road;
- SR 82 from Daniels Parkway to $40^{\text {th }}$ Street SW; and
- SR 82 from the Hendry/CollierCounty line to Corksc rew Road

Table 3: $\mathbf{2 0 2 6}$ PM Peak Hour Level of Service Summary - With WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana

| Roadway | From | To | 2026 Background Traffic |  |  |  | 2026 Total Project Traffic (1) |  |  |  | 2026 Total Traffic |  |  |  | No. of Lanes | $\begin{array}{\|c\|} \hline \text { LOS } \\ \text { Standar } \\ \mathrm{d} \end{array}$ | $\begin{array}{\|c\|} \hline \text { Dir. } \\ \text { Service } \\ \text { Volume } \\ \hline \end{array}$ | Peak Dir. | Peak Dir. V/C Ratio | $\begin{array}{\|c\|} \hline \text { LOS } \\ \text { Standar } \\ \text { d Met? } \end{array}$ | $\begin{array}{\|c} \begin{array}{c} \text { No. of } \\ \text { Lanes } \\ \text { Needed } \end{array} \\ \hline \end{array}$ | Dir. Service Volume | $\begin{array}{\|c\|} \hline \text { Peak } \\ \text { Dir. } \\ \text { V/C } \\ \text { Ratio } \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{gathered} \hline \text { Peak } \\ \text { Dir. } \\ \text { Hourly } \\ \hline \end{gathered}$ | $\begin{gathered} \text { Peak } \\ \text { Dir. } \\ \hline \end{gathered}$ | $\begin{array}{\|c\|} \hline \begin{array}{c} \text { Off-Peak } \\ \text { Dir. } \\ \text { Hourly } \end{array} \\ \hline \end{array}$ | $\begin{aligned} & \hline \text { Off- } \\ & \text { Peak } \\ & \text { Dir. } \end{aligned}$ | $\begin{array}{\|c\|} \hline \text { Peak } \\ \text { Dir. } \\ \text { Hourly } \\ \hline \end{array}$ | $\begin{gathered} \text { Peak } \\ \text { Dir. } \end{gathered}$ | $\begin{array}{\|c\|} \hline \begin{array}{c} \text { Off-Peak } \\ \text { Dir. } \\ \text { Hourly } \end{array} \\ \hline \end{array}$ | $\begin{array}{\|c\|} \hline \text { Off- } \\ \text { Peak } \\ \text { Dir. } \\ \hline \end{array}$ | $\begin{gathered} \text { Peak } \\ \text { Dir. } \\ \text { Hourly } \\ \hline \end{gathered}$ | $\begin{array}{\|c} \text { Peak } \\ \text { Dir. } \\ \hline \end{array}$ | Off-Peak <br> Dir. <br> Hourly$\|$ | $\begin{array}{c\|} \hline \text { Off- } \\ \text { Peak } \\ \text { Dir. } \\ \hline \end{array}$ |  |  |  |  |  |  |  |  |  |
| Alico Rd | Three Oaks Pkwy | 1-75 | 3,053 | w | 2,818 | E | 248 | E | 145 | w | 3,198 | w | 3,066 | E | 6D | E | 2,940 | w | 1.09 | No | 8D | 3,940 | 0.81 |
|  | 1-75 | Ben Hill Griffin Pkwy | 1,577 | w | 1,455 | E | 295 | E | 174 | w | 1,751 | w | 1,750 | E | 6D | E | 2,940 | w | 0.60 | Yes |  |  |  |
|  | Ben Hill Griffin Pkwy | Airport Haul Rd | 363 | w | 335 | E | 546 | E | 322 | w | 881 | E | 685 | w | 4D | E | 1,960 | E | 0.45 | Yes |  |  |  |
|  | Airport Haul Rd | WildBlue Entrance | 363 | E | 335 | w | 546 | E | 322 | w | 909 | E | 657 | w | 2 U | E | 860 | E | 1.06 | No | 4D* | 1,960 | 0.46 |
|  | WildBlue Entrance | Green Meadows Rd | 363 | s | 335 | N | 372 | s | 241 | N | 735 | s | 576 | N | 2 U | E | 860 | s | 0.85 | Yes |  |  |  |
|  | Green Meadows Rd | Corkscrew Rd | 189 | S | 174 | N | 475 | s | 286 | N | 664 | s | 460 | N | 2 U | E | 860 | s | 0.77 | Yes |  |  |  |
| Ben Hill Griffin Pkwy | Corkscrew Rd | Estero Pkwy | 1,258 | s | 1,115 | N | 97 | s | 57 | N | 1,355 | s | 1,172 | N | 4D | E | 1,960 | s | 0.69 | Yes |  |  |  |
|  | Estero Pkwy | FGCU Entrance | 1,391 | s | 1,234 | N | 26 | s | 15 | N | 1,417 | s | 1,249 | N | 4D | E | 1,960 | S | 0.72 | Yes |  |  |  |
|  | FGCU Entrance | College Club Dr | 1,425 | N | 1,263 | s | 24 | s | 19 | N | 1,444 | N | 1,287 | S | 4D | E | 1,960 | N | 0.74 | Yes |  |  |  |
|  | College Club Dr | Alico Rd | 2,015 | N | 1,576 | S | 100 | N | 59 | S | 2,115 | N | 1,635 | S | 6D | E | 2,940 | N | 0.72 | Yes |  |  |  |
|  | Alico Rd | SWFIA Access Rd | 1,495 | s | 1,169 | N | 146 | s | 86 | N | 1,641 | S | 1,255 | N | 4D | E | 1,960 | s | 0.84 | Yes |  |  |  |
| Corkscrew Rd | Three Oaks Pkwy | 1-75 | 2,524 | E | 2,150 | w | 291 | E | 174 | w | 2,815 | E | 2,324 | w | 4D | E | 1,960 | E | 1.44 | No | 6D | 2,940 | 0.96 |
|  | 1-75 | Ben Hill Griffin Pkwy (EB) | 1,898 | E | 0 | w | 703 | E | 0 | w | 2,601 | E | 0 | w | 4D | E | 1,960 | E | 1.33 | No | 6D* | 2,940 | 0.88 |
|  | Ben Hill Griffin Pkwy (WB) | 1-75 | 0 | E | 1,242 | w | 0 | E | 333 | w | 0 | E | 1,575 | w | 4D | E | 1,960 | E |  |  | 6D* | 2,940 |  |
|  | Ben Hill Griffin Pkwy | Grande Oak Wy | 1,069 | E | 875 | w | 839 | E | 496 | w | 1,908 | E | 1,371 | w | 2D | E | 900 | E | 2.12 | No | 4D | 1,960 | 0.97 |
|  | Grande Oak Wy | Wildcat Run Dr | 854 | E | 699 | w | 882 | E | 522 | w | 1,736 | E | 1,221 | w | 2D | E | 900 | E | 1.93 | No | 4D* | 1,960 | 0.89 |
|  | Wildcat Run Dr | WildBlue West Entrance | 767 | E | 628 | w | 906 | E | 536 | w | 1,673 | E | 1,164 | w | 2 U | E | 860 | E | 1.95 | No | 4D* | 1,960 | 0.85 |
|  | WildBlue West Entrance | Cypress Shadows Blvd | 767 | E | 628 | w | 825 | E | 515 | w | 1,592 | E | 1,143 | w | 2 U | E | 860 | E | 1.85 | No | 4D* | 1,960 | 0.81 |
|  | Cypress Shadows Blvd | Bella Terra Blvd/WildBlue East Entrance | 680 | E | 557 | W | 825 | E | 515 | w | 1,505 | E | 1,072 | W | 2 U | E | 860 | E | 1.75 | No | 4D* | 1,960 | 0.77 |
|  | Bella Terra Blvd/WildBlue <br> East Entrance | Alico Rd | 261 | E | 213 | w | 804 | E | 520 | w | 1,065 | E | 733 | w | 2 U | E | 860 | E | 1.24 | No | 4D* | 1,960 | 0.54 |
|  | Alico Rd | Corkscrew Farms Entrance | 261 | E | 213 | w | 1,238 | E | 764 | w | 1,499 | E | 977 | w | 2 U | E | 1,640 | E | 0.91 | Yes |  |  |  |
|  | Corkscrew Farms Entrance | 6L's Farm Rd | 261 | E | 213 | w | 900 | E | 652 | w | 1,161 | E | 865 | w | 2 U | E | 1,640 | E | 0.71 | Yes |  |  |  |
|  | 6L's Farm Rd | Pepperland Entrance | 200 | E | 163 | w | 911 | E | 656 | w | 1,111 | E | 819 | w | 2 U | E | 1,640 | E | 0.68 | Yes |  |  |  |
|  | Pepperland Entrance | Verdana Entrance | 200 | E | 163 | w | 739 | E | 592 | w | 939 | E | 755 | w | 2 U | E | 1,640 | E | 0.57 | Yes |  |  |  |
|  | Verdana Entrance | TPI Rd | 200 | E | 163 | w | 217 | w | 129 | E | 380 | w | 329 | E | 2 U | E | 1,640 | w | 0.20 | Yes |  |  |  |
|  | TPI Rd | SR 82 | 200 | E | 163 | w | 143 | w | 85 | E | 306 | W | 285 | E | 2 U | E | 1,640 | W | 0.17 | Yes |  |  |  |
| Estero Pkwy | Three Oaks Pkwy | Ben Hill Griffin Pkwy | 958 | E | 816 | W | 57 | E | 33 | W | 1,015 | E | 849 | W | 4D | E | 1,960 | E | 0.52 | Yes |  |  |  |
| 1-75 | Bonita Beach Road | Corkscrew Road | 6,683 | N | 4,819 | S | 305 | N | 181 | S | 6,988 | N | 5,000 | S | 6D | D | 5,500 | N | 1.27 | No | 8D | 7,320 | 0.95 |
|  | Corkscrew Rd | Alico Rd | 6,787 | S | 4,895 | N | 52 | S | 29 | N | 6,839 | S | 4,924 | N | 6D | D | 5,500 | S | 1.24 | No | 8D | 7,320 | 0.93 |
| SR 82 | Daniels Pkwy | 40th St SW | 3,221 | E | 2,314 | w | 1 | E | 1 | w | 3,222 | E | 2,315 | w | 6D | D | 3,020 | E | 1.07 | No | 8D | 4,040 | 0.80 |
|  | 40th St SW | Alabama Rd | 2,488 | E | 1,787 | w | 3 | E | 3 | w | 2,491 | E | 1,790 | w | 6D | D | 3,020 | E | 0.82 | Yes |  |  |  |
|  | Alabama Rd | Parkdale Blvd | 2,409 | E | 1,731 | w | 5 | E | 4 | w | 2,414 | E | 1,735 | w | 6 D | D | 3,020 | E | 0.80 | Yes |  |  |  |
|  | Parkdale Blvd | Jaguar Blvd | 1,776 | E | 1,275 | W | 6 | E | 4 | w | 1,782 | E | 1,279 | w | 6 D | D | 3,020 | E | 0.59 | Yes |  |  |  |
|  | Jaguar Blvd | Homestead Rd | 629 | E | 451 | w | 8 | E | 5 | w | 637 | E | 456 | w | 6D | D | 3,020 | E | 0.21 | Yes |  |  |  |
|  | Homestead Rd | Bell Blvd | 922 | E | 662 | w | 15 | E | 9 | w | 937 | E | 671 | w | 4D | D | 3,240 | E | 0.29 | Yes |  |  |  |
|  | Bell Blvd | Columbus Blvd | 1,105 | E | 794 | w | 32 | E | 19 | w | 1,137 | E | 813 | w | 4D | D | 3,240 | E | 0.35 | Yes |  |  |  |
|  | Columbus Blvd | Collier Co. Line | 1,283 | E | 921 | w | 52 | E | 30 | w | 1,335 | E | 951 | w | 4D | D | 3,240 | E | 0.41 | Yes |  |  |  |
|  | Collier Co. Line | Corkscrew Road | 1,283 | E | 921 | W | 52 | E | 30 | W | 1,335 | E | 951 | w | 2 U | D | 1,190 | E | 1.12 | No | 4D | 3,240 | 0.41 |

${ }^{(1)}$ The 2026 Total Project Traffic includes WildBlue, Corkscrew Farms (aka The Place), Pepperland Ranch and Verdana.

* Denotes that the additional laneage is not needed without the four future developments.

OS standard for I-75 and SR 82 is based on FDOT's SIS LOS standard.
Maxim
Maximum directional service volumes for I-75 and SR 82 are based on the FDOT's 2012 Quality/Level of Service Handbook.
Peak Direction $\mathrm{V} / \mathrm{C}$ Ratio $=($ Peak Direction Hourly Volume)/(Peak Direction Maximum Service Volume)
A comparison of Table $\mathbf{2}$ and Table $\mathbf{3}$ indicates that the following roadway improvements are projected to be needed in the year 2026 both with and without the four future developments:

- Eight lanes on Alico Road from Three Oaks Parkway to I-75;
- Six lanes on Corkscrew Road from Three Oaks Parkway to I-75;
- Four lanes on Corkscrew Road from Ben Hill Griffin Parkway to Grande Oak Way;
- Eight lanes on I-75 from Bonita Beach Road to Corkscrew Road;
- Eight lanes on I-75 from Corkscrew Road to Alico Road;
- Eight la nes on SR 82 from Daniels Parkway to 40th Street SW; and
- Four lanes on SR 82 from the Hendry/Collier County line to Corkscrew Road

The need for each of these improvements was discussed in the previous section of this memorandum. The following additional roadway improvements are projected to be needed in the year 2026 as a result of the additional traffic that is generated from the WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana developments:

- Four lanes on Alico Road from Aiport Haul Road to the Wild Blue entrance;
- Six lanes on Corkscrew Road from I-75 to Ben Hill Griffin Parkway; and
- Four lanes on Corkscrew Road from Grande Oak Way to Alico Road

The additional roadway improvements that would be required to alleviate the projected level of service deficiencies resulting from the additional traffic that is generated by the WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana developments are graphically illustrated in in Appendix $\mathbf{F}$.

As stated previously, the six-laning of Corkscrew Road from I-75 to Ben Hill Griffin Parkway and the four-laning of Corkscrew Road from Ben Hill Griffin Parkway to Alico Road (as well as the eight-laning of I-75 from Bonita Beach Road to Alico Road) are included in the Lee County MPO's 2040 LRTP Needs Plan.

It should be noted that since the time the future year traffic projections were developed and the future year level of service analysis was conducted, Lee County is in the process of issuing a zoning administrative amendment for WildBlue. This zoning amendment will increase the number of residential dwelling units from 1,000 to 1,096 . This increase in single fa mily dwelling units is estimated to inc rease the total p.m. peak hour trip generation for this development by 62 vehic les ( 39 inbound vehic les and 23 outbound vehicles). Based on the results of the previous roadway segment level of service analysis, this small increase in p.m. peak hour volume is not expected to result in any additional level of service deficiencies.

## Summary

Future year (2026) roadway segment level of service analysis was conducted in support of Lee County's EEPCO Study. This analysis was conducted using 2026 traffic volumes that were derived through the use of a modified version of the District One Regional Planning Model. The peak hour peak direction volumes for two scenarios (i.e., with and without the WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana developments) were compared to the maximum peak hour peak direction level of service volumes associated with each specific roadway segment and the roadway segments that are projected to
operate at unacceptable levels of service both with and without the four additional future developments were identified. The maximum level of service volumes reflected LOS E conditions for the Lee County roadways and LOSD conditions for the FDOTroadways.

The following roadway segments are projected to operate at unacceptable levels of service in the year 2026 without the WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana developments:

- Alico Road from Three Oaks Parkway to I-75;
- Corkscrew Road from Three Oaks Parkway to I-75;
- Corkscrew Road from Ben Hill Griffin Parkway to Grande Oak Way;
- I-75 from Bonita Beach Road to Corkscrew Road;
- I-75 from Corkscrew Road to Alico Road;
- SR 82 from Daniels Parkway to $40^{\text {th }}$ Street SW; and
- SR 82 from the Hendry/Collier County line to Corkscrew Road

Based strictly on the results of the specific roadway segment level of service analysis conducted for this project, the following roadway improvements would be required to alleviate the projected level of service deficiencies:

- Eight lanes on Alico Road from Three Oaks Parkway to I-75;
- Six lanes on Corkscrew Road from Three Oaks Parkway to I-75;
- Fourlanes on Corkscrew Road from Ben Hill Griffin Parkway to Grande Oak Way;
- Eight lanes on I-75 from Bonita Beach Road to Corkscrew Road;
- Eight lanes on I-75 from Corkscrew Road to Alico Road;
- Eight la nes on SR 82 from Daniels Parkway to 40th Street SW; and
- Four lanes on SR 82 from the Hendry/Collier County line to Corkscrew Road

The following roadway segments are projected to operate at unacceptable levels of senvice in the year 2026 with the WildBlue, Corkscrew Fams, Pepperland Ranch and Verdana developments:

- Alico Road from Three OaksParkway to I-75;
- Alico Road from Airport Haul Road to the Wild Blue entrance;
- Corkscrew Road from Three Oaks Parkway to Alico Road;
- I-75 from Bonita Beach Road to Corkscrew Road;
- I-75 from Corkscrew Road to Alico Road;
- SR 82 from Da niels Pa rkway to $40^{\text {th }}$ Street SW; and
- SR 82 from the Hendry/Collier County line to Corkscrew Road

Based strictly on the results of the specific roadway segment level of service analysis conducted for this project, the following roadway improvements would be required to alleviate the level of service deficiencies projected to occur with the Wild Blue, Corkscrew Farms, Pepperland Ranch and Verdana developments:

- Eight lanes on Alico Road from Three Oaks Parkway to I-75;
- Six lanes on Corkscrew Road from Three Oaks Parkway to I-75;
- Fourlanes on Corkscrew Road from Ben Hill Griffin Parkway to Grande Oak Way;
- Eight lanes on I-75 from Bonita Beach Road to Corkscrew Road;
- Eight lanes on I-75 from Corkscrew Road to Alico Road;
- Eight la nes on SR 82 from Daniels Parkway to 40th Street SW; and
- Four lanes on SR 82 from the Hendry/Collier County line to Corkscrew Road
- Four lanes on Alico Road from Airport Haul Road to the Wild Blue entrance;
- Six lanes on Corkscrew Road from I-75 to Ben Hill Griffin Parkway; and
- Fourlanes on Corkscrew Road from Grande Oak Way to Alico Road


## Appendix A

Year 2026 EEPCO Travel Demand Model Land Use Data, PSWADT Volumes and Model Output Conversion Factors

TABLE A-1: 2026 EEPCO MODEL LAND USE DATA

| ZONE | SFDU | SFPOP | MFDU | MFPOP | IND_EMP | COMM_EMP | SERV_EMP | TOT_EMP | HMDU | HMPOP | SCHOOL | UNIVERSITY |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2944 | 0 | 0 | 0 | 0 | 9 | 117 | 0 | 126 | 0 | 0 | 0 | 0 |
| 2969 | 0 | 0 | 0 | 0 | 0 | 233 | 2,185 | 2,418 | 0 | 0 | 0 | 0 |
| 3005 | 0 | 0 | 0 | 0 | 466 | 908 | 671 | 2,045 | 190 | 342 | 0 | 0 |
| 3170 | 420 | 1,190 | 186 | 512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3172 | 0 | 0 | 313 | 551 | 0 | 573 | 167 | 740 | 167 | 300 | 0 | 0 |
| 3185 | 212 | 424 | 694 | 1,075 | 4 | 137 | 415 | 556 | 150 | 270 | 500 | 0 |
| 3201 | 742 | 1,522 | 387 | 785 | 41 | 319 | 357 | 717 | 94 | 170 | 0 | 0 |
| 3649 | 0 | 0 | 394 | 632 | 3 | 2,457 | 203 | 2,663 | 250 | 450 | 0 | 0 |
| 3650 | 89 | 197 | 26 | 47 | 1 | 4 | 33 | 38 | 0 | 0 | 0 | 0 |
| 3651 | 737 | 1,474 | 382 | 705 | 0 | 400 | 0 | 400 | 120 | 216 | 1,084 | 0 |
| 3654 | 330 | 660 | 58 | 68 | 0 | 12 | 212 | 224 | 0 | 0 | 0 | 0 |
| 3655 | 2,088 | 4,176 | 1,140 | 1,937 | 16 | 230 | 107 | 353 | 0 | 0 | 0 | 0 |
| 3656 | 0 | 0 | 0 | 0 | 110 | 15 | 240 | 365 | 0 | 0 | 0 | 0 |
| 3728 | 88 | 254 | 19 | 44 | 274 | 6 | 91 | 371 | 0 | 0 | 0 | 0 |
| 3966 | 0 | 0 | 0 | 0 | 929 | 414 | 533 | 1,876 | 466 | 838 | 0 | 90 |
| 3967 | 301 | 602 | 76 | 121 | 41 | 42 | 121 | 204 | 0 | 0 | 0 | 0 |
| 3976 | 148 | 296 | 316 | 351 | 0 | 30 | 562 | 592 | 200 | 360 | 0 | 0 |
| 3977 | 0 | 0 | 0 | 0 | 0 | 1,469 | 100 | 1,569 | 0 | 0 | 0 | 0 |
| 3980 | 0 | 0 | 1,258 | 4,748 | 15 | 101 | 1,621 | 1,737 | 0 | 0 | 0 | 18,481 |
| 3981 | 310 | 620 | 658 | 1,056 | 71 | 556 | 289 | 916 | 104 | 187 | 0 | 0 |
| 3986 | 0 | 0 | 0 | 0 | 364 | 242 | 291 | 897 | 267 | 480 | 0 | 0 |
| 3992 | 325 | 650 | 519 | 576 | 0 | 322 | 66 | 388 | 0 | 0 | 0 | 0 |
| 3994 | 169 | 338 | 0 | 0 | 1 | 0 | 12 | 13 | 0 | 0 | 0 | 0 |
| 4000 | 111 | 266 | 18 | 32 | 22 | 259 | 193 | 474 | 0 | 0 | 0 | 0 |
| 4001 | 0 | 0 | 0 | 0 | 764 | 250 | 0 | 1,014 | 0 | 0 | 0 | 0 |
| 4003 | 53 | 158 | 0 | 0 | 154 | 1 | 16 | 171 | 0 | 0 | 0 | 0 |
| 4007 | 76 | 190 | 5 | 13 | 13 | 88 | 25 | 126 | 0 | 0 | 0 | 0 |
| 4008 | 179 | 438 | 10 | 18 | 18 | 8 | 0 | 26 | 0 | 0 | 0 | 0 |



| SFDU $=$ Single family dwelling units | SER_EMP $=$ Service employees |
| :--- | :--- |
| SFPOP $=$ Single family population | TOT_EMP $=$ Total employees |
| MFDU $=$ Multi-family dwelling units | HMDU $=$ Hoel/Motel rooms |
| MFPOP $=$ Multi-family population | HMPOP $=$ Hotel/Motel population |
| IND_EMP $=$ Industrial employees | School $=$ Number of students (K-12) |
| COMM_EMP = Commercial employees | University $=$ Number of students |

## D1RPM 2026 Network with TAZ



D1RPM 2026 Refined Model - PSWT Volumes Without Selected Developments


2016 PEAK SEASON FACTOR CATEGORY REPORT - REPORT TYPE: ALL CATEGORY: 1200 LEE COUNTYWIDE




* PEAK SEASON


## Appendix B

Growth Trend Analyses
Traffic Trends - V2.0

| County: | Lee (12) |
| :---: | :---: |
| Station \#: | 120055 |
| Highway: | $\mathrm{I}-75$ Btwn Corkscrew Rd \& Alico Rd |



*Axle-Adjusted

## Traffic Trends - V2.0

| County: | Lee (12) |
| :---: | :---: |
| Station \#: | 120054 |
| Highway: | 1-75 Btwn Bonita Beach Rd \& Corkscrew Rd |









## Appendix C <br> Lee County/FDOT Generalized Peak Hour Directional Service Volumes

Lee County
Generalized Peak Hour Directional Service Volumes Urbanized Areas
April 2016
c: linput5

| Uninterrupted Flow Highway |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Level of Service |  |  |  |  |  |  |  |
| 1 | Divided | A | B | C | D | E |  |
| 2 | Undivided | 130 | 420 | 850 | 1,210 | 1,640 |  |
| 3 | Divided | 1,060 | 1,810 | 2,560 | 3,240 | 3,590 |  |
|  | Divided | 1,600 | 2,720 | 3,840 | 4,860 | 5,380 |  |

Arterials
Class I (40 mph or higher posted speed limit)
Level of Service

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Undivided | $*$ | 140 | 800 | 860 | 860 |
| 2 | Divided | $*$ | 250 | 1,840 | 1,960 | 1,960 |
| 3 | Divided | $*$ | 400 | 2,840 | 2,940 | 2,940 |
| 4 | Divided | $*$ | 540 | 3,830 | 3,940 | 3,940 |

Class II (35 mph or slower posted speed limit)

| Level of Service |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane | Divided | A | B | C | D | E |
| 1 | Undivided | $*$ | $*$ | 330 | 710 | 780 |
| 2 | Divided | $*$ | $*$ | 710 | 1,590 | 1,660 |
| 3 | Divided | $*$ | $*$ | 1,150 | 2,450 | 2,500 |
| 4 | Divided | $*$ | $*$ | 1,580 | 3,310 | 3,340 |

Controlled Access Facilities

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Undivided | $*$ | 160 | 880 | 940 | 940 |
| 2 | Divided | $*$ | 270 | 1,970 | 2,100 | 2,100 |
| 3 | Divided | $*$ | 430 | 3,050 | 3,180 | 3,180 |

Collectors
Level of Service

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Undivided | ${ }^{*}$ | ${ }^{*}$ | 310 | 660 | 740 |
| 1 | Divided | ${ }^{*}$ | $*$ | 330 | 700 | 780 |
| 2 | Undivided | $*$ | $*$ | 730 | 1,440 | 1,520 |
| 2 | Divided | $*$ | $*$ | 770 | 1,510 | 1,600 |

Note: the service volumes for I-75 (freeway), bicycle mode, pedestrian mode, and bus mode should be from FDOT's most current version of LOS Handbook.

## Lee County <br> Generalized Peak Hour Two-Way Service Volumes Urbanized Areas

April 2016
c: linput5
Uninterrupted Flow Highway
Level of Service

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | Undivided | 240 | 750 | 1,520 | 2,170 | 2,930 |
| 4 | Divided | 1,900 | 3,240 | 4,580 | 5,790 | 6,420 |
| 6 | Divided | 2,860 | 4,860 | 6,860 | 8,680 | 9,610 |

Arterials
Class I (40 mph or higher posted speed limit)
Level of Service

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | Undivided | $*$ | 250 | 1,430 | 1,530 | 1,530 |
| 4 | Divided | $*$ | 450 | 3,290 | 3,500 | 3,500 |
| 6 | Divided | $*$ | 720 | 5,080 | 5,270 | 5,270 |
| 8 | Divided | $*$ | 970 | 6,840 | 7,040 | 7,040 |

Class II (35 mph or slower posted speed limit)
Level of Service

| Level of Service |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane | Divided | A | B | C | D | E |
| 2 | Undivided | $*$ | $*$ | 590 | 1,270 | 1,380 |
| 4 | Divided | $*$ | $*$ | 1,270 | 2,840 | 2,960 |
| 6 | Divided | $*$ | $*$ | 2,060 | 4,380 | 4,470 |
| 8 | Divided | $*$ | $*$ | 2,830 | 5,920 | 5,970 |

## Controlled Access Facilities

Level of Service

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | Undivided | $*$ | 290 | 1,580 | 1,700 | 1,700 |
| 4 | Divided | $*$ | 490 | 3,520 | 3,770 | 3,770 |
| 6 | Divided | $*$ | 770 | 5,450 | 5,680 | 5,680 |

Collectors
Level of Service

| Lane | Divided | A | B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | Undivided | $*$ | $*$ | 560 | 1,180 | 1,330 |
| 2 | Divided | $*$ | $*$ | 590 | 1,240 | 1,400 |
| 4 | Undivided | $*$ | $*$ | 1,310 | 2,580 | 2,720 |
| 4 | Divided | $*$ | $*$ | 1,380 | 2,710 | 2,860 |

Note: the service volumes for I-75 (freeway), bicycle mode, pedestrian mode, and bus mode should be from FDOT's most current version of LOS Handbook.

12/18/12


TABLE 9
Generalized Peak Hour Directional Volumes for Florida's
Rural Undeveloped Areas and
Developed Areas Less Than 5,000 Population ${ }^{1}$
12/18/12


## Appendix D

## Roadway Improvements Needed Without EEPCO Developments



## Roadway Improvements Needed Without EEPCO Developments

o I-75 8-Ianing from Bonita Beach Road to Alico Road (FDOT has programmed a PD\&E study for 2018)
o Corkscrew Road 6-laning from Three Oaks Parkway to I-75
o Corkscrew Road 4-Ianing from Ben Hill Griffin Parkway to Grande Oak Way (Grandezza entrance)
o Alico Road 8-Ianing from Three Oaks Parkway to I-75
o SR 82 8-laning from Daniels Parkway to SW 40th Street

## Appendix E

Study Area Roadway Network 2026 Peak Hour Volumes for WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana


Bulve

D1RPM 2026 Refined Model - Project Traffic Percent Distribution
WildBlue \#2 (TA7 3122)


D1RPM 2026 Refined Model - Project Traffic Percent Distribution


ject Traffic Percent Distribution
tion





Clelel
Clelel
Clelel
Clelel

Project Traffic Percent Distribution
Model－Project Traffic Percent Distribution
Project Traffic Percent Distribution
$\square$






领




## Appendix F

Additional Roadway Improvements Needed With WildBlue, Corkscrew Farms, Pepperland Ranch and Verdana

## Additional Roadway Improvements Needed with Added EEPCO Traffic

o Alico Road 4-laning from Airport Haul Road to WildBlue Entrance

- Corkscrew Road 6-laning from I-75 to Ben Hill Griffin Parkway
- Corkscrew Road 4-laning from Grande Oak Way to Alico Road



[^0]:    AADT volumes derived from the 2026 District One Dis trictwide travel demand model．
    LOS standard for $1-75$ and SR 82 is based on FDOT＇s SIS LOS standard．

