state college area
CONNECTOR

PennDOT.gov/SCAC

Traffic Analysis Technical Memorandum

State College Area Connector Planning and Environmental Linkages Study

pennsylvania
DEPARTMENT OF TRANSPORTATION

U.S. Department of Transportation
Federal Highway Administration

February 2023

Table of Contents

Appendices

List of Tables

List of Figures

Introduction

This memorandum documents the traffic operations and safety evaluation conducted in support of the PEL Study for the State College Area Connector project. This analysis was conducted for Existing (Base Year 2017) and Future Year (2050 Design Year) scenarios.

Existing and Future No-Build Conditions

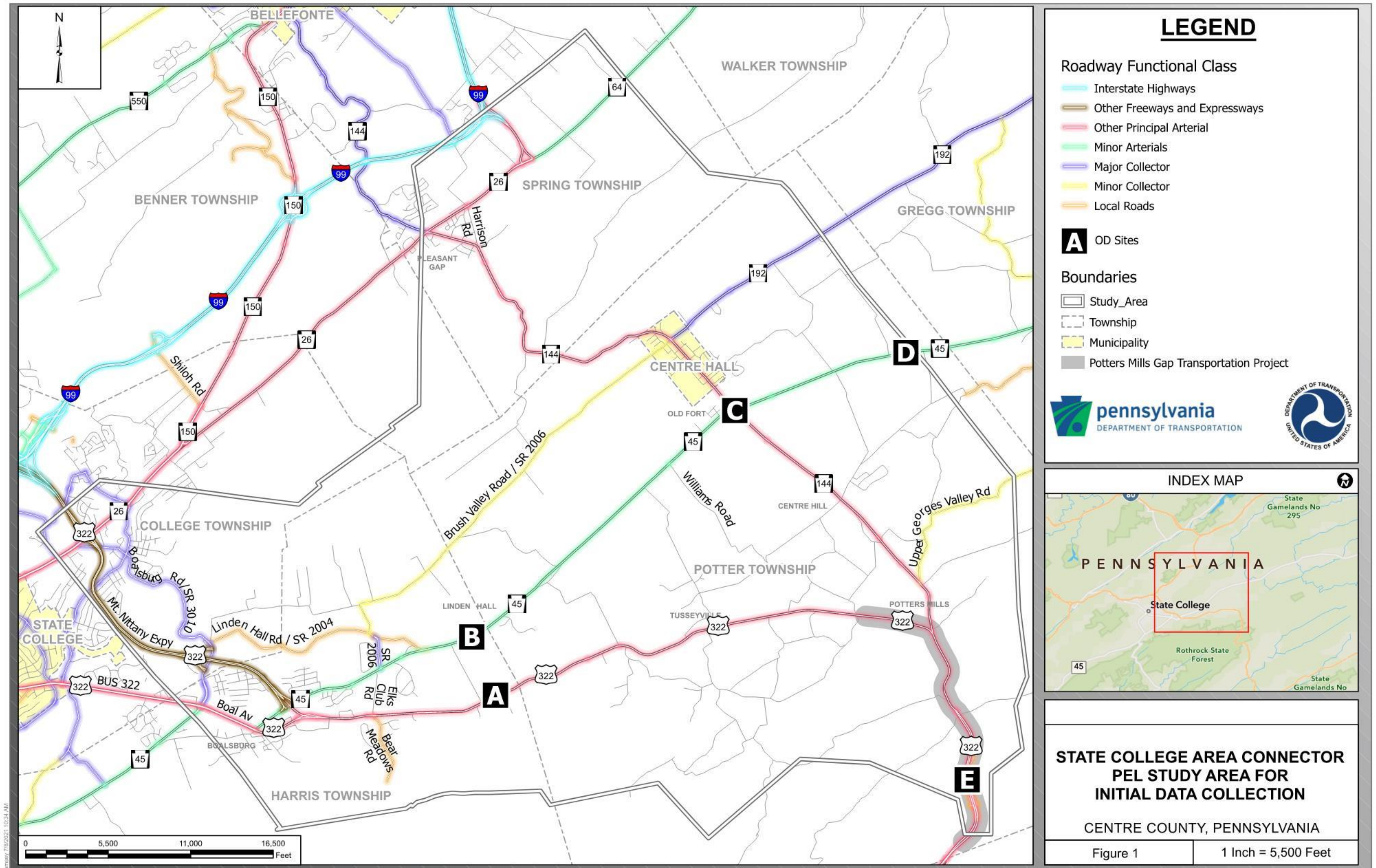
Study Area

The study area for the PEL Study is depicted in **Figure 1** and includes PA 45, PA 144, PA 192, US 322, Boal Avenue (Business Route 322/SR 3014), Boalsburg Road (SR 3010), Brush Valley Road (SR 2006), and other minor collectors and local roadways. Construction of the Potters Mill Gap Transportation Project (the portion of the US 322 corridor between Sand Mountain Road and Mountain Back Road/Red Mill Road) has been completed. Analysis of this interchange is not included in this PEL Study analysis.

This study area is approximately 70 square miles, extends through the southern portion of Centre County, and includes all or parts of six municipalities: Centre Hall Borough and Potter, Spring, Harris, College, and Benner Townships. The study area includes key transportation routes that provide access to regional destinations and beyond via major transportation routes such as U.S. Route (US) 322, Pennsylvania Route (PA) 144, PA 45, and Interstate 99 (I-99) which, in turn, provide access to nearby I-80. The initial data collection area is also shaped by the topography of the area. In general, the study area encompasses the southwestern portion of Penns Valley that extends between the Nittany Mountain to the north and the Seven Mountains area of the Tussey Mountain range to the south. Parts of Nittany Valley on the north side of the Nittany Mountain are also included within the study area, as is the more urbanized Centre Region that connects both valleys at the southern end of the Nittany Mountain.

Origin-Destination Study

To understand existing travel patterns and travel demand, and to aid in traffic forecasting, an Origin and Destination (OD) study was performed utilizing data obtained from StreetLight Data. StreetLight provides an on-demand mobility analytics software platform used to measure North American transportation-related data using “Big Data” from sources that include navigation analytics firm INRIX, fitness trackers, weather apps, and any other apps that have location components. The OD data obtained from StreetLight for the PEL Study used navigation-GPS data collected from smart phones with navigation guidance apps. The data was obtained for five strategic locations within the study area as listed below and shown on **Figure 1**.


LEGEND
Roadway Functional Class
Interstate Highways
Other Freeways and Expressways
Other Principal Arterial
Minor Arterials
Major Collector
Minor Collector
Local Roads
OD Sites
Boundaries
Study_Area
Township
Municipality
Potters Mills Gap Transportation Project
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
STATE COLLEGE AREA CONNECTOR
PEL STUDY AREA FOR
INITIAL DATA COLLECTION
CENTRE COUNTY, PENNSYLVANIA
Figure 1
1 Inch = 5,500 Feet
BELLEFONTE
WALKER TOWNSHIP
BENNER TOWNSHIP
SPRING TOWNSHIP
GREGG TOWNSHIP
PLEASANT GAP
Harrison Rd
CENTRE HALL
OLD FORT
CENTRE HILL
COLLEGE TOWNSHIP
POTTER TOWNSHIP
Brush Valley Road / SR 2006
Williams Road
Upper Georges Valley Rd
Shiloh Rd
Boalsburg Rd / SR 3010
Mt. Nittany Expy
Linden Hall Rd / SR 2004
LINDEN HALL
TUSSEYVILLE
POTTERS MILLS
STATE COLLEGE
BUS 322
Boal Av
BOALSBURG
SR 2006
Elks Club Rd
Bear Meadows Rd
HARRIS TOWNSHIP
A
B
C
D
E
0
5,500
11,000
16,500
Feet

- Site A: US 322 Eastbound west of Sharer Road
- Site B: PA 45 eastbound west of Cedar Run Road
- Site C: PA 144 southbound north of PA 45
- Site D: PA 45 westbound east of PA 144
- Site E: US 322 westbound east of PA 144

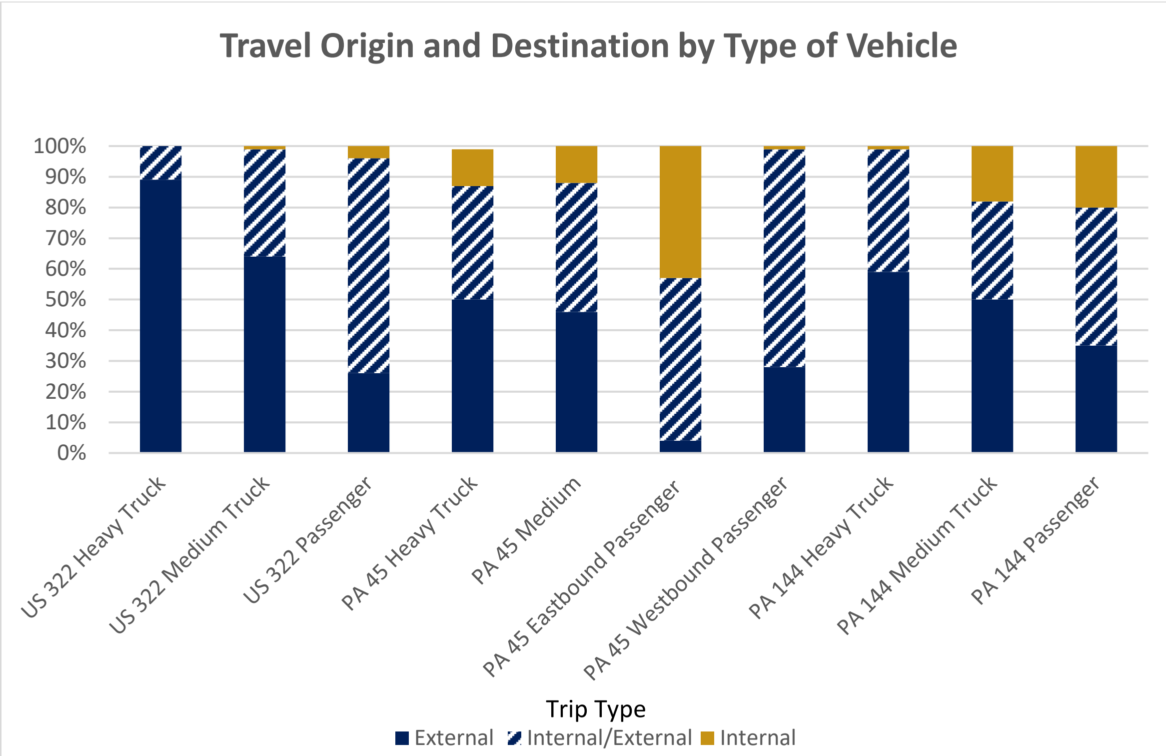
The StreetLight data at each OD survey site was analyzed to determine the following trip types:

- **External to External (E-E)** – Origin and destination are outside of the study area (through trip).
- **Internal to Internal (I-I)** – Origin and destination are inside the study area (local trip).
- **External to Internal (E-I) or Internal to External (I-E)** – Origin or Destination is outside the study area.

Table 1 (illustrated as a stacked bar chart on the following page) presents a summary of the trip types by trucks and passenger vehicles at each OD survey site. Trucks are further broken down by heavy trucks and medium trucks. Heavy trucks, as defined for this analysis, are considered tractor trailers with an average of five axles and medium trucks are trucks with two to three axles. **Table 1** also defines the typical weight definition used for truck types.

Table 1 – Origin-Destination Summary

Route	Sites	Truck		Trip Types		
		Type	Percent	E-E	I-I	E-I / I-E
Trucks						
US 322	Site A (EB) and Site E (WB)	Heavy	74%	89%	0%	11%
		Medium	26%	64%	1%	35%
PA 45	Site B (EB) and Site D (WB)	Heavy	23%	51%	12%	37%
		Medium	77%	46%	12%	42%
PA 144	Site C (SB)	Heavy	14%	59%	1%	40%
		Medium	86%	50%	18%	32%
Passenger Vehicles						
US 322	Site A (EB) and Site E (WB)	--	--	26%	4%	70%
PA 45	Site B (EB)	--	--	4%	43%	53%
	Site D (WB)	--	--	28%	1%	71%
PA 144	Site C (SB)	--	--	35%	20%	45%
Notes: Truck Types: H=Heavy Truck (>26,000 pounds); M=Medium Truck (14,000 to 26,000 pounds)						



Key findings of travel patterns are listed below.

US 322 (Truck and Passenger Traffic) – Heavy truck traffic is primarily through trips that travel through the PEL Study Area. Almost 90 percent of heavy trucks have an origin and destination outside the study area, and 100 percent of all heavy trucks have either an origin or destination outside of the study area. Heavy trucks are typically used for long-haul trips. Medium trucks, typically used for deliveries, have a similar trip type pattern; however, more medium trucks (35 percent) have an origin or destination within the study area. Alternatively, 74 percent of all passenger vehicles have either an origin, destination, or both within the study area.

The US 322 StreetLight data was further analyzed to determine breakdowns by vehicle type (passenger vehicle, medium truck, heavy truck) of specific areas of origins and destinations for traffic currently utilizing the US 322 section within the study area (between Boalsburg and Potters Mills). **Figures 2 through 6** illustrate this information.

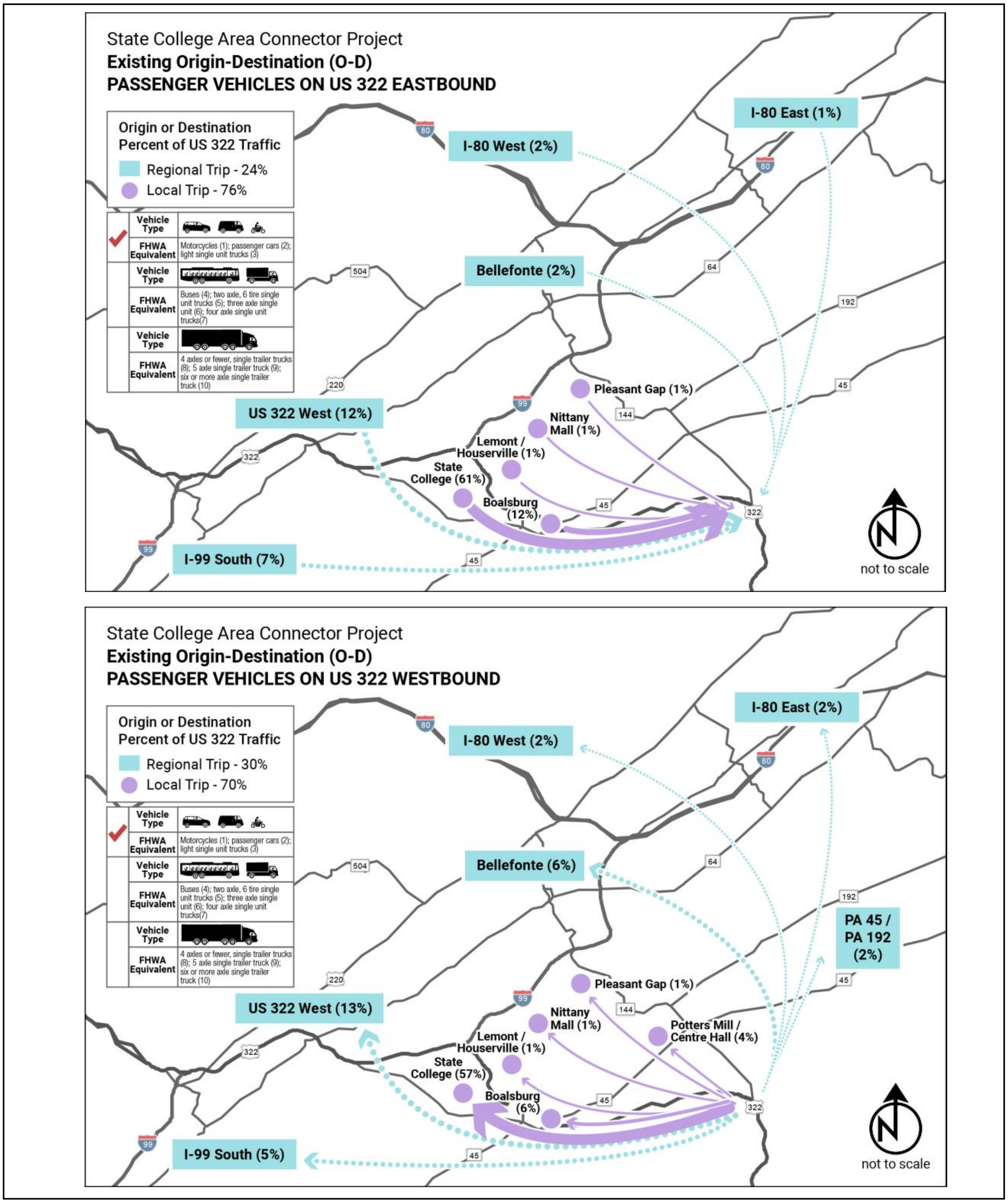


Figure 2 – Origin-Destination Traffic Patterns of US 322 Passenger Vehicle Traffic at Potters Mills

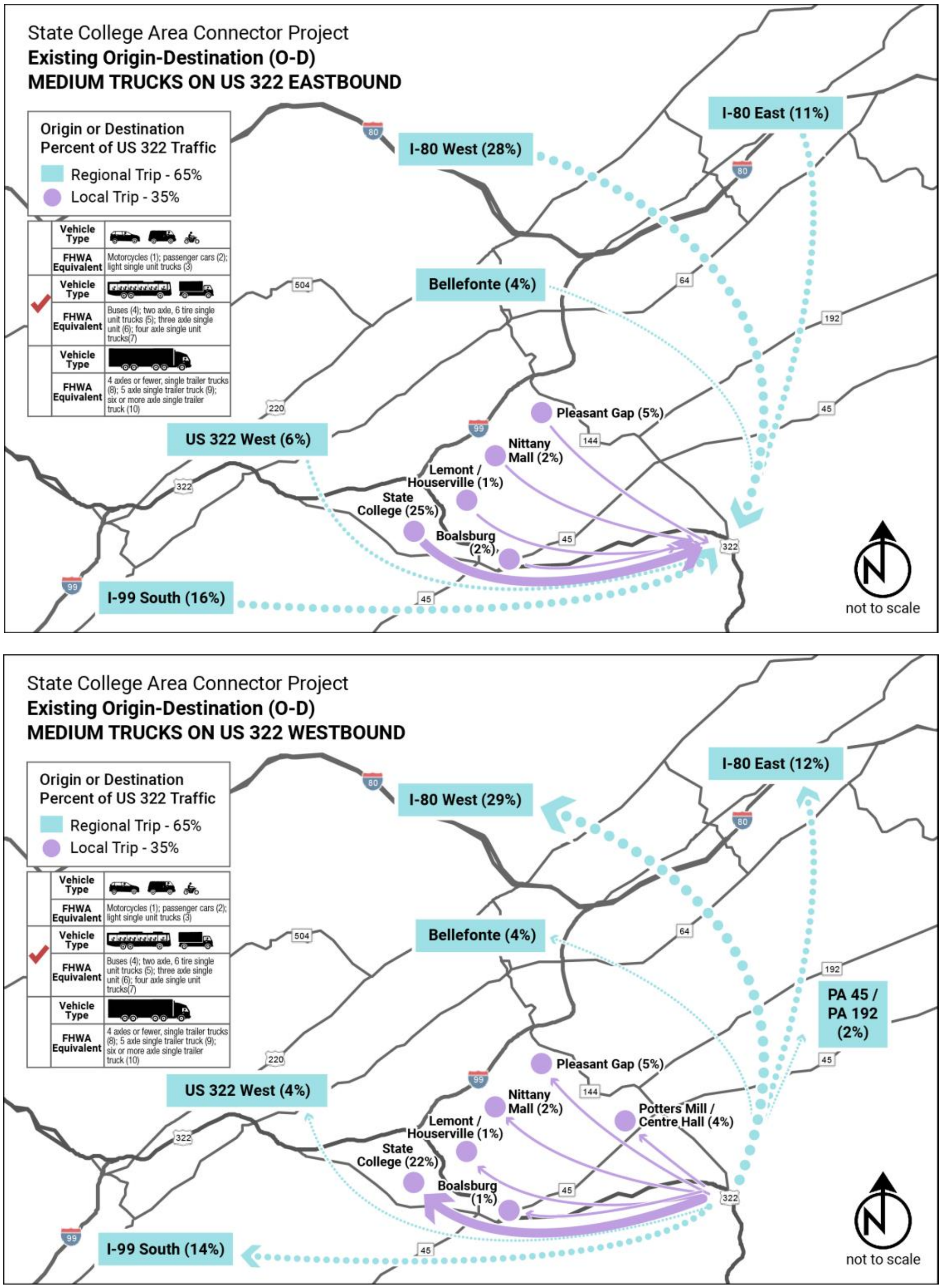


Figure 3 – Origin-Destination Traffic Patterns of US 322 Medium Truck Traffic at Potters Mills

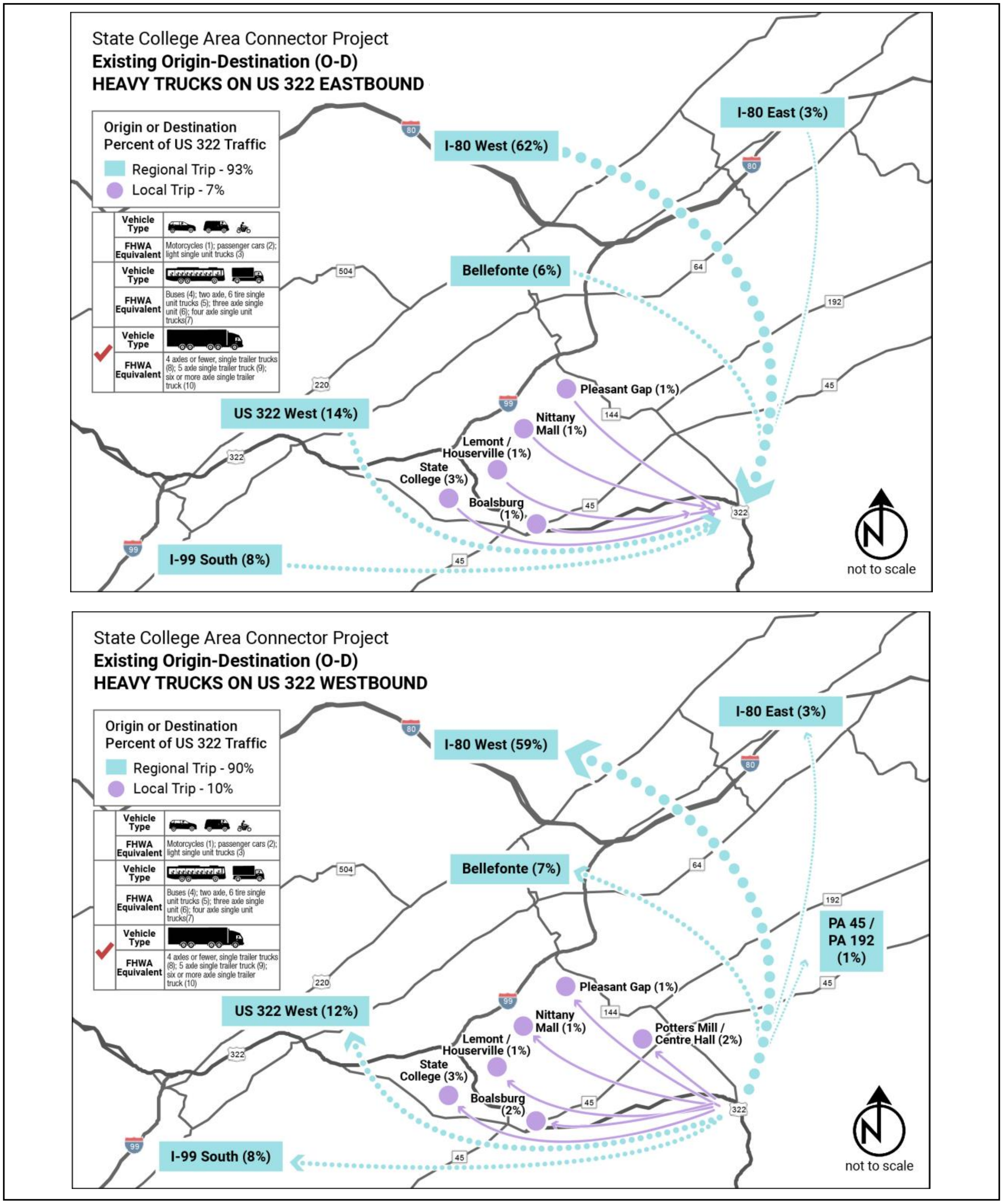


Figure 4 – Origin-Destination Traffic Patterns of US 322 Heavy Truck Traffic at Potters Mills

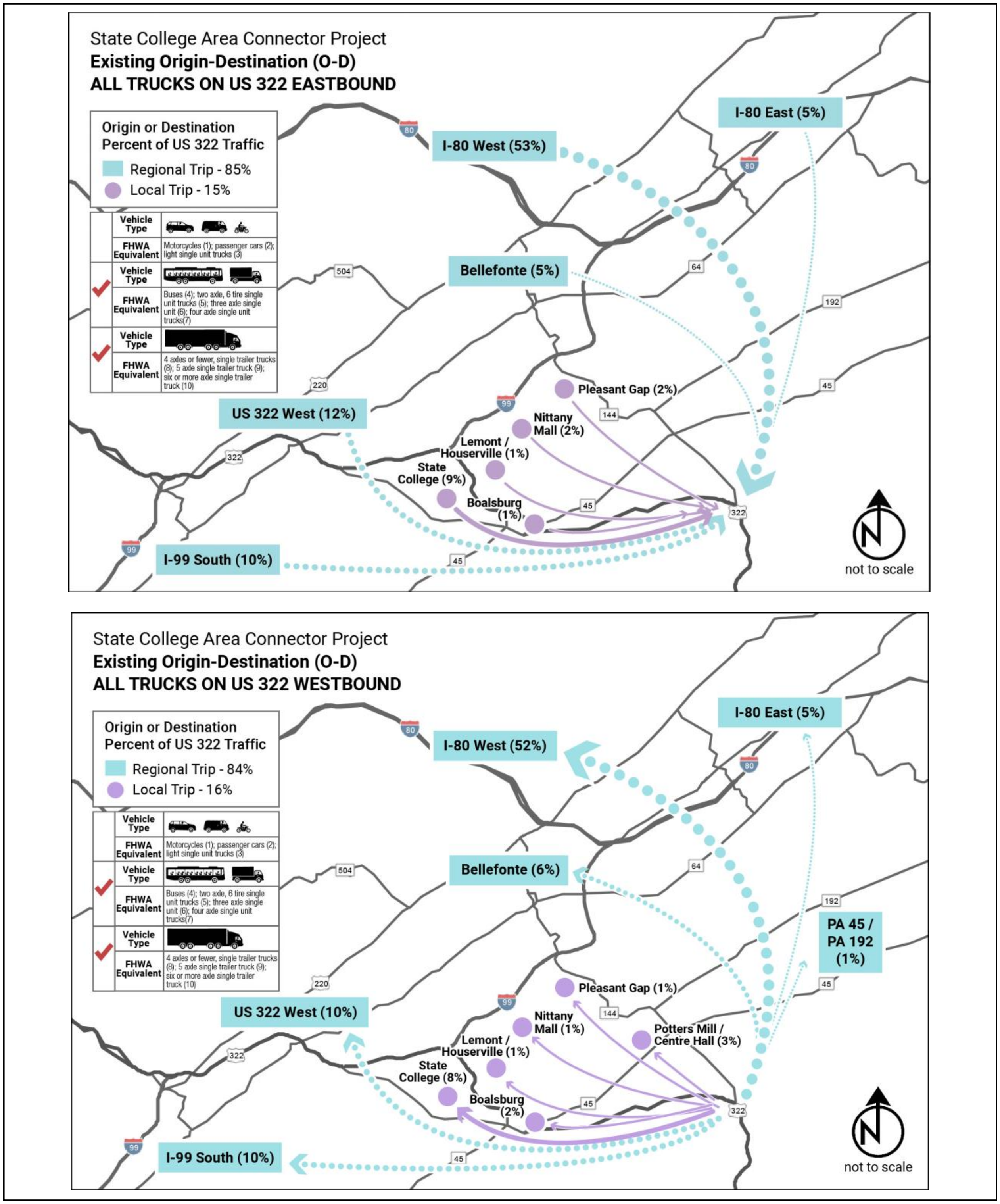


Figure 5 – Origin-Destination Traffic Patterns of US 322 Truck Traffic at Potters Mills

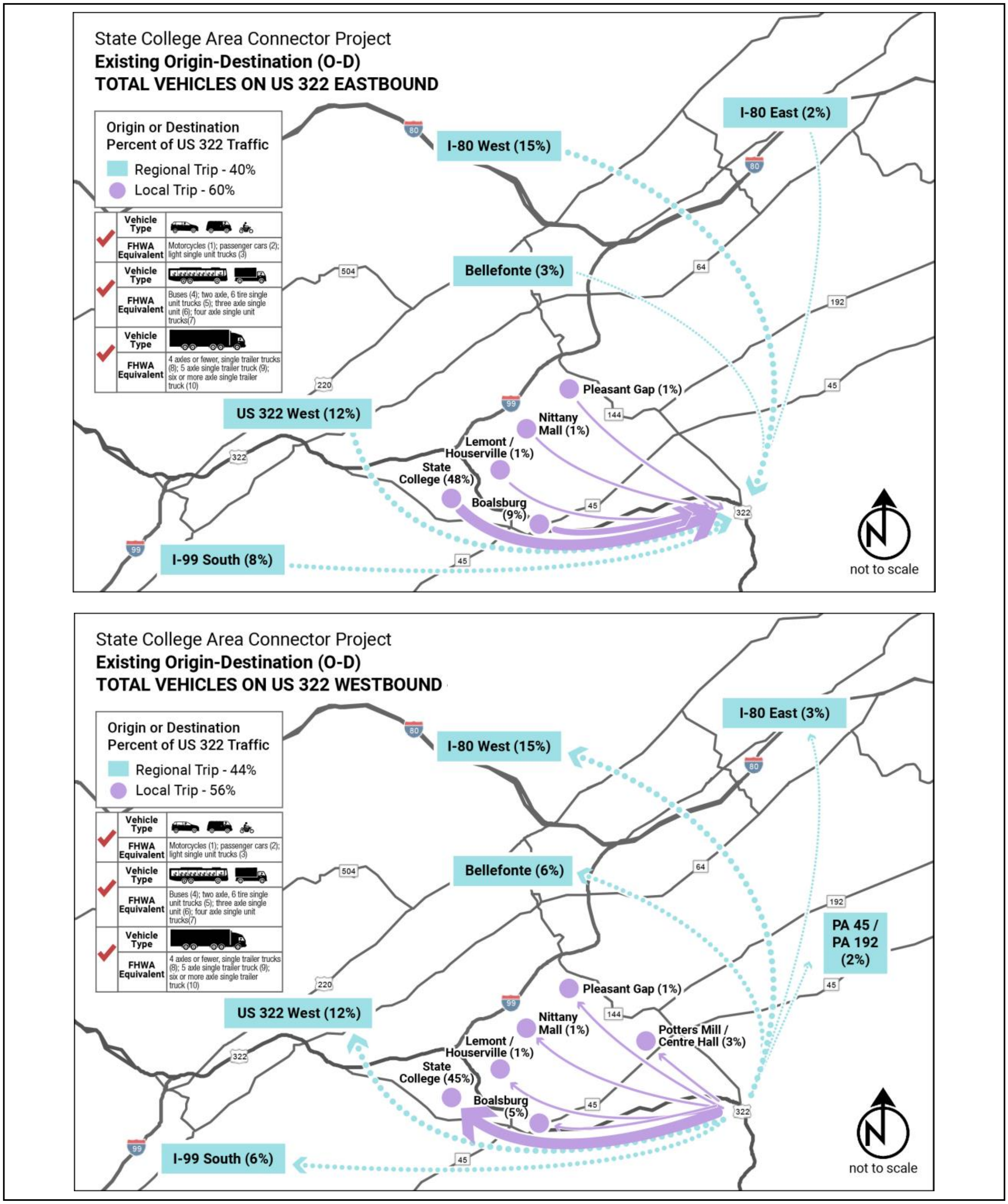


Figure 6 – Origin-Destination Traffic Patterns of US 322 All Traffic at Potters Mills

US 144 and PA 45 (Truck Traffic) – Truck traffic using PA 45 and PA 144 exhibit a more even distribution in terms of the percentage of regional (E-E) and local (I-I or E-I/I-E) trips; approximately a 50/50 split, indicating more local truck traffic use these corridors. The posted weight restriction along PA 144 over Nittany Mountain likely shifts a portion of truck traffic destined to I-80 and I-99 to US 322. However, the percentage of E-E truck traffic clearly indicates that truck operators are not compliant with the posted weight limit restrictions on PA 144.

PA 144 and PA 45 (Passenger Vehicles) – Passenger vehicle trips along eastbound and westbound PA 45 display different travel patterns. Eastbound PA 45 trips tend to be more local trips, or trips that start and end in the study area (43 percent), compared to 1 percent of westbound PA 45 trips (indicating return trips are spread out over various roadways). Likewise, 28 percent of all westbound trips were regional trips, compared to 4 percent of eastbound trips. In comparison, 20 percent of passenger vehicle trips on PA 144 are local trips and 35 percent are regional trips. Passenger trips along PA 144 are more evenly distributed between the different origins and destinations. Centre Hall Borough and Pleasant Gap are more dense areas which contribute to more diverse trip types that make up the passenger vehicle traffic volumes.

Traffic Volumes

Traffic volume data for the PEL Study was obtained from the *2019 Data Refresh Report for the Route 322/144/45 Corridors, Centre County, Pennsylvania*. The *Data Refresh Report* updated traffic and environmental information associated with the former South Central Center County Transportation Study (known as SCCCTS). Manual turning movement counts (AM and PM peak periods) and automatic traffic recorder counts (24-hour daily) were collected throughout the study area at similar locations included in the previous studies. This traffic data was factored according to PennDOT methodology to develop Base Year (2017) traffic volumes.

The Centre County Regional Travel Demand Model (TDM) was used in the development of future Design Year (2050) traffic forecasts for average daily traffic (ADT) and AM and PM peak hours. The TDM considers planned/programmed transportation improvements, future land uses changes, regional travel patterns, transit service, and commercial/freight forecasts. The TDM was recalibrated for 2017 traffic conditions utilizing the traffic volume data collected as well as the Streetlight data. Statewide travel conditions beyond Centre County, including influence of PennDOT CSVT project on SCAC traffic volumes were also considered; resulting in general confirmation of the Centre County model for this project’s use.

Table 2 provides a summary of Base Year 2017 and 2050 Design Year ADT link volumes and are also illustrated in **Figure 7** and **Figure 8**, respectively.

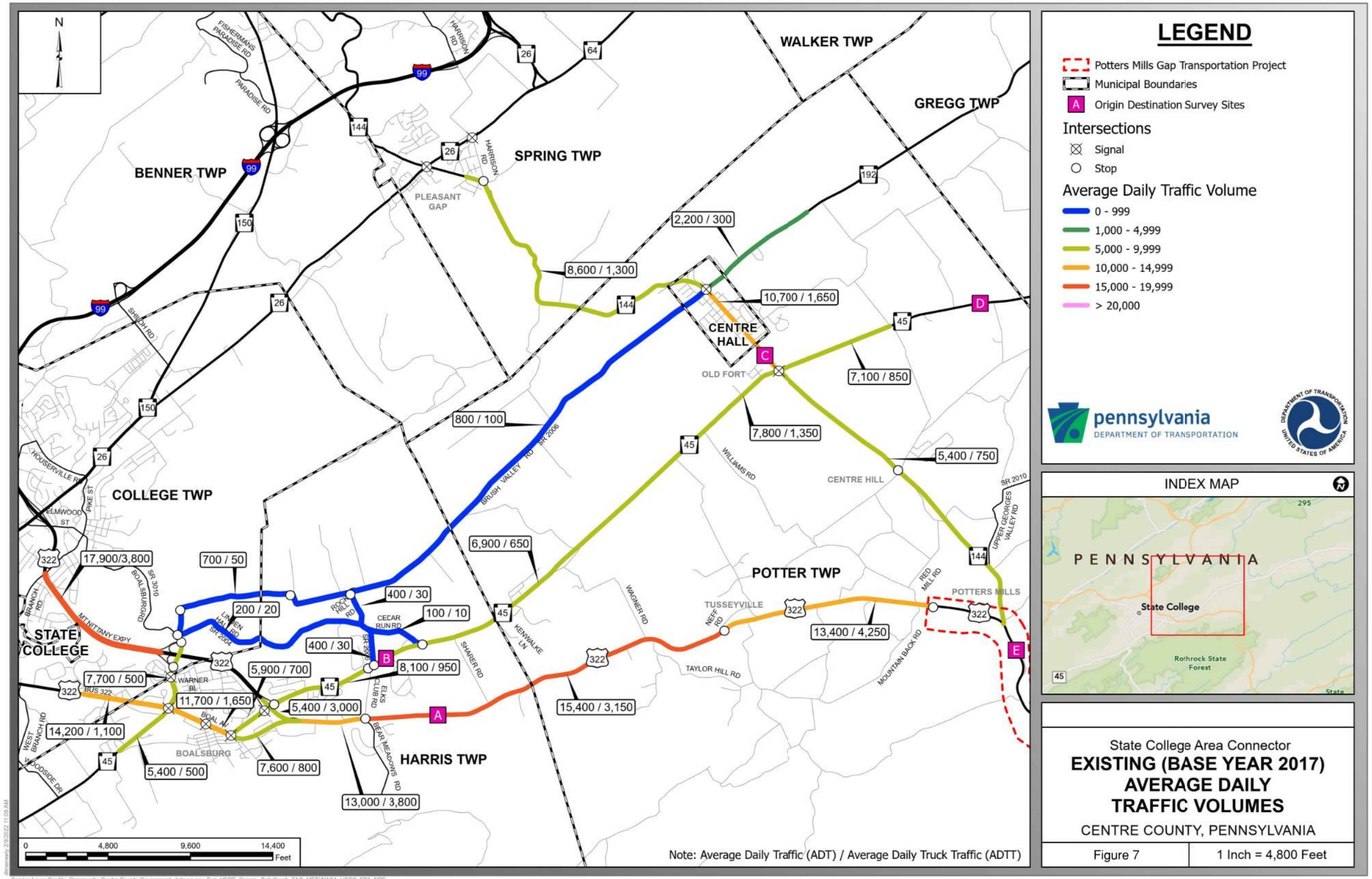
Table 2: Traffic Volume Summary (Segment ADT and ADTT)

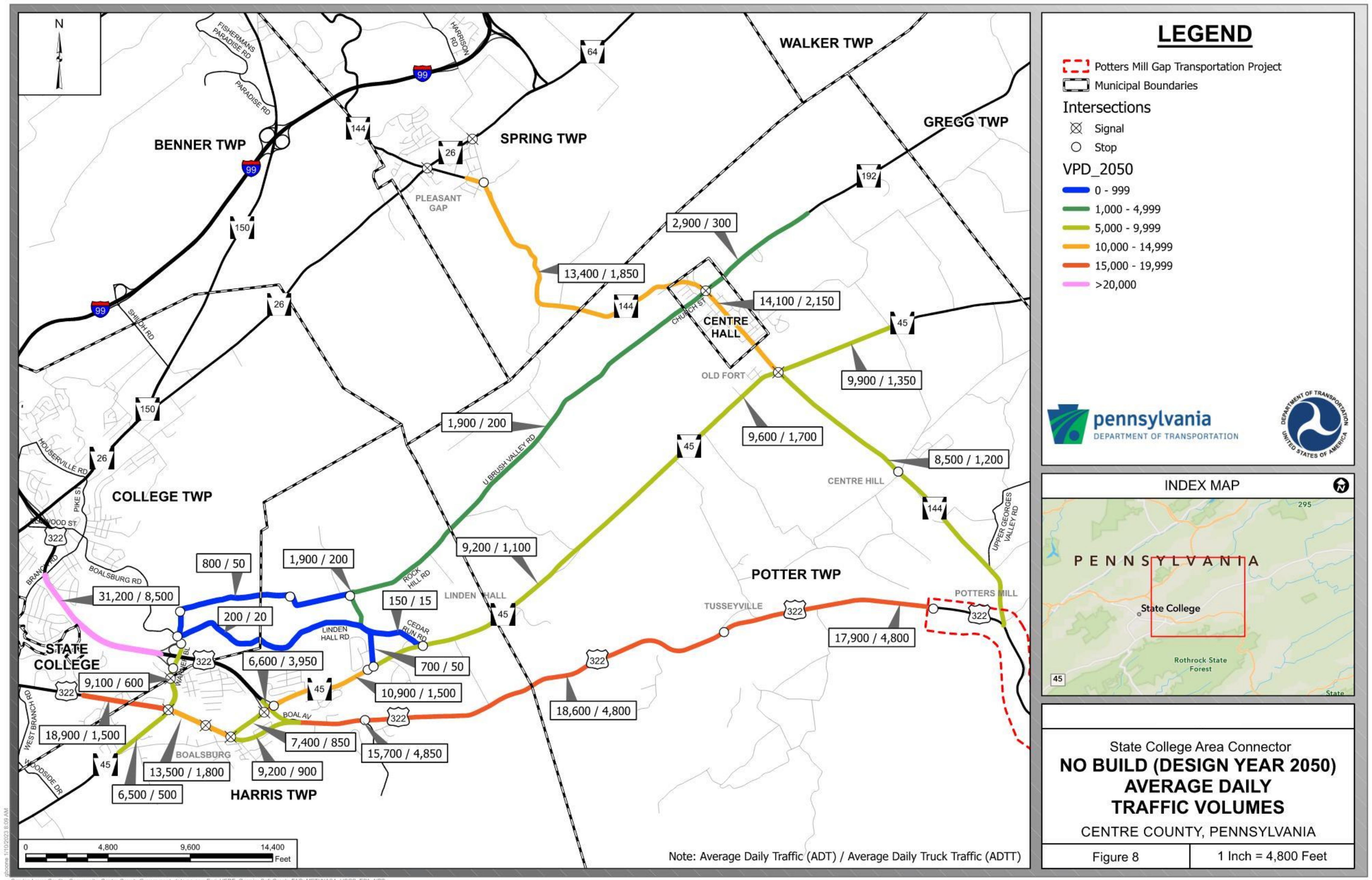
Roadway	Segment		Base Year (2017)		Design Year (2050)		Growth Rate	
	From	To	AADT	AADTT	AADT	AADTT	Total	Truck
US 322	Boal Ave	Elks Club Rd	**13,000**	3,800 (29%)	**15,700**	4,850 (31%)	**0.60%**	0.81%
	Elks Club Rd	Neff Road	**15,400**	3,150 (20%)	**18,600**	4,800 (26%)	**0.62%**	1.54%
	Neff Rd	Mountain Back Rd/ Red Mill Rd	**13,400**	4,250 (32%)	**17,900**	4,800 (27%)	**0.99%**	0.38%
PA 45	Boalsburg Rd	Boal Ave	**11,700**	1,650 (14%)	**13,500**	1,800 (13%)	**0.46%**	0.29%
	US 322	Elks Club Rd	**8,100**	950 (12%)	**10,900**	1,500 (14%)	**1.01%**	1.64%
	Elks Club Rd	Williams Rd	**6,900**	650 (9%)	**9,200**	1,100 (12%)	**1.05%**	2.10%
	Williams Rd	PA 144	**7,800**	1,350 (17%)	**9,600**	1,700 (18%)	**0.71%**	0.89%
PA 144	US 322	PA 45	**5,400**	750 (14%)	**8,500**	1,200 (14%)	**1.28%**	1.37%
	PA 45	Brush Valley Rd	**10,700**	1,650 (16%)	**14,100**	2,150 (15%)	**0.86%**	0.84%
	Brush Valley Rd	Harrison Rd	**8,600**	1,300 (15%)	**13,400**	1,850 (14%)	**1.26%**	0.92%

AADT = Annual Average Daily Traffic
AADTT = Annual Average Daily Truck Traffic (%Trucks)
Growth Rate = 2017-2050 Annual Growth Rate (linear)

Along US 322 between Boal Avenue (Business/Express US 322 Split) and Mountain Back Road/Red Mill Road, Base Year (2017) AADT volumes range between 13,000 vehicles per day (VPD) and 15,400 VPD with truck percentages between 20 percent and 32 percent. Within the study area, US 322 is classified as an East-West Other Principal Arterial and the statewide average truck percentage for an Other Principal Arterial is approximately seven percent. On average, there is over three times the percentage of trucks traveling along US 322 within the study area when compared to truck percentages of similar roadways. In the Design Year (2050), AADT volumes along the same segments of US 322 are expected to range between 15,700 VPD and 18,600 VPD with truck percentages expected to increase at a higher rate than passenger vehicles along the corridor.

Traffic along PA 45 (East-West Minor Arterial) between Boalsburg and Centre Hall ranges from 7,800 VPD and 11,700 VPD with truck percentages between 12 and 17 percent. Outside of the urbanized area of Boalsburg, truck volumes are anticipated to increase at a greater rate than passenger vehicles. In the Design Year (2050), traffic volumes are anticipated to increase to between 9,600 VPD and 13,500 VPD and truck percentages are anticipated to increase to between 13 and 18 percent. Although not as substantial as the truck traffic utilizing the US 322 corridor, the truck percentages are about double the statewide average for similar roadways.


LEGEND
Potters Mills Gap Transportation Project
Municipal Boundaries
Origin Destination Survey Sites
Intersections
Signal
Stop
Average Daily Traffic Volume
0 - 999
1,000 - 4,999
5,000 - 9,999
10,000 - 14,999
15,000 - 19,999
> 20,000
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
BENNER TWP
SPRING TWP
WALKER TWP
GREGG TWP
COLLEGE TWP
POTTER TWP
HARRIS TWP
STATE COLLEGE
CENTRE HALL
PLEASANT GAP
OLD FORT
CENTRE HILL
TUSSEYVILLE
POTTERS MILLS
BOALSBURG
2,200 / 300
8,600 / 1,300
10,700 / 1,650
7,100 / 850
7,800 / 1,350
800 / 100
5,400 / 750
6,900 / 650
17,900/3,800
700 / 50
200 / 20
400 / 30
100 / 10
400 / 30
8,100 / 950
5,900 / 700
7,700 / 500
11,700 / 1,650
5,400 / 3,000
14,200 / 1,100
5,400 / 500
7,600 / 800
13,000 / 3,800
15,400 / 3,150
13,400 / 4,250
Note: Average Daily Traffic (ADT) / Average Daily Truck Traffic (ADTT)
0 4,800 9,600 14,400 Feet
State College Area Connector
EXISTING (BASE YEAR 2017) AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 7
1 Inch = 4,800 Feet


LEGEND
Potters Mill Gap Transportation Project
Municipal Boundaries
Intersections
Signal
Stop
VPD_2050
0 - 999
1,000 - 4,999
5,000 - 9,999
10,000 - 14,999
15,000 - 19,999
>20,000
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
BENNER TWP
SPRING TWP
WALKER TWP
GREGG TWP
COLLEGE TWP
POTTER TWP
HARRIS TWP
STATE COLLEGE
CENTRE HALL
PLEASANT GAP
OLD FORT
CENTRE HILL
LINDEN HALL
TUSSEYVILLE
POTTERS MILL
BOALSBURG
2,900 / 300
13,400 / 1,850
14,100 / 2,150
9,900 / 1,350
9,600 / 1,700
1,900 / 200
8,500 / 1,200
9,200 / 1,100
800 / 50
1,900 / 200
150 / 15
31,200 / 8,500
200 / 20
6,600 / 3,950
700 / 50
10,900 / 1,500
9,100 / 600
18,900 / 1,500
13,500 / 1,800
6,500 / 500
9,200 / 900
7,400 / 850
15,700 / 4,850
18,600 / 4,800
17,900 / 4,800
Note: Average Daily Traffic (ADT) / Average Daily Truck Traffic (ADTT)
State College Area Connector
NO BUILD (DESIGN YEAR 2050)
AVERAGE DAILY
TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 8
1 Inch = 4,800 Feet

PA 144 is classified as a North-South Other Principal Arterial between US 322 and PA 26. Base Year (2017) traffic volumes range between 5,400 VPD and 10,700 VPD with truck percentages averaging 15 percent. Along this corridor, truck volumes increase at a similar rate to passenger vehicles. Design Year (2050) traffic volumes range between 8,500 VPD and 14,100 VPD. There is a weight limit of 10 tons on the section of PA 144 over Mount Nittany between Centre Hall and Pleasant Gap.

Levels of Service

Level of Service (LOS) is a quantitative performance measure that represents the quality of service being provided along a roadway or at an intersection. The measures used to determine LOS for transportation system elements are called service measures. The Highway Capacity Manual (HCM) defines six levels of service, ranging from A to F. LOS A represents the best operating conditions from a traveler's perspective and LOS F represents the worst. Typically, roadways are not designed to operate at LOS A during peak conditions, but instead provide a lower LOS that balances costs and other impacts. This area consists of both rural and non-rural areas. For rural areas LOS A through LOS C is considered acceptable operation and unacceptable operation is considered LOS D through LOS F. For non-rural areas, LOS A through LOS D is considered acceptable operation and unacceptable operation is considered LOS E and LOS F. The non-rural areas (urbanized area) are in the vicinity of Boalsburg and Pleasant Gap.

The LOS analysis was performed for the following facility types: signalized and unsignalized intersections, two-lane roadway segments, multi-lane roadway segments, freeway segments, and ramp segments. Traffic signal plans and coordination plans were obtained from the Department's Traffic Signal Asset Management System (TSAMS). Study area intersections were evaluated using Synchro plus SimTraffic (Trafficware, LLC) software (Version 10) which utilizes the methodologies outlined in the HCM. All roadway segments were analysis using the Highway Capacity Software (HCS).

A summary of the overall study area intersection levels of service for the Base Year (2017) and Design Year (2050) scenarios is contained in **Table 3**. **Table 4** summarizes the Base Year (2017) and Design Year (2050) segment levels of service. **Figure 9** and **Figure 10** illustrate the levels of service for the Base Year (2017) and Design Year (2050), respectively.

Table 3: Intersection Levels of Service Summary (Year 2017 and Year 2050 No Build)

#	Intersection	Base Year (2017		Design Year (2050)	
		Morning	Evening	Morning	Evening
1	Main Street (PA 144) & College Avenue (PA 26)	B(14)	B(11)	E(62)	B(17)
2	Harrison Road & College Avenue (PA 26)	B(10)	A(8)	B(17)	A(10)
3	Main Street (PA 144) & Harrison Road	b(14)	b(14)	d(28)	e(44)
4	Pennsylvania Avenue (PA 144) & Brush Valley Road (SR 2006/PA 192)	B(14)	B(14)	D(39)	D(52)
5	Pennsylvania Avenue (PA 144) & Earlystown Road (PA 45)	C(28)	B(19)	D(51)	C(29)
7	Warner Boulevard (PA 45/SR 3010) & Boal Avenue (PA 45/SR 3014)	C(26)	B(17)	C(34)	C(20)
8A	Earlystown Road (PA 45) & US 322 EB Off-Ramp	A(8)	B(14)	B(12)	C(32)
8B	Earlystown Road (PA 45) & US 322 WB On-Ramp	a(0)	a(0)	b(1)	b(1)
9	Elks Club Road & Earlystown Road (PA 45)	c(19)	c(18)	d(29)	d(32)
10	Linden Hall Road (SR 2006) & Earlystown Road (PA 45)	c(16)	b(12)	d(26)	c(17)
11	Elks Club Road & Boal Avenue (US 322)	f(51)	f(66)	f(179)	f(240)
12A	Boalsburg Road (SR 3010) & US 322 EB On-/Off-Ramps	d(29)	c(19)	f(153)	f(183)
12B	Boalsburg Road (SR 3010) & US 322 WB On-/Off-Ramp	e(38)	f(76)	f(314)	f(2137)
13	Boalsburg Road (SR 3010) & Linden Hall Road & Brush Valley Road	a(10)	b(10)	b(11)	b(12)
14	Boalsburg Pike/Church Street & Boal Avenue (PA 45)	A(7)	A(7)	A(7)	A(8)
15	Main Street/Earlystown Road (PA 45) & Boal Avenue (PA 45/SR 3014)	A(8)	A(7)	B(11)	B(14)

A(##) – Signalized Level of Service (Expected Delay (seconds))
a(##) – Unsignalized Level of Service (Expected Delay (seconds))
red – LOS Unacceptable
[1]Unsignalized LOS represents the turning movement that experiences the most delay.

In the Base Year (2017) scenario, the study area intersections primarily operate at acceptable levels of service except in the Boalsburg area. The unsignalized intersections of US 322 and Elks Club Road and US 322 westbound on-/off-ramp and Boalsburg Road currently operate at unacceptable LOS during the peak hour time periods. The roadway segment analysis revealed that there are many areas that currently operate at unacceptable levels of service. US 322 from Red Mill Road/Mountain Back Road to the Mount Nittany Expressway, PA 45 from US 322 through PA 144, and PA 144 between Brush Valley Road and PA 26 all operate at unacceptable levels of service.

In the Design Year (2050) scenario, capacity and operations are anticipated to continue to deteriorate. In addition to the intersections along US 322 operating at unacceptable levels of service, intersections along PA 144 and PA 45 are expected to operate at unacceptable levels of service. PA 144 from the US 322 intersection north through the study area is anticipated to operate at unacceptable levels of service. US 322 from Red Mill Road/Mountain Back Road to the Mount Nittany Expressway will continue to operate at unacceptable levels. PA 45 from west of Centre Hall to US 322 in Boalsburg will continue to operate at unacceptable levels of service.

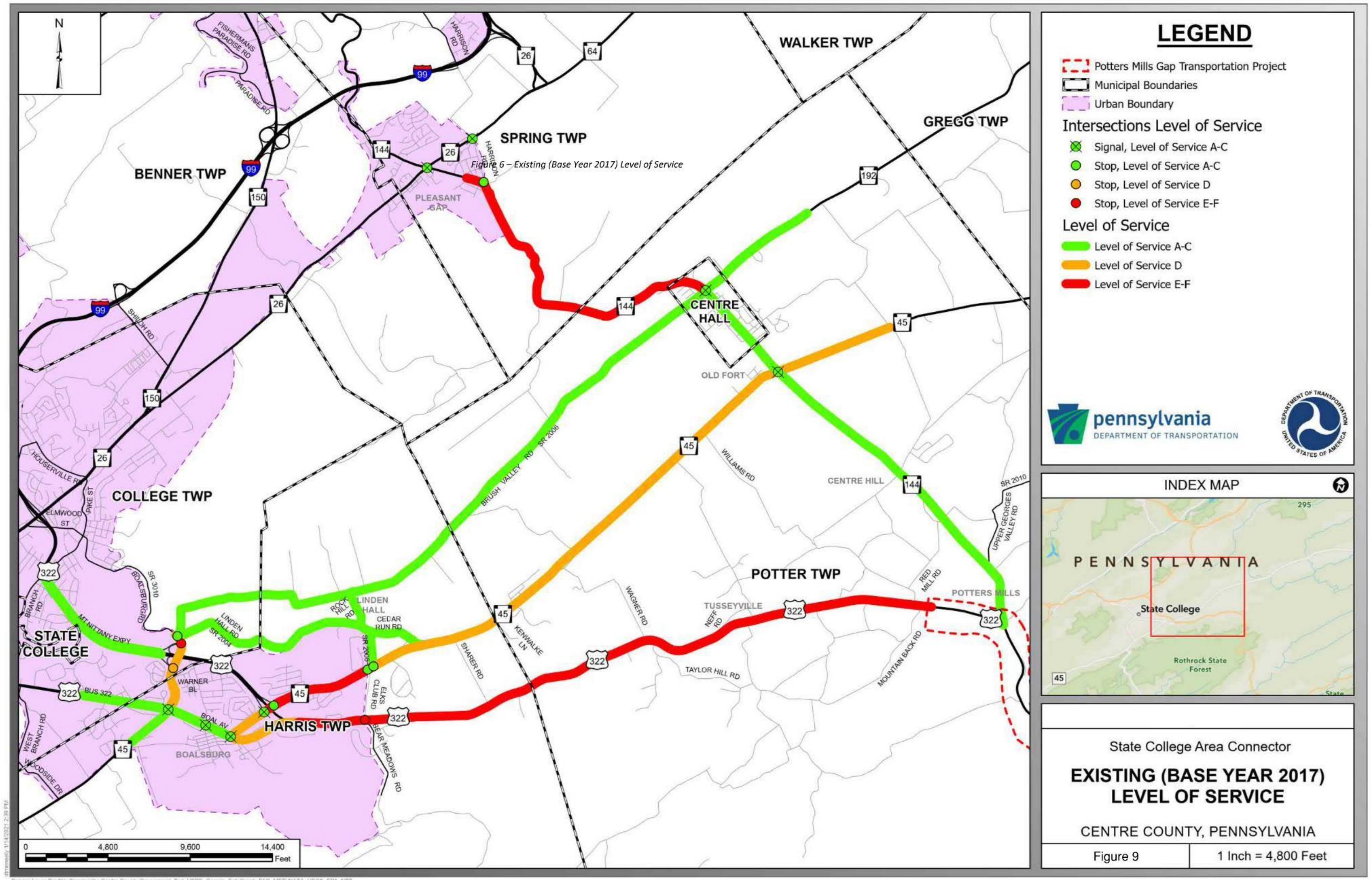
Table 4: Segment Levels of Service Summary (Year 2017 and Year 2050 No Build)

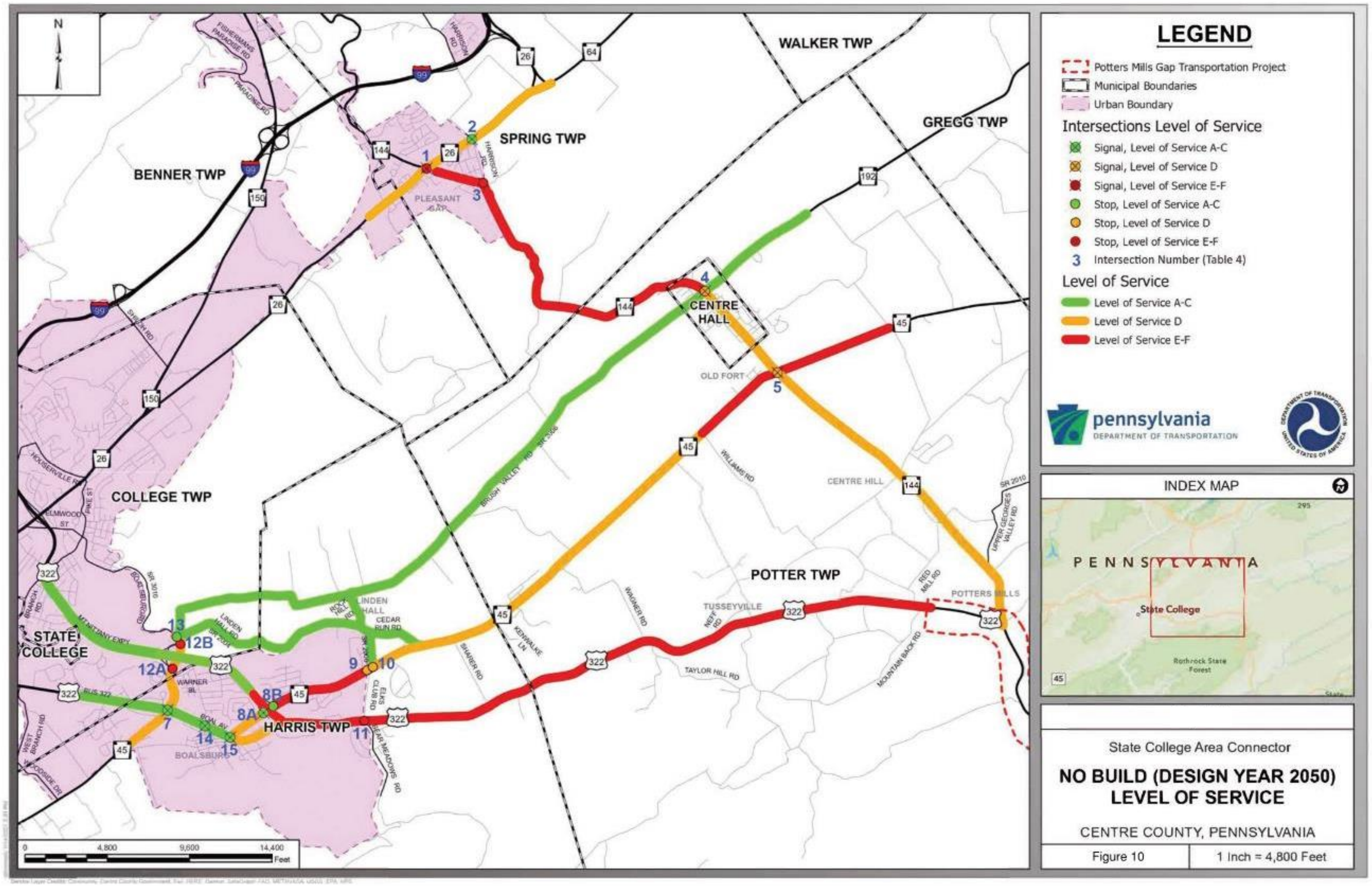
Roadway	Segment		Facility Type	Base Year (2017)		Design Year (2050)	
	From	To		Morning	Evening	Morning	Evening
PA 45	Main St	Boal Ave (SR 3014)	Two-Lane Urban	C / C	C / C	D / C	C / C
	Warner Blvd (SR 3010)	Main St	Multi-Lane Urban	A / B	A / A	A / B	B / A
	Main St	US 322 EB Off-Ramp	Two-Lane Urban	A / D	D / B	B / D	D / C
	US 322 WB On-Ramp	Elks Club Rd	Two-Lane Urban	B / E	D / B	B / E	E / C
	Elks Club Rd	Williams Rd	Two-Lane Rural	A / D	D / B	A / D	D / B
	Williams Rd	Old Fort Rd (PA 144)	Two-Lane Rural	A / E	D / B	B / E	E / C
	Old Fort Rd (PA 144)	Indian Lane	Two-Lane Rural	B / D	D / B	B / D	E / C
PA 144	General Potter Hwy (US 322)	Earlystown Rd (PA 45)	Two-Lane Rural	C / C	C / C	D / C	D / D
	Earlystown Rd (PA 45)	Brush Valley Rd (PA 192)	Two-Lane Rural	C / C	C / C	D / D	D / D
	Brush Valley Rd (PA 192)	Harrison Rd	Two-Lane Rural	E / E	E / E	E / E	E / E
US 322	College Ave (PA 26)	Warner Blvd (SR 3010)	Freeway Urban	A / A	A / A	A / B	B / A
	Boal Ave (SR 3014)	Elks Club Rd	Two-Lane Urban	D / E	E / E	E / E	E / E
	Elks Club Rd	Neff Rd	Two-Lane Rural	D / E	E / E	E / E	E / E
	Neff Rd	Mountain Back Rd	Two-Lane Rural	D / E	E / D	D / E	E / D

Table 4: Segment Levels of Service Summary (Year 2017 and Year 2050 No Build) (cont'd)

Roadway	Segment		Facility Type	Base Year (2017)		Design Year (2050)	
	From	To		Morning	Evening	Morning	Evening
Brush Valley Rd (SR 2006/PA 192)	Boalsburg Rd (SR 3010)	Rock Hill Rd (SR 2006)	Two-Lane Urban	A / A	A / A	A / A	A / A
	Rock Hill Rd (SR 2006)	Pennsylvania Ave (PA 144)	Two-Lane Rural	A / A	A / A	B / B	B / B
	Pennsylvania Ave (PA 144)	Pond Lane	Two-Lane Rural	A / C	C / B	A / C	C / B
S. Atherton St (SR 3014)	Branch Rd	Warner Blvd (SR 3010)	Multi-Lane Urban	A / B	B / A	A / B	B / A
Boal Ave (SR 3014)	Earlystown Rd (PA 45)	US 322	Two-Lane Urban	B / D	D / C	B / D	D / C
Warner Blvd (SR 3010)	Boal Ave (SR 3014)	US 322 EB On-/Off-Ramps	Two-Lane Urban	A / D	D / C	C / D	D / D
Linden Hall Rd (SR 2004)	Cedar Run Rd (SR 2004)	Boalsburg Rd (SR 3010)	Two-Lane Urban	A / B	A / A	A / B	A / A
Cedar Run Rd (SR 2004)	Earlystown Rd (PA 45)	Linden Hall Rd (SR 2006)	Two-Lane Urban	A / A	A / A	A / A	A / A
Linden Hall Rd (SR 2006)	Cedar Run Rd (SR 2004)	Earlystown Rd (PA 45)	Two-Lane Urban	A / B	B / A	A / B	B / A
Rock Hill Rd (SR 2006)	Brush Valley Rd	Linden Hall Rd (SR 2004)	Two-Lane Urban	A / B	B / A	A / B	B / A
Earlystown Rd (PA 45)	US 322 EB Off Ramp/WB On Ramp		Ramp Urban	A / A	B / A	A / B	B / A
Boalsburg Rd (SR 3010)	US 322 WB On Ramp/Off Ramp		Ramp Urban	B / B	A / A	B / B	B / A
	US 322 EB On Ramp/Off Ramp		Ramp Urban	A / A	B / B	A / A	B / B

red – LOS Unacceptable


LEGEND
Potters Mills Gap Transportation Project
Municipal Boundaries
Urban Boundary
Intersections Level of Service
Signal, Level of Service A-C
Stop, Level of Service A-C
Stop, Level of Service D
Stop, Level of Service E-F
Level of Service
Level of Service A-C
Level of Service D
Level of Service E-F
Figure 6 – Existing (Base Year 2017) Level of Service
WALKER TWP
GREGG TWP
SPRING TWP
BENNER TWP
PLEASANT GAP
CENTRE HALL
OLD FORT
CENTRE HILL
COLLEGE TWP
POTTER TWP
TUSSEYVILLE
POTTERS MILLS
LINDEN HALL
STATE COLLEGE
HARRIS TWP
BOALSBURG
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
State College Area Connector
EXISTING (BASE YEAR 2017) LEVEL OF SERVICE
CENTRE COUNTY, PENNSYLVANIA
Figure 9
1 Inch = 4,800 Feet
0
4,800
9,600
14,400
Feet


LEGEND
Potters Mills Gap Transportation Project
Municipal Boundaries
Urban Boundary
Intersections Level of Service
Signal, Level of Service A-C
Signal, Level of Service D
Signal, Level of Service E-F
Stop, Level of Service A-C
Stop, Level of Service D
Stop, Level of Service E-F
3 Intersection Number (Table 4)
Level of Service
Level of Service A-C
Level of Service D
Level of Service E-F
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
WALKER TWP
SPRING TWP
BENNER TWP
GREGG TWP
COLLEGE TWP
POTTER TWP
HARRIS TWP
STATE COLLEGE
CENTRE HALL
PLEASANT GAP
OLD FORT
CENTRE HILL
TUSSEYVILLE
POTTERS MILLS
BOALSBURG
LINDEN HALL
State College Area Connector
NO BUILD (DESIGN YEAR 2050)
LEVEL OF SERVICE
CENTRE COUNTY, PENNSYLVANIA
Figure 10
1 Inch = 4,800 Feet

Bicycle Level of Service (BLOS) was also performed for the AM/PM peak hour capacity analysis of roadway segments for two-lane highways and multilane highways for the PA 45, PA 144, and US 322 study area roadways. The results of these analyses for Base Year (2017) and Year 2050 No Build are shown in **Table 5**. These BLOS results show LOS D or worse conditions on nearly all study area segments during either or both AM and PM peak hours for the Base Year (2017) as well as Year 2050 No Build.

Table 5: Bicycle Levels of Service Summary (Year 2017 and Year 2050 No Build)

Roadway	Segment		Facility Type	Base Year (2017)		Design Year (2050)	
	From	To		Morning	Evening	Morning	Evening
PA 45	Main St	Boal Ave (SR 3014)	Two-Lane	D / D	D / D	D / D	D / D
	Warner Blvd (SR 3010)	Main St	Multi-Lane	D / D	C / C	D / D	D / C
	Main St	US 322 EB Off-Ramp	Two-Lane	A / A	A / A	A / A	A / A
	US 322 WB On-Ramp	Elks Club Rd	Two-Lane	E / E	D / E	E / E	D / E
	Elks Club Rd	Williams Rd	Two-Lane	E / D	D / D	F / E	D / E
	Williams Rd	Old Fort Rd (PA 144)	Two-Lane	E / D	D / D	E / D	D / D
	Old Fort Rd (PA 144)	Indian Lane	Two-Lane	D / C	C / C	D / C	C / C
PA 144	General Potter Hwy (US 322)	Earlystown Rd (PA 45)	Two-Lane	D / F	E / E	D / F	E / E
	Earlystown Rd (PA 45)	Brush Valley Rd (PA 192)	Two-Lane	D / D	D / D	D / D	D / D
	Brush Valley Rd (PA 192)	Harrison Rd	Two-Lane	D / D	C / D	D / D	D / D
US 322	College Ave (PA 26)	Warner Blvd (SR 3010)	Freeway	n/a	n/a	n/a	n/a
	Boal Ave (SR 3014)	Elks Club Rd	Two-Lane	F / F	E / F	F / F	E / F
	Elks Club Rd	Neff Rd	Two-Lane	F / F	D / F	F / F	E / F
	Neff Rd	Mountain Back Rd	Two-Lane	F / F	D / E	F / F	D / F

Crash Analysis

Crash data from January 2014 through December 2018 (5-years) was obtained from PennDOT and analyzed for various roadways within the project area. Data was obtained from PennDOT's Open Data Portal through the Pennsylvania Crash Information Tool (PCIT). Data for the non-state-maintained roadways was included in the data obtained from the Open Data Portal and is included in this analysis; however, it may not be complete or comprehensive.

Some safety measures and improvement projects that PennDOT has implemented since 2014 include:

- Added center turn lane along US 322 (Harley Davidson to Wagner Road); Fall 2014
- Adjusted S-curve alignment and profile along US 322 (vicinity of Wagner Road and Taylor Hill Road intersections); Fall 2014
- Constructed new bridge over US 322 in area of Sand Mountain Road; September 2015
- Constructed a new US 322 limited access roadway section from a new Sand Mountain Road interchange (included elimination of the existing at-grade intersection that was completed in October 2017) to a new Potters Mills interchange, west of the existing US 322 intersection with PA 144 (PMG, Sections B05 and B06 Project); Construction began Spring 2018 and completed October 2021

The specific roadway sections analyzed for the study are provided below:

- PA 45: Between Main Street (Boalsburg) to east of PA 144
- PA 144: Between US 322 to north of PA 26
- PA 192: East of PA 144
- US 322: Between PA 45 to Red Mill Road/Mountain Back Road
- Linden Hall Road/Cedar Hill Road (SR 2004): Entire length
- Brush Valley Road/Red Hill Road (SR 2006): Entire length
- Boalsburg Road/Warner Boulevard (SR 3010): North of Linden Hall Road (SR 2004) to SR 3014
- Boal Avenue (SR 3014): Between Villa Crest Drive to US 322
- Brush Valley Road (local): Between Boalsburg Road (SR 3010) to Red Hill Road (SR 2006)

There were 396 reportable crashes within the study area over the 5-year period. This includes five fatal crashes (1 percent), 168 injury crashes (42 percent), and 223 property damage only crashes (no injuries or fatalities) (56 percent). **Table 6** summarizes the crash severity by corridor.

Table 6: Crash Severity by Corridor

Roadway	PDO	Injury	Fatal	Total
PA 45	72 (50%)	70 (49%)	1 (1%)	**143 (36%)**
PA 144	68 (61%)	39 (35%)	4 (4%)	**111 (28%)**
PA 192		1 (100%)		**1 (0%)**
US 322	69 (64%)	39 (36%)		**108 (27%)**
Linden Hall Rd/Cedar Hill Rd (SR 2004)	1 (100%)			**1 (0%)**
Brush Valley Rd/Red Hill Rd (SR 2006)	3 (50%)	3 (50%)		**6 (2%)**
Boalsburg Rd/ Warner Blvd (SR 3010)	3 (23%)	10 (77%)		**13 (3%)**
Boal Ave (SR 3014)	5 (45%)	6 (55%)		**11 (3%)**
Brush Valley Road	2 (100%)			**2 (1%)**
Total	**223 (56%)**	**168 (42%)**	**5 (1%)**	**396 (100%)**

Crash frequencies represent number of crashes (5-year total) not the number of injuries or fatalities
PDO: Property Damage Only (no injuries)

PA 45 (143 crashes) experienced the highest crash frequency of all the corridors followed by PA 144 (111 crashes) and US 322 (108 crashes). Out of the five total fatalities, four occurred along PA 144. When compared to PA 144 and US 322; the PA 45 corridor experiences a higher percentage, almost 50 percent, of injury crashes.

Table 7 summarizes the total crashes by crash type and by corridor.

Table 7: Crash Types by Corridor

Roadway	Angle	Head-On	Hit Fixed Object	Hit Ped	Rear-end	Side-swipe (Opp.)	Side-swipe (Same)	Non-Collision	Other	Total
PA 45	49 (34%)	6 (4%)	43 (30%)	1 (<1%)	28 (20%)	1 (<1%)	3 (2%)	4 (3%)	8 (6%)	**143 (36%)**
PA 144	17 (15%)	4 (4%)	52 (47%)		22 (20%)	4 (4%)	1 (1%)	5 (4%)	6 (5%)	**111 (28%)**
PA 192			1 (100%)							**1 (0%)**
US 322	18 (17%)	3 (3%)	25 (23%)		42 (39%)	6 (6%)	2 (2%)	2 (2%)	10 (9%)	**108 (27%)**
SR 2004			1 (100%)							**1 (0%)**
SR 2006			3 (50%)			1 (17%)		2 (33%)		**6 (2%)**
SR 3010	7 (54%)		2 (15%)		3 (23%)				1 (8%)	**13 (3%)**
SR 3014	4 (37%)		2 (18%)		2 (18%)		2 (18%)		1 (9%)	**11 (3%)**
Brush Valley Rd			2 (100%)							**2 (1%)**
Total	**95 (24%)**	**13 (3%)**	**131 (33%)**	**1 (0%)**	**97 (24%)**	**12 (3%)**	**8 (2%)**	**13 (3%)**	**26 (7%)**	**396 (100%)**

Crash frequencies represent number of crashes (5-year total)

Rear-end crashes (97 crashes / 24 percent) occur the most frequent within the study area followed by angle crashes (95 crashes / 24 percent). Rear-end crashes are the most frequent along US 322 and are likely due to the mix of local, through traffic, and uncontrolled access along the corridor. Along PA 45 angle crashes (49 crashes / 34 percent) are most prevalent. Hit Fixed Object crashes (52 crashes / 47 percent) are the number one crash type along PA 144.

Weather and lighting do not seem to be a factor in most crashes in the study area as 313 crashes (80 percent) occurred in conditions classified as “clear”. There were 43 crashes (11 percent) in the rain and another 30 crashes in the snow (8 percent). Additionally, 276 crashes (70 percent) took place in the daylight with 16 crashes (4 percent) taking place in areas with streetlights, accounting for 74 percent of the total crashes.

Table 8 summarizes the total crashes by Unit 1 vehicle type and by corridor.

Table 8: Unit 1 Vehicle Type by Corridor

Roadway	Passenger Vehicles			Heavy Vehicles (Trucks)			Bicycle	Unk	Total
	Auto	SUV	MC	Large	Small	Bus			
PA 45	76 (53%)	32 (22%)	2 (2%)	3 (2%)	29 (20%)			1 (1%)	**143 (36%)**
PA 144	53 (48%)	30 (27%)	3 (3%)	3 (3%)	19 (17%)	1 (1%)	1 (1%)	1 (1%)	**111 (28%)**
PA 192		1 (100%)							**1 (0%)**
US 322	57 (53%)	25 (23%)	1 (1%)	8 (7%)	16 (15%)	1 (1%)			**108 (27%)**
SR 2004	1 (100%)								**1 (0%)**
SR 2006	4 (67%)	1 (17%)			1 (17%)				**6 (2%)**
SR 3010	7 (54%)	4 (31%)	1 (7.5%)	1 (7.5%)					**13 (3%)**
SR 3014	4 (37%)	3 (27%)	1 (9%)	1 (9%)	1 (9%)		1 (9%)		**11 (3%)**
Brush Valley Rd	2 (100%)								**2 (1%)**
Total	**204 (52%)**	**96 (24%)**	**8 (2%)**	**16 (4%)**	**66 (17%)**	**2 (1%)**	**2 (1%)**	**2 (1%)**	**396 (100%)**

Crash frequencies represent number of crashes (5-year total)
MC: Motorcycle
Unk: Unknown Vehicle Type

When the Pennsylvania State Police complete a crash report the vehicle that is listed as Unit 1 is the vehicle the officer believes is the reason the crash occurred. As noted, approximately 22 percent of all crashes within the study area were caused by a heavy vehicle. PA 45, PA 144, and US 322 all exhibit similar crash experiences related to Unit 1 being a heavy vehicle. In total, there were 130 crashes (33 percent) that involved (but were not necessarily caused by) at least one truck.

Highway Safety Analysis

A Highway Safety Manual (HSM) analysis was completed for the Base Year (2017) and Design Year (2050) to evaluate the safety performance of the existing roadway network. The HSM provides analytical tools and techniques for quantifying potential effects of crashes for evaluation of improvement options to aid in decisions made during the planning, design, operations, and maintenance process. Like how the HCM evaluates how design elements impact operations the HSM evaluates how design elements impact safety. The analysis was performed utilizing the Department's HSM Safety Analysis Tool. The HSM Safety Analysis Tool combines Rural Two-Lane Roadways, Rural Multilane Highways, and Urban and Suburban Arterials into one spreadsheet which has been customized for use in Pennsylvania.

The methodologies of the HSM were utilized to calculate the Predicted Average Crash Frequency (Baseline), Expected Average Crash Frequency (Normalized), and the Potential for Safety Improvement

(PSI) within the study area. The Predicted Average Crash Frequency is the estimate of long-term average crash frequency which is forecast based on regression models and calibration factors. The Expected Average Crash Frequency is the estimate of long-term average crash frequency which is calculated based on the observed crash frequency (the study area crash data).

The PSI estimates how much long-term crash frequency can be reduced at a site and is represented as the Expected Average Crash Frequency minus the Predicted Average Crash Frequency. According to the *Publication 319 - Needs Study Handbook*, A project has a safety need if the expected crashes are higher than the predicted crashes in the study area (i.e., a positive PSI).

Table 9 summarizes the results of the HSM analysis by roadway and by scenario. The resultant PSI for the entire study area and each individual corridor shows that there is not an overall safety need. Additionally, the ratio of Fatal/Injury crashes to PDO crashes (43 percent Fatal/Injury) of the observed crash frequency is substantially outperforming the ratio of the predicted crash frequency (55 percent Fatal/Injury). However, when evaluating the roadways by segment and intersection, there are sites within the study area where the expected number of crashes is greater than the predicted number of crashes (i.e., showing a safety need).

The results of the HSM analysis by segment and intersection are illustrated in **Figure 11**. The sites identified for a positive PSI difference through the HSM analysis correlate to the areas identified that do not meet vertical or horizontal criteria based on the posted speed limits.

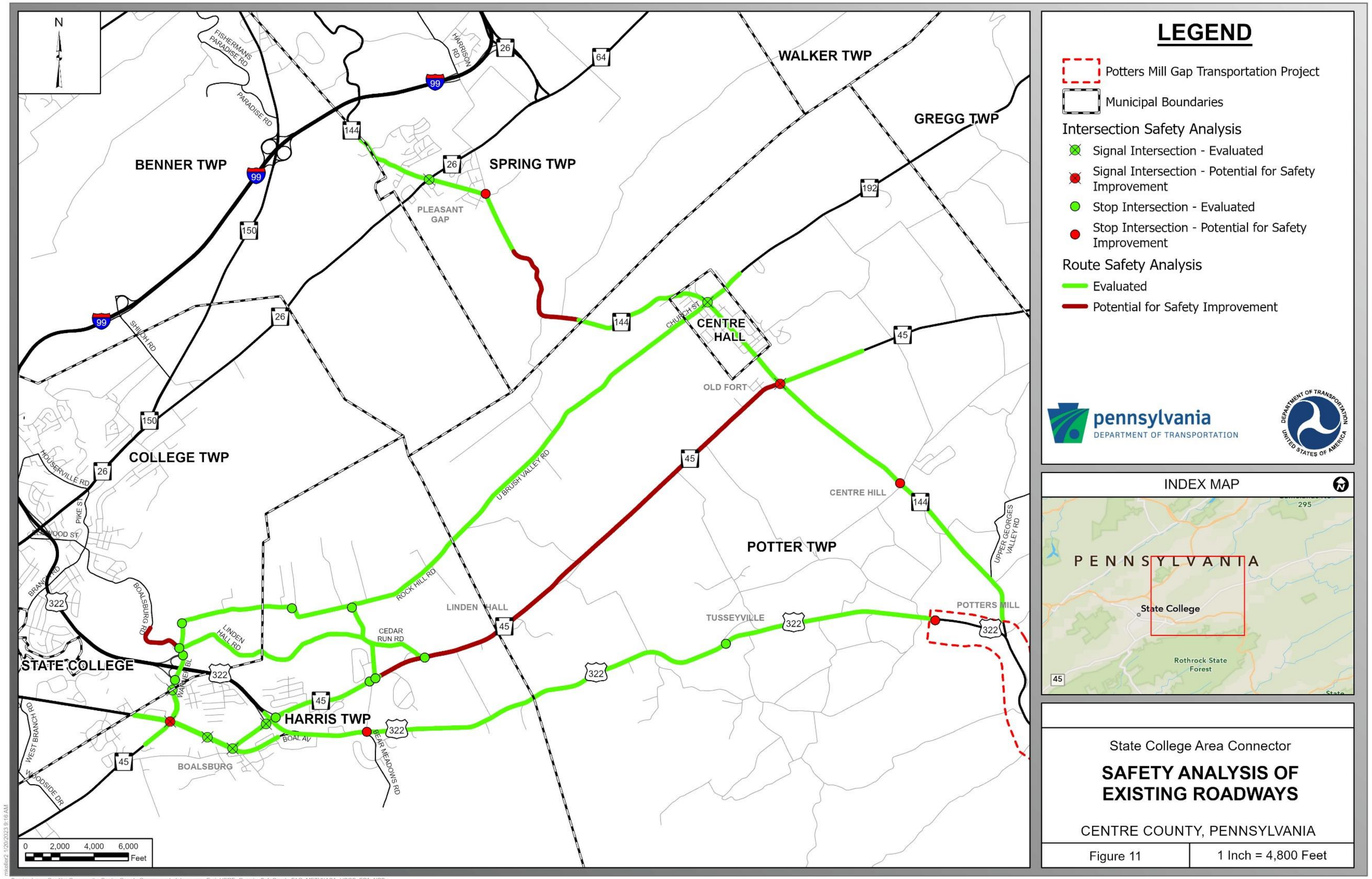
There is a PSI along PA 144 for the segment that travels from the top of Mount Nittany into Pleasant Gap, along PA 45 between Elks Club Road and PA 144, and Boalsburg Road north of Linden Hall Road. There is a PSI at the intersections of US 322 and Elks Club Road and US 322 and Red Mill Road/Mountain Back Road. It should be noted that this was a higher-level screening analysis and not every intersection/driveway was evaluated individually; therefore, it would be possible that PSI could exist at other similar unsignalized access locations. Along PA 144, PSI exists at Airport Road/Sinking Creek Road, PA 45 (signalized), and at Harrison Road in Pleasant Gap. In the town of Boalsburg, there is a PSI at the signalized intersection of Boal Avenue and PA 45.

On average, during the Design Year (2050), crashes within the study are predicted to increase by 24 percent. However, the number of crashes along PA 144 is predicted to increase by 33 percent due to the anticipated traffic growth in the area. Of the other major corridors within the study area, crashes along US 322 are predicted to increase by 17 percent and crashes along PA 45 are predicted to increase by 20 percent. These predicted increased crashes paired with increased congestion may exacerbate the crash frequencies experienced within the study area.

Table 9: Highway Safety Analysis Summary

Roadway	Base Year (2017)												Design Year (2050)			
	Predicted Crash Frequency			Observed Crash Frequency			Expected Crash Frequency			Potential for Safety Improvement			Predicted Crash Frequency			Percent Increase
	FI	PDO	Total	FI	PDO	Total	FI	PDO	Total	FI	PDO	Total	FI	PDO	Total	
PA 45	23.0	20.0	43.0	13.0	12.8	25.8	17.0	13.1	30.1	-5.9	-6.9	-12.9	27.6	23.8	51.5	**20%**
PA 144	24.9	22.3	47.2	8.8	14.8	23.6	17.1	13.3	30.3	-7.8	-9.1	-16.9	33.6	29.1	62.7	**33%**
PA 192	0.7	0.9	1.6	0.0	0.0	0.0	0.5	0.1	0.6	-0.3	-0.8	-1.0	0.9	1.1	2.0	**25%**
US 322	15.6	15.0	30.6	7.0	11.8	18.8	11.4	11.5	22.9	-4.2	-3.6	-7.7	18.3	17.6	35.9	**17%**
Linden Hall Road, Cedar Run Road (SR 2004)	0.4	0.3	0.7	0.0	0.2	0.2	0.4	0.3	0.6	0.0	0.0	0.0	0.5	0.3	0.7	**7%**
Linden Hall Road, Rock Hill Road, Brush Valley Road (SR 2006)	2.0	1.8	3.8	0.6	0.6	1.2	1.8	1.3	3.1	-0.2	-0.5	-0.7	3.6	3.2	6.8	**79%**
Boalsburg Road, Warner Boulevard (SR 3010)	3.7	3.5	7.2	2.8	1.4	4.2	3.4	1.8	5.2	-0.4	-1.6	-2.0	4.1	3.7	7.8	**9%**
Boal Avenue (SR 3014)	15.2	6.2	21.4	1.0	0.8	1.8	2.9	0.9	3.7	-12.3	-5.4	-17.6	18.2	7.4	25.6	**20%**
Brush Valley Road	1.2	0.8	2.0	0.0	0.4	0.4	0.9	0.7	1.6	-0.2	-0.1	-0.3	1.4	1.0	2.4	**20%**
Total	**86.7**	**70.7**	**157.4**	**33.2**	**42.8**	**76.0**	**55.3**	**42.9**	**98.2**	**-31.3**	**-27.9**	**-59.2**	**108.2**	**87.2**	**195.4**	**24%**

Displayed in **crashes per year**
Percent Increase: Comparison of Design Year (2050) predicted crashes to Base Year (2017) predicted crashes
FI - Fatal and Injury crashes
PDO – Property Damage Only crash


LEGEND
Potters Mill Gap Transportation Project
Municipal Boundaries
Intersection Safety Analysis
Signal Intersection - Evaluated
Signal Intersection - Potential for Safety Improvement
Stop Intersection - Evaluated
Stop Intersection - Potential for Safety Improvement
Route Safety Analysis
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pennsylvania
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TUSSEYVILLE
POTTERS MILL
STATE COLLEGE
HARRIS TWP
BOALSBURG
PLEASANT GAP
CEDAR RUN RD
N
0 2,000 4,000 6,000 Feet
State College Area Connector
SAFETY ANALYSIS OF EXISTING ROADWAYS
CENTRE COUNTY, PENNSYLVANIA
Figure 11
1 Inch = 4,800 Feet

PEL Study Alternatives

The alternatives analysis for this PEL Study consisted of a multi-level screening process. Screening Level 1 consisted of a qualitative evaluation in the ability of each alternative to meeting the established project purpose and needs. Screening Level 2 consisted of a quantitative analysis of each of the alternatives advanced beyond Screening Level 1. The Level 2 screening was further broken down into 2 sub-levels: Level 2A and Level 2B. This document includes the traffic analysis of the study alternatives advanced to the Level 2A and Level 2B screenings.

One of the goals identified for an improvement alternative is for it to reduce traffic volume on the existing study area roadway network. Therefore, this criterion was used for the Level 2A screening.

For the Level 2B screening traffic evaluation, intersection and roadway capacity analyses were performed using Synchro and HCS software.

Below are brief descriptions of the three alternatives advanced for Level 2A/2B operational and safety evaluation for the PEL study. Three alternatives have been advanced consisting of an Upgrade Existing Alternative and two new build roadway alternatives; one along the US 322 corridor (Build Alternative 1) and one along the PA 144 corridor (Build Alternative 2).

Upgrade Existing Alternative

The Upgrade Existing Alternative consists of geometric upgrades of the existing US 322 Corridor following the existing US 322 roadway alignment to provide a four-lane, barrier separated facility that would allow left turns at select intersections. Access to local roads and properties adjacent to the highway would be restricted to right-in and right-out movements with left turns accommodated at jughandle turnarounds spaced throughout the corridor. **Figure 12** provides a conceptual layout of the jughandle locations for this alternative.

Build Alternative 1 (US 322 Corridor)

This alternative involves a new four-lane limited access roadway with full width inside and outside shoulders that parallels the US 322 corridor from Potters Mill Gap to the existing four-lane limited access Mount Nittany Expressway in Boalsburg. A full access interchange with connection to existing PA 45 is included in the network in addition to the new roadway. An access road connecting existing US 322 and PA 45 is also included.

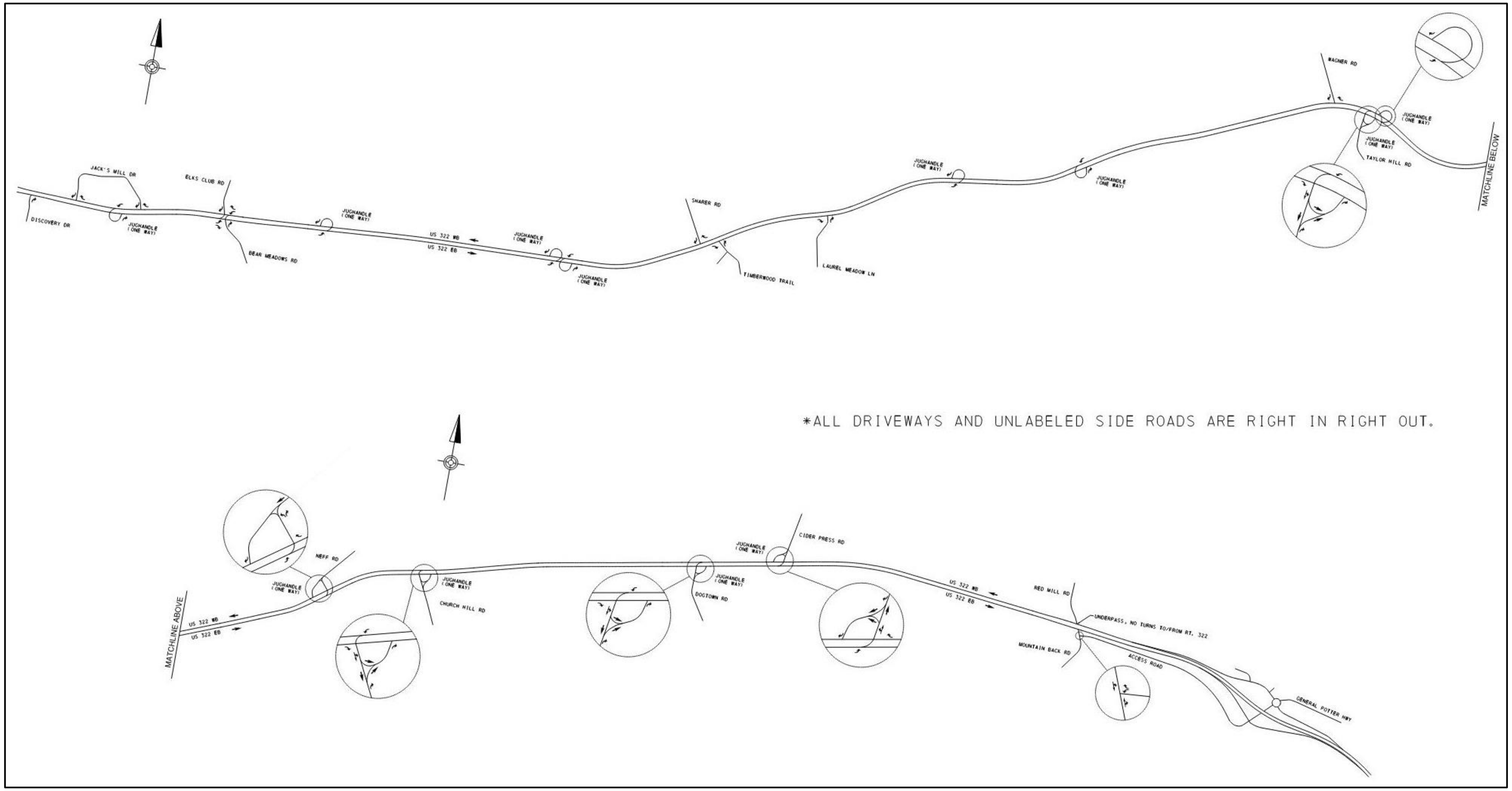


Figure 12 – Upgrade Existing Alternative – Jughandle Concept Layout

Build Alternative 2 (PA 144 Corridor)

This alternative involves a new four-lane limited access roadway with full width inside and outside shoulders that parallels the PA 144 corridor and connects US 322 at Potters Mill Gap and I-99 at the existing PA 26/I-99 interchange ramps near Pleasant Gap. A full access interchange with connection to existing PA 45 west of PA 144 is included.

Future Design Year (2050) Traffic Volume Projections

Regional Travel Demand Model

Consistent with development of the Year 2050 No Build traffic projections, Year 2050 Build traffic volumes also utilized the Centre County Regional TDM. The TDM considers planned/programmed transportation improvements, future land uses changes, regional travel patterns, transit service, and commercial/freight forecasts. Enhancements were made to the Centre County TDM representative of each alternative scenario.

Model coding enhancements for the Upgrade Existing alternative involved changes to parameters including the number of lanes, speeds, and link capacity for the US 322 model roadway links for the upgraded US 322 corridor limits between the existing US 322 (Mt. Nittany Expressway) in Boalsburg and Potters Mills Gap. For the new roadway build alternatives (Build Alternative 1 and Build Alternative 2) model coding enhancements included the coding of new links and nodes (i.e., roadways and intersections) for the new roadways along with the appropriate parameter settings (number of lanes, speed, link capacity, etc.) commensurate for the type of facility (two-lane rural, four-lane limited access, etc.). Also, only for Build Alternative 2 (PA 144 corridor), some model coding parameters were modified for the existing US 322 two-lane section; the underlying premise for these modifications was to reduce the functional class of existing US 322 to optimize the attractiveness of the new limited access roadway. The modified parameters included the speed and link capacity, changing them from a principal arterial setting to that of a minor arterial roadway.

As earlier described, the new roadway for Build Alternative 2 (PA 144 corridor) would parallel existing PA 144 with direct connections with US 322 in Potters Mills and I-99 in Pleasant Gap; providing an alternative route to State College via I-99. To better understand model assignments for this alternative, additional post-processing efforts were performed. This included a sensitivity analysis to evaluate model traffic volume assignments on US 322, PA 45 and the Build Alternative 2 Roadway for traffic traveling between the eastern side of the study area and the US 322/I-99 corridor in the northern area of State College, coupled with the StreetLight Origin-Destination data discussed in the Existing Conditions and Future No-Build section.

For this high-level planning study and ease of public review, future AADT and AADTT volumes ranges were also developed for the study area roadways. The ranges consider multiple segments along a roadway and sensitivity in traffic routing/volume assignments. Traffic route sensitivity occurs when multiple route options, with similar travel times, are available to the motorist between their origin and destination locations. A few examples of this are when roadways parallel each other like US 322 and PA 45 in the Boalsburg area, or in the case of Build Alternative 2 (PA 144 Corridor) a motorist on US 322 at Potters Mill Gap with a destination in the vicinity of Innovation Park could utilize either US 322 or the PA 144 corridor and I-99 to reach their destination.

Level 2A Screening

For the Level 2A evaluation of the new roadway build alternatives (Build Alternative 1 and Build Alternative 2), the new corridor roadways were coded into the model network from terminus point to terminus point, with no intermediate interchange(s). There were no interchanges included in either of the off alignment build alternatives (Alternative 1 and Alternative 2). The purpose of this evaluation was to determine potential reduction in traffic volumes on the local roadway network within the study area, as this could result in an operational improvement benefit due to a new or improved alignment “pulling” volume off the existing roadways.

Design Year 2050 Annual Average Daily Traffic (AADT) and Annual Average Daily Truck Traffic (AADTT) volume projections were developed for each of the Level 2A screening alternatives, which are contained in **Table 10** and ranges depicted on **Figure 13** through **Figure 15** for the build alternative roadways as well as other study area roadways.

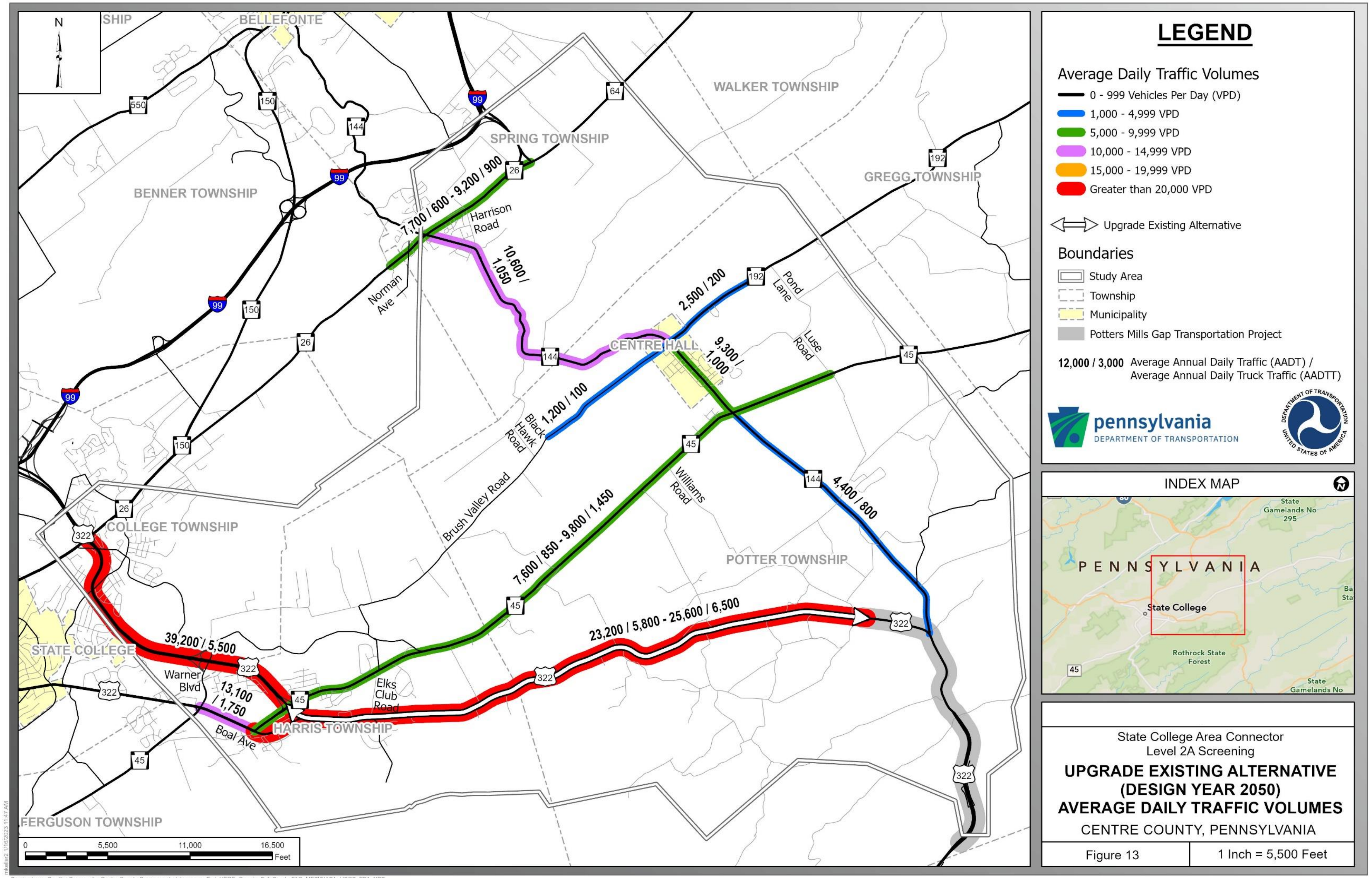
A comparison of the Design Year 2050 No Build volumes to the Design Year 2050 AADT and AADTT traffic volumes for each screening alternative shown in **Table 10** indicates the following:

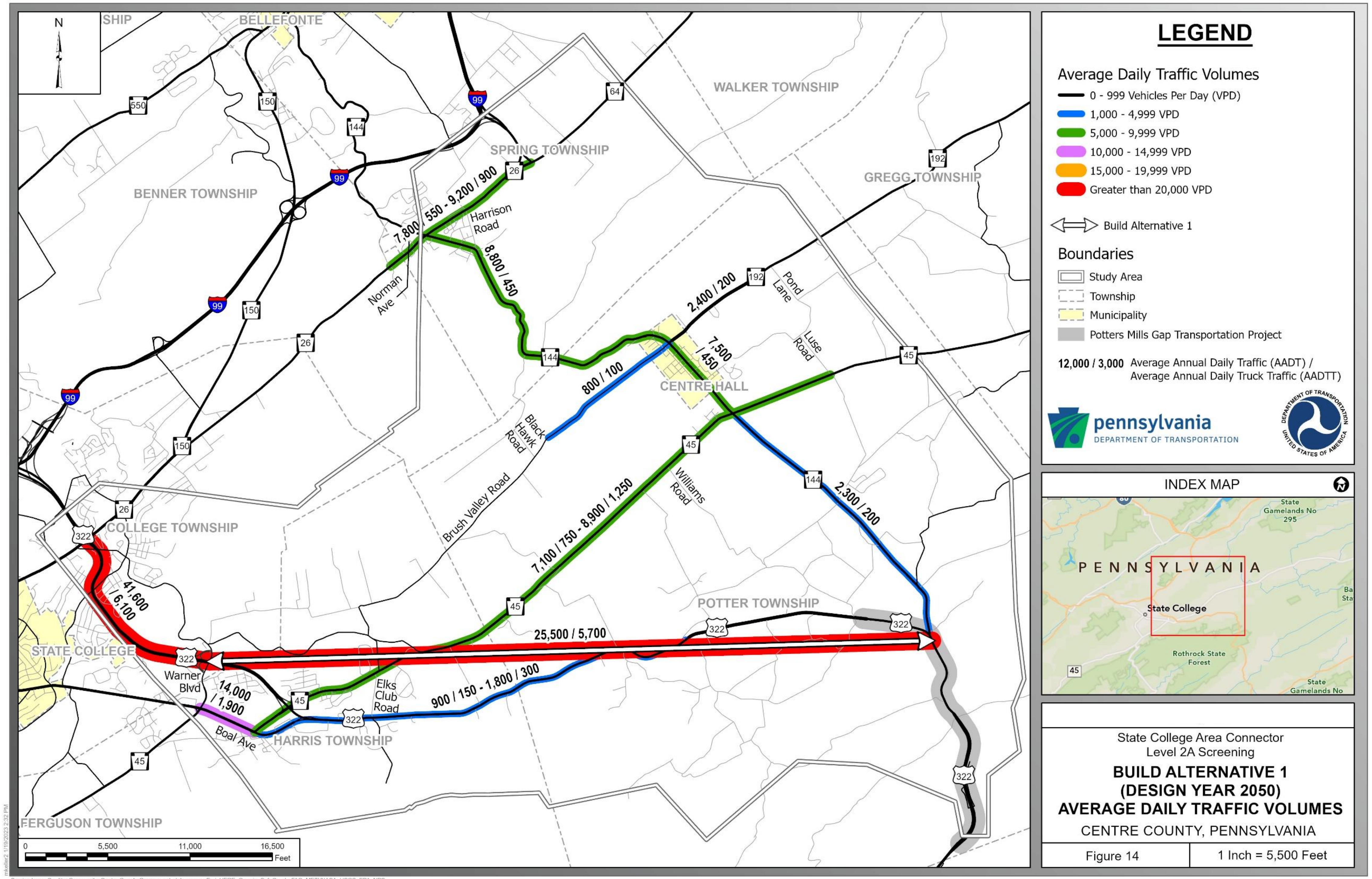
- All alternatives reduce AADT and AADTT volumes on the existing local roadway network.
- Build Alternative 1 would result in the largest reduction in AADT and AADTT (47 percent and 70 percent, respectively), followed by Build Alternative 2 (33 percent and 60 percent, respectively). The Upgrade Existing Alternative would have the least reduction in AADT and AADTT volumes on PA 45 and PA 144 roadways (16 percent and 25 percent, respectively).

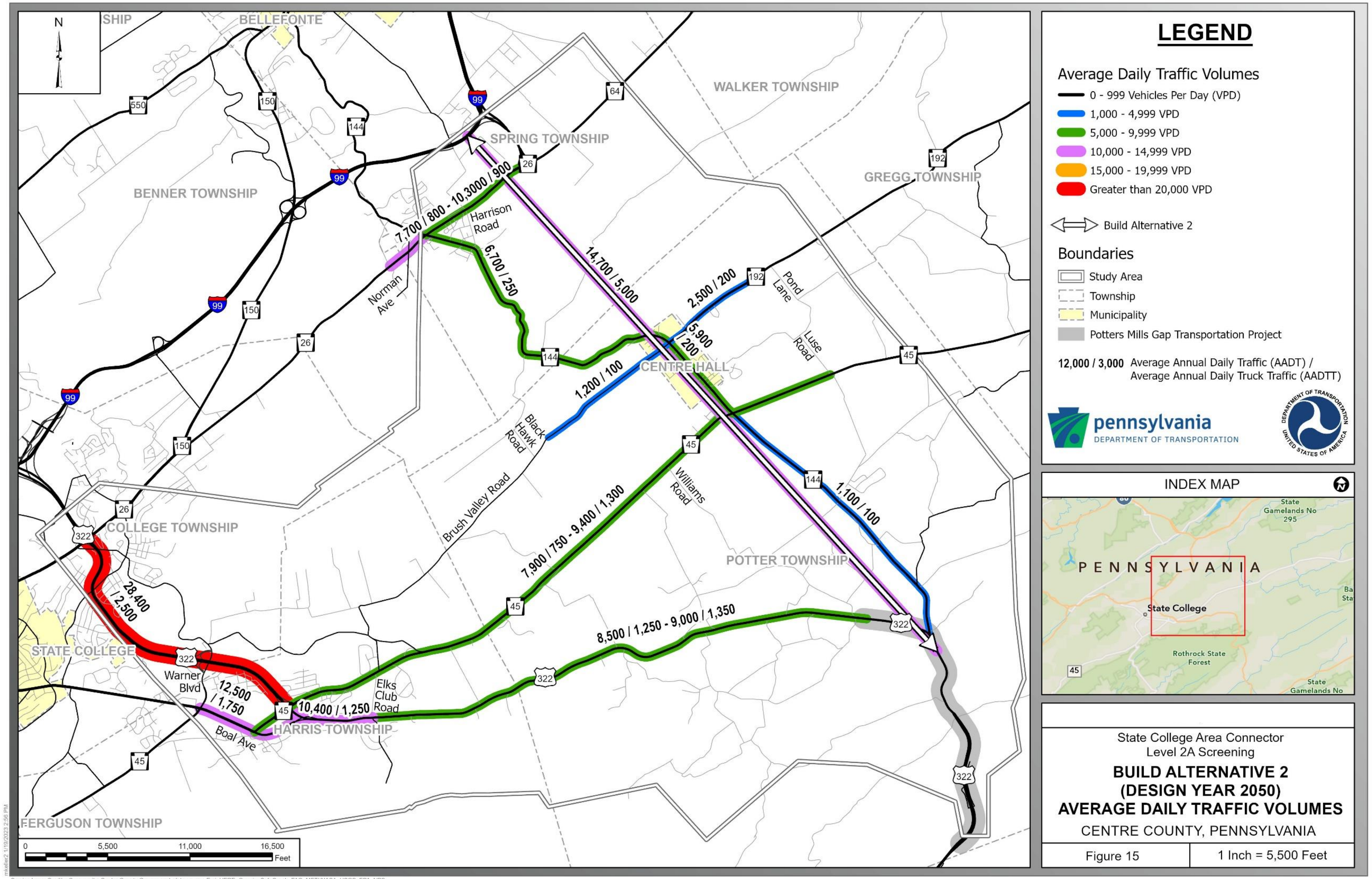
Table 10: Level 2A Screening Design Year (2050) Traffic Volume Summary

Roadway	Segment		Year 2050 Traffic Volumes							
			No Build		US 322 Upgrade Existing		Build Alt. 1		Build Alt. 2	
	From	To	AADT	AADTT	AADT	AADTT	AADT	AADTT	AADT	AADTT
PA 45	Warner Blvd	Boal Ave	**13,500**	1,800	**13,100**	1,750	**14,000**	1,900	**12,500**	1,750
	US 322	Elks Club Rd	**10,900**	1,500	**9,100**	1,150	**8,900**	1,100	**9,300**	1,100
	Elks Club Rd	Williams Rd	**9,200**	1,100	**7,600**	850	**7,100**	750	**7,900**	750
	Williams Rd	PA 144	**9,600**	1,700	**8,600**	1,450	**8,100**	1,250	**8,900**	1,300
	PA 144	Luse Rd	**9,900**	1,350	**9,800**	1,350	**8,900**	1,200	**9,400**	1,050
	Average		***10,620***	*1,490*	***9,640***	*1,310*	***9,400***	*1,240*	***9,600***	*1,190*
PA 144	US 322	PA 45	**8,500**	1,200	**4,400**	800	**2,300**	200	**1,100**	100
	SPA 45	Brush Valley Rd	**14,100**	2,150	**9,300**	1,000	**7,500**	450	**5,900**	200
	Brush Valley Rd	Harrison Rd	**13,400**	1,850	**10,600**	1,050	**8,800**	450	**6,700**	250
	Average		***12,000***	*1,733*	***8,100***	*950*	***6,200***	*367*	***4,567***	*183*
US 322	Boal Ave	Elks Club Rd	**15,700**	4,850	**25,600**	6,500	**1,800**	150	**10,400**	1,250
	Elks Club Rd	Neff Rd	**18,600**	4,800	**24,200**	5,800	**1,100**	200	**9,000**	1,250
	Neff Rd	US 322/ Potters Mills	**17,900**	4,800	**23,200**	5,800	**900**	300	**8,500**	1,350
	Average		***17,400***	*4,817*	***24,333***	*6,033*	***1,267***	*217*	***9,300***	*1,283*
PA 26/ PA 64	PA 144	Norman Ave	**9,200**	600	**9,200**	600	**9,200**	550	**10,300**	800
	PA 144	I-99 Ramps	**7,700**	900	**7,700**	900	**7,800**	900	**7,700**	900
	Average		***8,450***	*750*	***8,450***	*750*	***8,500***	*725*	***9,000***	*850*
Brush Valley Rd (SR 2006 / PA 192)	PA 144	Blackhawk Rd	**1,900**	200	**1,200**	100	**800**	100	**1,200**	100
	PA 144	Pond Lane	**2,900**	300	**2,500**	200	**2,400**	200	**2,500**	200
	Average		**2,400**	250	**1,850**	150	**1,600**	150	**1,850**	150
Build Alternative 1	Boalsburg Rd (SR 3010)	US 322/ Potters Mills	**-**	-	**-**	-	**25,500**	5,700	**-**	-
Build Alternative 2	US 322/ Potters Mills	PA 26/I-99	**-**	-	**-**	-	**-**	-	**14,700**	5,000

AADT = Annual Average Daily Traffic in vehicles per day
AADTT = Annual Average Daily Truck Traffic in trucks per day (%Trucks)


LEGEND
Average Daily Traffic Volumes
0 - 999 Vehicles Per Day (VPD)
1,000 - 4,999 VPD
5,000 - 9,999 VPD
10,000 - 14,999 VPD
15,000 - 19,999 VPD
Greater than 20,000 VPD
Upgrade Existing Alternative
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
12,000 / 3,000 Average Annual Daily Traffic (AADT) / Average Annual Daily Truck Traffic (AADTT)
pennsylvania DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
State Gamelands No 295
State Gamelands No
BENNER TOWNSHIP
SPRING TOWNSHIP
WALKER TOWNSHIP
GREGG TOWNSHIP
COLLEGE TOWNSHIP
POTTER TOWNSHIP
HARRIS TOWNSHIP
FERGUSON TOWNSHIP
STATE COLLEGE
BELLEFONTE
CENTRE HALL
7,700 / 600 - 9,200 / 900
10,600 / 1,050
2,500 / 200
9,300 / 1,000
1,200 / 100
4,400 / 800
7,600 / 850 - 9,800 / 1,450
23,200 / 5,800 - 25,600 / 6,500
39,200 / 5,500
13,100 / 1,750
Harrison Road
Norman Ave
Pond Lane
Luse Road
Black Hawk Road
Brush Valley Road
Williams Road
Warner Blvd
Boal Ave
Elks Club Road
0 5,500 11,000 16,500 Feet
State College Area Connector
Level 2A Screening
UPGRADE EXISTING ALTERNATIVE
(DESIGN YEAR 2050)
AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 13
1 Inch = 5,500 Feet


LEGEND
Average Daily Traffic Volumes
0 - 999 Vehicles Per Day (VPD)
1,000 - 4,999 VPD
5,000 - 9,999 VPD
10,000 - 14,999 VPD
15,000 - 19,999 VPD
Greater than 20,000 VPD
Build Alternative 1
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
12,000 / 3,000 Average Annual Daily Traffic (AADT) / Average Annual Daily Truck Traffic (AADTT)
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
BENNER TOWNSHIP
SPRING TOWNSHIP
WALKER TOWNSHIP
GREGG TOWNSHIP
COLLEGE TOWNSHIP
POTTER TOWNSHIP
HARRIS TOWNSHIP
FERGUSON TOWNSHIP
STATE COLLEGE
CENTRE HALL
BELLEFONTE
7,800 / 550 - 9,200 / 900
8,800 / 450
2,400 / 200
7,500 / 450
800 / 100
2,300 / 200
7,100 / 750 - 8,900 / 1,250
25,500 / 5,700
41,600 / 6,100
14,000 / 1,900
900 / 150 - 1,800 / 300
Harrison Road
Norman Ave
Pond Lane
Luse Road
Black Hawk Road
Brush Valley Road
Williams Road
Elks Club Road
Warner Blvd
Boal Ave
State College Area Connector
Level 2A Screening
BUILD ALTERNATIVE 1
(DESIGN YEAR 2050)
AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 14
1 Inch = 5,500 Feet


LEGEND
Average Daily Traffic Volumes
0 - 999 Vehicles Per Day (VPD)
1,000 - 4,999 VPD
5,000 - 9,999 VPD
10,000 - 14,999 VPD
15,000 - 19,999 VPD
Greater than 20,000 VPD
Build Alternative 2
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
12,000 / 3,000 Average Annual Daily Traffic (AADT) / Average Annual Daily Truck Traffic (AADTT)
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
State College Area Connector
Level 2A Screening
BUILD ALTERNATIVE 2
(DESIGN YEAR 2050)
AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 15
1 Inch = 5,500 Feet
BELLEFONTE
WALKER TOWNSHIP
SPRING TOWNSHIP
BENNER TOWNSHIP
GREGG TOWNSHIP
COLLEGE TOWNSHIP
POTTER TOWNSHIP
STATE COLLEGE
HARRIS TOWNSHIP
FERGUSON TOWNSHIP
CENTRE HALL
7,700 / 800 - 10,3000 / 900
Harrison Road
6,700 / 250
14,700 / 5,000
2,500 / 200
Pond Lane
5,900 / 200
Luse Road
1,200 / 100
Black Hawk Road
Norman Ave
Brush Valley Road
7,900 / 750 - 9,400 / 1,300
Williams Road
1,100 / 100
8,500 / 1,250 - 9,000 / 1,350
28,400 / 2,500
12,500 / 1,750
10,400 / 1,250
Warner Blvd
Elks Club Road
Boal Ave
0
5,500
11,000
16,500
Feet

Level 2B Screening

For the Level 2B evaluation of the new roadway build alternatives (Build Alternative 1 and Build Alternative 2), further refinements of the Level 2A screening Year 2050 traffic volume projections (AADT and AADTT) were performed for the alternatives. These refinements continued to utilize the Centre County Regional TDM and included consideration of intermediate access (interchanges) for the build alternatives. The TDM network was modified for the following Build Alternatives:

- Build Alternative 1 – A full access interchange east of Sharer Road with connections to existing PA 45 and US 322 was included in the network in addition to the new alignment.
- Build Alternative 2 – A full access interchange with connection to existing PA 45 west of PA 144 was included to provide an additional access with this new alignment between existing US 322 and I-99.

Design Year 2050 AADT and AADTT volume projections were developed for each of the Level 2B screening alternatives, which are contained in **Table 11** and ranges are depicted on **Figure 16** through **Figure 18** for the build alternative roadways as well as other study area roadways.

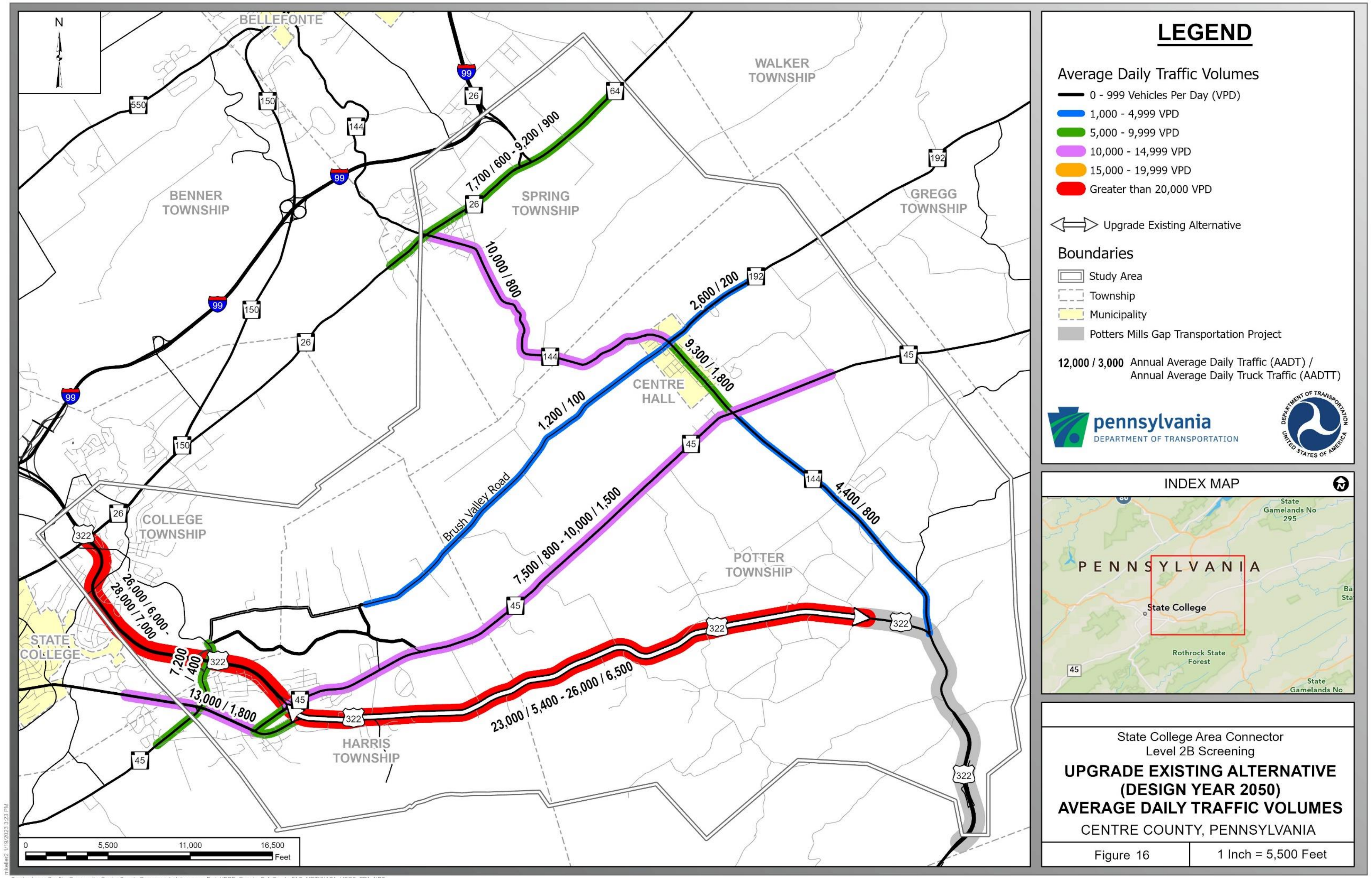
A comparison of the Design Year 2050 No Build volumes to the Design Year 2050 AADT and AADTT traffic volumes for each Level 2B screening alternative shown in **Table 11** indicates the following:

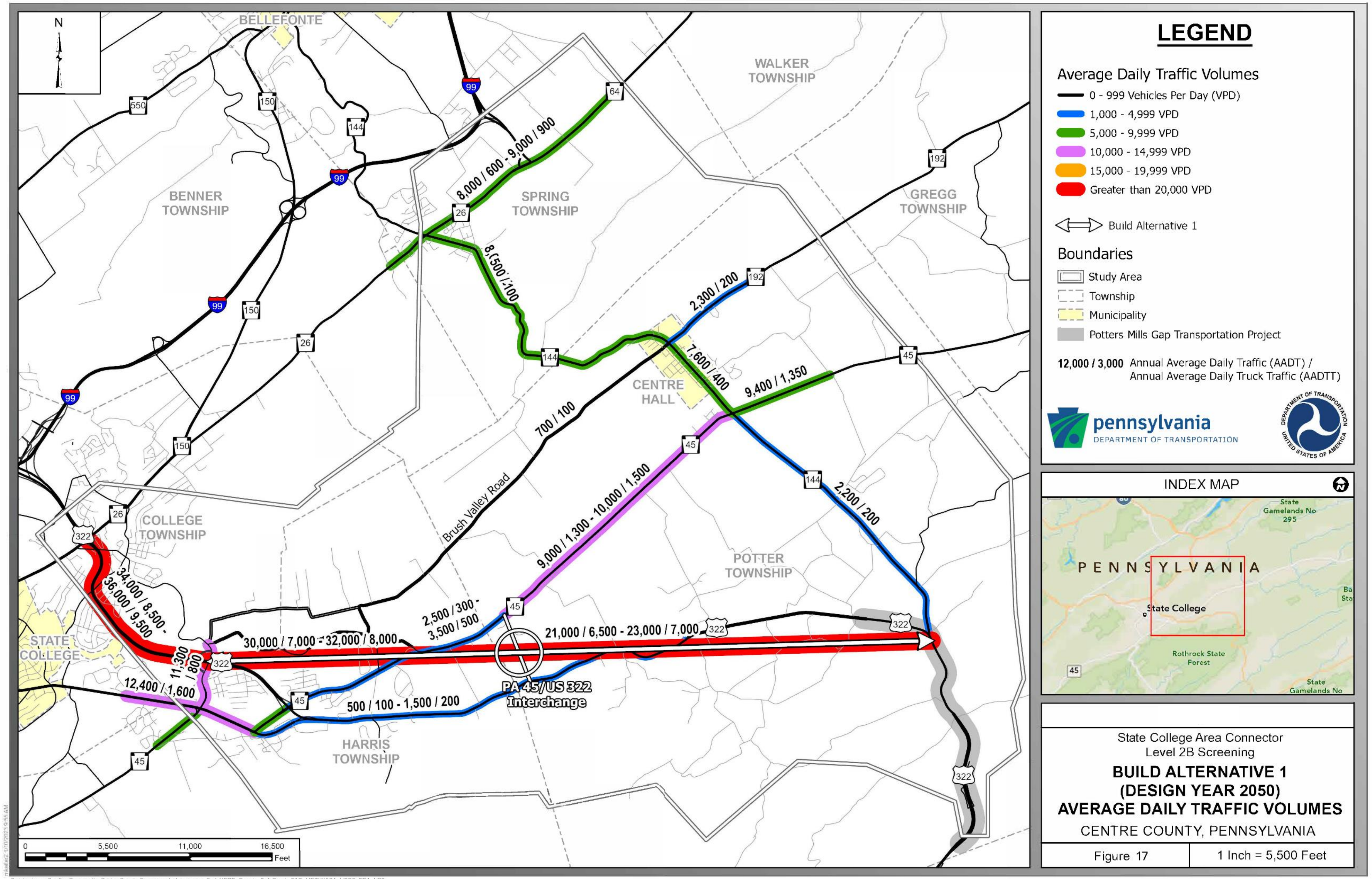
- All alternatives reduce AADT and AADTT volumes on the existing local roadway network.
- Build Alternative 1 would result in the largest reduction in AADT and AADTT (53 percent and 73 percent, respectively), followed by Build Alternative 2 (46 percent and 57 percent, respectively). The Upgrade Existing Alternative would have the least reduction in AADT and AADTT volumes on PA 45 and PA 144 roadways (17 percent and 21 percent, respectively).

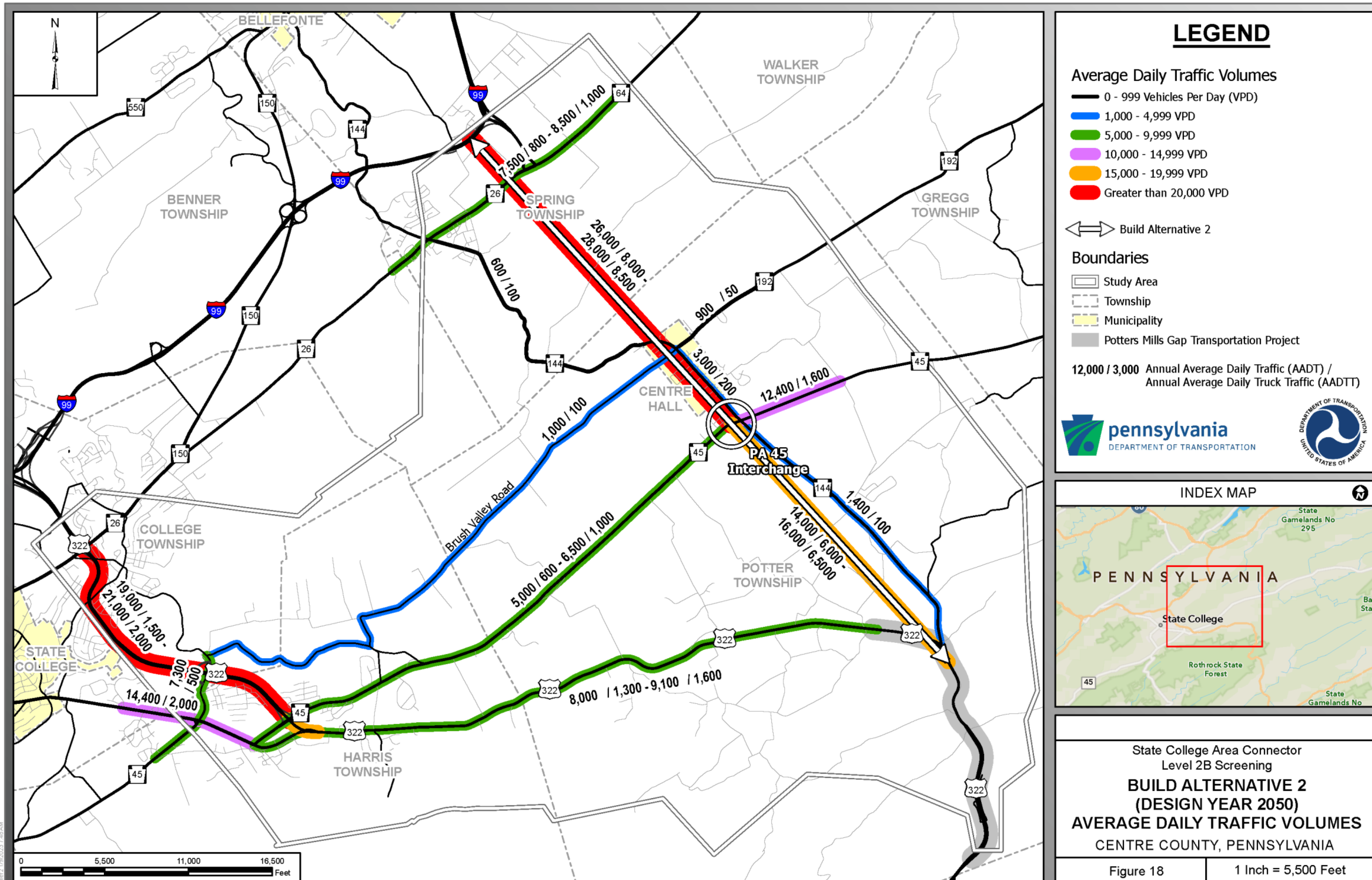
Table 11: Level 2B Screening Design Year (2050) Traffic Volume Summary

Roadway	Segment		Year 2050 Traffic Volumes							
			No Build		US 322 Upgrade Existing		Build Alt. 1		Build Alt. 2	
	From	To	AADT	AADTT	AADT	AADTT	AADT	AADTT	AADT	AADTT
PA 45	Boalsburg Rd	Boal Ave	13,500	1,800	13,000	1,800	12,400	1,600	14,400	2,000
	US 322	Elks Club Rd	10,900	1,500	9,100	1,150	3,200	450	6,100	700
	Elks Club Rd	Williams Rd	9,200	1,100	7,500	850	-	-	5,200	550
	Elks Club Rd	Connector Rd	-	-	-	-	2,400	350	-	-
	Connector Rd	Williams Rd	-	-	-	-	9,300	1,450	-	-
	Williams Rd	PA 144	9,600	1,700	8,600	1,450	9,300	1,450	6,100	1,000
	PA 144	Luse Rd	9,900	1,350	9,800	1,350	9,400	1,350	12,400	1,600
	Average		*10,620*	*1,490*	*12,000*	*1,320*	*7,340*	*1,040*	*8,840*	*1,170*
PA 144	US 322	PA 45	8,500	1,200	4,400	800	2,200	200	1,400	50
	PA 45	Brush Valley Rd	14,100	2,150	9,300	1,800	7,600	400	3,000	150
	Brush Valley Rd	Harrison Rd	13,400	1,850	10,000	800	8,000	500	600	100
	Average		*12,000*	*1,733*	*7,900*	*1,133*	*5,933*	*367*	*1,667*	*100*
US 322	Boal Ave	Elks Club Rd	15,700	4,850	23,400	6,500	1,400	100	9,100	1,600
	Elks Club Rd	Neff Rd	18,600	4,800	26,000	6,500	700	50	8,000	1,350
	Neff Rd	US 322/ Potters Mills	17,900	4,800	23,000	5,400	500	200	8,500	1,950
	Average		*17,400*	*4,817*	*25,100*	*6,133*	*867*	*117*	*8,533*	*1,633*
PA 26/ PA 64	PA 144	Norman Ave	9,200	600	9,200	600	8,700	600	7,200	800
	PA 144	I-99 Ramps	7,700	900	7,700	900	8,100	900	8,200	1,000
	Average		*8,450*	*750*	*8,450*	*750*	*8,400*	*750*	*7,700*	*900*
Brush Valley Rd (SR 2006 / PA 192)	PA 144	Blackhawk Rd	1,900	200	1,200	100	700	100	1,000	100
	PA 144	Pond Lane	2,900	300	2,600	200	2,300	200	900	50
	Average		*2,400*	*250*	*1,900*	*150*	*1,500*	*150*	*950*	*75*
Build Alternative 1	Boalsburg Rd (SR 3010)	PA 45/US 322	-	-	-	-	31,000	7,500	-	-
	PA 45/US 322	US 322/ Potters Mills	-	-	-	-	22,000	6,750	-	-
	Average		-	-	-	-	26,500	7,125	-	-
Build Alternative 2	US 322/ Potters Mills	PA 45	-	-	-	-	-	-	15,000	6,250
	PA 45	PA 26/I-99	-	-	-	-	-	-	27,000	8,250
	Average		-	-	-	-	-	-	21,000	7,250

AADT = Annual Average Daily Traffic in vehicles per day
AADTT = Annual Average Daily Truck Traffic in trucks per day (%Trucks)


LEGEND
Average Daily Traffic Volumes
0 - 999 Vehicles Per Day (VPD)
1,000 - 4,999 VPD
5,000 - 9,999 VPD
10,000 - 14,999 VPD
15,000 - 19,999 VPD
Greater than 20,000 VPD
Upgrade Existing Alternative
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
12,000 / 3,000 Annual Average Daily Traffic (AADT) / Annual Average Daily Truck Traffic (AADTT)
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
State College Area Connector
Level 2B Screening
UPGRADE EXISTING ALTERNATIVE
(DESIGN YEAR 2050)
AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 16
1 Inch = 5,500 Feet
BELLEFONTE
WALKER TOWNSHIP
BENNER TOWNSHIP
SPRING TOWNSHIP
GREGG TOWNSHIP
CENTRE HALL
COLLEGE TOWNSHIP
POTTER TOWNSHIP
STATE COLLEGE
HARRIS TOWNSHIP
7,700 / 600 - 9,200 / 900
10,000 / 800
2,600 / 200
9,300 / 1,800
1,200 / 100
Brush Valley Road
7,500 / 800 - 10,000 / 1,500
4,400 / 800
26,000 / 6,000 - 28,000 / 7,000
7,200 / 400
13,000 / 1,800
23,000 / 5,400 - 26,000 / 6,500
0
5,500
11,000
16,500
Feet


LEGEND
Average Daily Traffic Volumes
0 - 999 Vehicles Per Day (VPD)
1,000 - 4,999 VPD
5,000 - 9,999 VPD
10,000 - 14,999 VPD
15,000 - 19,999 VPD
Greater than 20,000 VPD
Build Alternative 1
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
12,000 / 3,000 Annual Average Daily Traffic (AADT) / Annual Average Daily Truck Traffic (AADTT)
pennsylvania DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
State College Area Connector
Level 2B Screening
BUILD ALTERNATIVE 1
(DESIGN YEAR 2050)
AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 17
1 Inch = 5,500 Feet
BELLEFONTE
WALKER TOWNSHIP
BENNER TOWNSHIP
SPRING TOWNSHIP
GREGG TOWNSHIP
CENTRE HALL
COLLEGE TOWNSHIP
POTTER TOWNSHIP
STATE COLLEGE
HARRIS TOWNSHIP
8,000 / 600 - 9,000 / 900
8,1500 / 100
2,300 / 200
7,600 / 400
9,400 / 1,350
700 / 100
2,200 / 200
9,000 / 1,300 - 10,000 / 1,500
Brush Valley Road
34,000 / 8,500 - 36,000 / 9,500
11,300 / 800
30,000 / 7,000 - 32,000 / 8,000
2,500 / 300 - 3,500 / 500
21,000 / 6,500 - 23,000 / 7,000
12,400 / 1,600
500 / 100 - 1,500 / 200
PA 45/US 322 Interchange
0 5,500 11,000 16,500 Feet



State College Area Connector
Level 2B Screening
BUILD ALTERNATIVE 2 (DESIGN YEAR 2050) AVERAGE DAILY TRAFFIC VOLUMES
CENTRE COUNTY, PENNSYLVANIA
Figure 18 | 1 Inch = 5,500 Feet

Levels of Service

Intersection and roadway segment capacity/Level of Service (LOS) analyses were performed consistent with the Year 2050 No Build analyses. As previously noted for Existing and No Build Conditions, the LOS analyses were performed for the following facility types: signalized and unsignalized intersections, two-lane roadway segments, multi-lane roadway segments, freeway segments, and ramp segments. Study area intersections were evaluated using Synchro plus SimTraffic (Trafficware, LLC) software (Version 10) which utilizes the methodologies outlined in the 2010 HCM. All roadway segments were analyzed using the Highway Capacity Software (HCS).

As discussed earlier in the Existing and Future No Build Conditions section, the study area consists of both rural and non-rural areas. For rural areas LOS A through LOS C is considered acceptable operation and unacceptable operation is considered LOS D through LOS F. For non-rural areas, LOS A through LOS D is considered acceptable operation and unacceptable operation is considered LOS E and LOS F. The non-rural areas (urbanized areas) are in the vicinity of Boalsburg and Pleasant Gap. It should also be noted that all build alternatives will be designed to provide acceptable LOS. Therefore, no LOS analyses for any new intersections or any new build roadways are included in this document.

Table 12 provides a summary of the overall study area intersection levels of service for the Design Year 2050 conditions for the No Build scenario as well as for each alternative. **Table 13** summarizes Design Year 2050 segment levels of service for the No Build scenario as well as for each alternative. Design Year 2050 levels of service for the three alternatives being evaluated are depicted on **Figure 19** through **Figure 21.**

Evaluation of the **Table 12** results for the study alternatives for Year 2050 Design Year in comparison with the Year 2050 No Build indicate that all build alternatives would result in improvement in levels of service at most intersections. Under all build alternatives, the intersections shown to have unacceptable LOS are all existing unsignalized intersections; additional improvements (such as signalization) could be mitigation measures that could potentially achieve acceptable levels of service.

Table 12: Intersection Levels of Service Summary (Design Year 2050)

#	Intersection	Design Year (2050) Level of Service (Delay in seconds)							
		No Build		US 322 Upgrade Existing		Build Alt 1 (US 322 Corridor)		Build Alt 2 (PA 144 Corridor)	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Main St (PA 144) & College Ave (PA 26)	E(62)	B(17)	B(17)	A(9)	B(15)	B(11)	B(14)	A(10)
2	Harrison Rd & College Ave (PA 26)	B(17)	A(10)	A(9)	A(9)	A(8)	A(7)	A(6)	A(6)
3	Main St (PA 144) & Harrison Rd	d(28)	e(44)	c(16)	C(17)	b(12)	b(13)	b(11)	b(12)
4	Pennsylvania Ave (PA 144) & Brush Valley Rd (SR 2006/PA 192)	D(39)	D(52)	B(14)	B(11)	B(11)	A(9)	B(12)	B(12)
5	Pennsylvania Ave (PA 144) & Earlystown Rd (PA 45)	D(51)	C(29)	B(17)	B(18)	B(15)	B(16)	B(12)	B(12)
7	Warner Blvd (PA 45/SR 3010) & Boal Ave (PA 45/SR 3014)	C(34)	C(20)	B(16)	B(15)	B(19)	B(17)	B(17)	B(16)
8A	Earlystown Rd (PA 45) & US 322 EB Off-Ramp	B(12)	C(32)	A(10)	B(12)	N/A	N/A	A(18)	B(11)
8B	Earlystown Rd (PA 45) & US 322 WB On-Ramp	b(1)	b(1)	b(2)	a(8)	N/A	N/A	a(8)	a(8)
9	Elks Club Rd & Earlystown Rd (PA 45)	d(29)	d(32)	c(18)	b(15)	b(10)	b(11)	b(12)	b(12)
10	Linden Hall Rd (SR 2006) & Earlystown Rd (PA 45)	d(26)	c(17)	b(13)	b(12)	a(10)	a(9)	b(13)	b(11)
11	Elks Club Rd & Boal Ave (US 322)	f(179)	f(240)	b(13)	b(13)	a(9)	a(9)	d(31)	c(23)
12A	Boalsburg Rd (SR 3010) & US 322 EB On-/Off-Ramps	f(153)	f(183)	c(15)	b(14)	f(74)	f(152)	c(15)	b(13)
12B	Boalsburg Rd (SR 3010) & US 322 WB On-/Off-Ramp	f(314)	f(2137)	e(43)	d(33)	f(182)	e(46)	e(46)	c(21)
13	Boalsburg Rd (SR 3010) & Linden Hall Rd & Brush Valley Rd	b(11)	b(12)	a(8)	a(9)	a(9)	a(9)	a(9)	a(8)
15	Main St/Earlystown Rd (PA 45) & Boal Ave (PA 45/SR 3014)	B(11)	B(14)	A(8)	B(11)	A(5)	B(11)	A(5)	B(12)

A(##) – Signalized Level of Service (Expected Delay (seconds))
a(##) – Unsignalized Level of Service (Expected Delay (seconds))
red – LOS Unacceptable
[11]Unsignalized LOS represents the turning movement that experiences the most delay

Table 13: Segment Levels of Service Summary (Design Year 2050)

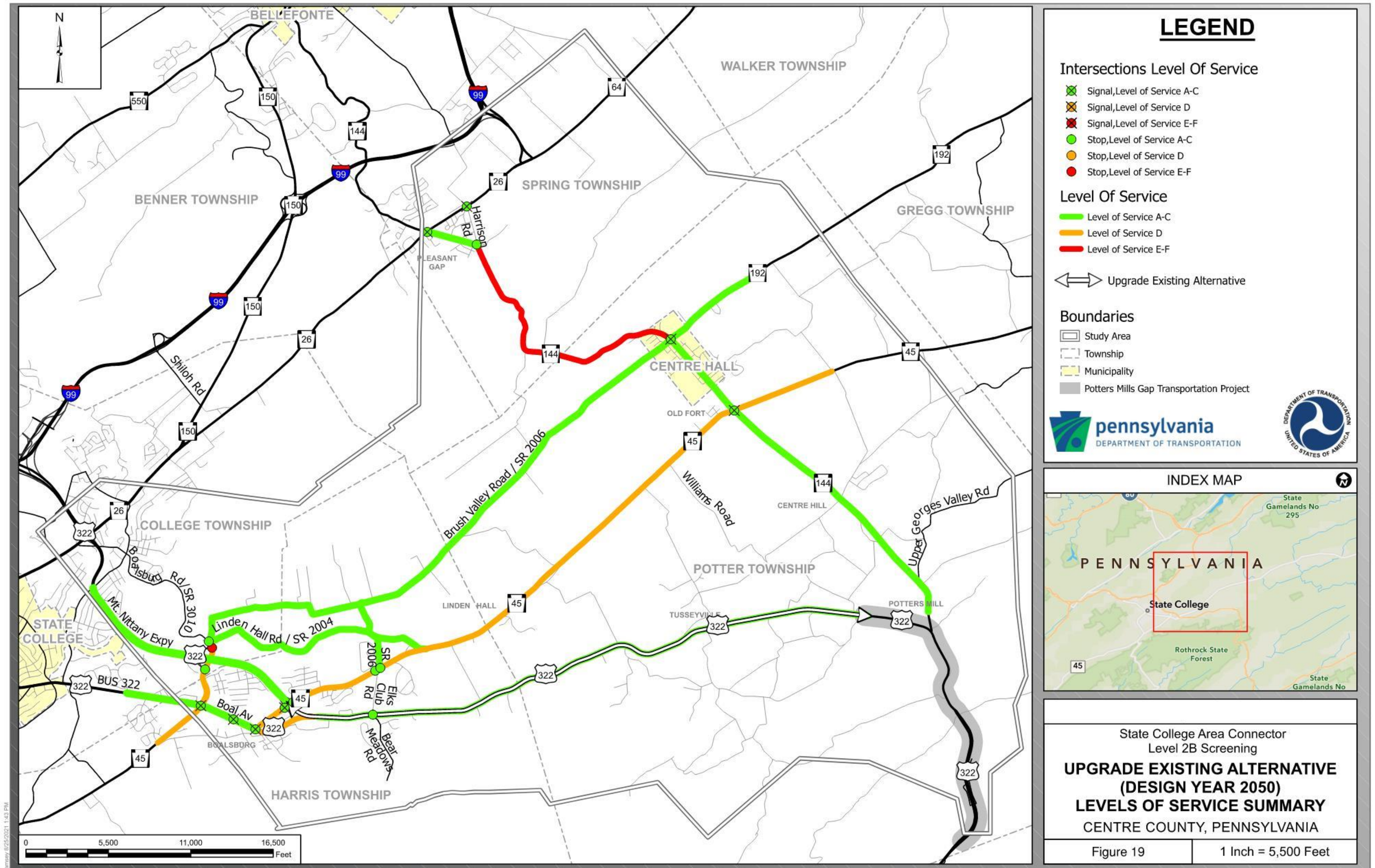
Roadway	Segment		Facility Type	Design Year (2050) Level of Service							
				No Build		US 322 Upgrade Existing		Build Alt. 1		Build Alt. 2	
	To	From		AM	PM	AM	PM	AM	PM	AM	PM
PA 45	US 322 WB On Ramp	Elks Club Rd	Two-Lane Urban	B / E	E / C	C / D	D / C	B / B	B / A	B / D	D / C
	Elks Club Rd	Williams Rd	Two-Lane Rural	A / D	D / B	C / D	D / C	-	-	A / C	C / C
	Elks Club Rd	Connector Rd	Two-Lane Rural	-	-	-	-	C / D	D / C	-	-
	Connector Rd	Williams Rd	Two-Lane Rural	-	-	-	-	C / D	D / C	-	-
	Williams Rd	Old Fort Rd (PA 144)	Two-Lane Rural	B / E	E / C	C / D	D / C	C / D	D / C	B / D	D / C
PA 144	General Potter Hwy (US 322)	Earlystown Rd (PA 45)	Two-Lane Rural	D / C	D / D	B / B	C / B	A / B	A / B	A / A	A / A
	Earlystown Rd (PA 45)	Brush Valley Rd (PA 192)	Two-Lane Rural	D / D	D / D	C / C	C / C	C / C	C / C	B / B	B / B
	Brush Valley Rd (PA 192)	Harrison Rd	Two-Lane Rural	E / E	E / E	E / E	E / E	E / E	E / E	E / E	E / E
US 322	Boal Ave (SR 3014)	Elks Club Rd	Two-Lane Multi-Lane Urban	E / E -	E / E -	- A / B	- C / B	C / C -	C / C -	D / D -	D / D -
	Elks Club Rd	Neff Rd	Two-Lane Multi-Lane Rural	E / E -	E / E -	- A / B	- B / B	C / C -	C / C -	D / D -	D / D -
	Neff Rd	Mountain Back Rd	Two-Lane Multi-Lane Rural	D / E -	E / D -	- B / B	- B / B	A / A -	A / A -	C / D -	D / D -
Boal Ave (SR 3014)	Branch Rd	Warner Blvd (SR 3010)	Multi-Lane Urban	A / B	B / A	A / A	A / A	A / A	A / A	A / A	A / A
	Earlystown Rd (PA 45)	US 322	Two-Lane Urban	B / D	D / C	B / C	C / B	A / C	C / A	C / C	C / B
Warner Blvd (SR 3010)	Boal Ave (SR 3014)	US 322 EB On-/Off-Ramps	Two-Lane Urban	C / D	D / D	C / B	B / C	D / B	C / C	C / B	B / D

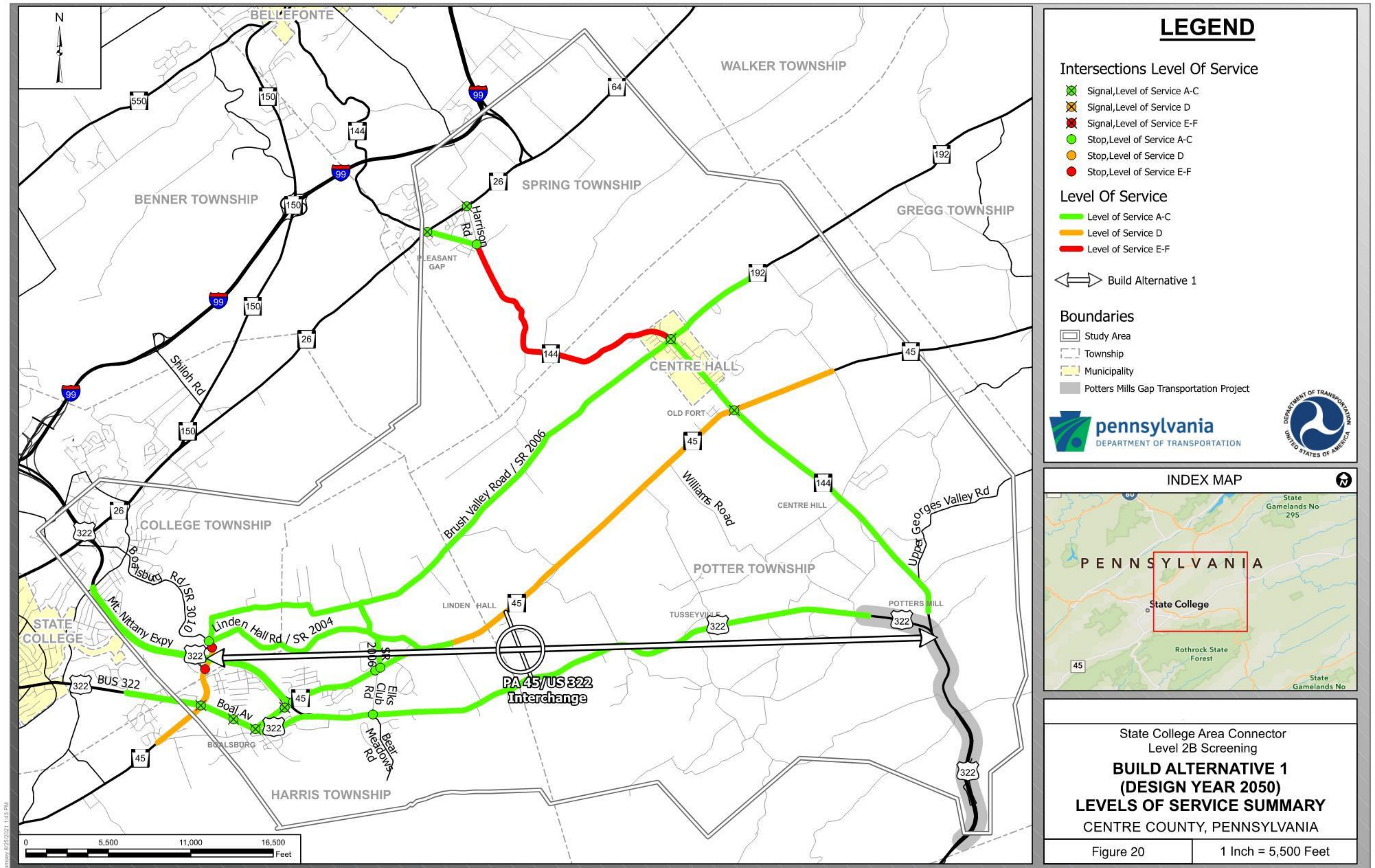
red – LOS Unacceptable
* Intersection with proposed PA 45 Connector Road for Build Alternative 1.

Evaluation of **Table 13** shows the build alternatives would improve levels of service on several of the roadway segments over those for the No Build scenario, and the study alternatives would provide acceptable levels of service (LOS D or better) on roadway segments within the non-rural study areas, except for Build Alternative 2.

Within the rural study areas, **Table 13** also indicates the following:

- Under Build Alternative 2, US 322 would operate at an unacceptable LOS D
- Regardless of the study alternative, portions of PA 45 would operate at an unacceptable LOS D
- Regardless of the study alternative, PA 144 over Mount Nittany would operate at an unacceptable LOS E due to roadway geometry


LEGEND
Intersections Level Of Service
Signal,Level of Service A-C
Signal,Level of Service D
Signal,Level of Service E-F
Stop,Level of Service A-C
Stop,Level of Service D
Stop,Level of Service E-F
Level Of Service
Level of Service A-C
Level of Service D
Level of Service E-F
Upgrade Existing Alternative
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
State College Area Connector
Level 2B Screening
UPGRADE EXISTING ALTERNATIVE
(DESIGN YEAR 2050)
LEVELS OF SERVICE SUMMARY
CENTRE COUNTY, PENNSYLVANIA
Figure 19
1 Inch = 5,500 Feet
N
BELLEFONTE
WALKER TOWNSHIP
BENNER TOWNSHIP
SPRING TOWNSHIP
GREGG TOWNSHIP
PLEASANT GAP
Harrison Rd
CENTRE HALL
OLD FORT
Shiloh Rd
COLLEGE TOWNSHIP
Brush Valley Road / SR 2006
Williams Road
CENTRE HILL
Upper Georges Valley Rd
POTTER TOWNSHIP
Boalsburg Rd/SR 3010
Mt. Nittany Expy
Linden Hall Rd / SR 2004
LINDEN HALL
TUSSEYVILLE
POTTERS MILL
STATE COLLEGE
BUS 322
Boal Av
SR 2006
Elks Club Rd
Bear Meadows Rd
BOALSBURG
HARRIS TOWNSHIP
0
5,500
11,000
16,500
Feet


LEGEND
Intersections Level Of Service
Signal,Level of Service A-C
Signal,Level of Service D
Signal,Level of Service E-F
Stop,Level of Service A-C
Stop,Level of Service D
Stop,Level of Service E-F
Level Of Service
Level of Service A-C
Level of Service D
Level of Service E-F
Build Alternative 1
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
Rothrock State Forest
State Gamelands No 295
State College Area Connector
Level 2B Screening
BUILD ALTERNATIVE 1
(DESIGN YEAR 2050)
LEVELS OF SERVICE SUMMARY
CENTRE COUNTY, PENNSYLVANIA
Figure 20
1 Inch = 5,500 Feet
BELLEFONTE
WALKER TOWNSHIP
SPRING TOWNSHIP
BENNER TOWNSHIP
GREGG TOWNSHIP
PLEASANT GAP
Harrison Rd
CENTRE HALL
OLD FORT
Shiloh Rd
Brush Valley Road / SR 2006
Williams Road
CENTRE HILL
COLLEGE TOWNSHIP
Upper Georges Valley Rd
POTTER TOWNSHIP
Boalsburg Rd / SR 3010
STATE COLLEGE
Mt. Nittany Expy
Linden Hall Rd / SR 2004
LINDEN HALL
TUSSEYVILLE
POTTERS MILL
PA 45/US 322 Interchange
BUS 322
Boal Av
Elks Club Rd
Bear Meadows Rd
BOALSBURG
HARRIS TOWNSHIP
0
5,500
11,000
16,500
Feet

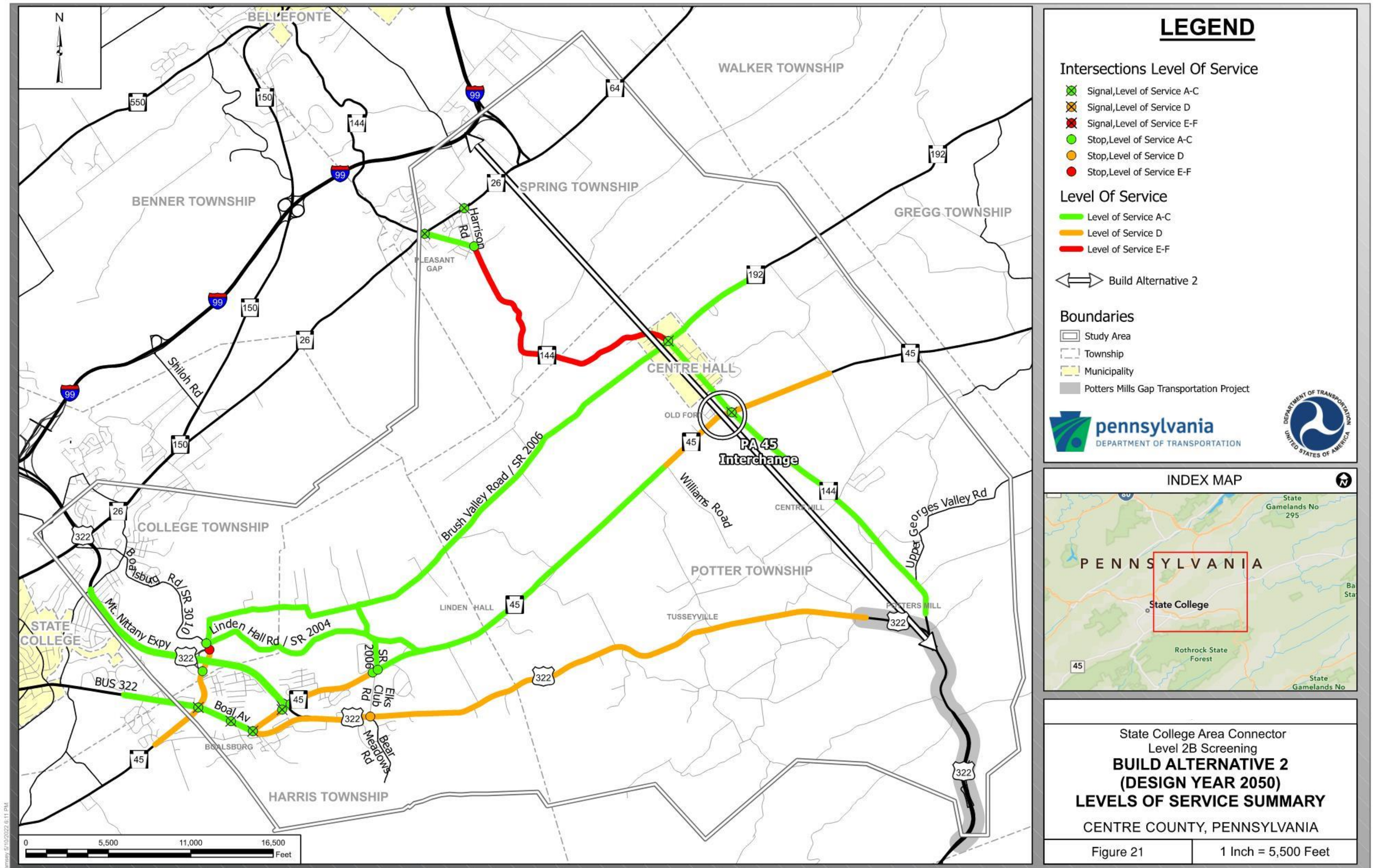

LEGEND
Intersections Level Of Service
Signal,Level of Service A-C
Signal,Level of Service D
Signal,Level of Service E-F
Stop,Level of Service A-C
Stop,Level of Service D
Stop,Level of Service E-F
Level Of Service
Level of Service A-C
Level of Service D
Level of Service E-F
Build Alternative 2
Boundaries
Study Area
Township
Municipality
Potters Mills Gap Transportation Project
pennsylvania
DEPARTMENT OF TRANSPORTATION
INDEX MAP
PENNSYLVANIA
State College
BELLEFONTE
WALKER TOWNSHIP
SPRING TOWNSHIP
BENNER TOWNSHIP
GREGG TOWNSHIP
CENTRE HALL
PA 45 Interchange
COLLEGE TOWNSHIP
POTTER TOWNSHIP
STATE COLLEGE
HARRIS TOWNSHIP
Brush Valley Road / SR 2006
Linden Hall Rd / SR 2004
Williams Road
Upper Georges Valley Rd
Mt. Nittany Expy
Boalsburg Rd/SR 3010
Harrison Rd
Shiloh Rd
BUS 322
Boal Av
Elks Club Rd
Bear Meadows Rd
State College Area Connector
Level 2B Screening
BUILD ALTERNATIVE 2
(DESIGN YEAR 2050)
LEVELS OF SERVICE SUMMARY
CENTRE COUNTY, PENNSYLVANIA
Figure 21
1 Inch = 5,500 Feet

Table 14 provides a summary of the BLOS results for Design Year 2050 scenarios for each of the study alternatives; the Year 2050 No Build is also provided for reference. These BLOS results show under the Upgrade Existing Alternative, BLOS conditions would not improve on the study area roadways. For Build Alternative 1, BLOS would improve on existing US 322 as well as on the southern portion of PA 45 between US 322 and the proposed PA 45 Connector Road; other segments would experience LOS D or worse BLOS. For Build Alternative 2, BLOS would generally improve on PA 144 as well as on US 322; other segments would experience LOS D or worse BLOS.

Table 14: Bicycle Levels of Service Summary (Design Year 2050)

Roadway	Segment		Facility Type	Design Year (2050) Level of Service							
				No Build		US 322 Upgrade Existing		Build Alt. 1		Build Alt. 2	
	From	To		AM	PM	AM	PM	AM	PM	AM	PM
PA 45	US 322 WB On Ramp	Elks Club Rd	Two-Lane	E / E	D / E	F / E	F / F	B / B	B / A	F / E	F / F
	Elks Club Rd	Williams Rd	Two-Lane	F / E	D / E	F / E	F / F	-	-	F / E	F / F
	Elks Club Rd	Connector Rd	Two-Lane	-	-	-	-	B / B	B / A	-	-
	Connector Rd	Williams Rd	Two-Lane	F / E	D / E	F / E	F / F	F / E	F / F	F / E	F / F
	Williams Rd	Old Fort Rd (PA 144)	Two-Lane	E / D	D / D	F / E	F / F	F / E	F / F	F / E	F / F
PA 144	General Potter Hwy (US 322)	Earlystown Rd (PA 45)	Two-Lane	D / F	E / E	F / F	F / F	F / F	F / F	B / D	E / C
	Earlystown Rd (PA 45)	Brush Valley Rd (PA 192)	Two-Lane	D / D	D / D	E / F	F / F	E / F	F / F	C / C	D / D
	Brush Valley Rd (PA 192)	Harrison Rd	Two-Lane	D / D	D / D	E / F	F / E	E / F	F / E	A / A	A / A
US 322	Boal Ave (SR 3014)	Elks Club Rd	Two-Lane Multi-Lane	F / F -	E / F -	- F / F	- F / F	A / A -	A / A -	D / C -	D / E -
	Elks Club Rd	Neff Rd	Two-Lane Multi-Lane	F / F -	E / F -	- F / F	- F / F	A / A -	A / A -	E / D -	D / E -
	Neff Rd	Mountain Back Rd	Two-Lane Multi-Lane	F / F -	D / F -	- F / F	- F / F	A / A -	A / A -	D / D -	D / E -

Highway Safety Analysis

A Highway Safety Manual (HSM) analysis was performed for each alternative advanced to the Level 2B screening using PennDOT's HSM Safety Analysis Tool, consistent with Design Year (2050) No Build safety analysis. The objective of this analysis was to evaluate the existing key study area roadways (US 322, PA 144, and PA 45) and the new build alternative roadway with the corresponding ADT volume projections, calculating predicted crash frequencies for the roadways to cumulatively compare each alternative to the No Build analysis. This comparison would determine the quantitative reduction in crash frequencies (of all crashes and of fatal and injury crashes) that could be attributable to the alternative. Consistent with the Design Year (2050) No Build safety analysis previously completed, crash data was not used in evaluating the alternatives.

HSM tools were used to quantitatively evaluate the safety benefits associated with each build alternative. The analysis utilized PennDOT's Toolbox A for analyzing all rural and urban two-lane and multi-lane arterial facilities. Interchange Safety Analysis Tool Enhanced (ISATe (PA-Calibrated)) was utilized for evaluating existing or proposed freeway/limited access facilities. Roadway design criteria identified for each alternative concept was used as input(s) in Toolbox A or ISATe for each build alternative roadway. Traffic volumes for each alternative were obtained from the Centre County TDM. The 2050 TDM network was updated to reflect representative conditions for each alternative and volumes from the model output were used for the safety analysis.

US 322 Upgrade Existing

For this alternative, segments of US 322 previously analyzed with PennDOT's Toolbox A as rural two-lane facilities were revised/analyzed as rural multi-lane roadways. Because this alternative would prohibit left turns from most sideroads onto and from US 322 directly to the side roads, several jughandles (**Figure 12**) were provided through the corridor to allow for this traffic movement. For the purpose of this safety analysis, each jughandle connection with US 322 was analyzed as an additional intersection.

Left turning volumes, in the form of ADTs, were not directly available from the TDM. However, the model did provide peak hour turning movement counts for each intersection included in the study. Utilizing the turning movement counts, percentages for left turning vehicles were manually calculated. Left turning percentages were subsequently applied to the ADT volumes at the intersections to determine left turning ADT volumes. For the purposes of this PEL Study analysis, it was assumed that the percentage of left turning vehicles during the peak hour would be consistent over a 24-hour period. Left turning ADT volumes were then manually assigned to the proposed jughandles, depending on the approach of the left turning vehicles at the intersections.

Safety analysis results for all facilities analyzed for this alternative are presented in **Table 15** below.

Build Alternative 1

ISATe was utilized to evaluate a new four-lane freeway facility along the US 322 corridor, while Toolbox A was utilized to evaluate a proposed new connector road between PA 45 and US 322, as well as to evaluate existing US 322, PA 144, and PA 45. The interchanges of US 322/Boalsburg Road and US 322/PA 144 were not included as part of this safety analysis. Existing US 322, PA 144, and PA 45 previously analyzed were evaluated by updating the traffic volumes within their previous analyses only, based on the TDM for this alternative. Safety analysis results for all facilities analyzed for this alternative are presented in **Table 15**.

Build Alternative 2

ISATe was utilized to evaluate a new 4-lane freeway facility along the PA 144 corridor, while Toolbox A was utilized to evaluate existing US 322, PA 144, and PA 45. The interchanges of US 322/Boalsburg Road and US 322/PA 144 were not included as part of this safety analysis. Existing US 322, PA 144, and PA 45 previously analyzed were evaluated by updating the traffic volumes within their previous analyses only, based on the TDM for this alternative. Safety analysis results for all facilities analyzed for this alternative are presented in **Table 15**.

The results of the HSM analysis show the following compared to the No Build scenario:

- Under the Upgrade Existing Alternative, the number of total crashes is predicted to decrease along PA 144 and PA 45 due to decreased volumes on these roadways. However, predicted crashes would nearly double along US 322 due to increased volumes and the introduction of several jughandle intersections with this alternative. Within the study area, the overall number of all crashes is predicted to increase by approximately 10 percent for the Upgrade Existing Alternative, although the overall number of fatality/injury crashes is predicted to decrease (approximately 3 percent).
- Under Build Alternative 1, predicted crashes would decrease on all study area roadways due to the decreased volumes on these roadways, with existing US 322 having the largest decrease. Within the study area, the overall number of crashes would decrease; all crashes would be reduced by approximately 18 percent and fatality/injury crashes would be reduced by approximately 22 percent.
- Under Build Alternative 2, predicted crashes would decrease on all study area roadways due to the decreased volumes on these roadways, with existing PA 144 having the largest decrease. Within the study area, the overall number of crashes would decrease; all crashes would be reduced by approximately 25 percent and fatality/injury crashes would be reduced by approximately 28 percent.

Table 15: HSM Analysis of Alternatives

Roadway Facility	Predicted Number of Annual Crashes (Design Year 2050)			
	No Build	US 322 Upgrade Existing	Build Alternative 1	Build Alternative 2
Predicted Crash Frequency (All crashes)				
Total for Entire Study Network	**149**	**165**	**122**	**112**
Existing US 322	*36*	*-*	*7*	*33*
Existing PA 144	*63*	*55*	*46*	*18*
Existing PA 45	*50*	*42*	*38*	*38*
New Roadway	*-*	*68*	*31*	*23*
Predicted Crash Frequency (Fatal & Injury crashes)				
Total for Entire Study Network	**79**	**77**	**62**	**57**
Existing US 322	*18*	*-*	*3*	*17*
Existing PA 144	*34*	*30*	*25*	*9*
Existing PA 45	*27*	*22*	*20*	*20*
New Roadway	*-*	*25*	*14*	*11*