NCBC Access and Mobility Study

May 2019

Submitted to:

Gulf Regional Planning Commission

Prepared by:

NEEL-SCHAFFER

This study was prepared under contract with the Gulf Regional Planning Commission, Mississippi, with financial support from the Office of Economic Adjustment, Department of Defense and the Mississippi Development Authority. The content reflects the views of the Gulf Regional Planning Commission and does not necessarily reflect the views of the Office of Economic Adjustment or the Mississippi Development Authority.

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1.0 Introduction and Summary

This report summarizes the findings of a traffic analysis performed by Neel-Schaffer under contract with Gulf Regional Planning Commission (GRPC) for the movement of military traffic to/from the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. The project site is located in southwest Gulfport, Mississippi, south of I-10, west of US Highway 49, and north of US Highway 90. The analysis was prepared for submittal to GRPC and the NCBC to assess the transportation needs of the existing NCBC facility as it relates to access and mobility for the Base.

1.1 Purpose

The purpose of this analysis was to evaluate the existing/future roadways and intersections adjacent to the base that serve as the primary transportation routes for military traffic traveling to/from military destinations. For this analysis, these military destinations included Camp Shelby in Forrest County to the north and the Port of Gulfport to the south. Traffic impacts related to flooding of Canal Road and congestion along US Highway 49 affect the traffic circulation of the base traffic to/from the north. The use of 30th Avenue to/from the port to the south is the primary truck route to the Port of Gulfport. The trip generation of the existing NCBC site was quantified through traffic counts conducted at the existing gates and at the adjacent roadways and intersections within the project study area.

The congestion along Canal Road, coupled with the lack of paved shoulders, poor pavement condition and frequent flooding make this route less dependable for military traffic during routine training and in the event of emergency deployment. This study forecast military/ background traffic to year 2040 and evaluated the 30th Avenue and Canal Road corridors to determine geometric/capacity deficiencies that would impact military readiness on these roadways. Deficiencies were identified, roadway improvements to Canal Road and 30th Avenue and new roadway alternatives were recommended to improve the reliability of access for this important military base.

2.0 Existing Conditions

2.1 Site Location

The ±1098 acre NCBC site is located 1 mile north of the Port of Gulfport and extends south of 28th Street, east of Simmons Drive and west of 34th Avenue. The base is home to the Atlantic Fleet Seabees. Construction projects on the NCBC site have included a Naval Construction Training Center Complex, Consolidated Professional Development Center Complex, Armory, Consolidated Security Complex, Training Hall, 22NCR Command and Control Facility, Bachelor Enlisted Quarters, Consolidated Public Works Facility, Housing Welcome Center, Pass Road/Broad Avenue Security Improvements and several operational buildings. Access to the site is limited to two main gates: 28th Street-north gate and Pass Road-east gate. The location of the project site is shown graphically in **Figure 1**. Access to the site is primarily via US Highway 49-Pass Road and Canal Road-28th Street.

2.2 Naval Construction Battalion Center Land Use and Intensity

The ±1098-acre site is currently an active United States Naval base. Based on information provided by NCBC, the NCBC has 5,400 military/civilian and contractors and 925 military family members. Total population on the base is approximately 6,325. The base also has daily visitors and military retirees that visit the Exchange, Commissary, and medical facilities for services.

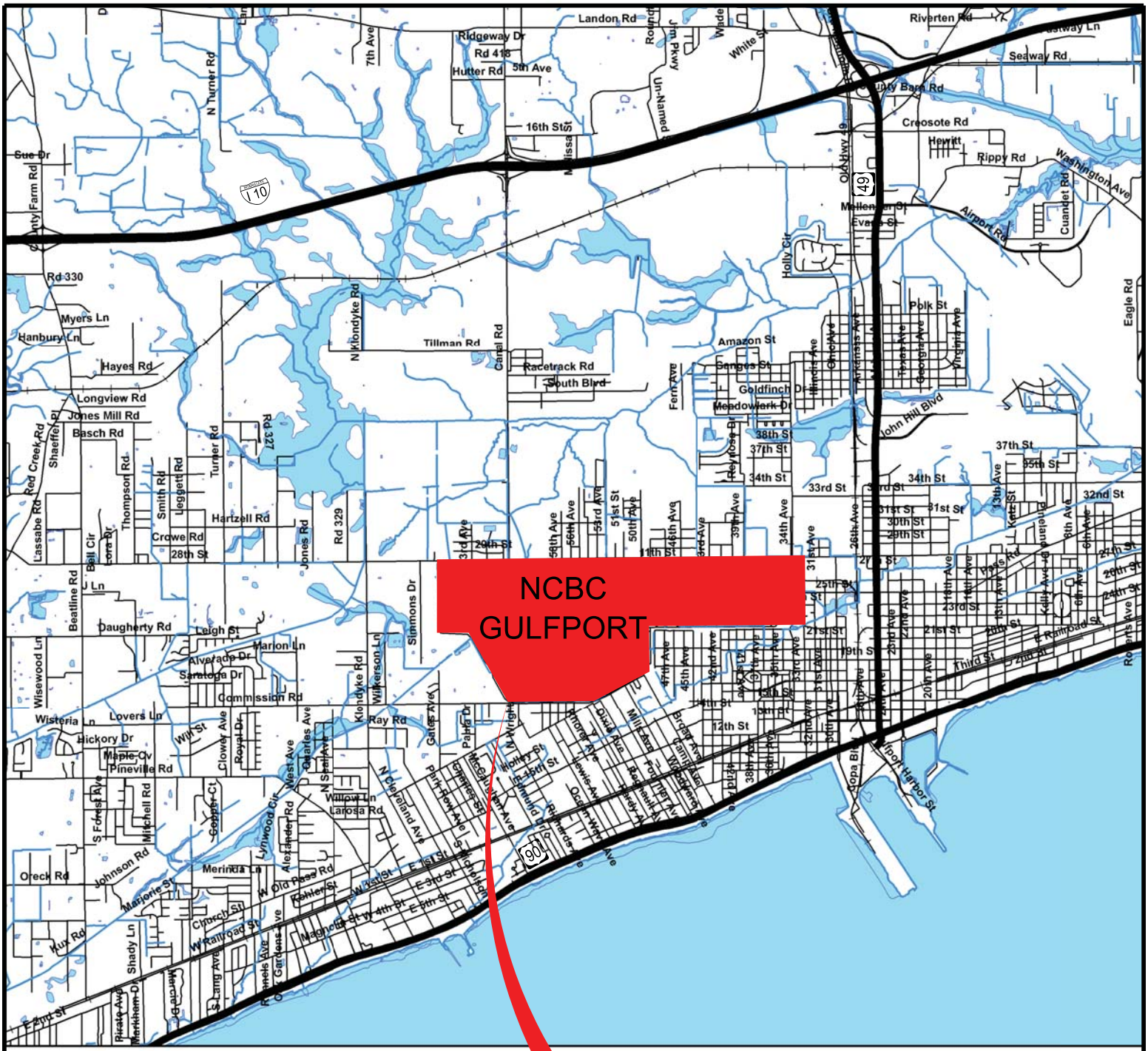
2.3 Study Area

The area of significant impact was defined in the scope to include Canal Road to the west, US Highway 49 to the east, the Port of Gulfport to the south and I-10 to the north. The functional classification of the primary routes includes:

Principal Arterials – US Highway 90 and US Highway 49
Minor Arterials – 28th Street, Canal Road, and Pass Road
Other Freeways/Expressways – 30th Avenue

While 30th Avenue was classified as "Other Freeways/Expressways," current design changes to SR 601 have abandoned the designation of full access control along 30th Avenue.

With these functionally classified roadways serving the base, the significant intersections were evaluated within the project study area.



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VICINITY MAP

FIGURE
1

2.4 Roadways and Intersections

The study area was determined to include Canal Road from I-10 to 28th Street, 28th Street from Canal Road to US Highway 49, 30th Avenue from 28th Street to US Highway 90, and Pass Road from the NCBC east base entrance at 33rd Avenue/Pass Road to US Highway 49. The study intersections were identified as the major intersections along these routes within the study area. The study intersections are listed in **Table 1**.

Table 1
Study Intersections

#	Roadway	Intersection	Traffic Control
1	I-10 WB Ramps	Canal Road	Signal
2	I-10 EB Ramps	Canal Road	Signal
3	28th Street	Canal Road	Signal
4	28th Street	Base Entrance/Exit	Signal
5	28th Street	34th Avenue	Signal
6	28th Street	33rd Avenue	Signal
7	28th Street	30th Avenue	Signal
8	28th Street	US Hwy 49	Signal
9	US Hwy 49	Pass Road	Signal
10	33rd Avenue	Pass Road	Signal
11	30th Avenue	Pass Road	Signal
12	30th Avenue	19th Street	Signal
13	30th Avenue	17th Street	Signal
14	30th Avenue	16th Street	All-way Stop
15	30th Avenue	15th Street	Minor-St Stop
16	30th Avenue	13th Street	Signal
17	30th Avenue	US Hwy 90	Signal

Source: Neel-Schaffer, 2019.

An inventory of these roadways and intersections was conducted to document the existing conditions.

Canal Road is a north/south roadway classified as a minor arterial that extends 2.8 miles from 28th Street north to I-10 and 5.5 miles from I-10 north to MS Highway 53. Canal Road widens at the I-10 interchange from a two-lane undivided roadway to a four-lane divided roadway with signalized intersections at both the eastbound and westbound I-10 ramps. The intersection of Canal Road at 28th Street is also signalized. The four-lane cross section of Canal Road extends ±850 ft south of the eastbound I-10 ramp intersection and then transitions to a two-lane undivided, rural cross section, approximately 22 ft in width. Canal Road crosses the Kansas City Southern (KCS) railroad tracks approximately 0.5 miles south of I-10 with an at-grade crossing – Crossing #914676J. The crossing has lights, bells and flashers, but no gates. The FRA crossing inventory is provided in the Appendix. The posted speed limit on Canal Road is 35 mph.

Looking north on Canal Road from Tillman Road

Canal Road crosses Turkey Creek with a 42 ft wide concrete bridge, 1.8 miles south of I-10. Approximately 1.4 miles of Canal Road (from south of Tillman Road to just north of 28th Street) is within a Zone AE Flood zone or the Turkey Creek Floodway. This section of Canal Road is reported to flood routinely. South of the Turkey Creek bridge, an open ditch/canal parallels Canal Road to the west. A guardrail exists along the west side of the roadway to prevent vehicles from entering the canal. The canal is estimated to be approximately 8-10 ft in depth and extends north of 28th Street to Turkey Creek.

Looking south on Canal Road at Turkey Creek bridge

Above: Looking north on Canal Road, ±500 ft north of 28th Street

Below: Looking north in ditch/canal, on west side of Canal Road ±500 ft north of 28th Street

Twenty-Eighth (28th) Street is an east/west roadway that borders the NCBC base to the north. The section of 28th Street between Beatline Road and Pass Road is classified as a minor arterial roadway. The posted speed limit in the study area is 35 mph. The roadway width is approximately 21 ft, but widens at the base entrance and Canal Road for dedicated left turn lanes. A recent road project widened 28th Street to a five-lane roadway with sidewalks and new traffic signals from 34th Avenue east to US Highway 49.

Above: Looking west on 28th Street at 39th Avenue
Below: Looking east on 28th Street at 30th Avenue

Thirtieth (30th) Avenue is a north/south roadway extending from the Port of Gulfport at US Highway 90, north to 28th Street – a distance of approximately 1.4 miles. The cross section of 30th Avenue varies from a four-lane divided roadway from US Highway 90 to 16th Street, to a five-lane roadway from 16th Street to 19th Street, to a four-lane undivided roadway from 19th Street to 28th Street (gaining north/south left turn lanes at Pass Road and a northbound left turn lane at 28th Street. A city water well exists in the median of 30th Avenue just north of 15th Street. Sidewalks exist on both sides of 30th Avenue throughout the majority of the corridor. There are some gaps in the sidewalk at some of the retail plazas and at the railroad crossing north of 15th Street. On-street parking is provided in the two blocks between 17th Street and 15th Street. Traffic signals exist at 28th Street, Pass Road, 19th Street, 17th Street, 13th Street and US Highway 90. An all-way stop exists on 30th Avenue at 16th Street. Thirtieth Avenue serves as the truck route for Port traffic, to help reduce the truck traffic on US Highway 49 through downtown Gulfport. The posted speed limit is 35 mph on 30th Avenue.

Above: Looking north on 30th Avenue, north of 20th Street

The functional classification of 30th Avenue is affected by the potential Port Connector Road (SR 601). The Port Connector Road is planned as a controlled access facility from I-10 south to 28th Street. Prior plans included extending the controlled access south into the Port, with grade separation between the new SR 601 roadway and existing surface streets/roadways. Current plans include at-grade intersections from 28th Street south, bypassing the existing 30th Avenue alignment (to the west) at Pass Road and 28th Street and using the existing alignment of 30th Avenue south of Pass Road. Regardless, the functional classification of 30th Avenue south of Pass Road is classified the same as the Port Connector Road – "Other Freeways and Expressways," on the Urban Functional Classification Map. This section of 30th Avenue is more likely to serve as an arterial route, either as a Principal Arterial or Minor Arterial, depending on the City's plans to restrict access/parking along this corridor.

Looking south on 30th Avenue, north of 20th Street

2.5 NCBC Base Access

There are three access points for automobile traffic to the Naval Construction Battalion Center: 1) 28th Street/Commercial Gate, 2) Pass Road/Visitor Center, and 3) Broad Avenue. The access points are controlled by NCBC staff and vehicles entering via these roadways are screened, and access is restricted to people authorized to be on the base. These access points are Entry Control Facilities (ECF's) and are also referred to as gates. Visitors w/o base access are required to enter through the Pass Road gate.

2.6 Traffic Volumes

Base year (2018) traffic counts were conducted at the study intersections on Tuesday, September 25, and Thursday, September 27, 2018. Traffic counts were conducted at each of the study intersections to document the base year peak-hour traffic volumes. The existing 2018 base year peak-hour traffic volumes for the study area are shown in **Figure 2**.

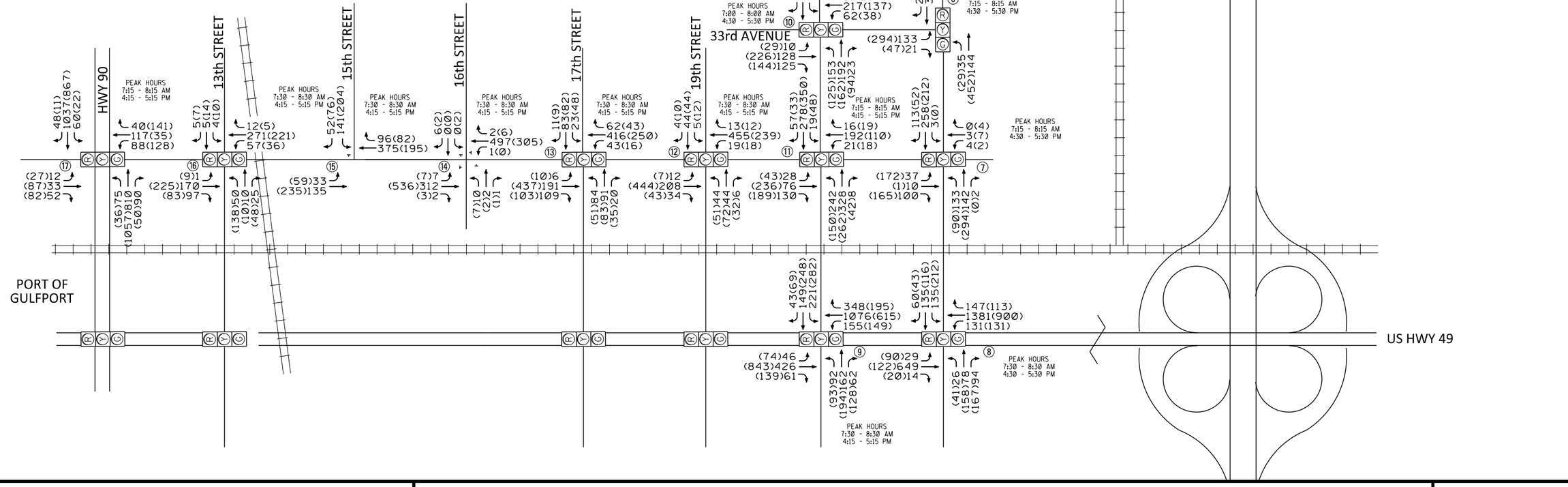
LEGEND

XX - AM PEAK HOUR

(XX) - PM PEAK HOUR

①-⑧ COUNT DATE: 9/27/18 - THURSDAY

⑨-⑯ COUNT DATE 9/25/18 - TUESDAY



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2018 EXISTING TRAFFIC

FIGURE 2

2.7 Capacity and Level of Service

The capacity and level of service (LOS) of an intersection is evaluated based on the delay, turning movement volumes, traffic composition and roadway geometrics. The methodology used in this analysis is based on the *Highway Capacity Manual*, 2010 Edition (HCM). The level of service, as outlined in the HCM, is reported as a letter designation of LOS A through LOS F (A is least delay and F is most delay). The traffic volumes recorded at the study intersections during the AM and PM peak hours were analyzed using the information provided in the HCM. The results of this analysis are shown in **Table 2**. The capacity analysis sheets are provided in the report Appendix.

Table 2 - Year 2018 Existing Traffic Levels-of-Service

Signalized Intersection	**Time Period**	**Approach Level-of-Service**				**Intersection LOS**
		NB	**SB**	**EB**	**WB**	
I-10 WB Ramp/ Canal Road	AM Peak	A	A	-	C	B
	PM Peak	A	A	-	C	B
I-10 EB Ramp/ Canal Road	AM Peak	A	A	C	-	A
	PM Peak	A	A	C	-	A
28th Street/ Canal Road	AM Peak	-	B	B	C	B
	PM Peak	-	C	B	D	C
28th Street/ NCBC Gate	AM Peak	B	-	C	B	C
	PM Peak	B	-	B	B	B
28th Street/ 34th Avenue	AM Peak	-	A	B	B	B
	PM Peak	-	B	A	B	B
28th Street/ 33rd Avenue	AM Peak	B	-	B	B	B
	PM Peak	A	-	C	B	B
28th Street/ 30th Avenue	AM Peak	C	C	C	C	C
	PM Peak	C	C	C	C	C
28th Street/ US Hwy 49	AM Peak	B	B	C	C	B
	PM Peak	C	B	C	C	C
Pass Road/ US Hwy 49	AM Peak	B	B	C	C	C
	PM Peak	C	B	C	C	C
Pass Road/ 33rd Avenue	AM Peak	B	B	C	C	B
	PM Peak	B	B	C	C	B
Pass Road/ 30th Avenue	AM Peak	B	B	C	C	C
	PM Peak	A	B	C	C	C
19th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	A
17th Street/ 30th Avenue	AM Peak	A	A	C	C	B
	PM Peak	A	A	C	C	B
13th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	A
US Highway 90/ 30th Avenue	AM Peak	B	C	A	B	B
	PM Peak	C	C	B	B	B
All-Way Stop Intersection	**Time Period**	**Approach Level-of-Service**				**Intersection LOS**
		NB	**SB**	**EB**	**WB**	
16th Street/ 30th Avenue	AM Peak	A	B	A	A	B
	PM Peak	B	A	A	A	B

Source: Neel-Schaffer, 2019.

The level of service analysis shows that the traffic volumes are operating at acceptable levels, from a capacity standpoint. However, the volume analysis does not reflect shifts in traffic patterns when Canal Road is flooded. The diversion of traffic from Canal Road creates significant congestion issues adjacent to the NCBC base when Canal Road is flooded.

Roadway links were evaluated using the peak hour/peak direction traffic volume. The Florida DOT has a *Quality/LOS Handbook* that identifies threshold volumes for roadway links for planning purposes. The volumes are provided in a series of tables identifying route type, number of lanes and corresponding level of service threshold volumes. The major routes within the study area were evaluated using these planning level threshold volumes. The results of this link analysis are provided in **Table 3**.

Table 3
Year 2018 Roadway Link Levels-of-Service

Roadway	Location	Lanes	Directional Capacity (vph)	Existing Year 2018 Pk Hr Vol	Direction	LOS
Canal Road	S. of I-10 EB Ramps	4LD	1,700	875	NB	D
	N. of Railroad Xing	2LU	800	**800**	NB	**E**
	N. of 28th Street	2LU	800	**742**	NB	**E**
28th Street	E. of Canal Road	2LU	800	**769**	WB	**E**
	W. of 34th Avenue	2LU	800	626	WB	D
	W. of Hwy 49	5L	1,700	371	EB	D
Pass Road	E. of 33rd Avenue	5L	1,700	409	EB	D
	W. of Hwy 49	5L	1,700	599	EB	D
30th Avenue	S. of 28th Street	4LU	1,700	338	NB	D
	S. of Pass Road	4LU	1,700	491	SB	D
	N. of US Hwy 90	4LD	1,700	304	SB	C

Source: Neel-Schaffer, 2019, FDOT Quality/LOS Handbook

Based on the 2018 traffic count, the two-lane section of Canal Road south of I-10 and the section of 28th Street from Canal Road to 34th Avenue are near the threshold capacity of a 2-lane roadway in the peak direction in the peak hour.

2.8 NCBC Existing Traffic

The traffic accessing the NCBC site uses one of three gates: 1) North-28th Street/Commercial Gate, 2) East-Pass Road/Visitor Center, and 3) South-Broad Avenue. The north and east gates were counted as part of the area counts to identify the major traffic movements to the north and east. A summary of the peak hour vehicular trips by gate are listed in **Table 4**.

Table 4
Year 2018 NCBC Peak Hour Trips

NCBC Gate	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
28th Street/Commercial Gate	234	94	328	2	365	367
Pass Road/Visitor Center	221	193	414	216	277	493
Subtotal	455	287	742	218	642	860

Count Date: 9/27/18. Source: Neel-Schaffer, 2019.

Based on the 2018 traffic counts, the NCBC had 742 vehicles travel through the north/east gates in the AM Peak hour and 860 vehicles in the PM Peak hour.

During training operations, there is more traffic traveling to/from Camp Shelby and to/from the Port of Gulfport for special operations. The mobilization of troops/equipment from the base varies depending on the mission. Typical events include:

-Tractor-trailers hauling excavators/bulldozers
-High Mobility Multipurpose Wheeled Vehicle (HMMWV, or Humvee)
-Single Unit trucks/troop transport vehicles (3 axle vehicles)
-Construction equipment/forklift
-Water well team – fork lift/back hoe equipment

Information provided by the NCBC revealed that some of these events take place at the Port of Gulfport, particularly for the water well team. February was identified as one of the peak months for base traffic to/from Camp Shelby from the NCBC. A count was conducted at the north and east gates to compare to the counts from September, as shown in **Table 5**.

Table 5
Year 2019 NCBC Peak Hour Trips

	AM Peak Hour			PM Peak Hour		
NCBC Gate	In	Out	Total	In	Out	Total
28th Street/Commercial Gate	192	89	281	33	215	248
Pass Road/Visitor Center	197	128	325	165	215	380
Subtotal	389	217	606	198	430	628

Count Date: 2/14/19. Source: Neel-Schaffer, 2019.

Base traffic was identified to be higher in September than in February.

2.9 Port of Gulfport

The Port of Gulfport is located south of US Highway 90 and is accessed by two signaled intersections on US Highway 90 at 30th Avenue and 25th Avenue (US Highway 49), and at the unsignalized intersection of Copa Boulevard. While rail accesses the Port at Copa Boulevard, none of the tenants at the Port are currently using rail to move freight. Semi-trucks haul the containerized cargo along US Highway 90 and north along 30th Avenue – the designated truck route in Gulfport. Based on information provided by the Port, the amount of cargo shipped in/out of the Port is currently approximately 250,000 TEU's (twenty-foot equivalent units). Two TEU's equal 1 FEU (Forty-foot equivalent unit), which is the typical size of a shipping container. The movement of 125,000 containers annually, would equate to 480 trucks in/480 trucks out per day, if hauling only occurred on weekdays. In the 8 hours counted at the intersection of US Highway 90/30th Avenue, there were 193 semi-trucks in/out of the Port.

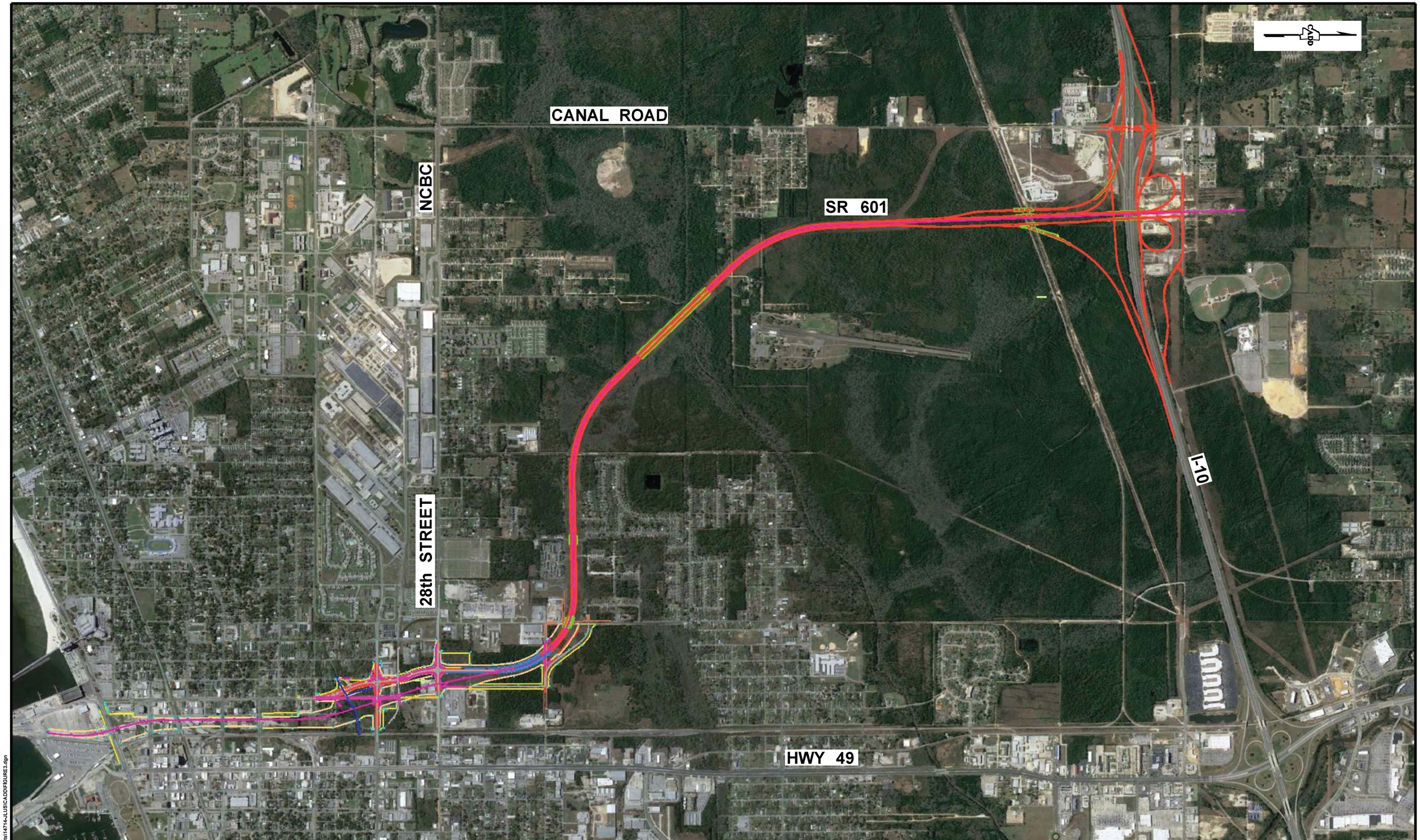
The Cotton Compress property located north of 28th Street and west of 34th Avenue is a 40 acre parcel that was recently purchased by the Port. According to the Port, the purchase of this property is intended for hurricane evacuation and off-site maintenance and repairs of facilities.

3.0 Horizon Year Road Network

3.1 SR 601 – Port Connector Road Project

The access to the study area is affected by the planned Port Connector Road project (SR 601). The SR 601 roadway project has been discussed for years. Initial plans included an access-controlled facility from I-10 south to the Port of Gulfport with an interstate designation of I-310. The plan included a new interchange with I-10 immediately east of the Canal Road interchange, bridges over the KCS railroad tracks, bridges over Turkey Creek, and an elevated roadway south of 28th Street parallel to the railroad tracks (on the west side of the tracks), over US Highway 90 and the roadway would have ended at the Port of Gulfport. MDOT has prepared preliminary engineering design plans, acquired right-of-way, cleared the land and relocated utilities for the route from I-10 to 28th Street. The 1996 cost estimate for construction was $300 million, but the project is currently unfunded.

Changes to the southern section of the route have included eliminating the access control on the south end of the project. Access control is anticipated to remain from I-10 south to 28th Street, and then the new Port Connector Road would transition to align with 30th Avenue south of Pass Road. The southern section of this proposed roadway from 28th Street south to US Highway 90 would operate as an arterial route, with the northern section (north of 28th Street) as access controlled. These roadway design plans are being developed by MDOT, but are not currently funded for construction. The SR 601 concept plan is shown graphically in **Figure 3**.



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SR 601 CONCEPT PLAN

FIGURE 3

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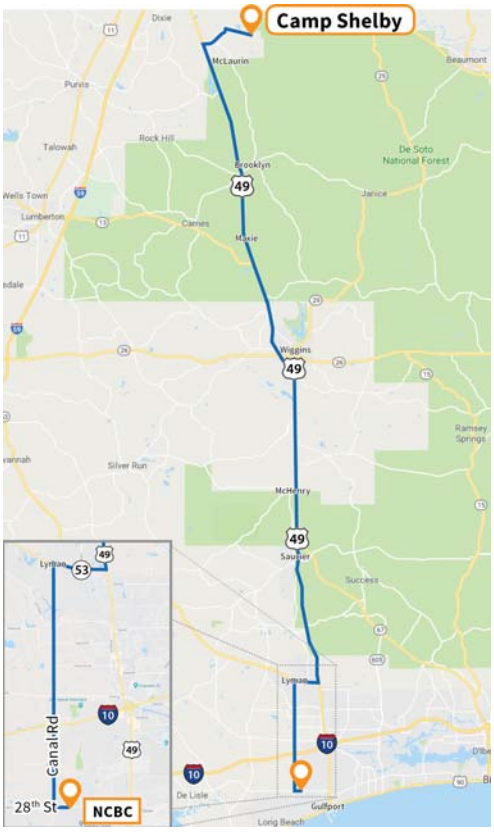
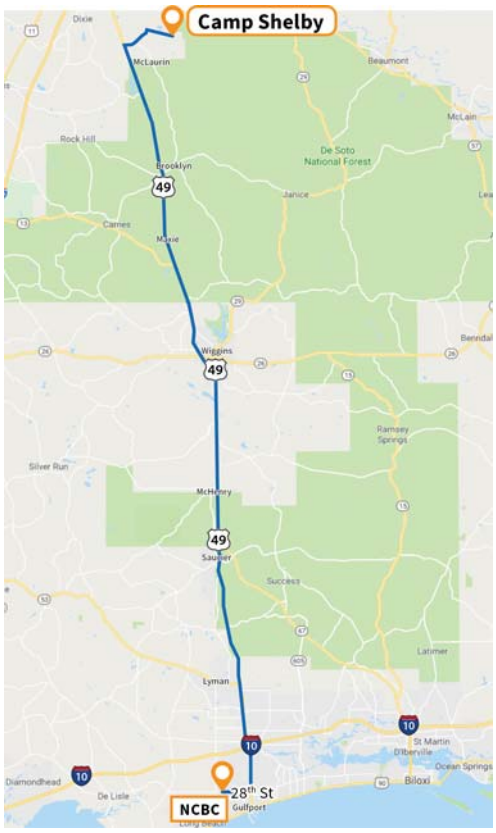
3.2 Canal Road

Canal Road has an existing interchange with I-10 and signalized ramps with the I-10 eastbound/ westbound ramps. The cross section of Canal Road widens to a four-lane divided roadway at these ramps, then narrows to a two-lane undivided roadway to the north and south. The extension of Canal Road south of the interchange/commercial area includes a narrow (21'-22') paved roadway with open ditches and a significant amount of property affected by flood zone/floodway. Rainfall events routinely close Canal Road due to flooding issues. Some of the NCBC base traffic uses Canal Road, when the roadway is not flooded, to avoid US Highway 49 traffic and signals. When traveling to Camp Shelby, the NCBC traffic travels north on Canal Road to MS Hwy 53, then east to US Highway 49, to avoid the traffic/signals along US Highway 49 in Gulfport. Per the NCBC, semi-trucks from the base do not use Canal Road due to the narrow cross section and lack of shoulders.



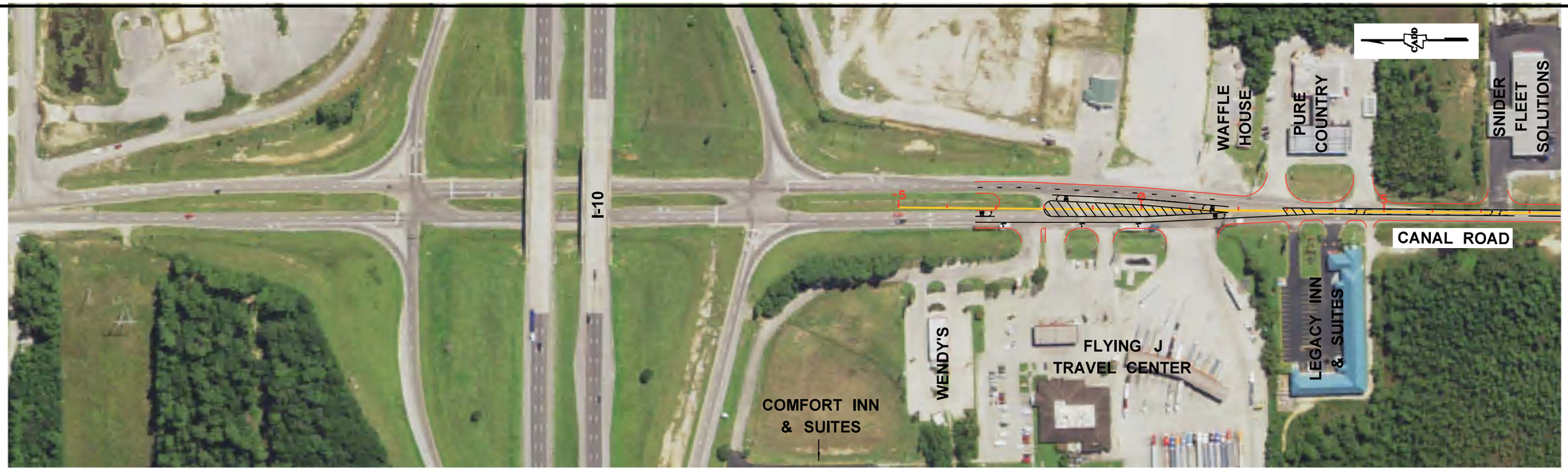
Auto route from NCBC to Camp Shelby



Truck route from NCBC to Camp Shelby

Widening Canal Road (south of I-10) to provide a 3-lane or 4-lane cross section was evaluated as an improvement to access for the base. The 3-lane Canal Road concept is shown in **Figures 4A-C** and 4-lane concept shown in **Figure 5A-C**. Typical sections are shown in **Figure 6**.

Canal Road traverses the Turkey Creek floodplain and floodway. Approximately 1.2 miles of Canal Road is within Zone AE Flood zone and the Turkey Creek floodway. Any roadway work within this corridor would have to undergo a significant hydraulic analysis/design to prevent further risk to adjacent commercial/residential structures in the area. Per the Flood Insurance Rate Maps (FIRM), the flood zone and Turkey Creek floodway are shown in **Figure 7**.



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CANAL ROAD 3-LANE CONCEPT

FIGURE 4A

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CANAL ROAD 3-LANE CONCEPT

FIGURE 4B

S:\Projects\14714-JLUS\CADD\FIGURE4c.dgn

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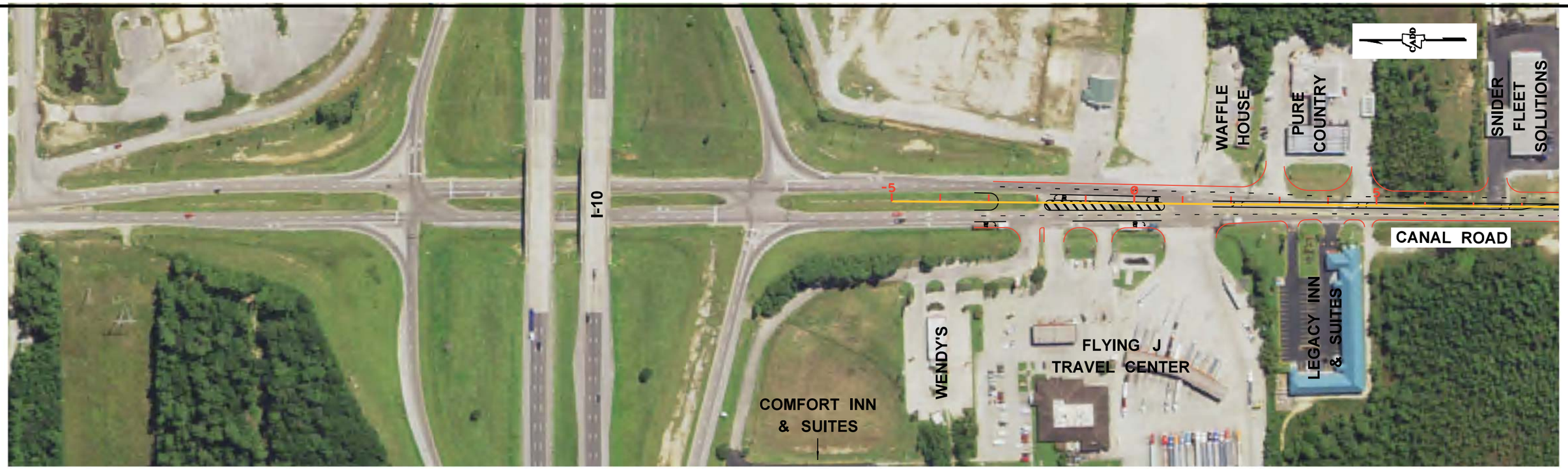
CANAL ROAD 3-LANE CONCEPT

FIGURE 4C



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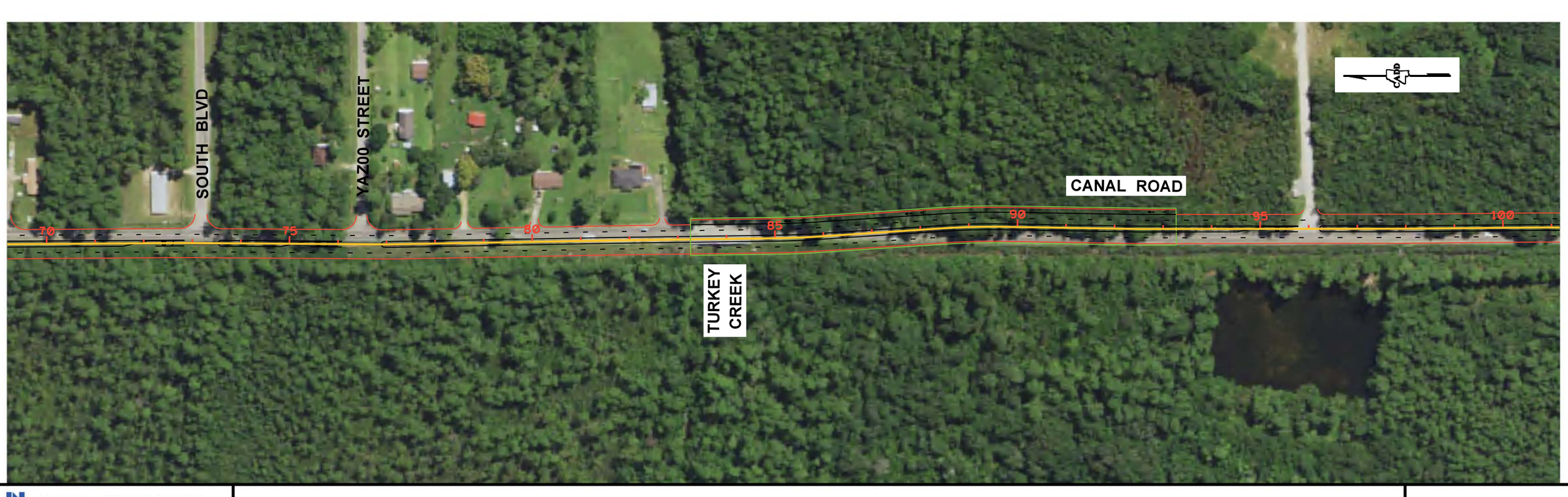
CANAL ROAD 4-LANE CONCEPT

FIGURE 5A



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CANAL ROAD 4-LANE CONCEPT

FIGURE 5B

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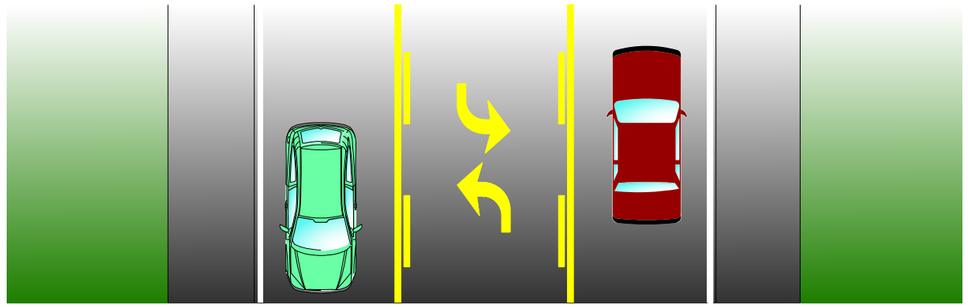
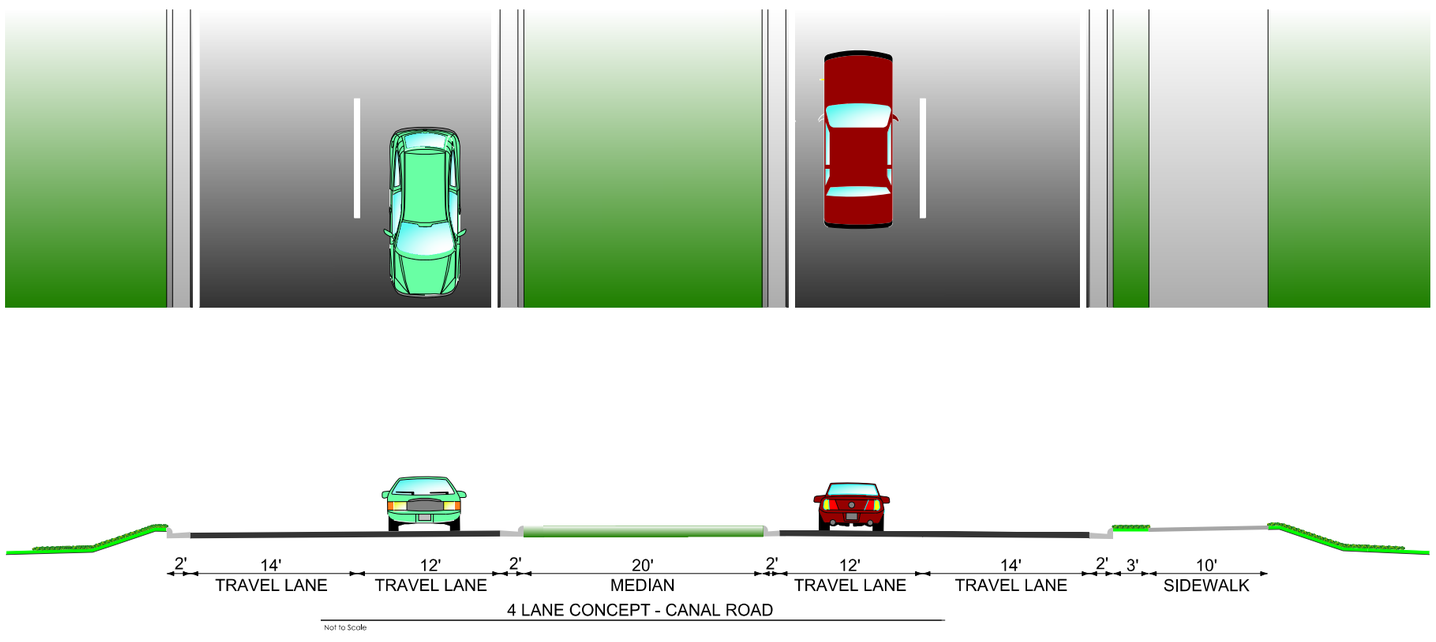
CANAL ROAD 4-LANE CONCEPT

FIGURE 5C



3 LANE CONCEPT - CANAL ROAD

Not to Scale



4 LANE CONCEPT - CANAL ROAD

Not to Scale

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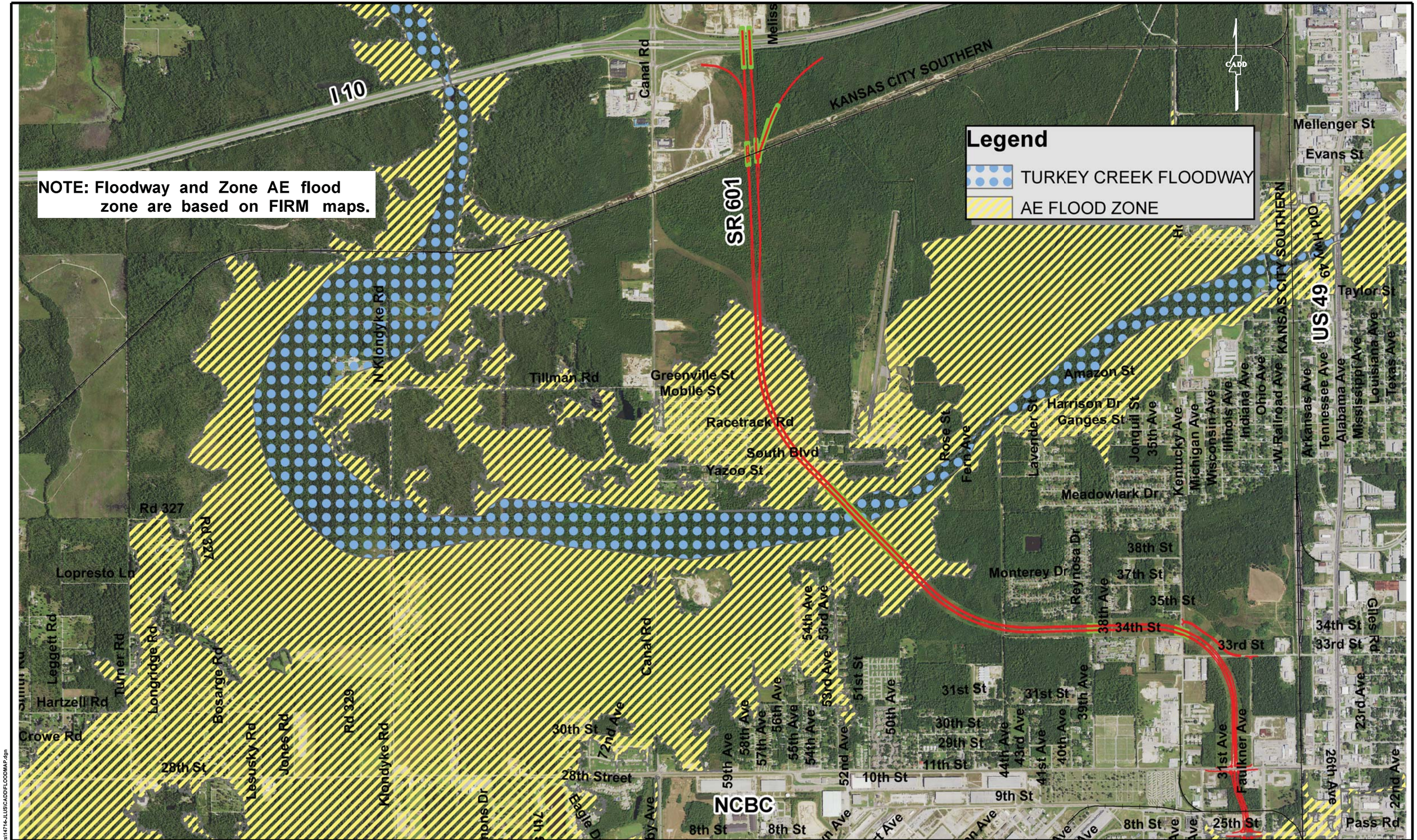
TYPICAL SECTIONS CANAL ROAD

FIGURE
6



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TURKEY CREEK FLOOD MAP

FIGURE 7

3.3 30th Avenue

The cross section of 30th Avenue varies from US Highway 90 to 28th Street, a distance of approximately 7,100 ft. The south end of the corridor provides the primary entry to the Port of Gulfport, along with access to the Casino parking garage and Beach Casino parking lot. From US Highway 90 to 16th Street, 30th Avenue has a 30 ft raised center median with two 12 ft travel lanes northbound and southbound.

Looking south on 30th Avenue at US Highway 90/Port Entrance

On street parking is provided along 30th Avenue between 15th Street and 17th Street. An at-grade railroad crossing exists just north of 13th Street (CSX Crossing #340238T). A water well exists in the median just north of 15th Street (shown below).

The median narrows north of this water well and between 16th and 19th Streets, a center turn lane separates north/south traffic and the cross section includes 5-12 ft travel lanes.

North of 19th Street, the center turn lane tapers out and 30th Avenue has two northbound and two southbound travel lanes with 48 ft of asphalt. The cross section of 30th Avenue widens at both Pass Road and 28th Street to gain a left turn lane at the signal/cross street.

A railroad crossing exists on 30th Avenue north of Pass Road (KCS Crossing #305165T) that serves the NCBC. This section of 30th Avenue from Highway 90 to 28th Street serves as the truck route for freight deliveries to/from the Port of Gulfport. Traffic signals exist on 30th Avenue at Highway 90, 13th Street, 17th Street, 19th Street, Pass Road and 28th Street. An all-way stop exists on 30th Avenue at 16th Street.

Right-of-way is approximately 120 ft in the corridor, and the ROW limits extend to the buildings on each side in many areas.

3.4 Alternate Alignment for SR 601

The impact of a new interchange on I-10 immediately adjacent to the existing Canal Road Interchange creates the need for numerous bridges/CD Roads to allow the two interchanges to work together without adversely impacting the mainline I-10 traffic. Additionally, three separate bridges are needed to cross the railroad just south of I-10 with this access controlled route. An alternate alignment of SR 601 is proposed to use the existing Canal Road interchange, then transition into the SR 601 corridor, south of the KCS railroad. The right-of-way for this "temporary" connection has been acquired and cleared, as this connection to Canal Road is visible on the aerial photography. This alternate alignment concept would likely require additional Federal Highway Administration approvals, but would be a significant cost savings for the construction cost. This alternate SR 601 alignment is forecast to accommodate 80% of the traffic that the original SR 601 alignment would attract per the traffic model. The conceptual alignment for the Alternate SR 601 is shown in **Figure 8**.

4.0 Traffic and Improvement Analysis

4.1 Area Traffic Growth Factors

The horizon year for the analysis of traffic was identified as year 2040. Traffic volumes on the Mississippi Gulf Coast have been variable since Hurricane Katrina. Census data was researched to identify the historical growth trends in population for Gulfport and Harrison County. The results of the historical population changes reported by the US Census between 1990 and 2015 are listed in **Table 6**.

Table 6
Historical Population Growth Rate

		Total Population			2010-2017	2010-2017
Description	Year 2017	Year 2010	Year 2000	Year 1990	Percent Change	Compound Annual Growth
Gulfport, MS	71,822	67,897	71,557	64,683	5.78%	0.81%
Harrison County, MS	205,027	187,105	189,601	165,365	9.58%	1.32%

Source: US Census, 2017, 2010, 2000, 1990. Neel-Schaffer, 2019.

The census data reflects a decrease in population from year 2005 to year 2006 related to Hurricane Katrina with an impact in Gulfport dropping from a population of 73,192 to 67,696 and in Harrison County a population decrease from 195,843 to 171,890, a loss of approximately 24,000 people in Harrison County.

The Long Range Transportation Plan was used to evaluate the impacts on area roadways for future year traffic volumes (Year 2040). These forecasts were used on the existing and future roadway network. Volume scenarios were forecast for 1) Existing roadway network, 2) four-lane Canal Road, 3) four-lane Canal Road + SR 601, 4) four-lane Canal Road + Partial SR 601, and 5) Partial SR 601.

Information from the NCBC identified that the base is in the last stages of the Installation Development Plan, but there is not any development pending that would increase traffic off-base. Traffic model information for the NCBC and Port are provided in **Table 7**.

I-10

WAFFLE HOUSE

PURE COUNTRY

SNIDER FLEET SOLUTIONS

KCS RAILROAD

295

300

305

310

315

CANAL ROAD

WENDY'S

FLYING J TRAVEL CENTER

LEGACY INN & SUITES

COMFORT INN & SUITES

SR 601

320

325

330

CANAL ROAD

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SR 601 ALTERNATE ALIGNMENT

FIGURE 8

Table 7
Traffic Model - Employment/Dwelling Unit Information

Land Use	Year	Employment					Total DU	Occupied DU	Total Population
		Total	AMC	MTCUW	Retail	OS			
Port	2013	20	0	14	0	6	0	0	0
	2040	1,970	0	725	10	1,235	0	0	0
NCBC	2013	3,844	4	15	0	3,285	540	407	1,812
	2040	4,772	4	15	0	3,981	772	582	2,481

Notes: AMC – Agriculture, Mining, Construction
MTCUW – Manufacturing, Transportation, Communications, Utilities, Wholesale Trade
OS – Government, Office, Services

Source: Neel-Schaffer, 2019.

The number of people on the base was estimated to be approximately 6,325 based on information provided by the NCBC. The total employment and population combined to be 7,253 in the 2040 model. No additional growth was added to the traffic model for the NCBC based on the information provided.

The potential projects at the Port are numerous. There are potential military projects, commercial – passenger cruise line opportunities, freight projects, and workforce development projects.

Military Projects: A new NAV-FMS or NAV-Air mission is anticipated at the Port. The mission is anticipated to include FMS (Foreign Military Sales). A V22 – Osprey mission is a possibility. In May 2019, the 155th Combat team will return from the Middle East and the Kansas National Guard will use the Port to return and then travel to Camp Shelby. ABCT – Assault Brigade Combat Team has a changed use for military missions. This ABCT would have four movements (out-in out-in) at the Port, with about 50 people and 200 units.

The movement of "Force com/Force Command" – Army active duty from Alaska is planned to use the Port of Gulfport and use 3 acres of space at the Port for 3 days in September. The exercise would move equipment/ troops north from the Port to Camp Shelby. It would be a large movement with approximately 600 people.

National Oceanic and Atmospheric Administration (NOAA) and the US Navy are proposing to have two detachments at the Port.

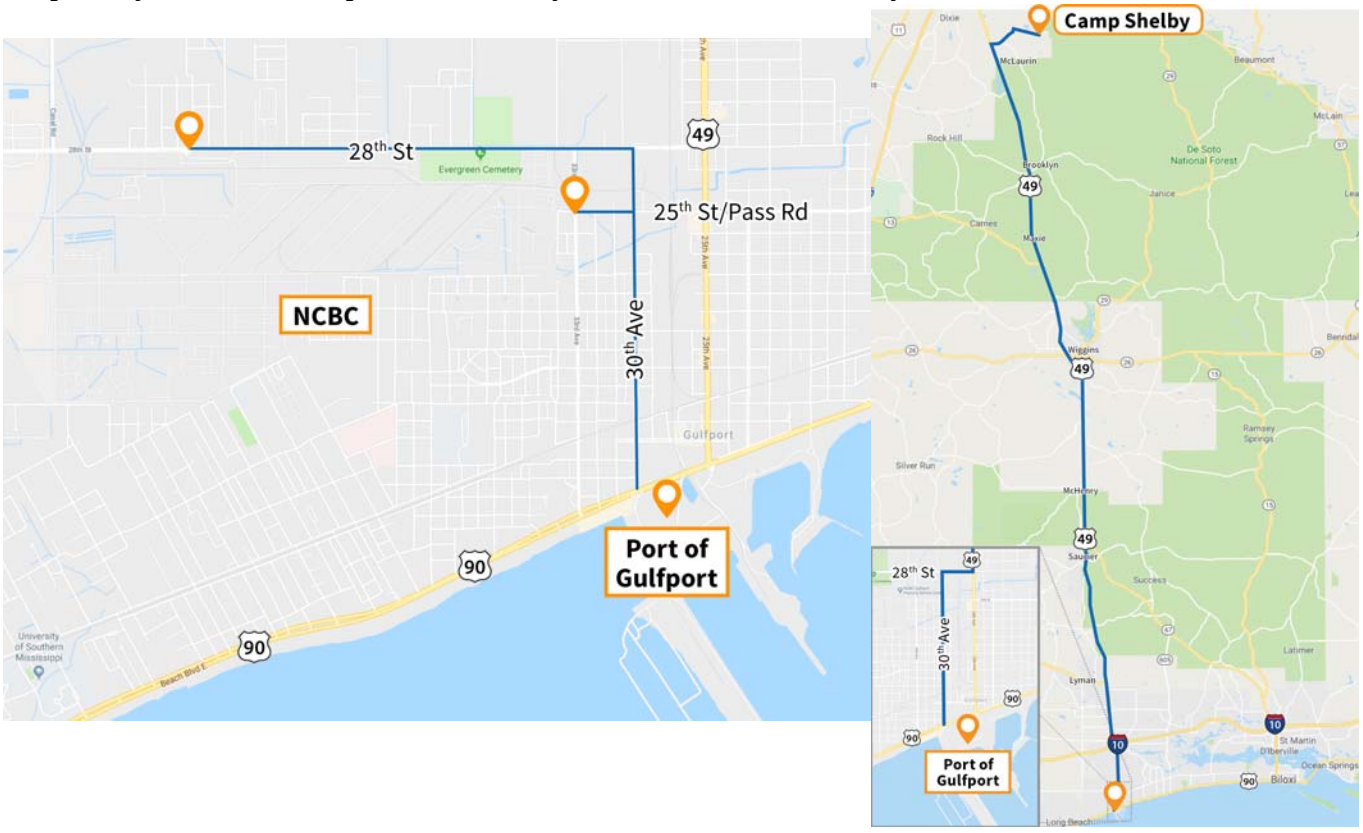
Commercial-Passenger Cruise Line: Discussions are underway with Carnival Cruise Line to have cruises based at the Port. The size of the cruise ships would accommodate approximately 4,000 passengers and would likely require a new parking garage. Estimates vary, but with 3 people per vehicle, each cruise would generate approximately 1,300 vehicles.

Freight Projects: The Port could have a new terminal operator – Yilport Holding. They are part of CMA-CGM Group. The Port reports that they currently ship about 250,000 TEU's/year. With the new operator, this could increase to 750,000 TEU's in the next 10 years. There is currently no rail shipping at the Port. All containers are transported via tractor-trailer. The increase from 125,000 containers (FEU's) annually to 375,000 containers, would equate to 1,440 trucks in/1,440 trucks out per day, if hauling only occurred on weekdays. This would equate to (approximately) an additional 1,000 trucks in and out of the Port daily. In the 8 hours counted at the intersection of US Highway 90/30th Avenue, there were 193 semi-trucks in/out (84 in/109 out) of the Port.

Workforce Development Projects: The Ocean Enterprise building is a $40 million investment in a Marine Research Center that is a cooperative effort with University of Southern Mississippi, MS Gulf Coast Community College (MGCCC) workforce training and private businesses at the Port. The $10 million structure has 18,000 SF in a 2-story building and opened in June 2018.

The potential for increased Port traffic is significant, with each of these options. Military movements, while important, are isolated events over shorter durations. The workforce development project has been constructed. The cruise ship potential is less likely to occur and is anticipated to have an impact study performed, if approved. The potential for tripling of the freight is a more likely possibility.

Military traffic movements to/from the Port and NCBC use 30th Avenue and both Pass Road and 28th Street. Traffic between the Port and Camp Shelby uses 30th Avenue and US Highway 49 as the primary route. The maps below identify the routes on the roadway network.



4.2 Future Year Traffic Volumes

The urban model was used as the base for future traffic scenarios for daily traffic volume forecasts. The last urban model for the area used 2013 as the base year and forecast traffic to year 2040. This base traffic model was used to evaluate the year 2040 No Build and Year 2040 with SR 601-Port Connector Road, with the primary focus on the minor arterial routes connecting the NCBC with I-10 and the Port. These roadways include: Canal Road, 28th Street and 30th Avenue. Additional volume scenarios were developed for a widened Canal Road (4-Lane divided). One scenario included both the SR 601 and a 4-lane Canal Road. The volume forecasts are listed in Tables 8A-C.

Table 8A – Daily Traffic Volume Forecast

		Canal Rd			34th Avenue	US Hwy 49	28th Street		
Description	Year	S. of I-10	Railroad	28th St	N. of 28th St	N. of 28th St	E. of Canal	W. of 34th	E. of 30th
Base Model	2013	10,749	10,180	9,594	1,885	39,864	10,746	11,904	13,540
No Build	2040	21,924	15,364	13,946	2,610	50,783	14,422	14,594	22,805
4 Lane Canal	2040	24,096	17,162	15,683	2,832	49,020	14,236	14,336	16,523
SR 601	2040	21,322	12,613	11,244	2,686	42,222	10,264	12,653	17,564
SR 601+ 4 Lane Canal	2040	22,668	13,029	11,586	2,657	41,844	9,658	12,093	17,452
Alt SR 601	2040	43,749	27,229	10,255	3,098	45,878	9,460	12,173	18,868
Alt SR 601 + 4 Lane Canal	2040	44,875	44,875	10,361	2,986	45,531	8,998	11,598	18,808

Source: Neel-Schaffer, 2019.

Table 8B – Daily Traffic Volume Forecast

		30th Avenue		Port Connector	Klondyke Rd	US Hwy 90	Pass Rd
Description	Year	S. of Pass	S. of 13th St	SR 601	S. of 28th St	W. of 33rd Ave	E. of 30th Ave
Base Model	2013	9,020	3,054	n/a	8,462	30,329	16,385
No Build	2040	12,454	3,864	n/a	10,275	35,522	15,594
4 Lane Canal	2040	12,126	3,836	n/a	10,753	35,519	19,441
SR 601	2040	24,726	8,404	33,774	9,849	35,011	23,546
SR 601+ 4 Lane Canal	2040	24,592	8,329	33,631	10,220	34,908	23,452
Alt SR 601	2040	24,185	8,110	27,230	9,900	35,057	24,902
Alt SR 601 + 4 Lane Canal	2040	23,948	8,186	27,905	10,112	34,598	25,005

Source: Neel-Schaffer, 2019.

Table 8C - Daily Traffic Volume Forecast

Description	Year	Volume Totals	Growth Total	Annual
Base	2013	52,920		
No Build	2040	69,094	31%	1.0%
4 Lane Canal	2040	69,068	31%	1.0%
SR 601	2040	73,293	38%	1.2%
SR 601+ 4 Lane Canal	2040	73,696	39%	1.2%
Alt SR 601	2040	75,133	42%	1.3%
Alt SR 601 + 4 Lane Canal	2040	75,458	43%	1.3%

Source: Neel-Schaffer, 2019.

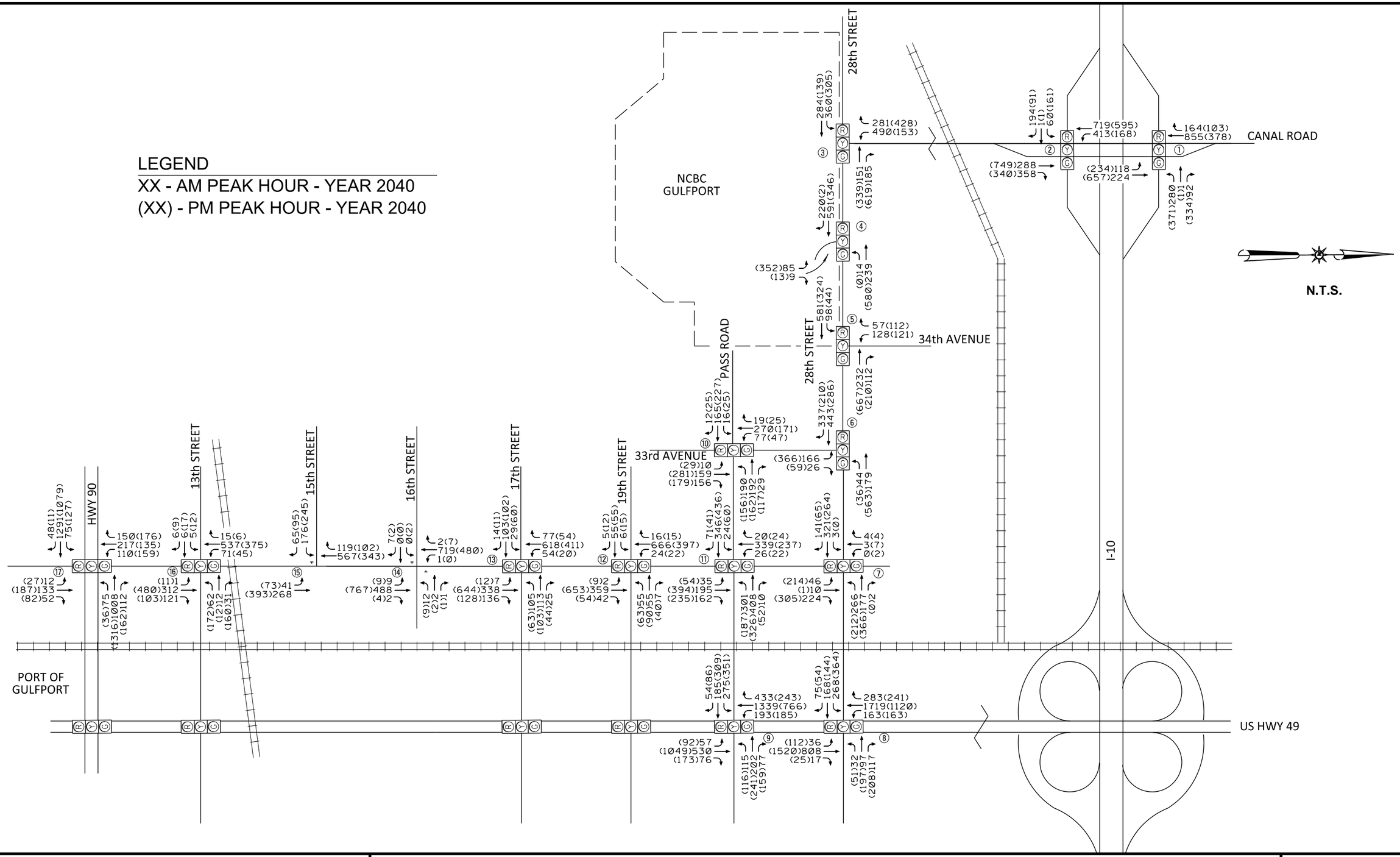
The volume totals for the development scenarios reflected a 1.0%-1.3% compound annual growth rate between 2013 and 2040 in the study area at the six roadway segments selected around the NCBC.

The future year traffic scenarios were developed by increasing the existing (2018) peak hour traffic volumes from 2018 to 2040 using a 1.0% compound annual growth rate, and then adding in additional truck traffic to/from the Port of Gulfport along 30th Avenue – No Build Scenario. To develop future traffic volumes for the SR 601/Port Connector Road, the horizon year volumes were developed from the regional traffic model for the traffic on SR 601, taken as 10% of the daily volume and then applying a directional factor. An alternate to the SR 601 concept was developed by using the existing Canal Road interchange and not requiring access control on the north end, thus eliminating the bridges over the railroad tracks and ramps/bridges at I-10. The traffic volume forecasts for the three volume scenarios: 1) 2040 No-Build, 2) 2040 with SR 601, and 3) 2040 with Alternate SR 601, are shown in **Figures 9-11**.

LEGEND

XX - AM PEAK HOUR - YEAR 2040

(XX) - PM PEAK HOUR - YEAR 2040



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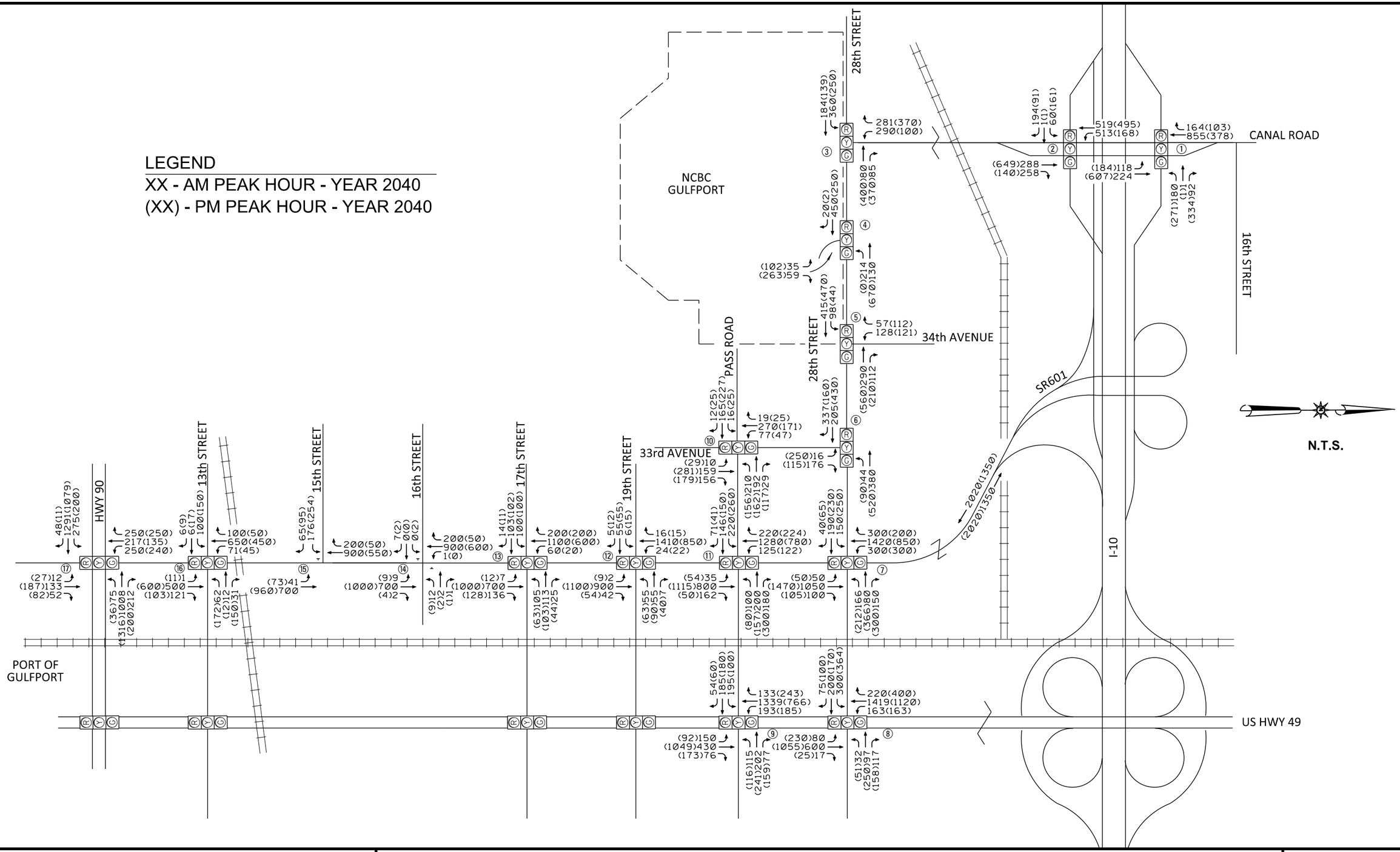
YEAR 2040 TRAFFIC "NO-BUILD" NETWORK

FIGURE 9

LEGEND

XX - AM PEAK HOUR - YEAR 2040

(XX) - PM PEAK HOUR - YEAR 2040



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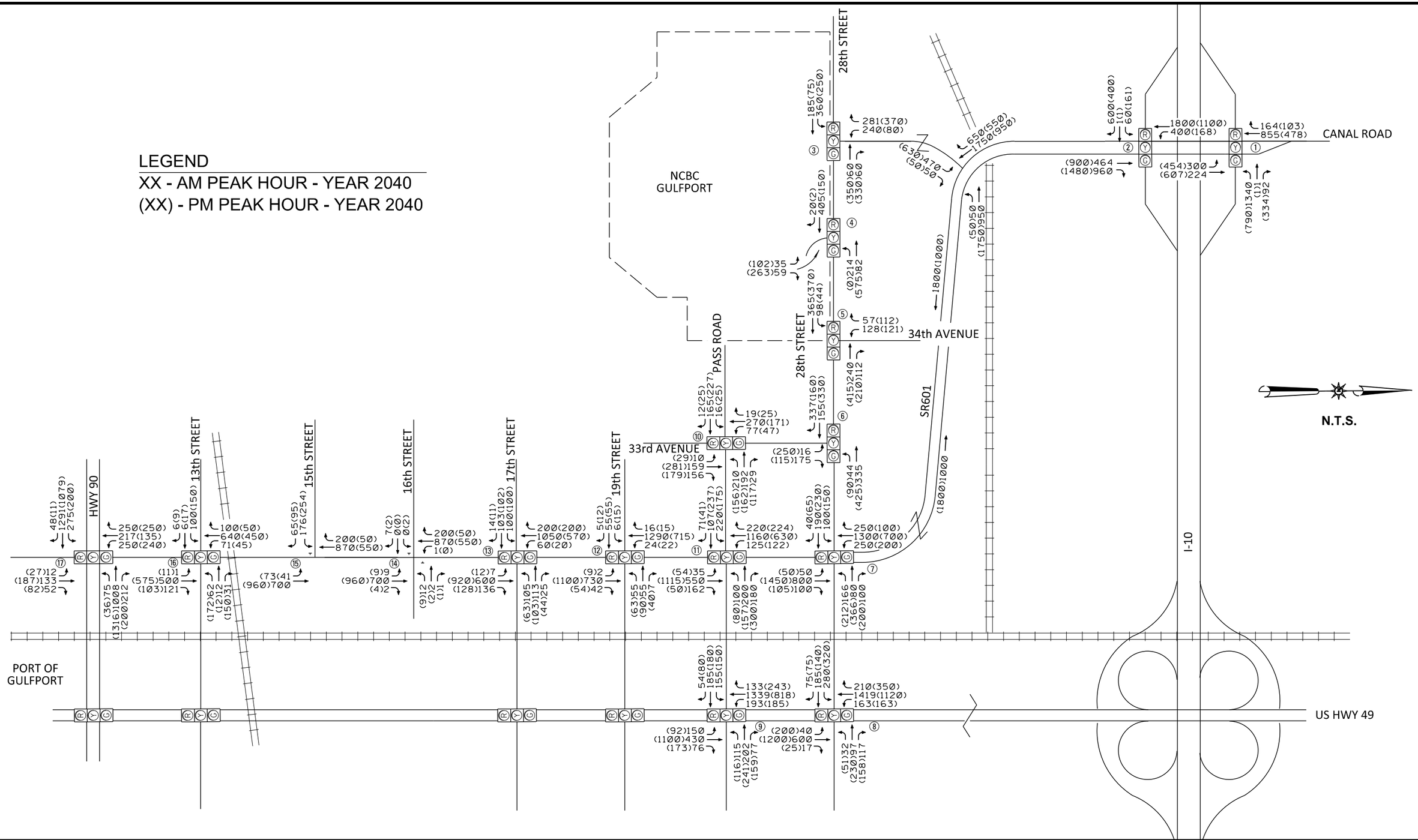
YEAR 2040 TRAFFIC WITH SR601

FIGURE 10

LEGEND

XX - AM PEAK HOUR - YEAR 2040

(XX) - PM PEAK HOUR - YEAR 2040



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YEAR 2040 TRAFFIC WITH ALTERNATE SR601 ALIGNMENT

FIGURE 11

4.3 Levels-of-Service

The horizon year traffic volumes were evaluated using two different methodologies: 1) the Highway Capacity Manual for peak hour turning movement volumes at intersections, and 2) link volumes based on planning level link capacity using Florida DOT volume/LOS tables from the Quality/LOS Handbook. Daily traffic volumes provide a general idea of the magnitude of traffic on a roadway, but the link volumes during the peak hour in the peak direction, and turning movements during peak hours, provide more information that can be quantified into more accurate delay/capacity calculations. Long range forecasts for planning were provided as daily traffic volumes (two-way) for the urbanized area. This analysis evaluated routes between I-10 and US Highway 90 in the vicinity of the NCBC. Existing traffic volumes (2018) were forecast to year 2040 with a 1% compound annual growth rate on the existing roadway network.

Intersection Analyses

Table 9 - Year 2040 "No-Build" Traffic - Intersection Levels-of-Service

Signalized Intersection	Time Period	Approach Level-of-Service				Intersection LOS
		NB	SB	EB	WB	
I-10 WB Ramp/ Canal Road	AM Peak	A	A	-	C	B
	PM Peak	A	A	-	C	B
I-10 EB Ramp/ Canal Road	AM Peak	A	A	C	-	A
	PM Peak	A	A	C	-	A
28th Street/ Canal Road	AM Peak	-	C	B	C	B
	PM Peak	-	C	B	B	B
28th Street/ NCBC Gate	AM Peak	B	-	D	B	C
	PM Peak	B	-	B	B	B
28th Street/ 34th Avenue	AM Peak	-	B	B	B	B
	PM Peak	-	C	A	B	B
28th Street/ 33rd Avenue	AM Peak	A	-	B	B	B
	PM Peak	B	-	C	B	B
28th Street/ 30th Avenue	AM Peak	C	C	D	C	C
	PM Peak	C	C	D	C	C
28th Street/ US Hwy 49	AM Peak	C	C	C	C	C
	PM Peak	D	D	D	**E**	D
Pass Road/ US Hwy 49	AM Peak	C	D	C	C	C
	PM Peak	C	C	D	D	C
Pass Road/ 33rd Avenue	AM Peak	B	B	C	C	B
	PM Peak	B	B	C	C	B
Pass Road/ 30th Avenue	AM Peak	B	B	C	C	C
	PM Peak	B	B	C	C	C
19th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	A
17th Street/ 30th Avenue	AM Peak	A	A	C	C	B
	PM Peak	A	A	C	C	B
13th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	B
US Highway 90/ 30th Avenue	AM Peak	C	D	B	B	B
	PM Peak	D	D	B	B	C

Source: Neel-Schaffer, 2019.

The intersection capacity analysis for the 2040 "No-Build" traffic reveals that the intersections are forecast to operate at acceptable levels, in the absence of flooding. When Canal Road is flooded, this traffic must re-route to other roadways, and puts more of a strain on the available capacity of the roadway network.

The traffic volume analysis for Year 2040 traffic with the construction of the Port Connector Road/SR 601 was evaluated at the study intersections. The results of the intersection capacity analysis are shown in **Table 10**.

Table 10
Year 2040 Traffic w/ SR 601 - Intersection Levels-of-Service

Signalized Intersection	Time Period	Approach Level-of-Service				Intersection LOS
		NB	SB	EB	WB	
I-10 WB Ramp/ Canal Road	AM Peak	A	A	-	C	A
	PM Peak	A	A	-	C	A
I-10 EB Ramp/ Canal Road	AM Peak	A	A	C	-	A
	PM Peak	A	A	C	-	A
28th Street/ Canal Road	AM Peak	-	B	B	C	B
	PM Peak	-	C	B	C	C
28th Street/ NCBC Gate	AM Peak	B	-	C	B	C
	PM Peak	B	-	B	C	B
28th Street/ 34th Avenue	AM Peak	-	B	B	C	B
	PM Peak	-	B	B	B	B
28th Street/ 33rd Avenue	AM Peak	B	-	A	A	A
	PM Peak	B	-	B	A	A
28th Street/ SR 601	AM Peak	C	C	D	D	C
	PM Peak	D	C	D	D	D
28th Street/ US Hwy 49	AM Peak	B	C	C	C	C
	PM Peak	C	D	C	D	C
Pass Road/ US Hwy 49	AM Peak	B	D	C	C	D
	PM Peak	C	B	C	C	C
Pass Road/ 33rd Avenue	AM Peak	B	B	C	C	B
	PM Peak	B	B	C	C	B
Pass Road/ SR 601	AM Peak	B	B	C	C	B
	PM Peak	D	C	C	D	D
19th Street/ 30th Avenue	AM Peak	A	A	C	D	A
	PM Peak	A	A	C	C	A
17th Street/ 30th Avenue	AM Peak	A	B	C	C	B
	PM Peak	A	A	C	C	B
13th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	B
US Highway 90/ 30th Avenue	AM Peak	D	D	C	**E**	D
	PM Peak	D	D	C	**E**	D

Source: Neel-Schaffer, 2019.

The intersection capacity analysis shows that westbound US Highway 90 traffic is forecast to be at capacity at 30th Avenue in Year 2040. Construction of a westbound right turn lane would help to alleviate some of the delays associated with this potential capacity issue.

A capacity analysis was also conducted for the alternate alignment of SR 601, to connect the new route with the existing Canal Road interchange. The results of the intersection capacity analysis are listed in **Table 11**.

Table 11
Year 2040 Traffic w/ Alternate SR 601 - Intersection Levels-of-Service

Signalized Intersection	Time Period	Approach Level-of-Service				Intersection LOS
		NB	SB	EB	WB	
I-10 WB Ramp/ Canal Road	AM Peak	D	D	-	D	D
	PM Peak	B	C	-	C	C
I-10 EB Ramp/ Canal Road	AM Peak	A	A	C	-	A
	PM Peak	A	A	C	-	A
Alt SR 601/ Canal Road	AM Peak	A	C	D	-	B
	PM Peak	B	B	D	-	C
28th Street/ Canal Road	AM Peak	-	B	B	C	B
	PM Peak	-	C	B	C	C
28th Street/ NCBC Gate	AM Peak	B	-	C	B	C
	PM Peak	B	-	B	B	B
28th Street/ 34th Avenue	AM Peak	-	A	B	C	B
	PM Peak	-	B	B	B	B
28th Street/ 33rd Avenue	AM Peak	B	-	A	A	A
	PM Peak	B	-	B	A	A
28th Street/ Alt SR 601	AM Peak	B	B	D	D	C
	PM Peak	C	C	D	D	C
28th Street/ US Hwy 49	AM Peak	B	B	C	C	C
	PM Peak	C	C	C	C	C
Pass Road/ US Hwy 49	AM Peak	B	D	C	C	C
	PM Peak	C	B	C	C	C
Pass Road/ 33rd Avenue	AM Peak	B	B	C	C	B
	PM Peak	B	B	C	C	B
Pass Road/ Alt SR 601	AM Peak	B	B	C	B	B
	PM Peak	B	B	D	C	C
19th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	A
17th Street/ 30th Avenue	AM Peak	A	B	C	C	B
	PM Peak	A	A	C	C	B
13th Street/ 30th Avenue	AM Peak	A	A	C	C	A
	PM Peak	A	A	C	C	B
US Highway 90/ 30th Avenue	AM Peak	D	D	C	**E**	D
	PM Peak	D	D	C	**E**	D

Source: Neel-Schaffer, 2019.

Similar to the original SR 601 capacity analysis, the westbound US Highway 90 traffic is forecast to be at capacity at 30th Avenue by 2040. Construction of a westbound right turn lane would help to alleviate some of the delays associated with this capacity issue.

Link Analyses

The roadway links were analyzed using the methodology provided by the Florida DOT with planning level capacity analysis for the peak hour/peak direction volumes on roadway links. Two lane roadways are anticipated to have a capacity of 800 vph in the peak direction, and four lane roadways a capacity of 1,700 vph in the peak direction. The link capacity evaluation for horizon year traffic is detailed in **Table 12**.

Table 12
Year 2040 Traffic - Link Levels-of-Service

			Peak Direction	Year 2040 No Build			Year 2040 SR 601			Year 2040 Alt SR 601		
Roadway	Location	Lanes	Capacity	Pk Hr	Dir	LOS	Pk Hr	Dir	LOS	Pk Hr	Dir	LOS
Canal Rd	S. of I-10 EB Ramp	4LD	1,700	1,089	NB	D	789	NB	D	2,400	SB	**F**
	N. of Railroad Xing	2LU	800	1,007	NB	**F**	705	NB	**E**	2,400	SB	**F**
	N. of 28th Street	2LU	800	924	NB	**F**	620	NB	D	580	NB	D
28th St	E. of Canal Road	2LU	800	958	WB	**F**	770	WB	**E**	680	WB	D
	W. of 34th Avenue	2LU	800	779	WB	**E**	672	WB	D	527	WB	D
	W. of Hwy 49	5L	1,700	562	EB	D	880	WB	D	780	WB	D
Pass Rd	E. of 33rd Avenue	5L	1,700	453	EB	C	453	EB	C	453	EB	C
	W. of Hwy 49	5L	1,700	746	EB	D	576	WB	D	576	WB	D
30th Ave	S. of 28th Street	4LU	1,700	520	NB	D	1,625	NB	**E**	1,605	NB	**E**
	S. of Pass Road	4LU	1,700	711	SB	D	1,451	SB	D	1,331	SB	D
	N. of US Hwy 90	4LD	1,700	477	SB	C	717	SB	D	717	SB	D

Source: Neel-Schaffer, 2019, FDOT Quality/LOS Manual.

The year 2040 traffic volumes for the No-Build scenario have similar results to the existing traffic link analysis with the two-lane section of Canal Road south of I-10 and 28th Street between Canal Road and 34th Avenue at – or over capacity. The congestion issues are compounded by the fact that routine flooding occurs on Canal Road, making the route impassable during heavy rainfall events.

The link analysis for the 2040 forecast with the SR 601 connection from I-10 to 28th Street is still anticipated to have some sections of the 2-lane portion of Canal Road near capacity, as well as 28th Street. Due to the heavy volume of traffic forecast on SR 601 (approximately 34,000 vpd), the section of roadway south of 28th Street is forecast to be at capacity with this influx of new traffic on this access controlled route releasing traffic directly onto the arterial street network at 28th Street.

The Alternate Alignment of SR 601 using the existing Canal Road interchange and then transitioning into the original SR 601 route south of the railroad tracks is shown to have a significant impact on regional traffic in the urban traffic model, with nearly 44,000 vpd on Canal Road south of I-10 and 27,000 vpd on the SR 601 route between Canal Road and 28th Street. This traffic demand on the Canal Road interchange would likely require 3 north/south thru lanes between I-10 and the Canal Road/SR 601 intersection south of the railroad tracks. Ramp improvements would also be needed to accommodate this increase in turning traffic at the I-10/Canal Road interchange. There is sufficient width under the I-10 overpass to provide 3 thru lanes both northbound and southbound.

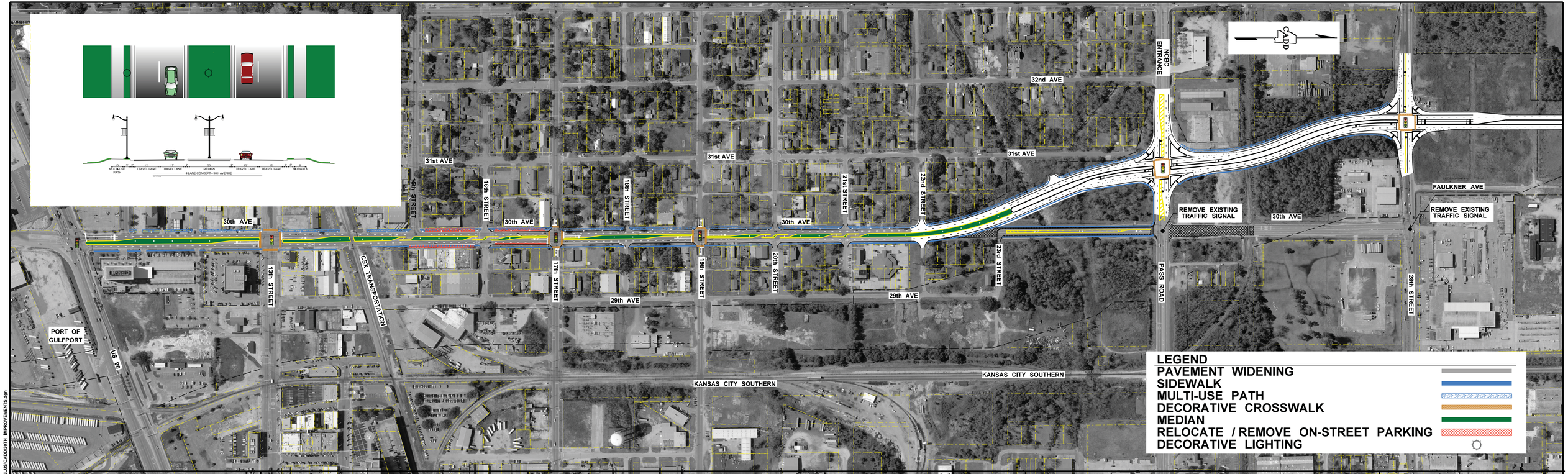
5.0 30th Avenue Corridor

5.1 Geometric Improvements

The existing traffic volumes on 30th Avenue serve as the primary truck route accessing the Port of Gulfport. The addition of traffic related to the SR 601 project is anticipated to increase the volume of traffic in this corridor by approximately 2.5 times the current volume by year 2040. This increased traffic is anticipated to include the majority of the Port of Gulfport traffic, including tractor-trailers. The additional truck traffic and regional traffic along 30th Avenue will put pressure on the existing system and the lack of access control could reduce the mobility of this increased traffic stream. Reducing the number of turning conflict locations is recommended through the conversion of 30th Avenue to a "Super Street." The introduction of a raised curb median the entire length of the corridor is recommended, along with eliminating the (unwarranted) all-way stop control at 16th Street. Existing traffic signals are recommended to be upgraded to provide improved detection and a coordinated signal system to allow vehicles on the major street to traverse the corridor on coordinated green times at each intersection. The conversion to a *Super Street* will increase travel speeds, increase capacity, decrease congestion, and decrease emissions.

Concurrent with this *Super Street* design, additional pedestrian accommodations are recommended, to allow dedicated crosswalks, wider sidewalks, and appropriate levels of street lighting to identify pedestrians in the roadway at night.

The proposed median construction will divert minor street left turning traffic to signalized intersections, reducing the effects that left turning traffic has on thru traffic. The conceptual design of 30th Avenue in shown graphically in **Figure 12**. Preliminary estimate of cost for the south end of 30th Avenue improvements was calculated to be approximately $7,000,000.



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30th AVENUE CORRIDOR - IMPROVEMENT CONCEPT

FIGURE 12

6.0 Preliminary Estimate of Cost

Three separate alternates were evaluated for cost estimating purposes: 1) 3-Lane Canal Road, 2) 4-Lane Canal Road, and 3) Alternate alignment of SR 601. Each of the alternates was evaluated to provide a preliminary estimate of project costs, for comparison.

3-Lane Canal Road

Project concept includes widening Canal Road from the four-lane transition near the I-10 interchange, south to 28th Street. Existing width is approximately 22 ft. Typical section will widen to 54 ft, providing 8 ft paved shoulders, 12 ft north/south travel lanes, and a 14 ft center two-way left turn lane (TWLTL).

North Section: The section of Canal Road between I-10 and Tillman Road is not in the 100 year flood zone, per the FIRM maps. Widening can occur along the existing alignment for this northern 5,600 LF. An upgraded railroad crossing would likely be required at the KCS railroad crossing. Right-of-way ranges from approximately 130 ft to 180 ft in width between I-10 and 0.3 miles south of the KCS railroad.

Central Section: The portion of Canal Road between Tillman Road and approximately 300 ft north of 28th Street is mostly within the 100-year flood zone and crosses the Turkey Creek floodway. A short bridge exists over Turkey Creek on Canal Road. Per the Harrison County Flood Insurance Study, the 100-year flood elevation on Canal Road is 22.3 ft, and 500-year flood elevation is 23.4 ft. Elevating the roadway from approximately elevation 19 ft/20 ft to elevation 23.4 ft, will bring the roadway up and out of the 500-year flood elevation. This section of roadway extends approximately 7,600 LF. The floodway is approximately 1,000 ft in width on the FIRM at Canal Road. A new bridge across this entire Turkey Creek floodway was used in this cost estimate, with a 40 ft bridge width. This section of roadway would likely require hydraulic analysis, evaluation of flood plain impacts, wetland mitigation and right-of-way acquisition. Existing right-of-way is approximately 50 ft in width in this section of Canal Road.

Southern Section: The southern 300 ft of Canal Road is shown to be above the 500-year flood elevation (elevation 24 ft) and has 3 lanes of traffic at the signalized intersection with 28th Street. Widening the existing roadway to the east is proposed, along with upgrading the traffic signal to a mast arm style signal. Right-of-way is approximately 70 ft in width.

Widening 28th Street from Canal Road east to the entrance to the NCBC, a distance of approximately 2,500 LF, was included in the cost evaluation. This section of roadway has an existing width of approximately 22 ft, and is proposed to be widened to 54 ft, to provide 8 ft paved shoulders, 12 ft east/west travel lanes, and a 14 ft center TWLTL. Right-of-way is approximately 80 ft in width.

Total Length: 13,500 LF Canal Road/2,500 LF 28th Street.
Preliminary Project Cost Estimate: $23,368,000

4-Lane Canal Road

Project concept includes widening Canal Road from the four-lane transition near the I-10 interchange, from 2-lanes to 4-lanes/divided south to 28th Street. Existing width is approximately 22 ft. Typical section will widen to 90 ft, providing curb/gutter with 12 ft north/south travel lanes, 2 ft inside/outside paved shoulders, and a 30 ft center grassed median. Right-of-way acquisition will be required. A 10 ft multi-use path is included in the typical section.

North Section: The section of Canal Road between I-10 and Tillman Road is not in the 100 year flood zone, per the FIRM maps. Widening is anticipated to be accomplished by widening to the east for the northern 5,600 LF. An upgraded railroad crossing would likely be required at the KCS railroad crossing. Right-of-way ranges from approximately 130 ft to 180 ft in width between I-10 and 0.3 miles south of the KCS railroad.

Central Section: The portion of Canal Road between Tillman Road and approximately 300 ft north of 28th Street is mostly within the 100-year flood zone and crosses the Turkey Creek floodway. A short bridge exists over Turkey Creek on Canal Road. Per the Harrison County Flood Insurance Study, the 100-year flood elevation on Canal Road is 22.3 ft, and 500-year flood elevation is 23.4 ft. Elevating the roadway from approximately elevation 19 ft/20 ft to elevation 23.4 ft, will bring the roadway up and out of the 500-year flood elevation. This section of roadway extends approximately 7,600 LF. The floodway is approximately 1,000 ft in width on the FIRM at Canal Road. New bridges across this entire Turkey Creek floodway were used in this cost estimate, with a 42 ft bridge width southbound and 54 ft width northbound, including a 10 ft multi-use path on the bridge. This section of roadway construction would likely require a hydraulic analysis, evaluation of flood plain impacts, wetland mitigation and right-of-way acquisition. Existing right-of-way is approximately 50 ft in width in this section of Canal Road.

Southern Section: The southern 300 ft of Canal Road is shown to be above the 500-year flood elevation (elevation 24 ft) and has 3 lanes of traffic at the signalized intersection with 28th Street. Widening the existing roadway to the east is proposed, along with upgrading the traffic signal to a mast arm style signal. Right-of-way is approximately 70 ft in width.

Widening 28th Street from Canal Road east to the entrance to the NCBC, a distance of approximately 2,500 LF, was included in the cost evaluation. This section of roadway has an existing width of approximately 22 ft, and is proposed to be widened to 54 ft, to provide 8 ft paved shoulders, 12 ft east/west travel lanes, and a 14 ft center TWLTL. Right-of-way is approximately 80 ft in width.

Total Length: 13,500 LF Canal Road/2,500 LF 28th Street
Preliminary Project Cost Estimate: $38,060,000

4-Lane / Alternate SR 601 Alignment

Project concept includes widening Canal Road from the four-lane transition near the I-10 interchange, from 2-lanes to 4-lanes/divided south to approximately 0.3 miles south of the KCS Railroad, then transition east to the SR 601 alignment, within the path of the acquired ROW. Existing width of Canal Road transitions from 4-lane to 2-lane in the northern section. Typical section varies with an urban section at the north/south ends and rural section in between. Urban section is 90 ft, providing curb/gutter with 12 ft north/south travel lanes, 2 ft inside/outside paved shoulders, and a 30 ft center grassed median. Rural section includes two 12 ft travel lanes in each direction, with 10 ft paved outside shoulder and 4 ft paved inside shoulders, with 88 ft from center line to center line of north/south lanes. Right-of-way has already been acquired through this alignment.

North Section: The section of Canal Road between I-10 and 0.3 miles south of the KCS Railroad is not in the 100 year flood zone, per the FIRM maps. Widening is anticipated to be accomplished by widening Canal Road to the east for the northern 2,800 LF. An upgraded railroad crossing would likely be required at the KCS railroad crossing. Right-of-way ranges from approximately 130 ft to 180 ft in width between I-10 and 0.3 miles south of the KCS railroad. The major roadway would be SR 601 and would require a new signalized intersection at the split of Canal Road/SR 601. SR 601 would transition to a rural cross section. Additional ROW was acquired for this as a temporary alignment of SR 601.

Central Section: The portion of SR 601 between Canal Road and just north of 28th Street is approximately 16,500 ft and has a significant portion of the roadway within the 100-year flood zone and crosses the Turkey Creek floodway. Bridges across the Turkey Creek floodway were based on the kmz file provided by MDOT. The bridge over Turkey Creek is 2,000 ft, with additional bridges over 39th Avenue (200 ft) and over 34th Avenue (250 ft). This section of roadway construction would likely require an updated hydraulic analysis. Right-of-way was already acquired for this roadway alignment.

Southern Section: The southern 4,500 ft of Alternate SR 601 is planned as an urban cross section with sidewalks. This alignment of SR 601 would transition into 30th Avenue, south of Pass Road. New traffic signals are proposed at 28th Street and Pass Road. Right-of-way has been acquired for this section of roadway.

Total Length: 23,800 LF
Preliminary Project Cost Estimate: $70,000,000

7.0 Recommendations and Conclusions

The access to the NCBC is a top priority for military effectiveness. The lack of available capacity and roadway flooding on Canal Road creates delays that could adversely affect military response times. Additional capacity is needed to/from the north to allow the NCBC to effectively deploy during training exercises and during times of needed military response to national threats/danger. The construction of SR 601 will provide a much needed (all weather) increase in capacity to the north for the base; however, the funding for this project has not been identified. Improving Canal Road to provide all-weather availability to traffic, through raising the roadway elevation above the 500-year flood elevation, is recommended, concurrent with widening to a four-lane roadway. This increase in elevation and width of the roadway will have impacts on wetlands and adjacent flood zones, that will likely have to be mitigated.

Improvements to 30th Avenue are also recommended, to place a priority on north/south traffic movements to/from the Port of Gulfport. Restricting minor street left turning movements to signalized intersections through median modifications will help to improve the north/south freight movements, as well as the movement of military traffic to/from the Port.

The effectiveness of the military base is of paramount importance to national security. Providing sufficient capacity and an all-weather reliable route through Canal Road improvements will help the NCBC provide effective response times to training exercises and to respond to national threats/disasters. New roadway facilities are recommended place a priority on access to the NCBC and provide for coordinated signal systems connecting to the Port of Gulfport to help promote military readiness.

Appendix