

FEASIBILITY STUDY

**NC 24 / NC 58
Evaluate the Need to Convert Existing Intersection
Into an Interchange**

Carteret County

Division 2

FS-0102A



Prepared by
Kimley-Horn and Associates, Inc.
for the
Program Development Branch
Division of Highways
N. C. Department of Transportation

A handwritten signature in blue ink that reads "Ron Hairr".

Ron Hairr
Project Manager
Kimley-Horn and Associates, Inc.

A handwritten signature in blue ink that reads "Derrick W. Lewis".

Derrick W. Lewis, P. E.
Feasibility Studies Engineer

4/5/02
Date

Carteret County
NC 24 / NC 58
Evaluate the Need to Convert the Existing Intersection
Into an Interchange

FS-0102A

I. General Description

This feasibility study investigates the potential to convert the existing at-grade intersection of NC 24 and NC 58 in Carteret County to an interchange. The study area (see Figure 1) is the area surrounding the existing intersection. It is recommended that the intersection of NC 24 and NC 58 remain an at-grade intersection with the existing lane configuration until such time as a grade-separated interchange is warranted by traffic volumes.

Based on the traffic projections provided through 2025, the existing intersection configuration is expected to operate at an acceptable level-of-service (LOS) through the year 2020. Beyond the 2020 Design Year, additional intersection improvements maybe needed to achieve an acceptable LOS. Even though an interchange at this location is not recommended at this time, we have evaluated the operational benefits and cost of two interchange alternatives.

Alternate 1 provides a diamond interchange with NC 58 crossing over NC 24 with dual bridges. Alternate 2 provides for NC 24 crossing over NC 58 using a five-lane undivided bridge. A more detailed description of each of these alternates along with their probable estimate of costs is included in Section IV of this report.

II. Need for Project

The purpose of this feasibility study is to analyze the traffic operations of the existing NC 24/NC 58 intersection, evaluate the need to convert this intersection into an interchange, and assess the impacts and cost associated with an interchange conversion.

NC 24 is designated as an "other principal arterial" in the current Carteret County Thoroughfare Plan and in the North Carolina Statewide Functional Classification System. The functional classification for NC 58 north and south of NC 24 is a minor collector and a minor arterial, respectively.

The existing (signalized) intersection of NC 24 and NC 58 has dual left-turn bays, two through lanes and an exclusive right-turn bay on each of the four approaches. NC 24, on the west leg of the intersection with NC 58, serves approximately 18,200 vehicles per day (vpd) in 2000. On the east leg of the intersection, NC 24 serves approximately 18,400 vpd in 2000. NC 58, on the north leg of the intersection with

NC 24, is used by approximately 8,200 vpd in 2000. On the south leg of the intersection, NC 58 serves approximately 15,400 vpd in 2000. The projected 2025 traffic volumes indicate approximately 35,000 and 36,000 vpd for the west and east legs, respectively, of NC 24 at the intersection with NC 58. The north and south legs of NC 58 at the intersection are projected to be approximately 16,200 and 34,000 vpd, respectively. The existing (2000) and projected (2025) traffic volumes for both an at-grade intersection and interchange are shown in Figures 2A and 2B.

In the mid-1960's, prior to the development of Interstate 40, a preliminary design was conceived for upgrading the NC 24/NC 58 intersection to an interchange. The preliminary design included a diamond type interchange with ramp terminals along NC 24. Based on the preliminary design criteria in effect at that time, the right-of-way anticipated to be required for the interchange was acquired and reserved.

Project R-2105AB completed in 2000 widened both NC 24 and NC 58 at this location to multi-lane facilities with expanded traffic signalization and signing. Consequently an accident data history for the newly constructed intersection configuration is not available.

Improving this intersection is ranked third on the Carteret County Transportation Committee's priority list (see attached letter dated May 18, 2001, in the Appendix). According to a letter from the NCDOT Division 2 Engineer, the Transportation Committee sees "the increased traffic from the west using NC 24 from I-40 to travel to the beaches as a need for the interchange. Also, an interchange would help the traffic flow in the event of a hurricane evacuation." (See attached letter dated May 29, 2001, in the Appendix.)

The Town of Emerald Isle passed a resolution on November 14, 2000 which supports further study of the impacts of an overpass at NC 24 and NC 58. The resolution also stated that the Town does not support the widening of the B. Cameron Langston Bridge to Emerald Isle nor the widening of NC 58 to five lanes through the Town. (See attached resolution in the Appendix.)

Synchro 5 Traffic Signal Coordination Software was used to perform capacity analyses for the PM peak hour for the existing (2000) and projected (2025) traffic volumes at the NC 24/NC 58 intersection. The anticipated levels-of-service (LOS) for the intersection were determined using methodologies contained in the *Highway Capacity Manual* (HCM) delay calculations, as computed using Synchro, and are indicated in Table 1. For the year 2000 PM peak-hour volumes, the existing intersection operates at LOS C. By the year 2020, it will degrade to LOS E. By the year 2025, the intersection is expected to operate at LOS F. An interchange proposed in place of the intersection will help to serve traffic more efficiently in 2025.

Table 1 NC 24 at NC 58 PM Peak-Hour Level of Service (Delay)				
Existing Intersection 2000	No Improvements 2020*	No Improvements 2025	Alternate 1 NC 58 Overpass with Intersections on NC 24 2025	Alternate 2 NC 24 Overpass with Intersections on NC 58 2025
C (25.2)	E (58.1)	F (80.9)	West: E (56.8)	North: D (41.3)
			East: D (47.2)	South: C (27.5)

*First year exceeding LOS D
 Synchro 5 Traffic Signal Coordination Software – results reported for HCS delay calculations

III. Environmental Screening

The following is a preliminary review of environmental issues that have a potential impact to the project with Alternates 1 and 2. The information obtained for the environmental screening is from readily available database information only. No survey work, other than a field inspection, was prepared for this study. The environmental screening is not a substitute for the project planning/environmental documentation process. The purpose of the environmental screening is to identify potential environmental issues early in the process. For the purpose of this study, potential environmental issues were identified within approximately one-half mile of the existing NC 58 intersection with NC 24. Figure 3, the Environmental Screening Map, shows the location of potential environmental issues.

Historic Properties

As part of the environmental screening process, the North Carolina State Historic Preservation Office (SHPO) was contacted to determine if any historic resources on the National Register of Historic Places or state lists exist within the proposed project corridor. A review of available mapping at the SHPO revealed no historic resources present within the study area. However, Carteret County has not been surveyed. The project area should be surveyed for historic architectural resources as part of any future environmental assessment.

Floodplains

Carteret County is a regular participant in the National Flood Insurance Program. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panels 3700043 0630 C and 370043 0637 C – Carteret County, North Carolina, and Panel 370046 0001 C – Town of Cape Carteret, North Carolina (Carteret County) were reviewed to determine whether the project study area would cross the 100-year floodplain. The 100-year floodplain is located along Boathouse Creek northwest of the existing intersection, along Deer Creek east of the intersection, and along Burden Channel southwest of the intersection. The Boathouse Creek floodplain extends to within approximately 1,000 feet of the intersection and has a base flood elevation of eight feet. The Deer Creek floodplain extends to within approximately 1,900 feet of the intersection and has a base flood elevation of 10 feet. The Burden Channel floodplain

extends to within approximately 2,400 feet of the intersection and has a base flood elevation of 10 feet. When constructing this project, local and state regulations regarding the 100-year floodplain should be followed.

Stream Classification

The proposed project area is located in the White Oak River Basin. The study area includes portions of Boathouse Creek, Deer Creek, and a tributary of Burden Channel. Boathouse Creek and Deer Creek are classified as Market Shellfishing, Salt Water (SA), and Deer Creek is also classified as Outstanding Resource Waters (ORW). The SA classification denotes salt waters, which are suitable for commercial shellfishing and all other tidal saltwater uses, which include primary and secondary recreation, fishing, and propagation and survival of aquatic life and other wildlife. The Outstanding Resource Waters designation classifies waters as unique and special waters of exceptional state or national recreational or ecological significance, which require special protection to maintain existing uses. These water bodies should be surveyed and have the appropriate coordination with the North Carolina Department of Environment and Natural Resources (NCDENR) and the U.S. Army Corps of Engineers (USACE) during any environmental document study.

Wetlands

The National Wetland Inventory (NWI) map for the Swansboro quad (USGS) was reviewed to determine whether the proposed project study area (a ½-mile radius around the intersection of NC 58 and NC 24) would impact any wetlands. The proposed study area includes palustrine and estuarine wetlands associated with Boathouse Creek, Deer Creek, and Burden Channel. Also, three small pockets of palustrine wetlands exist north of the intersection. During the preparation of any environmental assessment, it is recommended that these wetlands be surveyed and delineated. Proper permitting from the U.S. Army Corps of Engineers should be obtained before construction of the project, and appropriate mitigation measures should be taken if necessary.

Threatened and Endangered Species

The North Carolina Natural Heritage Program was contacted to determine the presence of any threatened and endangered species within the proposed project study area. No threatened or endangered plant or animal species were indicated within the project study area.

Environmental Justice

Executive Order 12898 requires that Federal agencies identify and address disproportionately high and adverse effects of federally funded projects on minority and low-income projects. The 1990 Census data were reviewed for high levels of minorities, elderly, and percent of people living below the poverty level, and for lower than normal family median income. Table 2 indicates the areas of potential environmental justice (EJ) concerns, and Figure 3 shows where these areas are located with respect to the proposed project corridor. As of the date of this study, the appropriate data from the 2000 Census were not available for use.

Table 2				
Areas of Potential Environmental Justice Concern				
Census Tract (Block Group)	Components of Environmental Justice Analysis[†]			
	Minorities	Age	Poverty Level	Median Family Income
9708 (3)	N	N	N	N
9708 (4)	N	N	Y	N
9708 (6)	N	Y	N	N
9708 (7)	N	Y	N	N

[†] Indicates areas of higher than normal amounts of minority population, elderly (age 65 or over) population, population below the poverty level, and lower than normal family median income. N indicates no concerns associated with the particular Block Group.

Source: U.S. Census Bureau, 1990.

Block Groups 6 and 7 within Census Tract 9708 contain potential concerns related to the elderly population. Though Executive Order 12898 does not require an environmental justice analysis based on age, many elderly people do not have either the resources or the desire to move. Relocations within the project area should be minimized to avoid disrupting the lives of elderly residents. Block Group 4 of Census Tract 9708 contains potential EJ concerns related to the poverty levels of the residents living within this area. Any future interchange should be designed in a manner that will minimize residential relocations. Also, any other appropriate public involvement measures should be taken to keep the public as informed as possible.

IV. Description of Alternates

The following two alternates along with the “Do Nothing” alternate were identified for further study. The proposed configuration for each alternate was determined based on existing (2000) and projected (2025) traffic volumes.

Do Nothing (Recommended)

Currently, the intersection of NC 24 and NC 58 has dual left-turn bays, two through lanes and an exclusive right-turn bay on each of its four approaches. Based on the existing configuration of the intersection and capacity analyses using the traffic projections, the “Do Nothing” Alternate operates acceptably (LOS D) until the year 2020.

Alternate 1

Alternate 1 improves the NC 24/NC 58 intersection to a diamond interchange along the NC 58 axis with ramp terminal intersections located on NC 24 (refer to Figure 6). This interchange would include dual bridges over NC 24 to accommodate the NC 58 through lanes. The cross section for the NC 58 approach to the interchange would be a four-lane divided controlled access facility with 12-foot travel lanes, a 22-foot depressed median, and 12-foot shoulders including four-foot paved shoulders, on existing right of way (minor area of additional right of way may be required at the northeast and southeast ramp terminals). The proposed cross section for NC 24 between the ramp

terminals would be a seven-lane (undivided) curb and gutter roadway, 84 feet wide face-to-face of curbs. For a detailed view of Alternate 1, please refer to the Alternate 1 Conceptual Design.

The lane configuration for the proposed ramp terminal intersections along NC 24 is as follows:

West intersection on NC 24

- Three through lanes and an exclusive right-turn bay (*Eastbound*)
- Two through lanes and dual left-turn lanes (full lane + bay) (*Westbound*)
- Dual left-turn bays and a free-flow right-turn lane (*Southbound*)

East intersection on NC 24

- Two through lanes and dual left-turn lanes (full lane + bay) (*Eastbound*)
- Three through lanes and an exclusive right-turn bay (*Westbound*)
- Dual left-turn bays and a free-flow right-turn lane (*Northbound*)

In 2025, the west intersection is expected to operate at LOS E with the proposed lane configuration, and the east intersection is expected to operate at LOS D (refer to Table 1). The west intersection operation is improved to LOS D in 2025 if dual eastbound exclusive right turn lanes are provided.

It is anticipated that there will be approximately 2 residential and 1 business relocated due to the interchange improvements with Alternate 1. A probable estimate of cost was prepared and includes approximately \$17,250,000 for construction and \$2,377,000 for right-of-way (ROW) for a total cost of \$19,627,000.

Construction.....	\$ 17,250,000
Right-of-way.....	\$ 2,377,000
Total Cost.....	\$ 19,627,000

Alternate 2

Alternate 2 improves the NC 24/NC 58 intersection to a diamond interchange along the NC 24 axis with ramp terminal intersections located on NC 58 (refer to Figure 7). The interchange would include a five-lane undivided bridge over NC 58 to accommodate NC 24. The cross section for the NC 24 approach to the interchange would be a seven-lane (undivided) curb and gutter section, 84 feet wide face-to-face of curbs, using 12-foot travel lanes. Significant additional rights of way, including business relocations, are required with this alternate. The proposed cross section for NC 58 between the ramp terminals would be a seven-lane (undivided) roadway, 84 feet wide face-to-face of shoulders, with 12-foot travel lanes and 12-foot shoulders including four-foot paved shoulders. For a detailed view of Alternate 2, please refer to the Alternate 2 Conceptual Design.

The lane configuration for the proposed ramp terminal intersections along NC 58 is as follows:

North intersection on NC 58

- Three through lanes and an exclusive right-turn bay (*Southbound*)

- Two through lanes and dual left-turn bays (*Northbound*)
- Exclusive right-turn bay and a dual left-turn (full lane + bay) (*Westbound*)

South intersection on NC 58

- Two through lanes and dual left-turn bays (*Southbound*)
- Three through lanes and an exclusive right-turn bay (*Northbound*)
- Dual left-turn bays and a free-flow right-turn lane (*Eastbound*)

In 2025, the north intersection is expected to operate at LOS D with the proposed lane configuration, and the south intersection is expected to operate at LOS C (refer to Table 1).

It is anticipated that there will be approximately 8 residential and 16 businesses relocated due to the interchange improvements with Alternate 2. A probable estimate of cost was prepared and includes approximately \$15,200,000 for construction and \$12,425,000 for right-of-way (ROW) for a total cost of \$27,625,000.

Construction.....	\$ 15,200,000
Right-of-way.....	\$ 12,425,000
Total Cost.....	\$ 27,625,000

V. Additional Comments

For Alternate 1, a minor amount of additional right of way would be required to accommodate the ramp terminals for the proposed interchange (see Alternate 1 Conceptual Design for proposed right of way limits). It is expected that no additional structures beyond those described in the previous section would be required for Alternate 1.

Alternate 2 would require extensive right-of-way acquisition along NC 24 in addition to several local business and residential takings. Alternate 2 also requires the construction of service roads to provide access to adjacent commercial and residential properties along NC 24.

Appendix

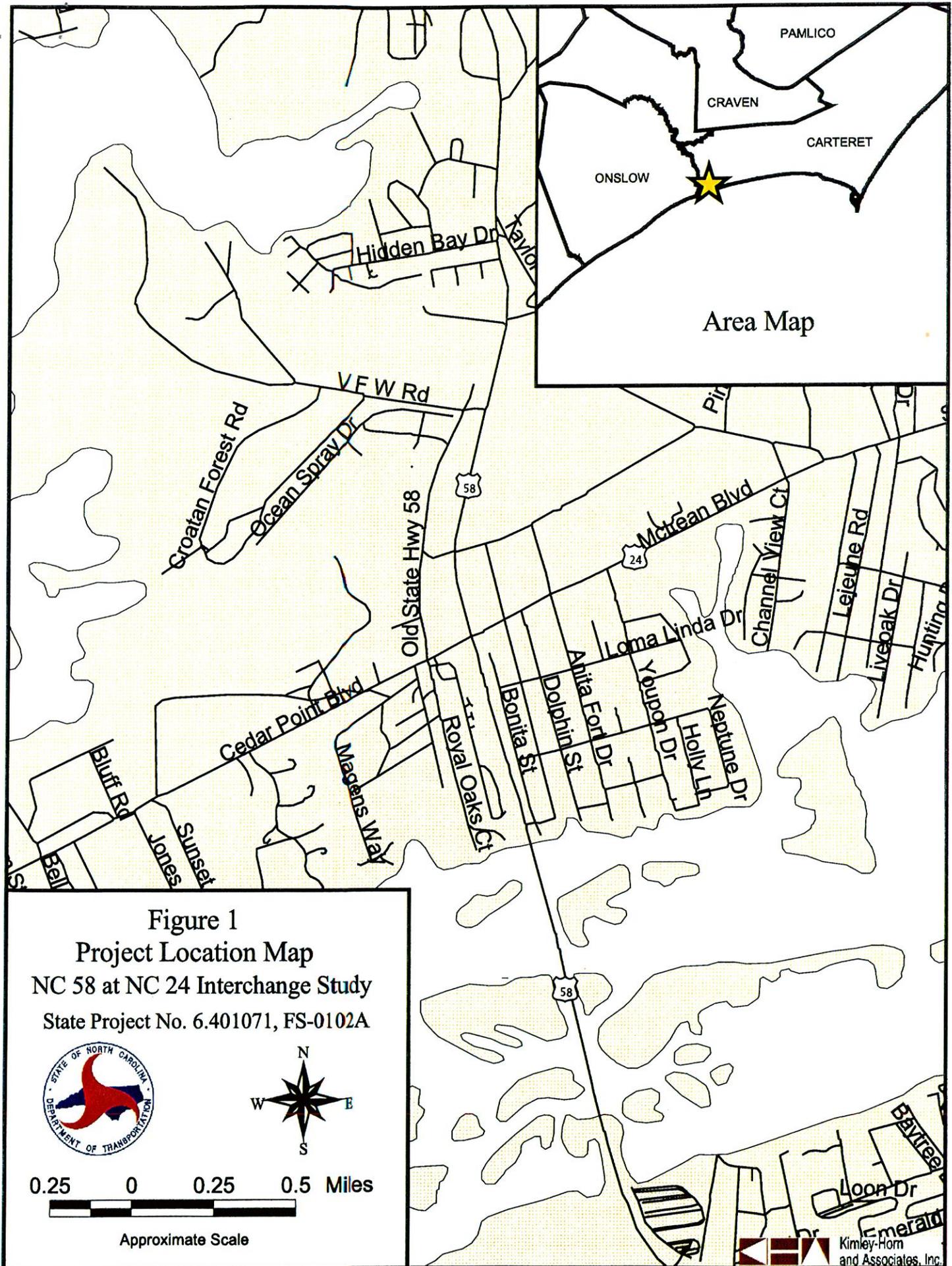
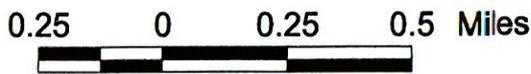
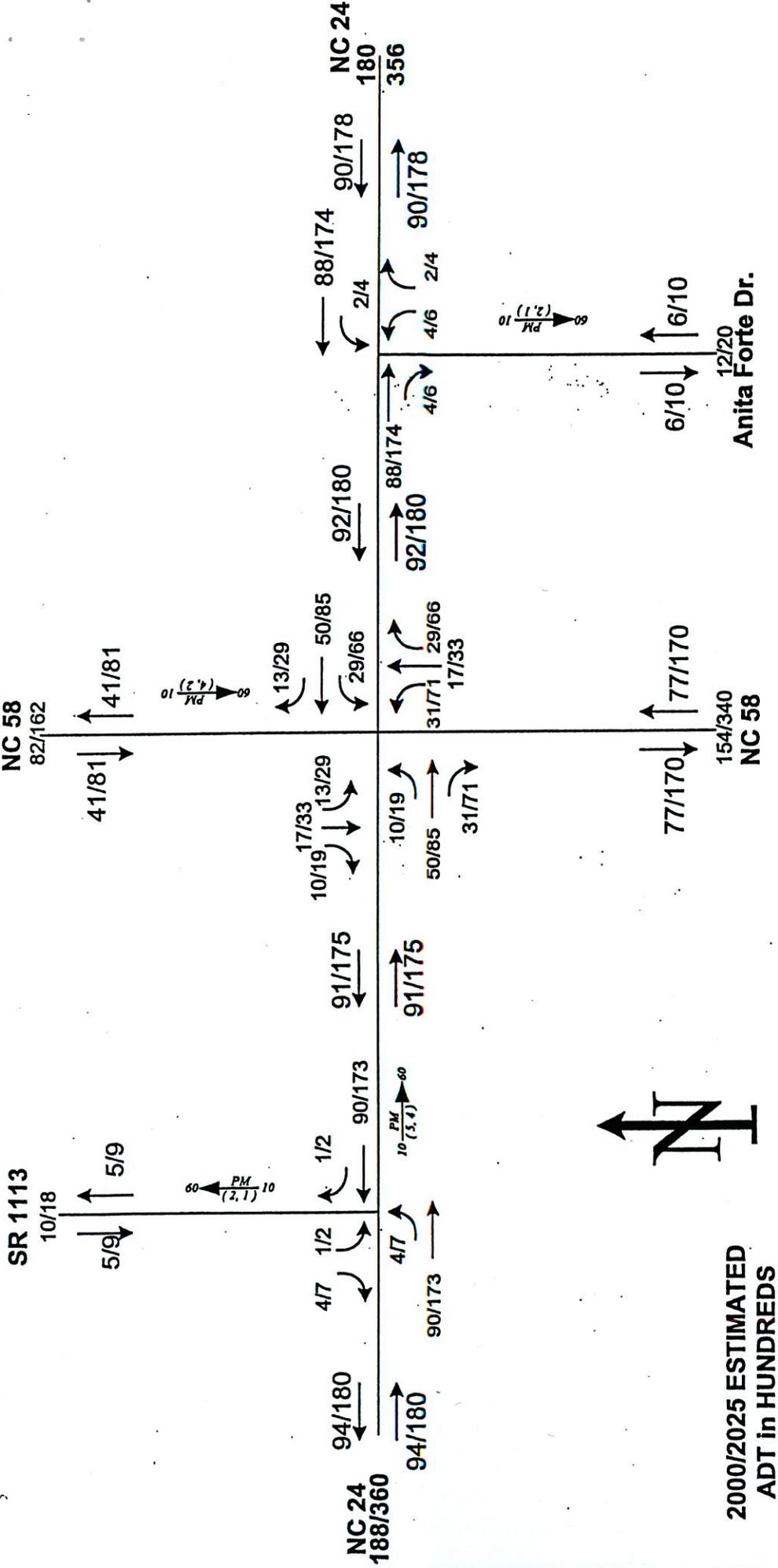


Figure 1
Project Location Map
 NC 58 at NC 24 Interchange Study
 State Project No. 6.401071, FS-0102A



Approximate Scale

Kimley-Horn and Associates, Inc.



LOCATION: NC 24/NC 58 Intersection

PROJECT: Existing Intersection

Figure 2A - Estimated Traffic with Intersection

COUNTY: Carteret

DIV.: 2 **DATE:** January, 2001

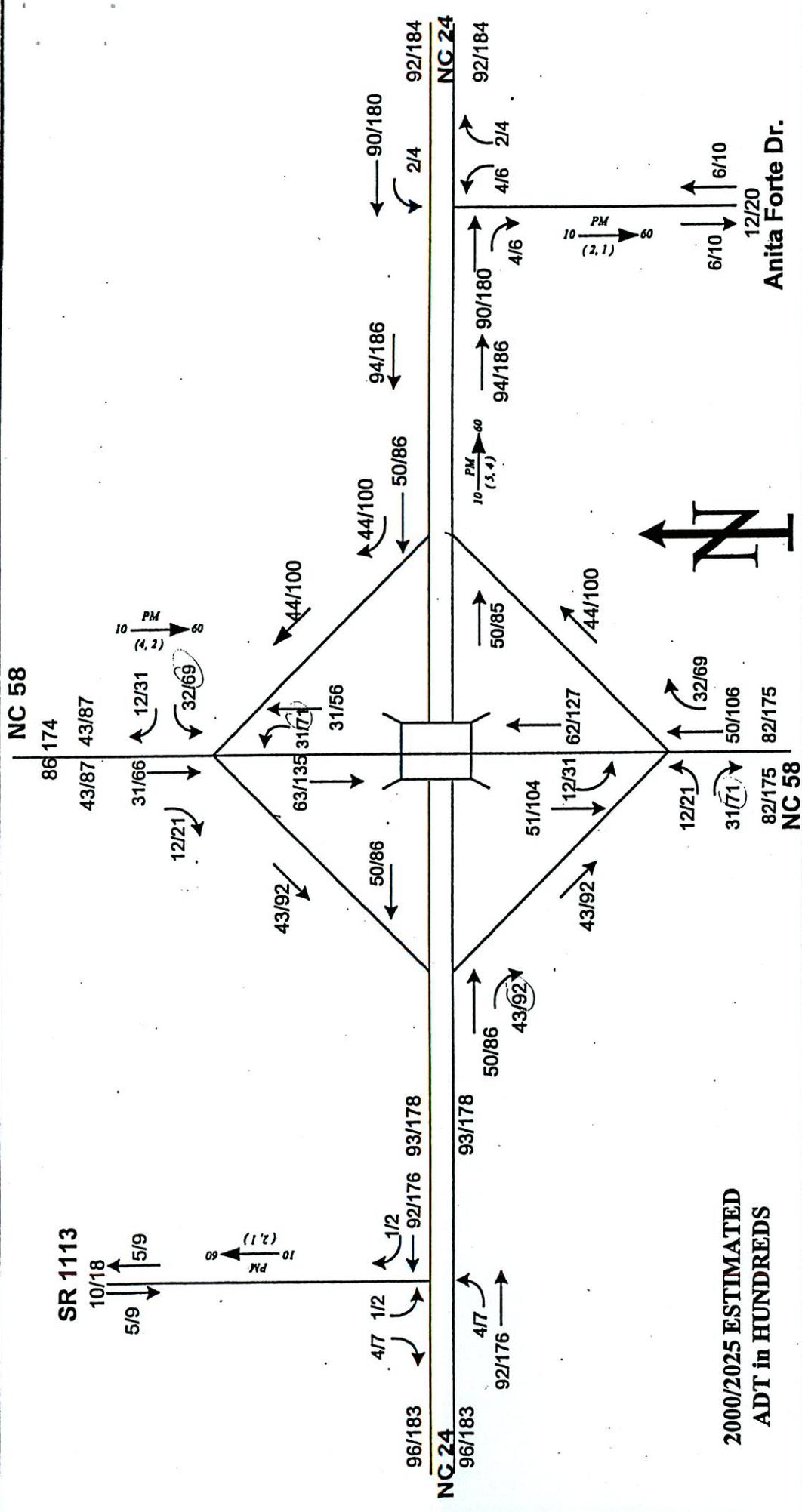
TIP # FS 0102 A **W. O. Feasibility**



VPD—# OF VEHICLES PER DAY
 ### MUCH LESS THAN ### VPD
 X MOVEMENT PROHIBITED

DBV — PM — D
 (d,t)

DBV DESIGN HOURLY VOLUME (%) - K30
 K30 = 30TH HIGHEST HOURLY VOLUME
 PM PM PEAK PERIOD
 D DIRECTIONAL SPLIT (%)
 ↑ INDICATES DIRECTION OF D
 REVERSE FLOW FOR AM PEAK
 (d,t) DUALS, TT-ST'S (%)



LOCATION: NC 24/NC 58 Intersection

PROJECT:
Proposed Interchange
Figure 2B - Estimated Traffic with Interchange

COUNTY: Carteret

DIV.: 2 **DATE:** January, 2001

TIP # FS 0102 A **W. O. Feasibility**



- ### VPD—# OF VEHICLES PER DAY
- ###- MUCH LESS THAN ### VPD
- X MOVEMENT PROHIBITED
- DHV PM (d, s) D
- DESIGN HOURLY VOLUME (%) - K30
- K30 - 30TH HIGHEST HOURLY VOLUME
- PM PM PEAK PERIOD
- D DIRECTIONAL SPLIT (%)
- ↑ INDICATES DIRECTION OF D
- REVERSE FLOW FOR AM PEAK
- (d, s) DUALS, TT-ST'S (%)

Figure 3 Environmental Screening Map

NC 58 and NC 24
Carteret County

State Project No. 6.401071, FS-0102A

LEGEND

-  Streets
-  Census Block Group Boundaries
-  9708 (4) Census Tract (Block Group)
-  Historic Sites
-  Hazardous Waste Facilities
-  Solid Waste Facilities
-  National Pollutant Discharge Sites
-  Anadromous Fish Spawning Areas
-  Proposed Critical Habitat Areas
-  NWI Wetlands
-  Q3 Floodplains
-  Wildlife Resource/Game Lands

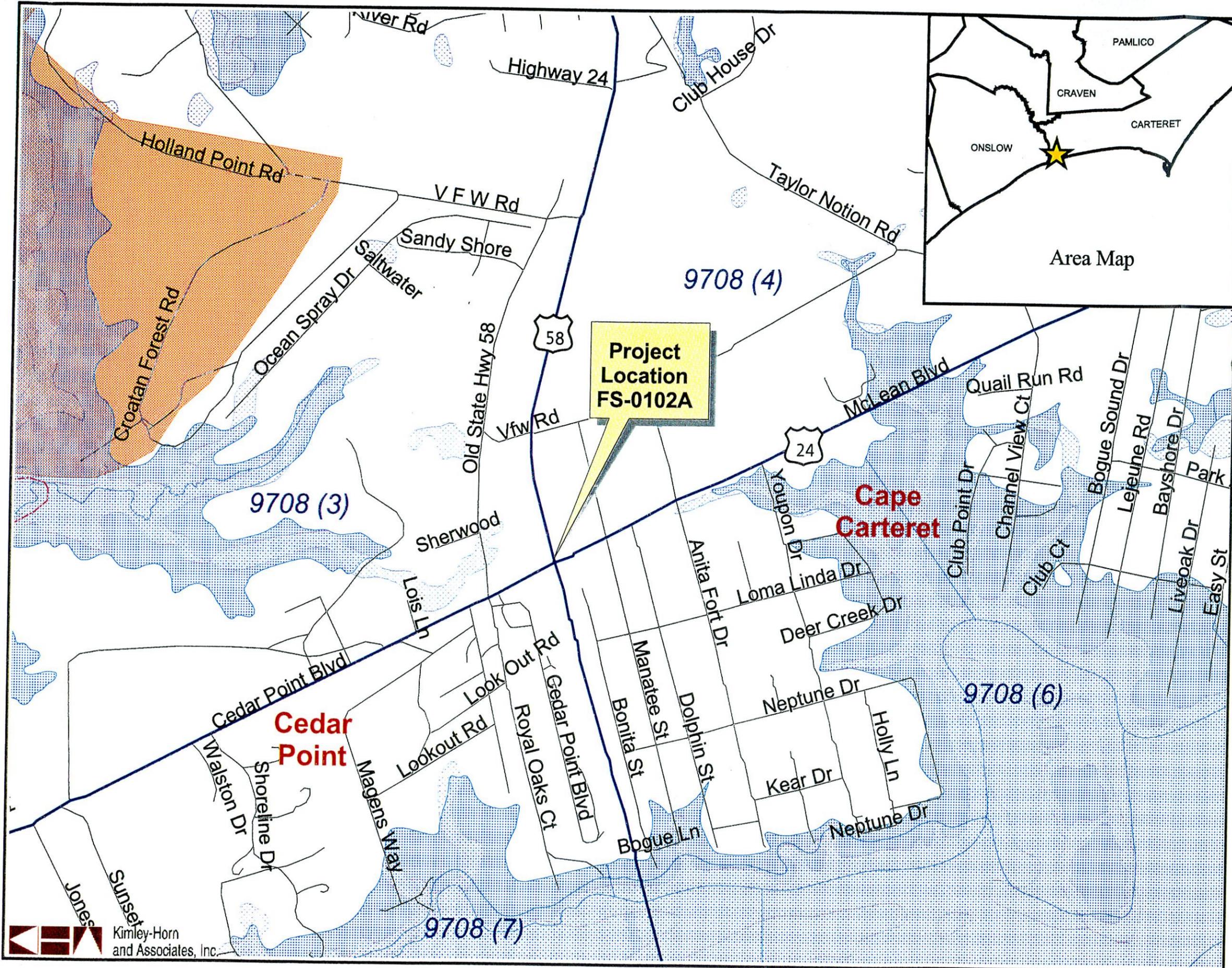
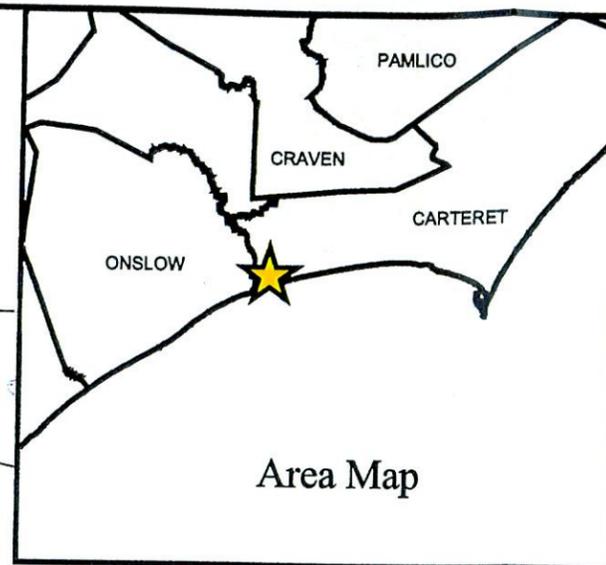
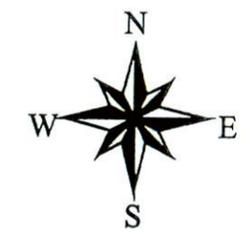
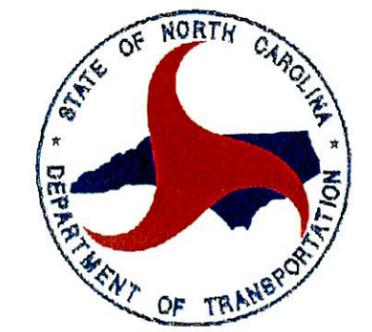


Figure 4

Photographs



Photo 1 – Looking WB on NC 24



Photo 2 – Looking WB on NC 24



Photo 3 – Looking EB on NC 24



Photo 4 – Looking EB on NC 24

Figure 5

Photographs (continued)



Photo 1 – Looking SB on NC 58



Photo 2 – Looking SB on NC 58

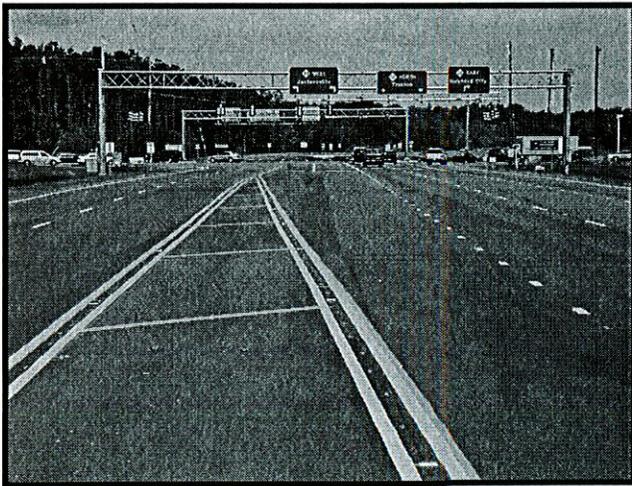
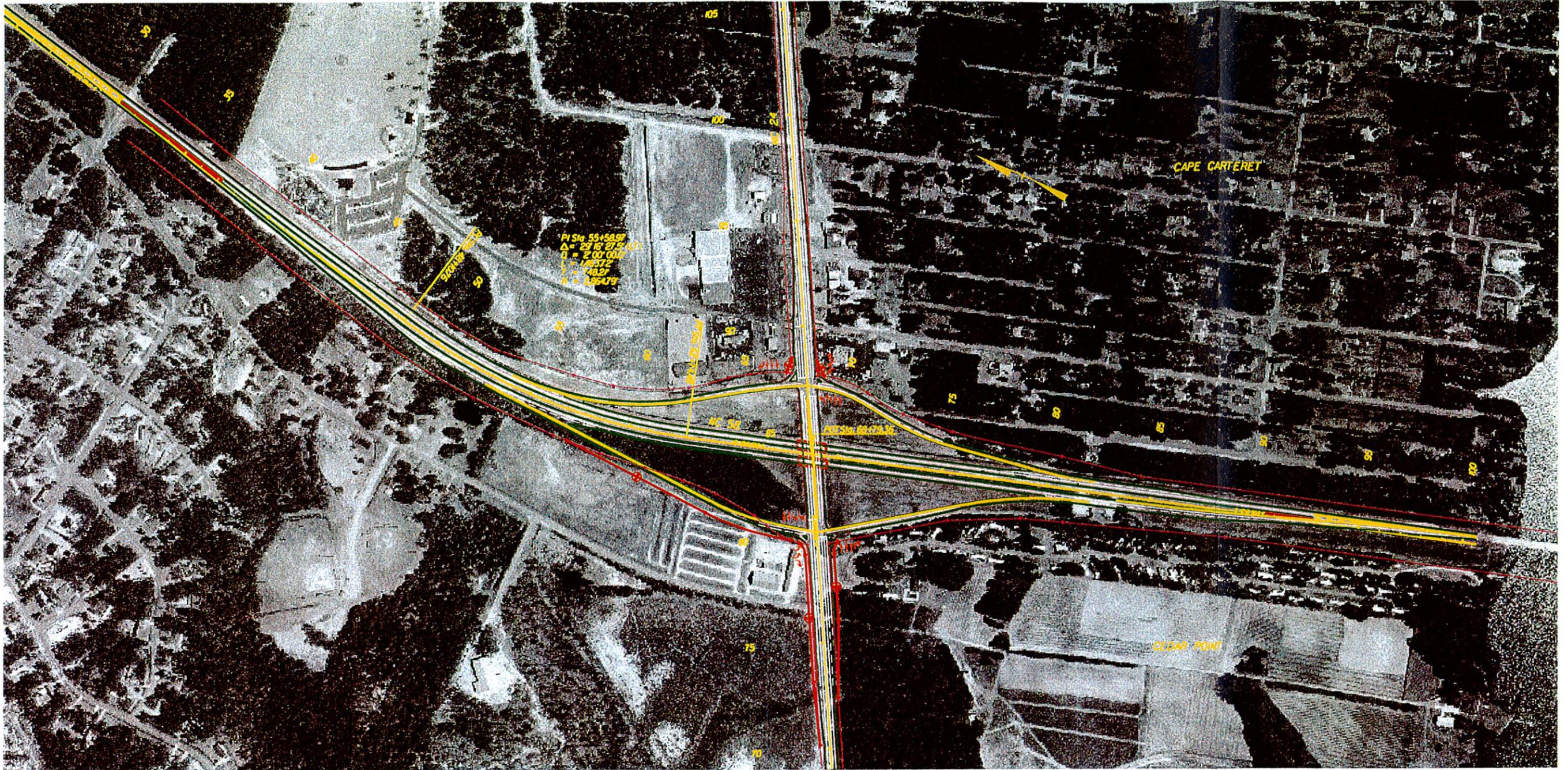


Photo 3 – Looking NB on NC 58



Photo 4 – Looking NB on NC 58



LEGEND

- Edge of Pavement
- Right of Way
- Structures

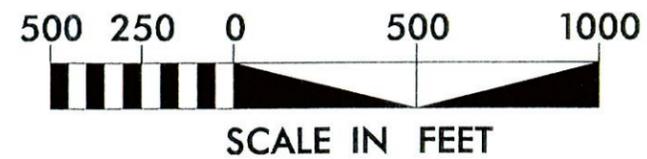
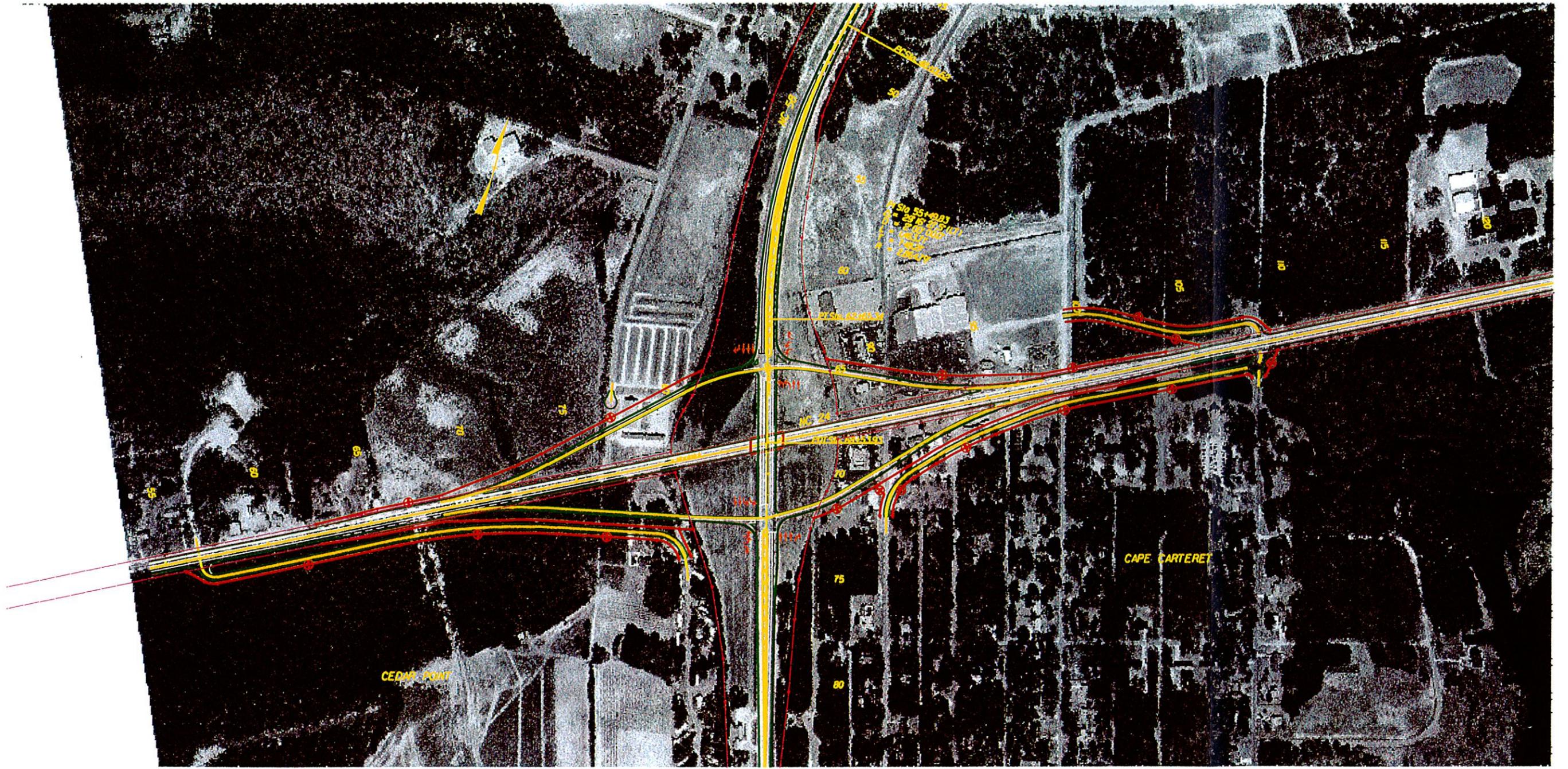


Figure 6
 Alternate 1 - NC 58 over NC 24
 NC 58 AT NC 24
 CARTERET COUNTY
 State Project No. 6.401071, FS-0102A



LEGEND

- Edge of Pavement
- Right of Way
- Structures

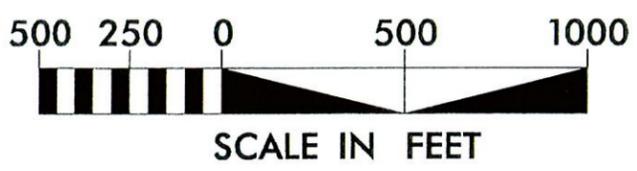


Figure 7
 Alternate 2 - NC 24 over NC 58
 NC 58 AT NC 24
 CARTERET COUNTY
 State Project No. 6.401071, FS-0102A

Board of Commissioners

Doug Brady, Chairman
Jonathan Robinson, Vice-Chairman
Bettie Bell
David Wheatly
Jimmy LaShan
Sam Stell
Mac Wells



County Manager

Pete Allen
Tel: (252) 728-8450
Fax: (252) 728-2092
petea@co.carteret.nc.us
www.co.carteret.nc.us

May 18, 2001

RECEIVED

MAY 21 2001

TPTO

Mr. Ron Hair
Project Manager
Kimley-Horn and Associates, Inc.
Post Office Box 33068
Raleigh, North Carolina 27636-3068

Re: NC 24 at NC 58 Overpass in Carteret County
State Project No. 6.401071, FS-0102A

Dear Mr. Hair:

Thank you for notifying me of the Kimley-Horn feasibility study to investigate the need and costs of a potential interchange at the NC 24 / NC 58 intersection in Western Carteret County.

I am very much familiar with the project having been Emerald Isle Mayor, Administrator and Manager for some 15 years and now Manager of Carteret County here in Beaufort.

At the present time, this interchange project is rated Number 3 on the County Transportation Improvement Committee's priority list submitted to DOT's TIP program. It ranks third behind improvements to the Gallants Channel Bridge project which I would presume would be years away from consideration because of the magnitude, expenses and permitting for such a project and it is ranked second behind the Highway 70 bypass improvements from Raleigh to the Coast and this project is currently underway.

The Hwy 24 / Hwy 58 project is critical to Carteret County because of the rapid increase in population and traffic growth in Western Carteret County. Compared to other County proposed projects, this project would be relatively inexpensive, adjacent land and right-of-way for construction is already purchased and available, the project site is high and dry and needed environmental and construction permits should be easily obtainable. To my knowledge, there is not critical wildlife habitat that would be negatively impacted by such highway construction in this immediate area.

With the statewide improvements to Hwy. 24 and especially on this Highway in this immediate Intersection area with Hwy. 58, an overpass/underpass at this intersection will greatly assist traffic flow, eliminate the dangers of a high traffic volume stoplight system and provide much needed assistance in emergency hurricane evacuation procedures from Bogue Banks.

You may wish to check with your Wilmington office that did some recent traffic work for us in Western Emerald Isle recently. They may have some numbers that could be of interest to you.

basic limitations to the times the contractor would be allowed to work. The local businesses and traffic would be very upset by the delays the construction would cause.

The Carteret County Transportation Committee sees this as a very necessary project and ranks it as their number 3 priority. They see the increased traffic from the west using NC 24 from I-40 to travel to the beaches as a need to the interchange. Also, an interchange would help the traffic flow in the event of a Hurricane evacuation. They also list the increased traffic on NC 58 from the Global Transpark as a part of the necessity to build this interchange.

We hope this input is beneficial to you in your Feasibility Study. If you have any questions or would like additional comments on this proposed project, please contact Ed Eatmon of this office at 252-830-3490.

Sincerely,

A handwritten signature in cursive script that reads "C. E. Lassiter, Jr." with a small flourish at the end.

C. E. Lassiter, Jr., P.E.

cc: B. E. Eatmon, Jr., P.E.

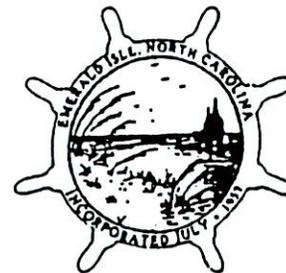
The Town of Emerald Isle

Mayor
Barbara M. Harris

Mayor Pro Tem
Emily Farmer

Commissioners
John F. Wootten
W. Emory Trainham
Jay Murphy
Pat McCraft

7500 Emerald Drive
Emerald Isle, North Carolina 28594-9320
Phone (252) 354-3424 Fax. (252) 354-5068
www.emeraldisle-nc.org



Pete Allen
Town Manager

RESOLUTION SUPPORTING FURTHER STUDY OF THE IMPACTS OF N.C. HIGHWAY 24 AND N.C. HIGHWAY 58 OVERPASS

WHEREAS, transportation improvements to N.C. Highway 24 are anticipated to make traffic flow through the N.C. Highway 24 and N.C. Highway 58 intersection acceptable; and

WHEREAS, military disembarkment delays are recognized to be due to the many traffic lights along the Highway 24 corridor between Camp Lejeune and the State Port in Morehead City; and

WHEREAS, a Feasibility Study has yet to be done that includes impacts to the Town of Emerald Isle from an Overpass at the intersection of N.C. Highway 24 and N.C. Highway 58; and

WHEREAS, the Carteret County Thoroughfare Plan includes the widening of the B. Cameron Langston Bridge to Emerald Isle and the widening of N.C. Highway 58 to 5 lanes through Town, which the Town of Emerald Isle does not support; and

WHEREAS, the Town of Emerald Isle wishes to remain a low-density family oriented community with which these transportation improvements are inconsistent; and

WHEREAS, in consideration of the above factors which have become evident since the Town passes a Resolution on September 12, 2000 supporting revising the 2002-2008 Transportation Improvement Program Priorities and the Town now desires to recant the same;

NOW, THEREFORE, BE IT RESOLVED that the Town of Emerald Isle requests a thorough Feasibility Study of the impacts of any such intersection changes, including construction impacts, on the traffic on the B. Cameron Langston Bridge and N.C. Highway 58 through the Town of Emerald Isle.

ADOPTED, this 14th day of November, 2000.

A Family Beach