

*Feasibility Study
for*

*Jacksonville Bypass Extension
Onslow County, North Carolina*

Submitted To:

*City of
JACKSONVILLE*



“Home of Camp Lejeune & MCAS New River”

Submitted by

JBM
Engineers & Planners

December 1, 1995

JBM Project No. 30295001.00

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1. PURPOSE AND NEED

Section 1 of this document identifies previous transportation studies related to the study area, information regarding the study area and a description of the proposed improvement. Subsequent sections of this document will present information regarding the description of alternatives considered, and presentation of the Recommended Alternative. The primary goals achieved by the presentation of this material is the establishment of a purpose and need for transportation improvements to US 17 within the study area and selection of the Recommended Alternative for further evaluation during preparation of subsequent environmental documentation.

1.1 Project History

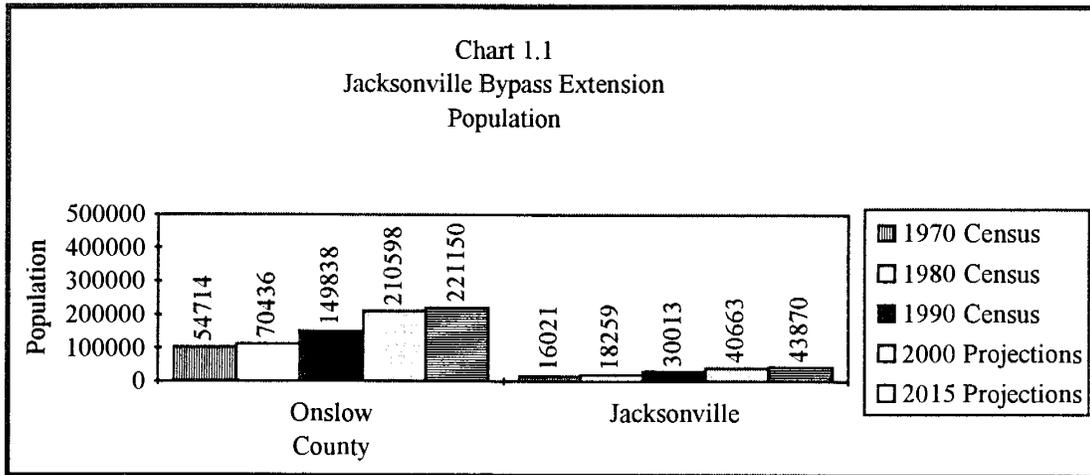
In the 1960's the North Carolina Department of Transportation (NCDOT) developed a Thoroughfare Plan¹ for the City of Jacksonville and its vicinity to serve as a guide for solving existing and anticipated traffic needs in the area. This plan was mutually adopted by NCDOT, the City of Jacksonville, and Onslow County. The latest updates to the Thoroughfare Plan were approved by NCDOT, the City of Jacksonville and Onslow County in 1993. The plan highlights improvements to major and minor roadways and included several new roadways including the Jacksonville Bypass and the extension of this bypass north of the US 17/Western Boulevard intersection.

The North Carolina Department of Transportation annually prepares a Transportation Improvement Program (TIP)². The TIP identifies funded projects for the next seven years. The Jacksonville Bypass (TIP No. U-2107) is included in the TIP with design activities in fiscal years 1995-1999. Right-of-way acquisition is scheduled to begin in fiscal year 1995, with construction starting in fiscal year 1995. The estimated completion date is fiscal year 2001.

1.2 Project Location and Description

The Jacksonville Bypass Extension study area is located in the central part of Onslow County, North Carolina (See Figure 1). Onslow County is bordered by Carteret County and Jones County to the North, Duplin County and Pender County to the west, to the south by the Atlantic Ocean, and to the east Carteret County and the Atlantic Ocean. Jacksonville (the county seat) is the largest municipality in Onslow County. The majority of employment opportunities are provided in Jacksonville and on the local military bases (Camp Lejeune and MCAS New River).

Census data indicates that the populations of Onslow County and City of Jacksonville experienced considerable growth during the 1970's and 1980's. These increases in population are shown in Chart 1.1. Population projections for the year 2000 and 2015 for Onslow County and the City of Jacksonville (also shown in Chart 1.1) indicate that continued growth in these areas is expected.



In the 1970's, population in Onslow County increased by approximately 10 percent. Growth increased during the 1980's to approximately 33 percent. Population projections for the year 2000 and 2015 indicate that Onslow County can expect population increases of approximately 41 percent during the 1990's and 5 percent during the 2000's.

During the 1970's, population in the City of Jacksonville grew by approximately 14 percent. Growth increased during the 1980's in Jacksonville by approximately 64 percent. Population projections for the year 2000 and 2015 indicate that the City of Jacksonville's population will increase by approximately 35 percent during the 1990's and 8 percent during the 2000's.

The major employer in the City of Jacksonville is the Camp Lejeune Military base. The Jacksonville economy is focused on the presence of the military and related government services associated with Camp Lejeune. Approximately 30 percent of Jacksonville's total employment is on the Camp Lejeune Military Base.

1.3 Study Area Description

The Jacksonville Bypass Extension highway improvement study area lies in the central part of Onslow County, north of the Jacksonville downtown area. The study area includes portions of the City of Jacksonville. The study area is bounded on the east by the existing US 17 roadway and extends westward to Henderson Road. The study area is bounded on the south by existing development south of Western Boulevard and to the north by Ramsey Road (SR 1324) as shown in Figure 1. This area corresponds to the area identified in the Jacksonville Thoroughfare Plan (Adopted 1993) which recommends a western bypass of existing US 17.

1.4 System Linkage

US 17 is designated in the Transportation Improvement Program (TIP) as a Key Economic Development Highway from the Virginia State Line to the South Carolina State Line. These highways are deemed to be of high importance both regionally and statewide. Qualities possessed by these routes include high traffic volumes and great economic importance and/or potential. The highway serves as a connector route linking the State of Virginia, Williamston, Washington, New Bern, Jacksonville, Holly Ridge, Wilmington and the State of South Carolina. This corridor is of vital importance to the eastern North Carolina counties it crosses for the following reasons:

- US 17 provides north-south access to the eastern North Carolina counties it crosses, as well as Virginia and South Carolina.
- US 17 is important to the tourism industry because it provides access to North Carolina's beaches and coastal communities.

Existing US 17 consists of a four-lane divided roadway both to the north and south of the study area. There are currently two signalized intersections along existing US 17 in the study area. The Jacksonville Bypass is currently expected to terminate at existing US 17 just south of the intersection of US 17 and Western Boulevard. This intersection is one of the busiest in Jacksonville providing access to the Camp Lejeune Military Base. The area surrounding this intersection has experienced rapid commercial development over the last several years. This development is expected to continue which will cause traffic conditions at this intersection to deteriorate further. The increased development and deteriorating traffic conditions at this locations make this an undesirable location for the termination of the Jacksonville Bypass project. Recent development in the study area has occurred along the alignment recommended in the thoroughfare plan, necessitating examination of alignments to the west of the existing thoroughfare alignment.

1.5 Transportation Demand

1.5.1 Traffic Demand

Existing traffic conditions along US 17 are expected to further deteriorate as development in the area and the resulting traffic demand along US 17 increases. The Jacksonville Bypass is currently expected to terminate at existing US 17 just south of the intersection of US 17 and Western Boulevard. The area surrounding this intersection has experienced rapid commercial development over the last several years. This development is expected to continue causing traffic conditions at this intersection to deteriorate. The increases in development and concentrations of through traffic on existing US 17 in the study area will strain the capacity of the existing highway network.

1.5.2 Future Planned and Programmed Road Improvements

The official planning document for the study area is the 1993 Jacksonville Thoroughfare Plan. The Thoroughfare Plan is part of the continuing planning process developed by the North Carolina Department of Transportation in cooperation with Onslow County and the City of Jacksonville. The Thoroughfare Plan was adopted by all cooperating bodies by mid-1993. Because the Thoroughfare Plan is part of the continuing planning process, it contains a statement noting "all proposed alignments and interchanges are for planning purposes only and are subject to change".

The Jacksonville Thoroughfare Plan shows proposed new roads and extensions of existing roads, as well as differentiating between major and minor thoroughfares. The Jacksonville Bypass Extension is shown on the Thoroughfare Plan to extend from existing US 17 at the current terminus of the Jacksonville Bypass, then turns northward crossing Western Boulevard, Kellum-Drum Road and Wolf Swamp before terminating at US 17 near Wolf Swamp. The Thoroughfare Plan alignment is shown as a freeway section.

Several other new roadways and roadway extensions in the vicinity of Jacksonville are proposed by the Thoroughfare Plan. These roadway improvements will serve to facilitate the circumferential movement of traffic around the municipality as well as north-south movement of traffic. These improvements include the Jacksonville Bypass and Henderson Drive Extension.

1.6 Capacity

1.6.1 Level of Service

Capacity of roadways is expressed in terms of level of service (LOS). Level of Service is defined by the 1985 Highway Capacity Manual, Special Report 209 (HCM)³ as a "quantitative measure describing operating conditions within a traffic stream, and their perception by motorists and/or passengers". For each type of facility for which analysis procedures are available, there are six levels of service defined. They are given letter designations, from A to F, with A representing the best operating conditions, and F, the worst. Basic operating characteristics for each level of service are described below:

Level of Service	Characteristics
A	Free flow conditions. Freedom to select desired speed and to maneuver within the traffic stream is extremely high. General level of comfort/convenience for motorists is excellent.
B	Stable flow conditions. Presence of other vehicles in the traffic stream becomes noticeable. Slight decline in the freedom to maneuver within the traffic stream.
C	Stable flow conditions. Ability to maneuver and operating speed in the traffic stream is significantly affected by other vehicles. General level of comfort/convenience declines noticeably at this level.
D	High density, but stable flow, approaching unstable flow. Speeds and freedom to maneuver are severely restricted. General level of comfort/convenience is poor. Small increases in traffic flow will generally cause operational problems at this level.
E	Unstable flow. Speeds reduced to a low, but relatively uniform value. Volumes at or near capacity, making freedom to maneuver within the traffic stream extremely difficult. Comfort/convenience are extremely poor, driver frustration is generally high. Small increases in traffic flow or minor perturbations within the traffic stream will cause breakdowns.
F	Forced or breakdown flow conditions. Volumes exceed roadway capacity, resulting in the formation of unstable queues. Operation within the queue is characterized by stop and go conditions. Stoppages for long periods of time occur due to traffic congestion.

Source: 1985 Highway Capacity Manual (HCM), Special Report 209 published by the Transportation Research Board.

1.7 Roadway Deficiencies

The existing thoroughfares in Jacksonville and the project vicinity are expected to exceed capacity necessitating the need for additional roadways and roadway improvements. One improvement already programmed with the North Carolina

Department of Transportation's Transportation Improvement Program is the Jacksonville Bypass. This road will function to relieve through traffic from Jacksonville's roadway system and also provide internal movement within the city.

The Jacksonville Bypass is currently proposed to end at US 17 south of the Western Boulevard intersection with an at-grade intersection. The US 17/Western Boulevard intersection is one of the busiest intersections in Jacksonville and is located in a rapidly developing area of the county. This rapid development is expected to further increase traffic demand and decrease level of service at this intersection and on the stretch of US 17 within the project limits. US 17 has been identified as by the Governor as a corridor which is vital to the creation of new jobs and economic growth.

The extension of the Jacksonville Bypass to the Ramsey Road area will serve several functions. It will provide increased efficiency for through traffic and will provide an alternative route to traffic currently using Western Boulevard to travel between the Camp Lejuene area and Richlands. Both of these functions will serve to improve the capacity at the Western Boulevard / US 17 intersection.

1.8 Social Demands and Economic Development

The project area is in one of the most rapidly developing areas of Onslow County. Recent commercial growth along both US 17 and Western Boulevard through the study area have contributed in the decline of level of service on the existing roadway system. Residential communities are also in development and planning stages throughout the study area. Two school facilities (elementary and middle), a fire station, and a recreational facility are currently planned on city-owned property in the study area along Western Boulevard. This facility is planned to be linked by roadway to communities located on US 17 and south of Western Boulevard.

The growth in residential, commercial and industrial land uses corresponds to increases in population and traffic demand on area roadways thus necessitating improvements to the existing roadway system.

1.9 Summary

Chapter 1 of this document presents elements which illustrate the need for an improved roadway system in the Jacksonville area. Development of the Jacksonville Bypass and the US 17 corridor statewide has been identified as a primary goal of many state and local transportation plans. The bypass extension would provide a vital link in this corridor which would aid in the movement of traffic in the Jacksonville area.

The Jacksonville Bypass is currently proposed to end at US 17 south of the Western Boulevard intersection with an at-grade intersection. The US 17/Western Boulevard intersection is one of the busiest intersections in Jacksonville and is located in a rapidly developing area of the county. This rapid development will further increase traffic demand and decrease the level of service at this intersection and on US 17 within the project limits. US 17 has been identified as by the Governor as a corridor which is vital to the creation of new jobs and economic growth.

The extension of the Jacksonville Bypass to the Ramsey Road area will serve several functions. It will provide increased efficiency for through traffic and will provide an alternative route to traffic currently using Western Boulevard to travel between the Camp Lejuene area and Richlands. Both of these functions will serve to improve the capacity at the Western Boulevard / US 17 intersection.

Interchanges located at US 17 and Western Boulevard would provide for increased and improved access from areas to the west and east to the study area. Additional growth anticipated in the study area would benefit from improved access to the areas north of Jacksonville while realizing the goals of long-range planning objectives.

2. DESCRIPTION OF ALTERNATIVES

Chapter 2 utilizes the information obtained in Chapter 1 of this report to determine a Recommended Alternative for improvements to the Jacksonville Bypass Extension study area. This chapter defines the "land suitability mapping" procedures used to determine the preliminary bypass corridors considered for analysis. The preliminary bypass corridors identified are evaluated using a matrix analysis. The results of this analysis is the selection of a Recommended Alternative.

2.1 Construction Alternatives

2.1.1 General Construction Corridors

The geographical limits of the study area are shown on Figure 1. The western boundary of the study area was limited by a large wetland area and the proposed Henderson Drive Extension. A bypass located beyond this limit would not be effective in relieving the traffic congestion experienced by existing US 17 due to an increase in travel time. Existing US 17 represented the study area boundary on the east. Additional lanes provided by an elevated roadway above existing US 17 was not considered as an option due to the high cost associated with this type of road construction.

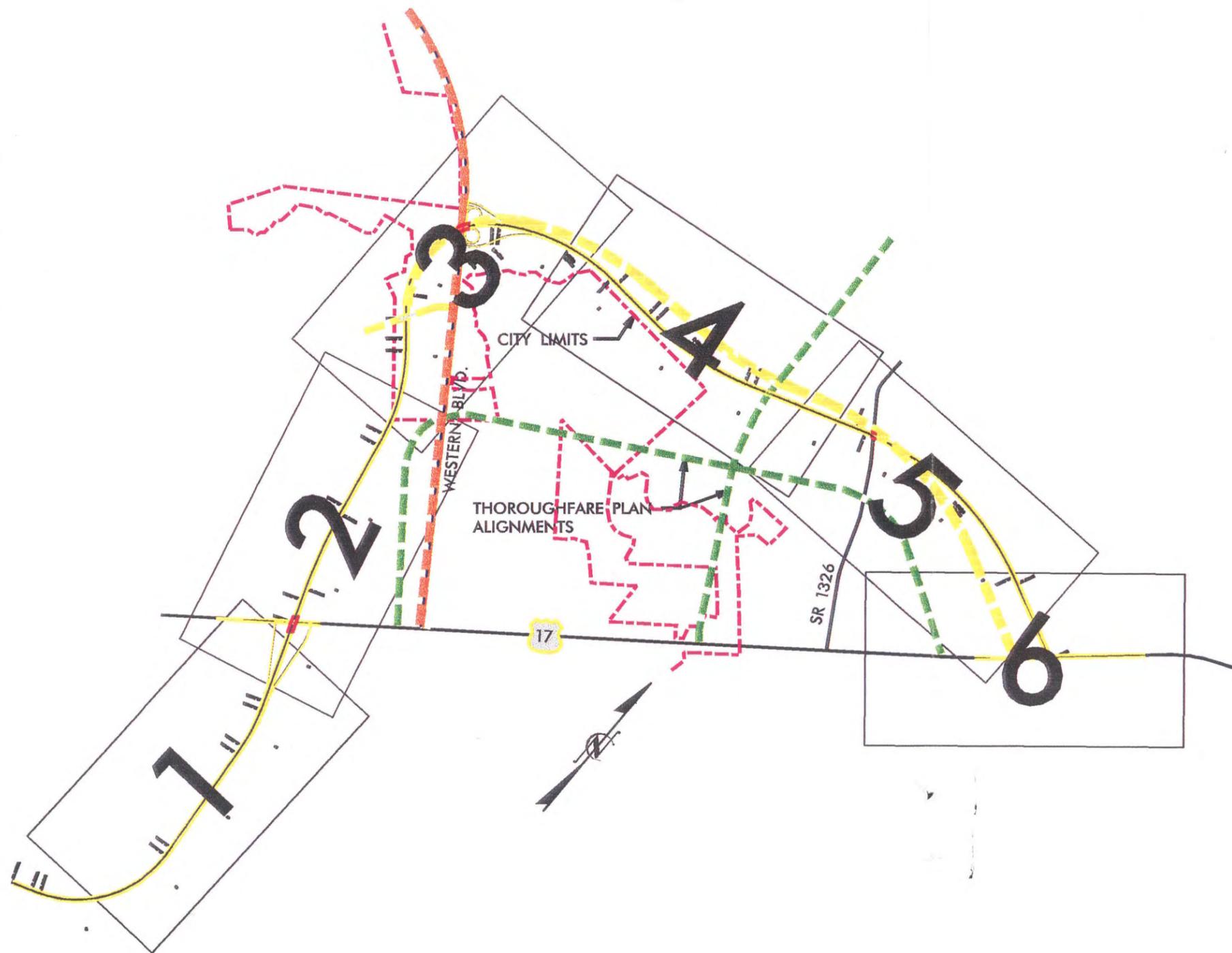
The method utilized to locate a roadway in a general study area is Land Suitability Mapping (LSM). The LSM process involves mapping known limiting factors on aerial mapping. Limiting factors, or factors which would inhibit construction of the roadway are listed below:

- threatened/endangered wildlife and plant species
- wetlands
- schools
- communities, churches and cemeteries
- mineral resources
- hazardous waste sites
- National Register Listed Historic/Archaeological sites
- parks/recreational areas
- existing and future planned land uses
- planned infrastructure improvements
- flood plain boundaries
- public service facilities
- utilities

Areas best suited for roadway development became evident after plotting all known factors (shown on Figure 2). These areas are then connected to produce general study corridors (also shown in Figure 2).

Three corridors were identified as a result of the Land Suitability Mapping. The corridors are described below.

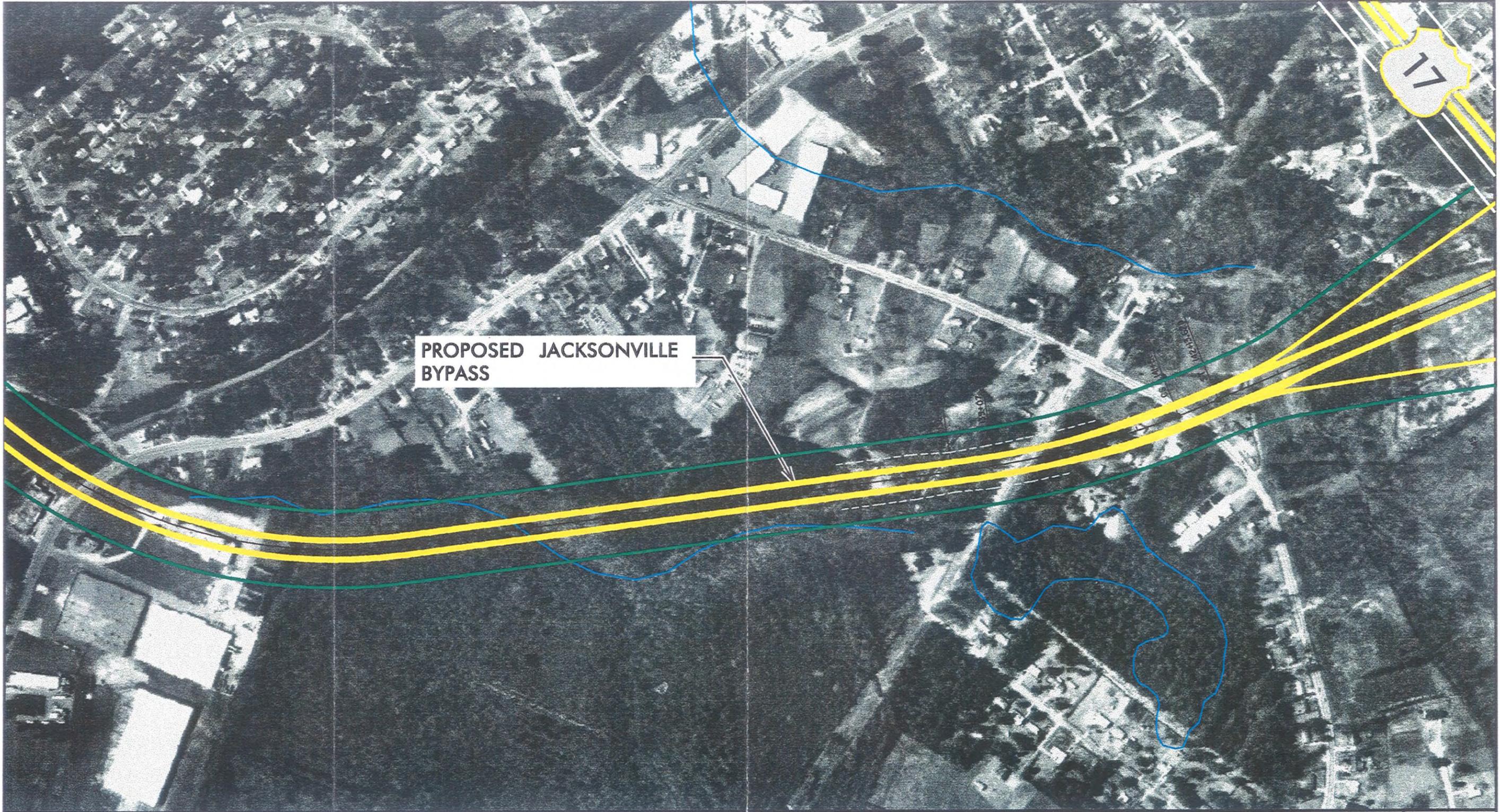
Alternative 1. Alternative 1 begins at existing US 17 at the proposed terminus to the Jacksonville Bypass and extends westerly to Western Boulevard just west of the proposed Jacksonville Commons Recreation / School facility. The alternative



- LEGEND**
- PROPOSED ROADWAY
 - PROPOSED BRIDGE
 - PROPOSED RIGHT-OF-WAY
 - ALTERNATE NO. 1 ROADWAY
 - ALTERNATE NO. 1 RIGHT-OF-WAY
 - CITY LIMITS
 - THOROUGHFARE PLAN ALIGNMENTS
 - FIRE DEPT./POLICE DEPT.
 - WATER FACILITIES
 - SANITARY SEWER FACILITIES
 - CHURCHES / CEMETERIES
 - ▨ FLOOD PLAIN
 - ▨ WETLANDS

CORRIDOR MAP INDEX
 US 17 JACKSONVILLE BYPASS EXTENSION
 CITY OF JACKSONVILLE
 ONSLOW COUNTY, NORTH CAROLINA

FIGURE 1



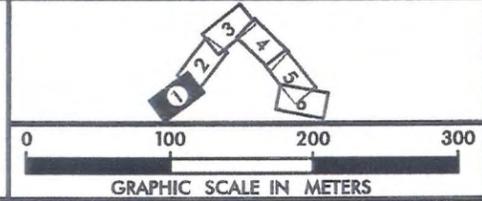
PROPOSED JACKSONVILLE BYPASS

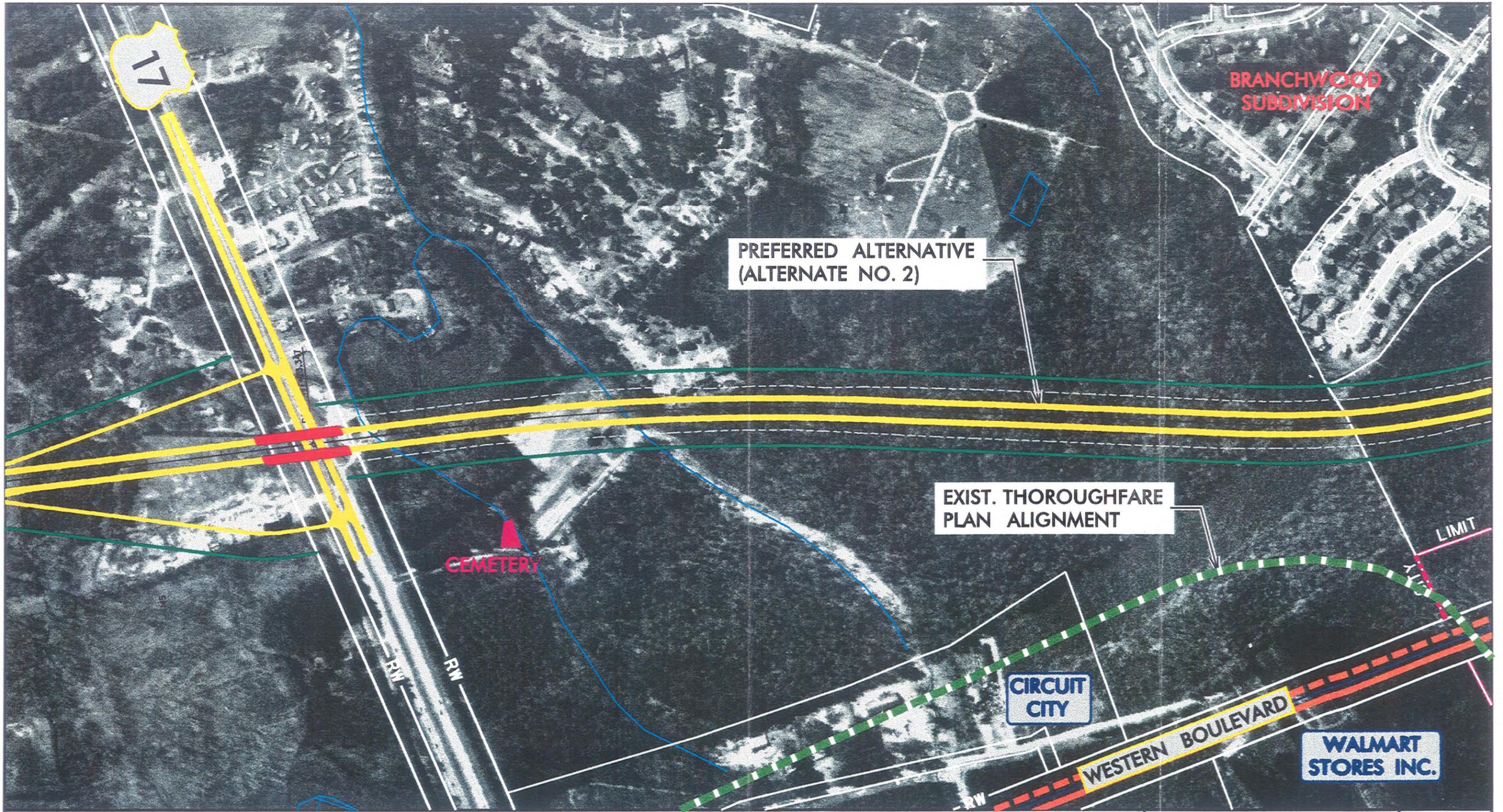
17

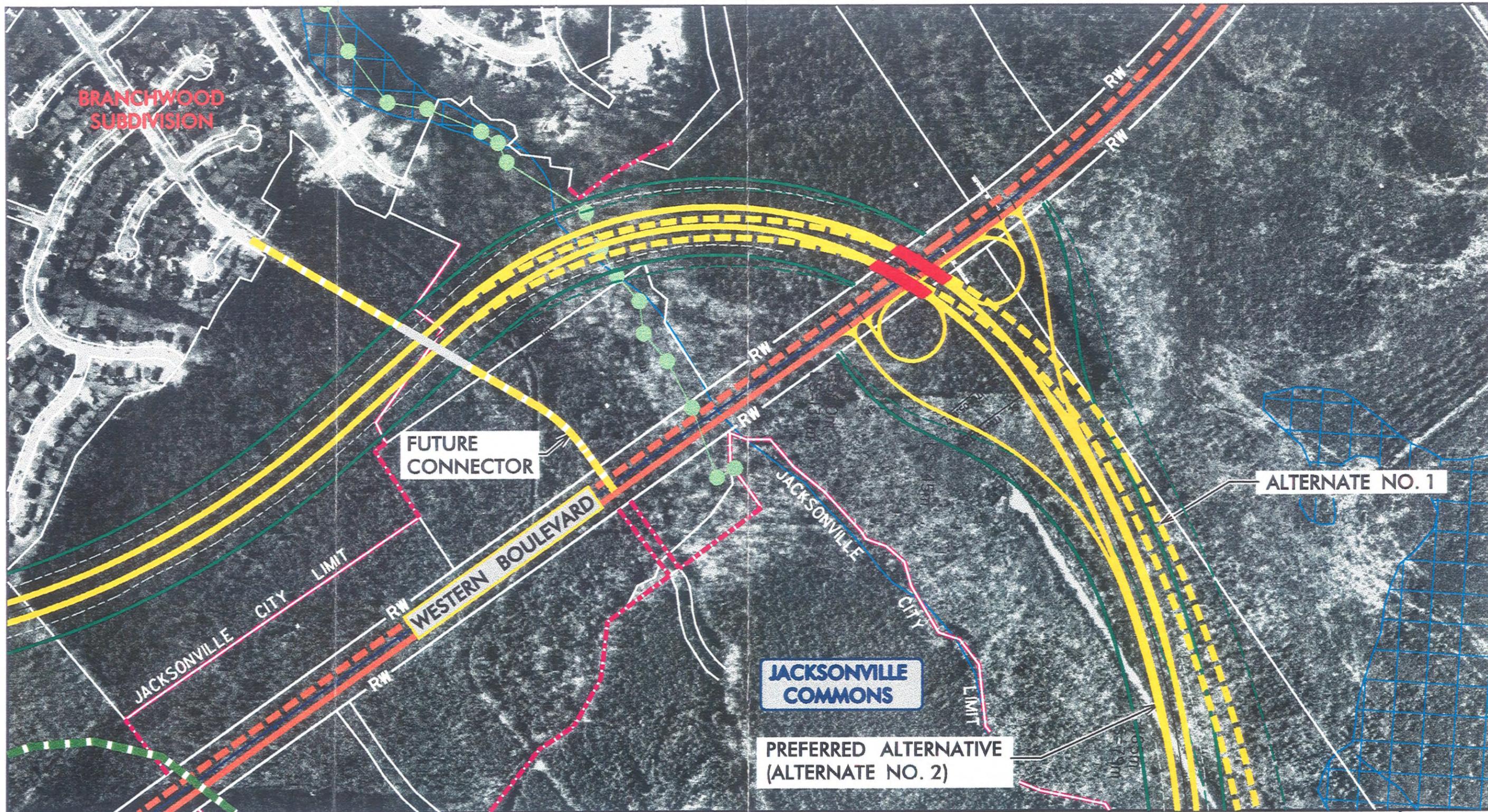


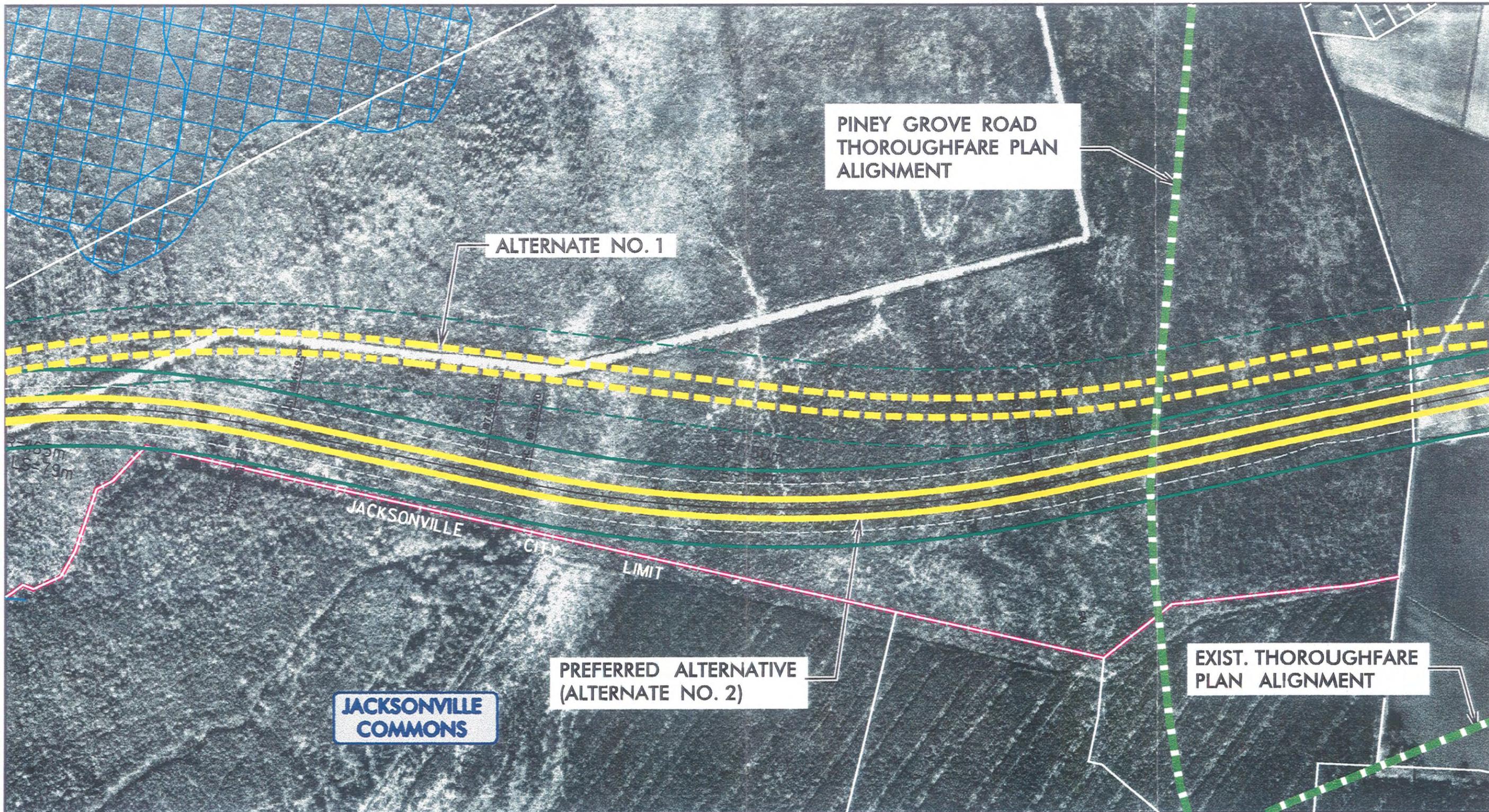
US 17 JACKSONVILLE BYPASS EXTENSION
CITY OF JACKSONVILLE
ONslow COUNTY, NORTH CAROLINA

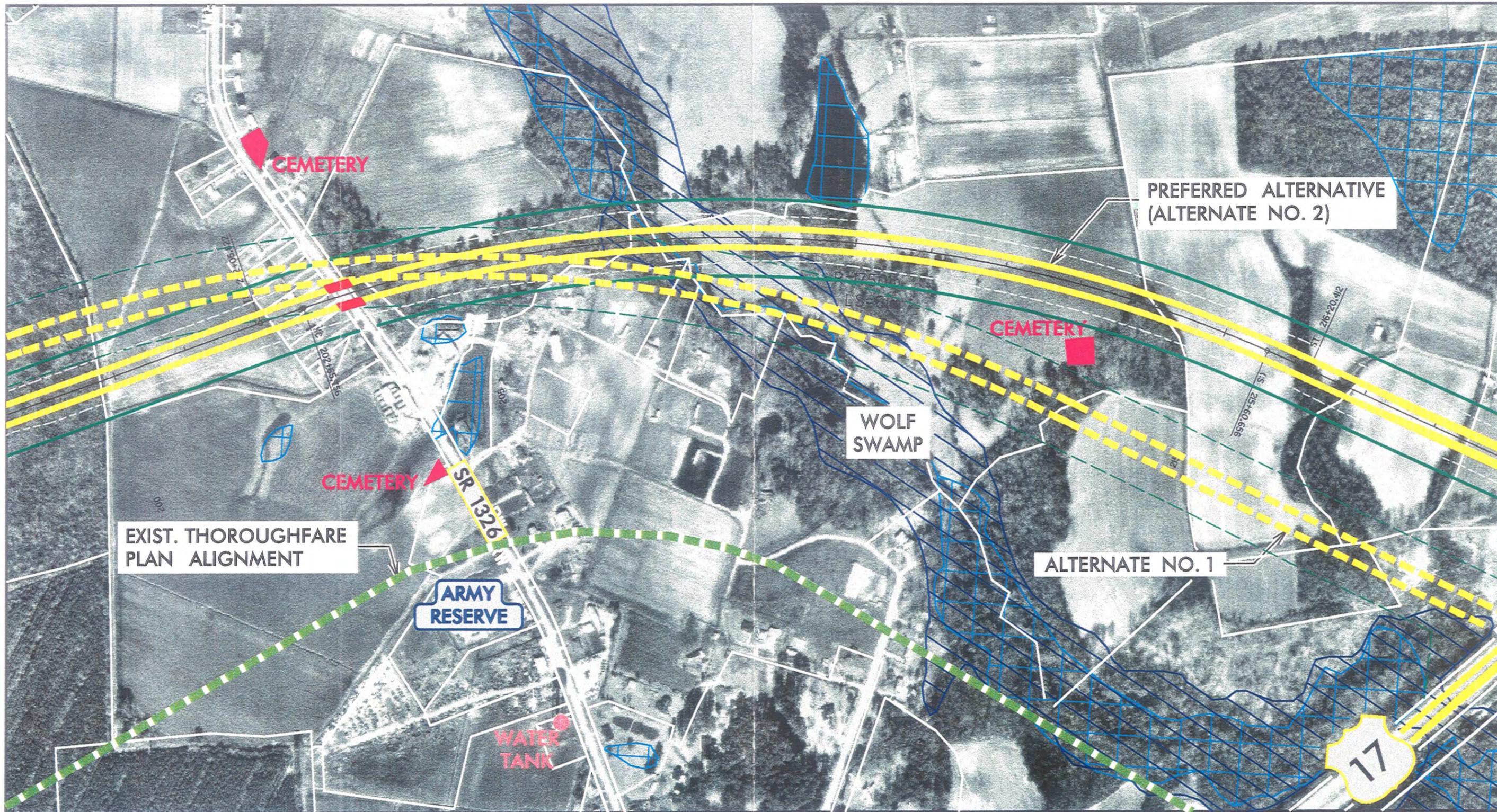
FIGURE 2

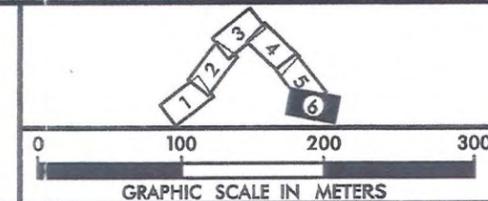
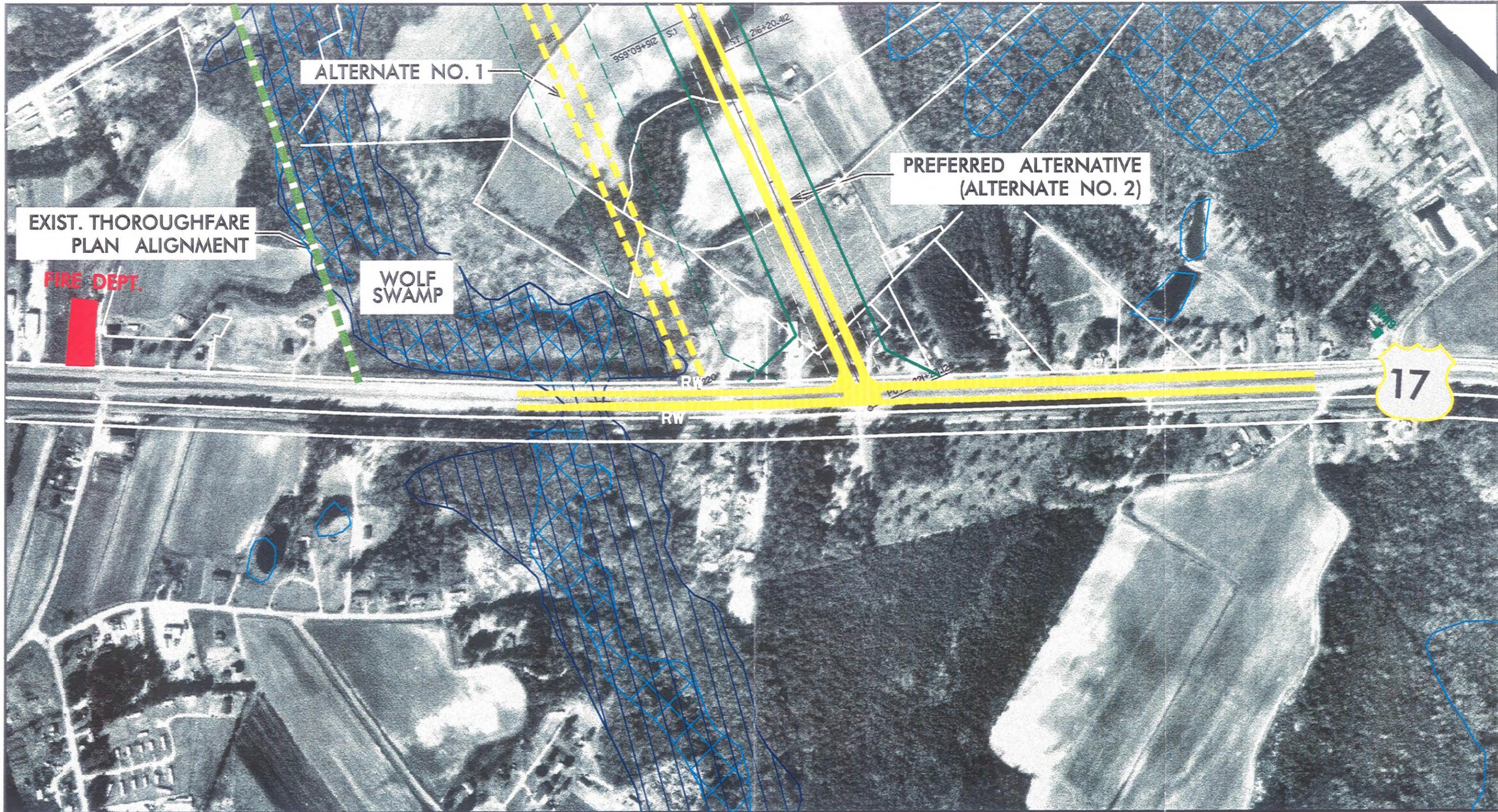












then proceeds northerly crossing Kellum-Drum Road (SR 1326) and Wolf Swamp, turning easterly and terminating at US 17 just north of Wolf Swamp.

Alternative 2 (Preferred Alternative) Alternative 2 follows the same basic alignment as Alternative 1. Differences in the alignment occur in the area of the proposed recreation facility property through the project terminus at US 17 north. Alternative 2 is closer to the property line of the proposed recreational facility and US 17 until it crosses Kellum-Drum Road (SR 1326). Alternative 2 then crosses Alternative 1 and terminates at US 17 north of Wolf Swamp and Alternative 1.

A third alternative was examined which followed the Alternative 1 and 2 alignment through the Western Boulevard interchange. The alignment then proceeded northerly along the proposed thoroughfare plan alignment for Henderson Drive Extension and then following Ramsey Road (SR 1324) to US 17. This alternative was eliminated from further consideration for two reasons: 1) the longer travel time required to take the bypass verses using existing US 17 and 2) the number of relocations (a minimum of eighteen residences) associated with the alternative. In addition, once the project intersected Henderson Drive Extension, the roadway would be a boulevard rather than the freeway proposed in the Thoroughfare Plan.

Interchanges are proposed for the following locations:

- US 17 at the Jacksonville Bypass
- Western Boulevard

Interchange locations were selected on the basis of area traffic demand, provision of adequate access to the study area and spacing criteria for interchanges. The interchange at US 17 is proposed as a partial diamond with access to and from the east. The interchange at Western Boulevard is proposed to be a partial cloverleaf in the northern quadrants. Both interchanges are shown on Figure 2.

2.1.2 Travel Time Study

A study to compare travel times was conducted on the three alternatives to determine whether the alternatives would result in travel times lower than the existing US 17 corridor. Travel conditions were assumed to operate at between a level of service C and D on the existing route for design year peak-hour traffic for the purposes of the analysis. Travel conditions on the Bypass Extension are expected to operate at a level of service B during the design year peak-hour. Results of the travel time study for the three alternatives is shown in Table 2.1.

**Table 2.1
Jacksonville Bypass Extension
Travel Time Study**

Alignment	Travel Time Along Alignment			Travel Time Along Existing US 17		
	Distance along Alignment	Estimated Travel Speed (mph)	Travel Time	Distance along US 17	Estimated Travel Speed	Travel Time
Alignment 1	4.506	57	4.743	2.626	37	5.258
Alignment 2	4.597	57	4.839	2.888	37	5.683
Alignment 3	5.492	45	8.323	2.92	37	5.74

2.1.3 Traffic Projections

Projected traffic volumes for the design year (2020) were estimated based on traffic projections shown in the Thoroughfare Plan. Traffic volumes on existing US 17 within the study area are expected to increase to 29,400 vehicles per day (VPD) with the Bypass Alternative. Projected traffic volumes on the Bypass Extension range between 21,600 VPD and 45,000 VPD.

Design year traffic volumes on existing US 17 in the study area can be expected to exceed 51,000 VPD without the Bypass Extension.

**Table 2.2
Jacksonville Bypass Extension
Traffic Projections**

Roadway	Location	Estimated 2020 ADT
US 17	North of Bypass Extension	30,200
	US 17 North to Western Boulevard	32,200
	Western Boulevard to US 17 South	38,800
	South of Bypass Extension	43,200
Bypass	US 17 North to Western Boulevard	21,600
	Western Boulevard to US 17 South	25,400
	East of US 17	45,000
Western Boulevard	West of Bypass	23,800
	Bypass to US 17	26,800
	East of US 17	37,800

2.1.4 Roadway Design Criteria

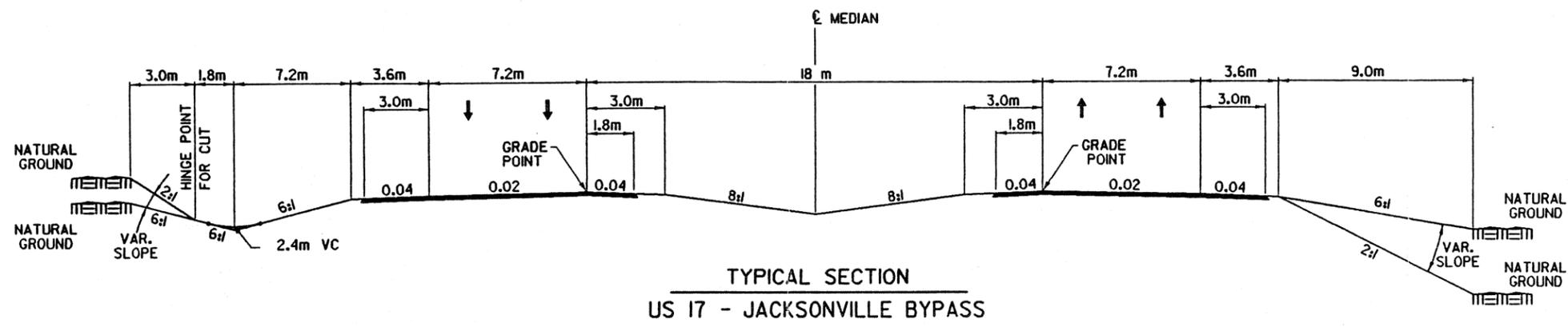
The roadway design criteria outlined in Table 2.3 was used in conjunction with the traffic projections to determine roadway geometrics for the proposed bypass alternatives. A four-lane limited access facility with a minimum 100 meter (350 foot) right-of-way was determined to be adequate for the projected needs of the study area. Typical sections are shown in Figure 3.

Table 2.3
Design Criteria
Jacksonville Bypass Extension
Onslow County, North Carolina

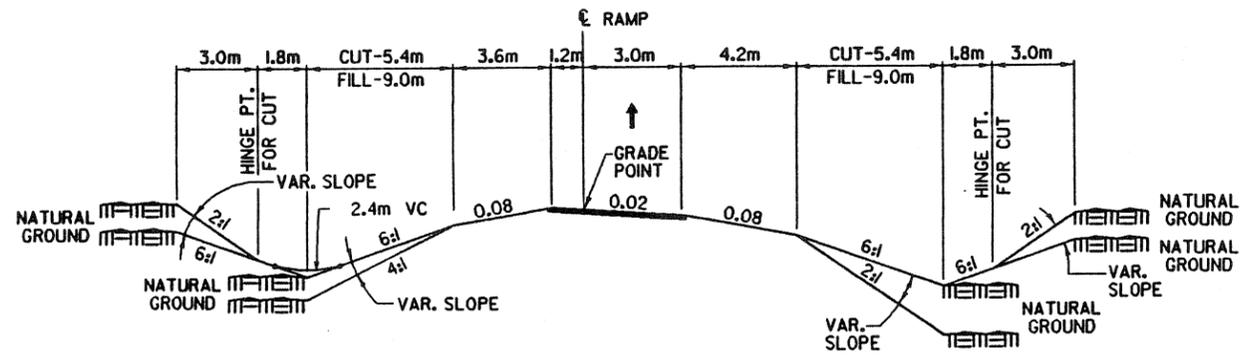
DESCRIPTION	VALUE	REFERENCE
General		
Functional Classification	Freeway	
Terrain	Level	
Median Width	18 m	
Lane Widths		
Freeway	3.6 m	
Interchange Turn Lane	3.6 m	
Ramp, Single Lane	4.2 m	DM 8-2
Left Turn Storage	3.6 m	
Shoulder Widths		
Freeway	3.6 m (out), 3.0 m (in)	
Bridge	3.6 m (out), 3.0 m (in)	
Ramp	4.2 m (out), 3.6 m (in)	
Loops	4.2 m (out), 3.6 m (in)	
Design Speed		
Freeway (Rural)	110 km/h	DM 1-1B
Ramps (Use Upper Range)	60 km/h - 100 km/h	DM 8-3
Loops	40 km/h - 50 km/h	DM 8-1
Horizontal Alignment		
Freeway (Rural)		
e_{max}	0.10	DM, 1-12, T-5
Radius (min)	455 m	DM, 1-12, T-4A
Ramps		
e_{max}	0.08	DM, 1-12, T-5
Radius (min)	125 m - 395 m	DM, 1-12, T-4A
Loops		
e_{max}	0.08	DM, 1-12, T-5
Radius (min)	45 m - 75 m	DM, 8-1
Vertical Alignment		
Freeway (Urban)		
Grade (max)	3%	DM, 1-12, T-3
K_{crest} (Use Upper Range)	80 - 151	DM, 1-12, T-1
K_{sag} (Use Upper Range)	43 - 62	DM, 1-12, T-1
Ramps		
Grade (max)	5% - 6%	DM, 8-4
K_{crest} (Use Upper Range)	62 - 105	DM, 1-12, T-1
K_{sag} (Use Upper Range)	37 - 51	DM, 1-12, T-1
Loops		
Grade (max)	6% - 10%	DM, 8-4
K_{crest} (Use Upper Range)	9 - 10	DM, 1-12, T-1
K_{sag} (Use Upper Range)	11 - 12	DM, 1-12, T-1
Vertical Clearances		
Over Interstates, Freeways and Arterials	5.0 m - 5.2 m	DM, 6-1
Over Local and Collector Roads and Streets	4.5 m - 4.7 m	DM, 6-1
Over All Railroads	7.0 m - 7.2 m	DM, 6-1
Over Design High Water of Major Rivers	0.6 m	DM, 6-1



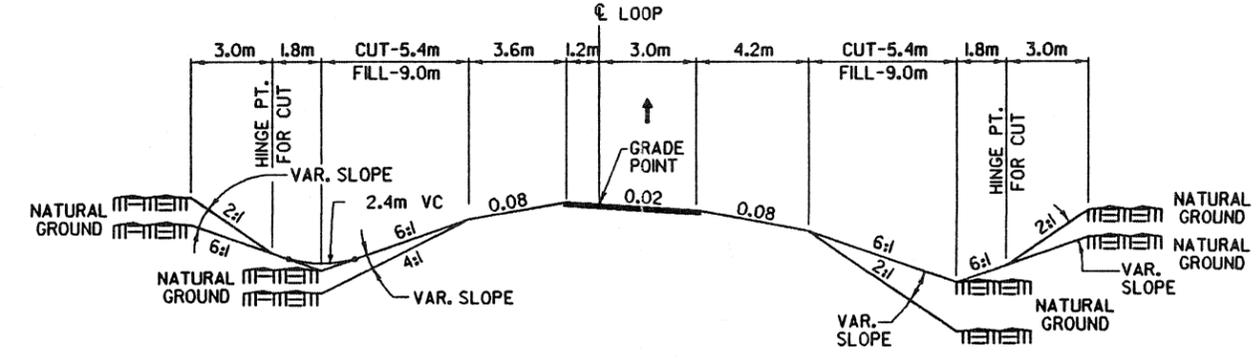
PROJECT REFERENCE NO.	SHEET NO.
B-2501	
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	



TYPICAL SECTION
US 17 - JACKSONVILLE BYPASS



RAMP TYPICAL SECTION
US 17 - JACKSONVILLE BYPASS



LOOP TYPICAL SECTION
US 17 - JACKSONVILLE BYPASS

2.1.5 Traffic Evaluations of Construction Corridors

The projected average daily traffic volumes for the Jacksonville Bypass Extension for the design year 2020 are shown in Table 2.2. Traffic capacity analyses were performed for interchange locations, freeway segments and the US 17 North Termini for design year traffic. Capacity analyses were performed utilizing the methodology in the 1985 Highway Capacity Manual. Results of the analyses reveal that the roadway system will operate at a level of service C or better except for the US 17 Exit Ramp during the PM peak hour which will operate at level of service D.

Table 2.4
Jacksonville Bypass Extension
2020 Traffic Capacity Analysis
AM Conditions - PM Conditions

Signalized Intersection	V/C Ratio	Delay	Level-of-Service
Western Boulevard NB Ramps	.705 - .659	16.3 - 16.4	C - C
Western Boulevard SB Ramps	.064 - .582	17.9 - 19.7	C - C
US 17 North Terminus	.713 - .778	18.1 - 18.1	C - C
US 17 Exit Ramp	.846 - 1.06	21.2 - 34.9	C - D
US 17 Entrance Ramp	.774 - .589	15.7 - 6.3	C - B

Table 2.5
Jacksonville Bypass Extension
2020 Traffic Capacity Analysis (Freeway Segments)

Segment	V/C Ratio	Density (pcpmp)	Level-of-Service
US 17 to Western Boulevard	.44	15	B
Western Boulevard to US 17 North	.38	13	B

3. PRELIMINARY ENVIRONMENTAL DATA

Chapter 3 summarizes the environmental information collected for preliminary evaluation of the alternatives. Included is a description of how the information was gathered, what information was obtained and how it was used.

3.1 Natural Environment

A preliminary assessment was performed to evaluate natural resource issues which may influence the selection of a viable bypass alternative within the study area. A variety of resources were used to support this initial effort including: United States Geological Service (USGS) mapping, Soil Conservation Service (SCS) soils information on Onslow County, National Wetland Inventory (NWI) mapping and aerial photography.

3.1.1 Wetlands

Wetlands in the study area consist of one primary type, Palustrine forested, deciduous wetlands (PF01). These are concentrated within flood plain limits of streams and creeks.

The majority of wetlands in the study area are bank-to-bank (B-B) systems. Larger wetland systems (B-B with associated flood plains) occur near the terminus (Wolf Swamp) of the project at US 17 north. Alternative 1 impacts the floodplains of this area.

Several ponds occur within the study area. It is expected that none of these ponds will be impacted by either Alternative 1 or Alternative 2.

The largest area of wetlands within the study area is located to the west of Alternatives 1 and 2. Neither Alternative 1 or Alternative 2 are expected to impact this wetland area.

3.1.2 Rare & Endangered Species

Information on federally protected species was obtained from the files maintained by the North Carolina Natural Heritage Program (NCNHP), and the Department of Environment, Health and Natural Resources (DEHNR) were reviewed for documented sightings of state or federally listed species and locations of significant natural areas.

Nine federally listed threatened / endangered species and nineteen candidate species are listed for Onslow County as of January 1995.

Threatened and Endangered Species

American Alligator (*Alligator mississippiensis*)
Logger Head Turtle (*Caretta caretta*)
Piping Plover (*Charadrius melodus*)
Green Turtle (*Chelonia Mydas*)
Eastern Cougar (*Felis concolor cougar*)
Red-Cocked Woodpecker (*Picoides borealis*)

Seabeach Amaranth (*Amaranthus pumilus*)
Rough-Leaf Loosestrife (*Lysimachia asperulifolia*)
Cooley's Meadowrue (*Thalictrum cooleyi*)

Status Review (Candidate Species)

Bachman's Sparrow (*Aimophila aestivalis*)
Henslow's Sparrow (*Ammodramus henslowii*)
Southern Hognose Snake (*Heterodon simus*)
Black Rail (*Laterallus jamaicensis*)
Mimic Glass Lizard (*Ophisaurus nemicus*)
Carolina Gopher Frog (*Rana capito capito*)
Croatan Caryfish (*Crocambarus plumimanus*)
Carolina Spleenwort (*Asplenium heteroresiliens*)
Hirst's Panic Grass (*Dichantherium Sp.*)
Venus Flytrap (*Dionaea muscipula*)
Pondspice (*Litsea aestivalis*)
Boykin's Lobelia (*Lobelia Boykinii*)
Loose Waterfoil (*Myriophyllum laxum*)
Carolina Grass-of-Parnassus (*Parnassia caroliniana*)
Awned Meadow-Beauty (*Rhexia aristosa*)
Thorne's Beaksedge (*Rhynchospora thornei*)
Carolina Goldenrod (*Solidago Pulchra*)
Spring-Flowering Goldenrod (*Solidago verna*)
Carolina Asphodel (*Tofieldia Glabra*)

The **American Alligator** (*Alligator mississippiensis*) is typically found in fresh to slightly brackish lakes, ponds, rivers and marshes in coastal plains and tidewater areas. There have been no sightings of American Alligator in the study area. Wolf swamp which is located near the northern project terminus should be examined in further environmental documentation for the existence of the species. Since the project alternative crosses Wolf Swamp, impacts to the species would be minimal.

Logger Head Turtles (*Caretta carretta*) nest on beaches and forage in the oceans and sound areas of the tidewater region. Since no beaches occur within the study area and the study area is not adjacent to the ocean or sound, suitable habitat will not be affected.

The **Piping Plover** (*Charadrius melodus*) is a bird found in the tidewater area on beaches and island-end flats. Since no beaches or island-end flats occur within the study area, suitable habitat will not be affected.

Green Turtles (*Chelonia Mydas*) nest on beaches and forage in the oceans and sound areas of the tidewater region. Since no beaches occur within the study area and the study area is not adjacent to the ocean or sound, suitable habitat will not be affected.

The **Eastern Cougar** (*Felis concolor cougar*) is typically found in remote areas with extensive forests. Due to the lack of extensive forests and the urbanized character of the study area, suitable habitat for the Eastern Cougar was not found.

The **Red-cockaded Woodpecker** (*Picoides borealis*) nests in old-growth pine stands, usually with very low understory. The study area is rapidly developing and no old growth pine stands were observed, therefore suitable habitat is not likely to be affected.

The **Seabeach Amaranth** (*Amaranthus pumilus*) is a vascular plant found in coastal areas on ocean beaches and island-end flats. Since suitable habitat is unlikely in the study area the species will not be affected.

Rough-Leaf Loosestrife (*Lysimachia asperulifolia*) grows only in wet, poorly drained soils which have high levels of peat or other organic matter. It is endemic to the coastal region in pocosin and savanna ecotones. It is a 1 to 2 foot tall perennial plant in the Primrose family with showy, yellow flowers. Since the study area consists predominately of wet pine flatwoods, suitable habitat is unlikely.

Cooley's Meadowrue (*Thalictrum cooleyi*) is a perennial plant in the Buttercup family found in coastal regions supporting wet savanna ecotones and open bogs. It is dependent on some form of disturbance to maintain its habitat. Since the study area consists predominately of wet pine flatwoods, suitable habitat is unlikely.

3.2 Cultural Impacts

3.2.1 Residential Development

Two main concentrations of residential development exist in the project area. One area is located between the alternatives and existing US 17 (Northside and adjacent developments). The second concentration exists to the south of the alternatives. Residential relocations are anticipated in one development south of the alignment near the US 17 tie-in with the Jacksonville Bypass and on Kellum-Drum Road where the alternatives cross. Noise impacts may be experienced at the remaining residential developments immediately adjacent to the bypass alternatives. The extent of impacts by noise to the properties and effective mitigation options (noise barriers, etc.) should be considered in further environmental documentation.

3.2.2 Historic Structures

The methodology consisted of background research to identify all properties within the study area listed in the National Register of Historic Places, and all properties considered to be either definitely eligible or probably eligible for the National Register, including those currently on the North Carolina National Register Study List. During the research phase, the architectural files of the State Historic Preservation Office (SHPO) were searched for National Register and Study List resources, as well as locally designated Historic Properties in the study area. This research discovered no listed resources.

The study area consists primarily of undeveloped property and recent developed property. Therefore, the existence of property eligible for listing in the study area is not likely.

3.2.3 Archaeological Sites

A preliminary review of files maintained by the Department of Cultural Resources yielded no listings of possible archaeological sites in the study area.

Further evaluations of potential impacts of the Recommended Alternative will be evaluated in subsequent environmental documentation. Consideration will be given to possible occurrence of additional sites located along flood plains and upland ridges.

3.2.4 Parks and Recreation Areas

Information on parks and recreational areas was collected from the City of Jacksonville. Only one planned recreational area, Jacksonville Commons, which is located on the north side of Western Boulevard near the City Limits. The property will also include a fire station, as well as an elementary and a middle school. Possible impacts to the recreation and school facilities include noise impacts due to the proximity of the recommended alternative to the property. Noise impact evaluations should be included in further environmental studies.

The parks and recreation facility is planned to connect to residential communities south of Western Boulevard and along US 17. Current plans for the connection of the communities to the south of Western Boulevard involve a extension of an existing road to the main entrance of the recreation facility at Western Boulevard. Provision of an overpass of the road extension by the Jacksonville Bypass Extension will minimize impacts to community cohesion with the parks and school facilities. Inclusion of this overpass was considered in the construction cost estimates for the various alternatives.

3.3 Relocations

3.3.1 Residential/Commercial Development

Two main concentrations of residential development exist in the project area. Residential relocations (5 residences with each alternative) are anticipated in a community south of the proposed alignment and west of existing US 17 near the south end of the study area. Also, residential relocations (6 with Alternative 1 and 5 with Alternative 2) are anticipated where the proposed alignment crosses Kellum-Drum Road. Noise impacts may be experienced to the properties adjacent to the proposed alignment. The extent of impacts by noise to the properties and effective mitigation options (noise barriers, etc.) should be considered in further environmental documentation.

Commercial development is located adjacent to US 17 throughout the study area. Commercial development is rapidly spreading throughout Western Boulevard in the study area. Existing businesses relocated by the alternative alignment include two at the southern terminus (both alternatives) and one at the northern terminus (Alternative 2).

4. RECOMMENDED ACTION

A series of three meetings was held with the Citizen's Advisory Council established for the project by the City of Jacksonville. The council consists of local official's and area businessmen. Also in attendance at these meetings was representatives of the North Carolina Department of Transportation. A matrix evaluation was conducted of Alternatives 1 and 2 (Table 4.1). A comparison of the resulting impacts associated with the alignment alternatives revealed that impacts for the two alternatives were basically the same. Alternative 2 will result in less impacts to the 100 year floodplain and Wolf Swamp. Also Alternative 2 hugs the property line for the proposed recreation/school facility, which eliminates excess property between the bypass and the property line at the recreational/school facility. For these reasons, Alternative 2 as been selected as the Recommended Action. The Citizen's Advisory Council has expressed support for this alternative.

Interchanges are recommended for both US 17 (partial diamond) and Western Boulevard. These interchanges will provide local access to the roadway network in the study area. Grade separations are proposed for Kellum-Drum Road. Additional grade separations are possible at Piney Green Road Extension and an extension of the development roadway to Western Boulevard. The northern project terminus is recommended to be an at-grade signalized intersection.

Estimated construction cost associated with the improvements is \$15.4 million. Cost estimates do not include the costs associated with right-of-way.

Table 4.1
Jacksonville Bypass Extension
Matrix Evaluation

	Alternative 1	Alternative 2	
Stream Crossing	4	4	Each
Wetlands	0 (0)	0 (0)	Hectares (Acres)
Churches	0	0	Each
Cemeteries	0	0	Each
Ponds	0 (0)	0 (0)	Hectares (Acres)
Residences	11	10	Each
Businesses	2	3	Each
Historic Sites	0	0	Each
Parks	0 (0)	0 (0)	Hectares (Acres)
Floodplains	35.339 (87.3)	17.763 (43.9)	Hectares (Acres)
Length	7.252 (4.5)	7.4 (4.6)	Kilometers (Miles)
Construction Cost	\$15,200,000	\$15,400,000	Dollars