STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

June 25, 2004

U. S. Army Corps of Engineers
Regulatory Field Office
6508 Falls of the Neuse Road
Suite 120
Raleigh, NC 27615

ATTN: Mr. Eric Alsmeyer
NCDOT Coordinator

SUBJECT: **Nationwide 23 application.** Durham County. NC 54 Widening from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard). Federal Aid Project No. STP-54(2). State Project No. 8.1352701. TIP Project No. R-2904. Division 5.

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to widen 1.1 miles of NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard) in Durham County. From Davis Drive to approximately 200 feet west of the railroad structure, the recommended typical section is a 4-lane divided shoulder section with a 17.5 foot raised median, and from 200 feet west of the railroad structure to Miami Boulevard, the recommended typical section is a 5-lane curb and gutter section.

STREAM AND WETLAND IMPACTS

Permanent stream impacts associated with the project will consist of piping 209 feet (0.014 acres) of two unnamed tributaries (UT's) to Burdens Creek (Table 1). Based on a conversation with Mr. Eric Alsmeyer (Corps of Engineers), it was determined that Site 1 is an intermittent stream that does not require mitigation, and Site 2 is a perennial stream that requires mitigation. There are no wetland impacts associated with the project (see page 7 of 8 of attached permit drawings for the project impact summaries). No mitigation is proposed for this project since the impact to the perennial stream is less than 150 feet.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

Table 1. Jurisdictional Stream Information for R-2904

Site	Station No.	Structure	Stream	DWQ Index No./Classification	Impact (linear feet)	Mitigation Required (linear feet)
1	47+58 L	30" RCP	Ut Burdens Creek	16-41-1-17-1-(0.3)/C NSW	160	0
2	52+62 L	36" RCP	Ut Burdens Creek	16-41-1-17-1-(0.3)/C NSW	49	0
Total					**209**	**0**

DESCRIPTION OF JURISDICTIONAL SITES:
Site 1: located at station L 47+58 (permit drawings 3 and 4 of 8). This is an intermittent stream. A 30" reinforced concrete pipe will be extended at this site. This stream will be relocated.

Site 2: located at station L 52+62 (permit drawings 5 and 6 of 8). This is a perennial stream. A 36" reinforced concrete pipe will be extended at this site.

FEDERALLY PROTECTED SPECIES

As of January 29, 2003, there are three species listed as federally protected for Durham County, North Carolina (See Table 2). In a letter dated June 18, 2004 we requested concurrence from the USFWS for "May Affect-Not Likely to Adversely Affect" calls for smooth coneflower and Michaux's sumac. A copy of this request is attached for your convenience.

Table 2. Federally Protected Species for Durham County, North Carolina.

Scientific Name	Common Name	Federal Status	Biological Conclusion
Echinacea laevigata	Smooth coneflower	Endangered	May Affect-Not Likely to Adversely Affect
Haliaeetus leucocephalus	Bald eagle	Threatened*	No effect
Rhus michauxii	Michaux's sumac	Endangered	May Affect-Not Likely to Adversely Affect

* Proposed for delisting.

CULTURAL RESOURCES

The proposed project will not effect any historical or archaeological resources within the project area. In a letter dated April 16, 2001, the State Historic Preservation Office concurs that there are no properties of architectural, historical, or archaeological significance in the project area (Appendix A, page A-5 of the attached Categorical Exclusion).

MITIGATION OPTIONS

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize wetland and stream impacts, and to provide full compensatory mitigation of all remaining wetland and stream impacts. Avoidance measures were taken during the planning and CE phase; minimization measures were incorporated as part of the project design.

Avoidance: All streams not directly affected by the project will be protected from unnecessary encroachment. No staging of construction equipment or storage of construction supplies will be allowed near surface waters.

Minimization: Stream impacts were minimized to the maximum extent practical. In addition to directly avoiding streams, NCDOT is incorporating the following measures to minimize impact to surface waters:

1. Use of 2:1 fill slopes in jurisdictional areas at all sites.
2. Pipe culvert inverts are to be buried one foot below the stream bed where feasible, depending on the relative elevations of the stream bed. All pipe culverts will maintain the normal stream flow and channel characteristics. This design will allow unimpeded passage by fish and other aquatic organisms.

- Stations 22+50 L, 26+80 L, 35+00 L, 37+00 L, 41+60 L, 41+80 L, 46+00 L
Preformed Scour Holes (plan sheets 4, 5, and 6)
To minimize impacts to the water quality and aquatic life, the design has incorporated preformed scour holes.

REGULATORY APPROVALS

Attached for your information is a copy of the Categorical Exclusion for the subject project. The project is being processed by the Federal Highway Administration as a "Categorical Exclusion" in accordance with 23 CFR 771.115(b). NCDOT requests these activities be authorized under a Section 404 Nationwide 23 (67 FR 2043-2044, January 15, 2002).

Other required approvals include a North Carolina Division of Water Quality (NCDWQ) 401 Water Quality Certification. We anticipate this project requires a 401 General Certification and are providing two courtesy copies of the permit application to the NCDWQ for their review.

If you have any questions or need any additional information, please contact Mr. Matt Haney at (919) 715-1428.

Sincerely,

Gregory J. Thorpe, Ph.D., Environmental Management Director
Project Development and Environmental Analysis Branch, NCDOT

cc: w/attachment
Mr. John Hennessy, Division of Water Quality
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan, USFWS
Mr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Jon Nance, P.E., Division 5 Engineer
Mr. Chris Murray, Division 5 Environmental Officer
Mr. Ron Hancock, P.E., Bridge Construction
W/o attachment
Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Mark Staley, Roadside Environmental
Mr. David Franklin, USACE, Wilmington
Ms. Jackie Obediente, Project Development Engineer
Ms. Beth Harmon, EEP

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

June 18, 2004

Gary Jordan
US Fish and Wildlife Service
P.O. Box 33726
Raleigh, NC 27636-3726

Subject: Biological Concurrence Request for the proposed widening of NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Blvd.) and replacement of the Southern Railroad Bridge, Durham County, TIP No. R-2904; State Project No. 8.1352701; Federal Aid Project No. STP-54(2).

Dear Mr. Jordan:

The purpose of this letter is to summarize federally protected species surveys to date and to request concurrence from the U.S. Fish and Wildlife Service (Service) pursuant to Section 7 of the Endangered Species Act, as amended (16 U.S.C. 1531 *et seq.*)(ESA).

The Categorical Exclusion (CE) for this project was completed in February 2003. To support the CE document, field surveys were conducted in June 2002 for Michaux's sumac and smooth coneflower. A biological conclusion of "No Effect" was determined based on no species found. Field surveys conducted in September and December 2001 for bald eagle determined that no habitat is present for this species. Therefore, a biological conclusion of "No Effect" was given for bald eagle. According to the USFWS January 29, 2003 list of endangered and threatened species, no new species have been added or deleted from the list. The USFWS listing of protected species and current Biological Conclusions are listed in the following table.

Federally Protected Species for Durham County

Common Name	Scientific Name	Status	Habitat	Biological Conclusion
Bald eagle	*Haliaeetus leucocephalus*	Threatened (proposed for delisting)	NO	No Effect
Smooth coneflower	*Echinacea laevigata*	Endangered	YES	May Affect-Not Likely to Adversely Affect
Michaux's sumac	*Rhus michauxii*	Endangered	YES	May Affect-Not Likely to Adversely Affect

MAILING ADDRESS:
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LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

Suitable habitat exists for smooth coneflower along roadsides in the project study area. Habitat also exists for Michaux's sumac along roadsides and edges of fields and woodlands in the project study area. No species were found during the June 2002 site visit. Therefore, a biological conclusion of "May Affect-Not Likely to Adversely Affect" was determined for both smooth coneflower and Michaux's sumac.

SURVEY METHODOLOGY

A plant-by-plant survey was conducted for smooth coneflower on June 11, 2002. Prior to the survey, the investigators visited a known population of smooth coneflower to have a fresh visual of the plant that will be surveyed. The survey for smooth coneflower consisted of a search for plants with light pink to purplish flowers. Smooth coneflower was not observed during the site investigation in the preferred habitat within the project study area. A total of 2 person-hours were spent conducting the survey.

A plant-by-plant survey was conducted for Michaux's sumac on June 11, 2002. The survey for Michaux's sumac consisted of a search for densely pubescent plants with a greenish to white flower. Michaux's sumac was not observed during the site investigation in the preferred habitat within the project study area. A total of 2 person-hours were spent conducting the survey.

QUALIFICATIONS OF PRINCIPAL INVESTIGATORS

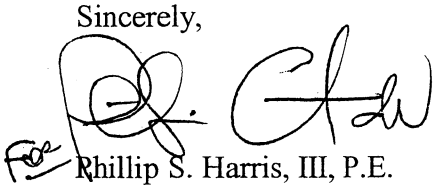
Investigator: Rachelle Beauregard, Environmental Specialist
Education: BS Fisheries and Wildlife Science, North Carolina State University
Experience: Biologist, Dr. J.H. Carter III and Associates, Inc., March 1997-January 2001. NC Department of Transportation, March 2001-present.

Investigator: Karen Lynch, Environmental Supervisor
Education: BS Wildlife Biology and Fisheries, North Carolina State University
Experience: NC Department of Transportation, November 1998-present. Environmental Biologist, DENR-Division of Water Quality, November 1984-November 1998.

Based on the above surveys conducted in 2002, the project area does not contain any federally-listed species known to occur in Durham County. The NCDOT concludes that the proposed project will have a biological conclusion of "May Affect, Not Likely to Adversely Affect" for smooth coneflower and Michaux's sumac. We believe the requirements of Section 7(a)(2) of the ESA have been satisfied and hereby request your concurrence.

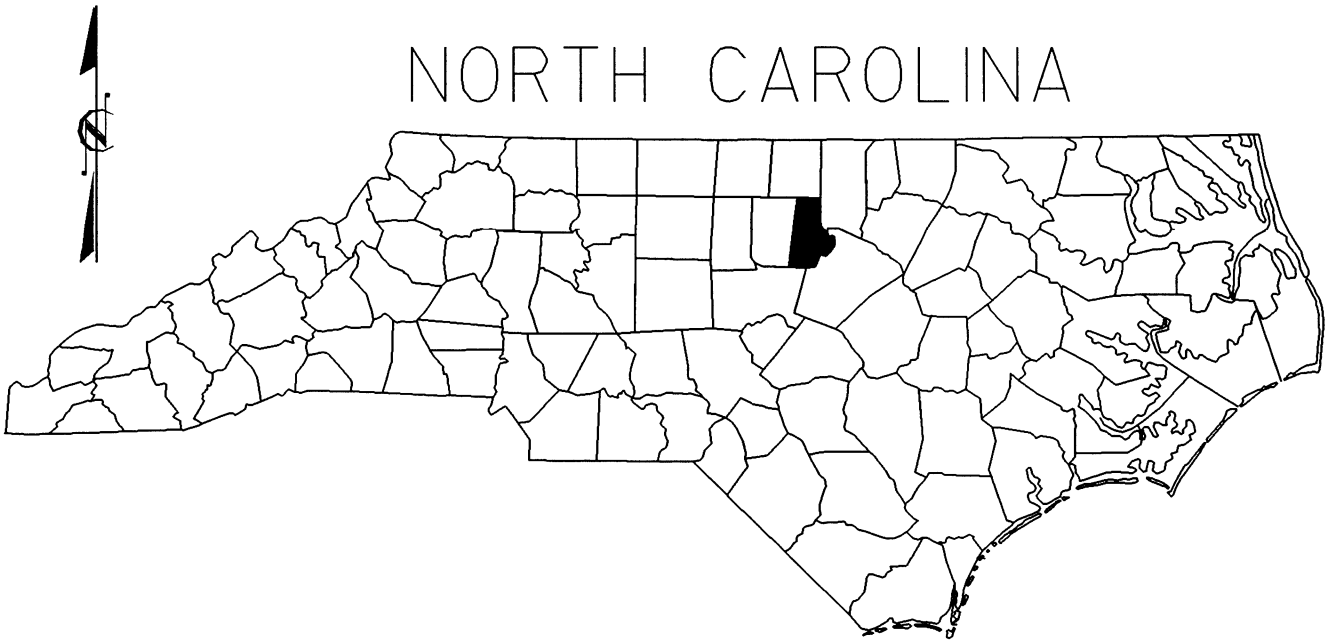
Thank you for your time. Please contact Matt Haney at (919) 715-1428 if you have any questions concerning this request.

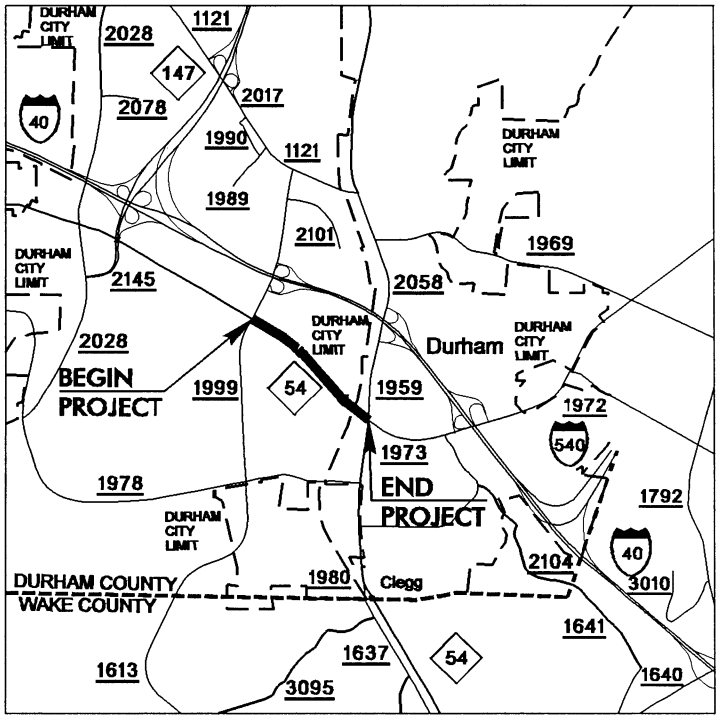
Sincerely,



Phillip S. Harris, III, P.E.
Manager, Office of Natural Environment

cc: Eric Alsmeyer, U.S. Army Corps of Engineers
Jackie Obediente, Project Engineer, PDEA
[redacted]

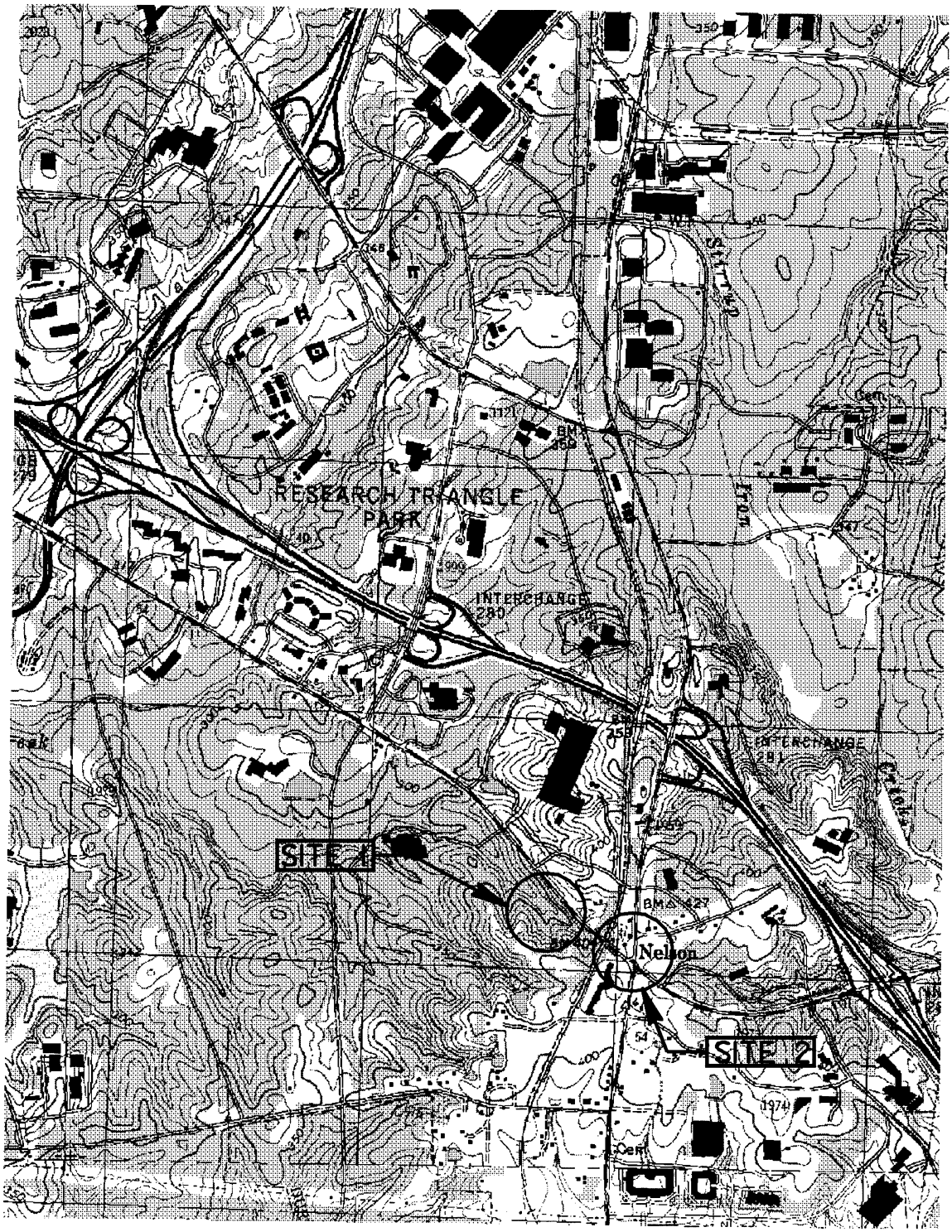




VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 8.1352701 (R-2904)
NC 54 FROM SR 1999(DAVIS DR)TO SR 1959 MIAMI BLVD. AND SR 1973 (PAGE RD) FROM NC 54 TO I-40 IN DURHAM



SITE MAP

DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 8.1352701 (R-2904)
NC 54 FROM SR 1999(DAVIS DR)TO SR 1959 MIAMI BLVD. AND SR 1973 (PAGE RD) FROM NC 54 TO I-40 IN DURHAM

8/17/99

REVISIONS

* REVISED EXISTING CHANNEL IMPACTED FROM 236' TO 160' AT SITE 1. 05/27/04 sth

$$$$$$$$SYSTIME$$$$$$$$
$$$$$$$$ISSUEDATE$$$$$$$$
$$$$$$$$USERNAME$$$$$$$$

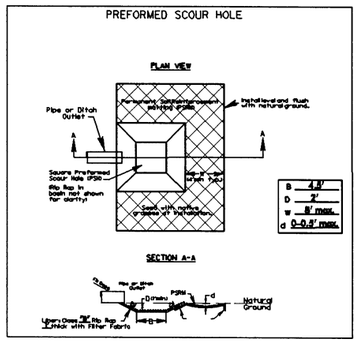
PROJECT REFERENCE NO.	SHEET NO.
R-2904	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83

PREFORMED SCOUR HOLE



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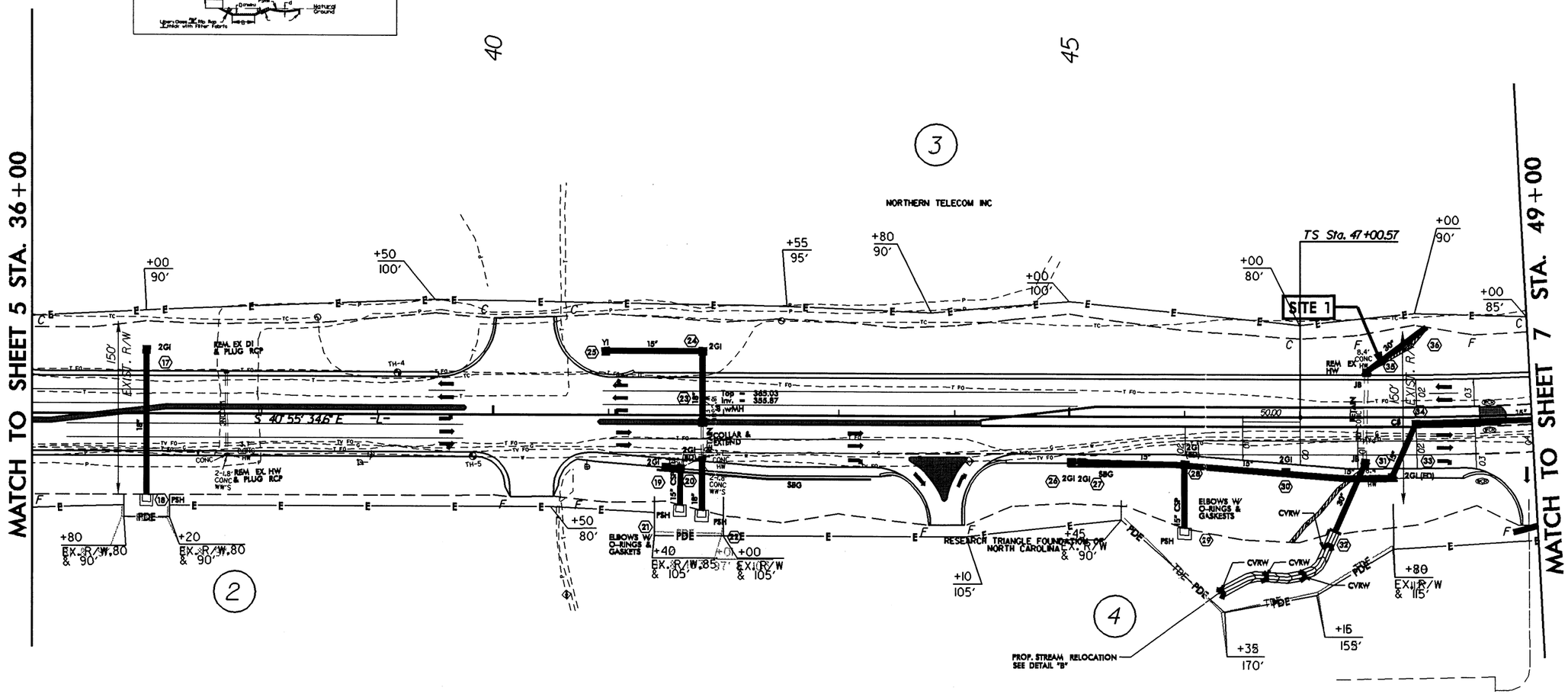
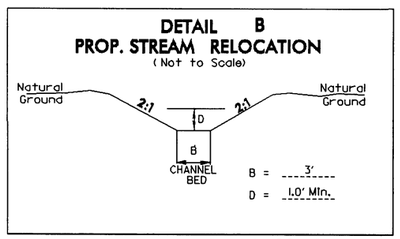
Ls = 200.00
LT = 133.35
ST = 66.68

DENOTES FILL IN SURFACE WATER

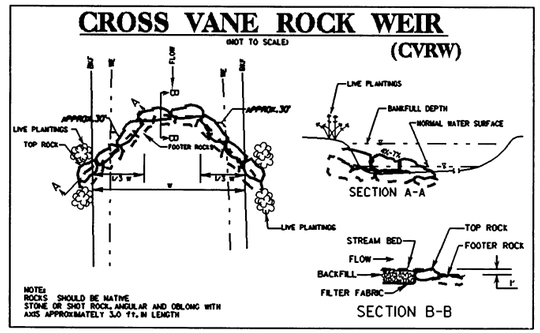


DETAIL B
PROP. STREAM RELOCATION
(Not to Scale)



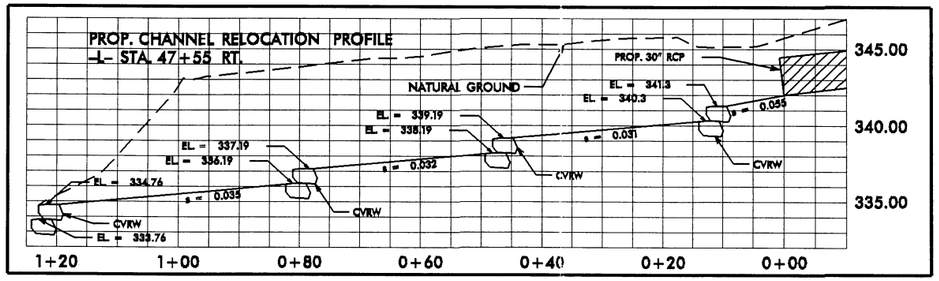
STA 46+30 TO 47+30 -L-

CROSS VANE ROCK WEIR
(NOT TO SCALE)
(CVRW)



NOTES:
ROCKS SHOULD BE NATIVE STONE OR SHOT ROCK, ANGULAR AND OBLONG WITH AXIS APPROXIMATELY 3.0 FT. IN LENGTH

PROP. CHANNEL RELOCATION PROFILE
-L- STA. 47+55 RT.



SCALE: 1"=100'

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2904	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

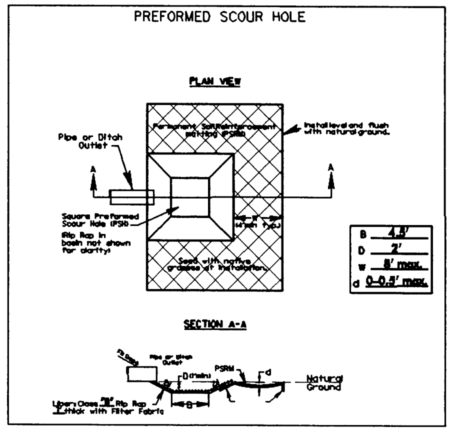
ENGLISH

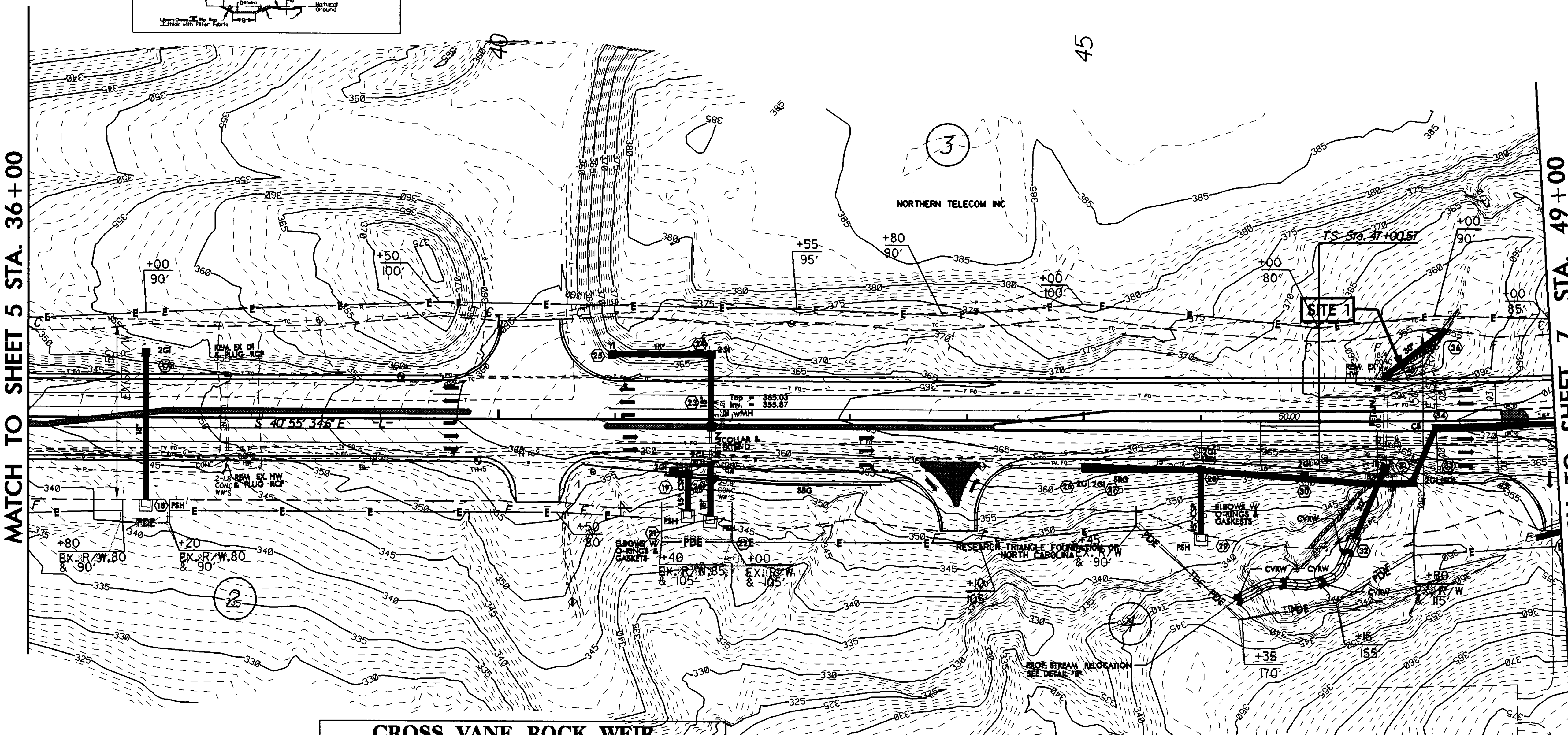
REVISIONS

* REVISED EXISTING CHANNEL IMPACTED FROM 236' TO 160' AT SITE 1. 05/27/04 srh

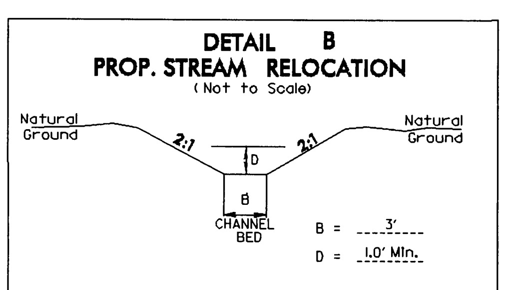
-L-
PIs Sta 48+33.92
Fs = 3°00' 56.0"
Ls = 200.00
LT = 133.35
ST = 66.68

DENOTES FILL IN SURFACE WATER

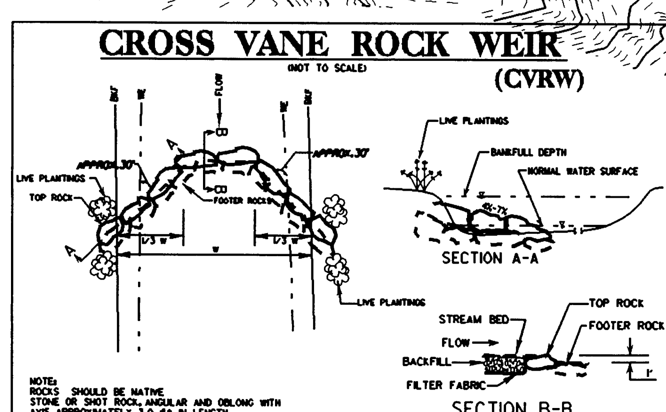


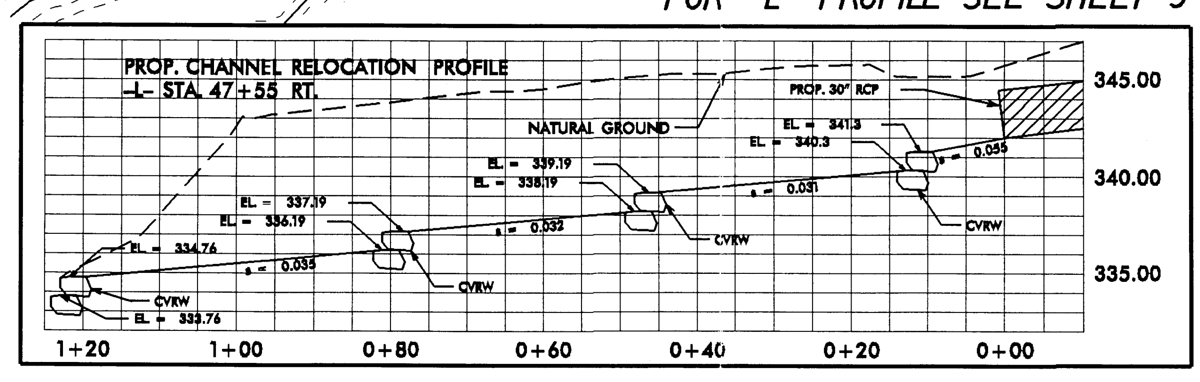


FOR -L- PROFILE SEE SHEET 9



STA 46+30 TO 47+30 -L-





SCALE: 1" = 100'

$$$$SYSTIME$$$$ $$$$DGN$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2904	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

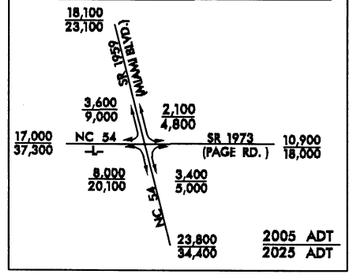
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

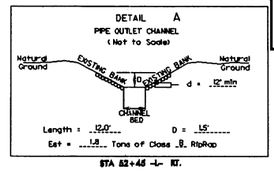
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PIs Sta 48+33.92	PI Sta 49+85.99	PIs Sta 51+37.98
Fs = 3°00' 56.0"	Δ = 5°08' 54.3" (LT)	Fs = 3°00' 56.0"
Ls = 200.00	D = 3°00' 56.0"	Ls = 200.00
LT = 133.35	L = 170.73	LT = 133.35
ST = 66.68	T = 85.42	ST = 66.68
	R = 1,900.00	
	SE = 0.04	

NC 54, MIAMI BLVD. AND PAGE RD.





DENOTES FILL
SURFACE WATER

STA. 57+38.87 -L- END STATE PROJECT R-2904

MATCH TO SHEET 6 STA. 49+00

SC Sta. 49+00.57

CS Sta. 50+71.30

ST Sta. 52+71.30

50' TAPER

150' RT LANE TAPER

150' RT LANE TAPER

RAMP / STAIRS

STATION PLATFORM

SIDEWALK

ELEVATOR / STAIRS

ELEVATOR / STAIRS

PEDESTRIAN BRIDGE

PEDESTRIAN BRIDGE

FUTURE PARKING DECK
(BY OTHERS)

PROPOSED 36" RCP W/HW
(TO BE INSTALLED BY OTHERS)

PROPOSED 36" RCP W/HW
(TO BE INSTALLED BY OTHERS)

CLASS "B" RIPRAP
SEE DETAIL "A"

PINC 52+90.03
-BL- BY5 PINC 11+19.52
-L- STA 53+25.70
18.58' RT

-BL- STA 53+42.80
120.98' RIGHT
ELEV. 405.13'
BM #3

-BL- 306 PINC 56+37.80
-L- STA 56+66.50
50.70' RT

POT Sta. 62+00.58

-NCGS CREEKSTONE-
POT 59+09.50
-BY-116+24.17 PINC
-BY2- 5+00.00 POT

S 52° 06' 21.0" E -L-

S 75° E 58.5' E

S 6° 55' 02.4" E

S 11° 32' 55.2" E

S 52° 52' 56.4" E

SCALE : 1" = 100'

FOR -L- PROFILE SEE SHEET 9

27-MAY-2004 11:25
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dwatkins 01

PROJECT REFERENCE NO.	SHEET NO.
R-2904	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

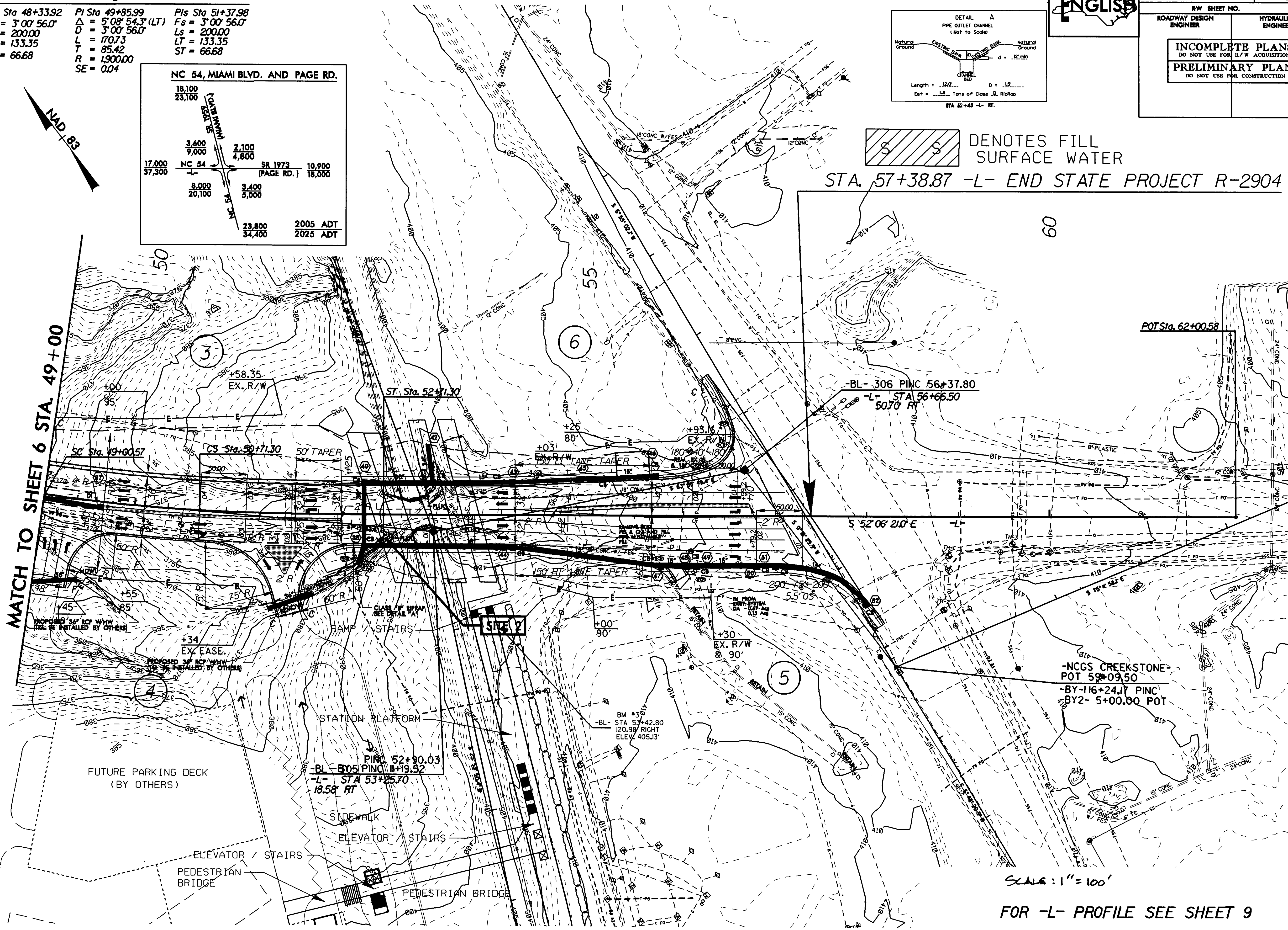
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

-L-

Pls Sta 48+33.92	PI Sta 49+85.99	Pls Sta 51+37.98
Fs = 3°00' 56.0"	Δ = 5°08' 54.3" (LT)	Fs = 3°00' 56.0"
Ls = 200.00	D = 3°00' 56.0"	Ls = 200.00
LT = 133.35	L = 170.73	LT = 133.35
ST = 66.68	T = 85.42	ST = 66.68
	R = 1,900.00	
	SE = 0.04	



SCALE : 1" = 100'

FOR -L- PROFILE SEE SHEET 9

27-MAY-2004 11:27
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shawnharris AT

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
1	-L- STA 47+58 Lt. & Rt.	30" RCP					0.011			160.00	
2	-L- STA 52+62 Rt.	36" RCP					0.003			49.000	
TOTALS:							0.014			209.00	

NCDOT

DURHAM COUNTY
PROJECT 8.1352701 (R-2904)
NC 54 FROM SR 1999 (DAVIS DR) TO
SR 1959 (MIAMI BLVD) AND SR 1973
PAGE RD FROM NC 54 TO I-40 IN DURHAM

REV.'D 5/27/2004

7/30/03

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
3	NORTHERN TELECOM, INC.	P.O. BOX 54470 LEXINGTON, KY 40555
4	RESEARCH TRIANGE FOUNDATION OF NORTH CAROLINA	P.O. BOX 12255 RTP, NC 27709

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

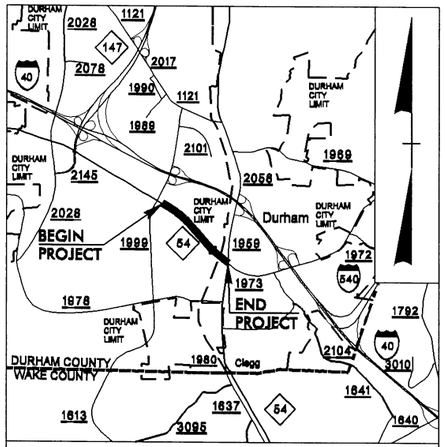
PROJECT: 8.1352701 (R-2904)

NC 54 FROM SR 1999(DAVIS DR)TO SR 1959 MIAMI BLVD. AND SR 1973 (PAGE RD) FROM NC 54 TO I-40 IN DURHAM

TIP PROJECT: R-2904

CONTRACT: C201192

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Symbology



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

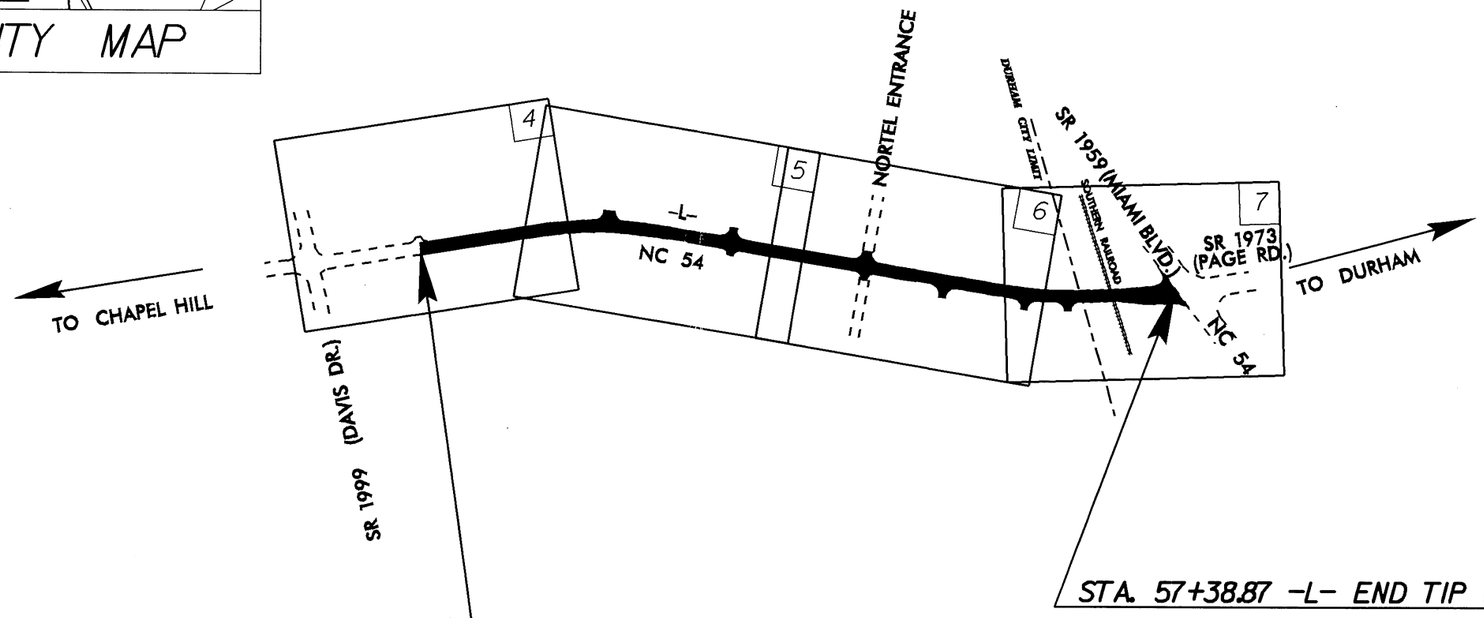
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2904	1	

STATE PROJECT NO.	F.A. PROJECT NO.	DESCRIPTION
34512.1.1	STP-54(2)	P.E.
34512.2.2	STP-54(2)	R /W, UTIL.
34512.3.1	STP-54(2)	CONST.

LOCATION: ***NC 54 FROM SR 1999 (DAVIS DRIVE) TO SR 1959 (MIAMI BLVD.)***

TYPE OF WORK: ***GRADING, PAVING, DRAINAGE, GUARDRAIL, SIGNALS, AND SIGNING***

NAD 83



STA. 15+90.64 -L- BEGIN TIP PROJECT R-2904

STA. 57+38.87 -L- END TIP PROJECT R-2904

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2005 = 17,800
ADT 2025 = 37,700
DHV = 10 %
D = 60 %
T = 5 % *
V = 50 MPH
* (TTST 2 % + DUAL 3 %)

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2904 = 0.786 MILES
TOTAL LENGTH TIP PROJECT R-2904 = 0.786 MILES

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh, NC 27610

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 26, 2003 (PROD.)
APRIL 21, 2006 (TIP)

LETTING DATE:
NOVEMBER 16, 2004 (PROD.)
APRIL 15, 2008 (TIP)

BRENDA MOORE, P.E.
PROJECT ENGINEER

THAD F. DUNCAN, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER *P.E.*

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2904	1-B

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut — C
- Prop. Slope Stakes Fill — F
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp — WCR
- Curb Cut for Future Wheelchair Ramp — CCFR
- Exist. Guardrail
- Prop. Guardrail
- Exist. Cable Guiderail
- Prop. Cable Guiderail
- Equality Symbol
- Pavement Removal

RIGHT OF WAY

- Baseline Control Point
- Existing Right of Way Marker
- Exist. Right of Way Line w/Marker
- Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)
- Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker
- Exist. Control of Access Line — CA
- Prop. Control of Access Line — CA
- Exist. Easement Line — E
- Prop. Temp. Construction Easement Line — E
- Prop. Temp. Drainage Easement Line — TDE
- Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

- Stream or Body of Water
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Shoreline
- Falls, Rapids
- Prop Lateral, Tail, Head Ditches — FLOW

STRUCTURES

MAJOR

- Bridge, Tunnel, or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR

- Head & End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Boxes — CB
- Paved Ditch Gutter

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal — T
- Cable TV Pedestal — C
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole — P
- Telephone Booth
- Water Manhole — W
- Light Pole
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole — T
- Power Transformer
- Sanitary Sewer Manhole — S
- Storm Sewer Manhole
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box — S
- Fiber Optic Splice Box — F
- Television or Radio Tower
- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS TS

- Recorded Water Line — W W
- Designated Water Line (S.U.E.*) — W W
- Sanitary Sewer — SS SS
- Recorded Sanitary Sewer Force Main — FSS FSS
- Designated Sanitary Sewer Force Main(S.U.E.*) — FSS FSS
- Recorded Gas Line — G G
- Designated Gas Line (S.U.E.*) — G G
- Storm Sewer — S S
- Recorded Power Line — P P
- Designated Power Line (S.U.E.*) — P P
- Recorded Telephone Cable — T T
- Designated Telephone Cable (S.U.E.*) — T T
- Recorded U/G Telephone Conduit — TC TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC TC
- Unknown Utility (S.U.E.*) — ?UTL ?UTL
- Recorded Television Cable — TV TV
- Designated Television Cable (S.U.E.*) — TV TV
- Recorded Fiber Optics Cable — FO FO
- Designated Fiber Optics Cable (S.U.E.*) — FO FO
- Exist. Water Meter — 0
- U/G Test Hole (S.U.E.*)
- Abandoned According to U/G Record — ATTUR
- End of Information — E.O.I.

BOUNDARIES & PROPERTIES

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Property Line Symbol — PL
- Exist. Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Property Number — 123
- Parcel Number — 6
- Fence Line — WW & ISBW
- Existing Wetland Boundaries — WLB
- Proposed Wetland Boundaries — WLB
- Existing Endangered Animal Boundaries — EAB
- Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

- Buildings
- Foundations
- Area Outline
- Gate
- Gas Pump Vent or U/G Tank Cap
- Church
- School
- Park
- Cemetery
- Dam
- Sign — S
- Well — W
- Small Mine
- Swimming Pool

TOPOGRAPHY

- Loose Surface
- Hard Surface
- Change in Road Surface
- Curb
- Right of Way Symbol — R/W
- Guard Post — GP
- Paved Walk
- Bridge
- Box Culvert or Tunnel
- Ferry
- Culvert
- Footbridge
- Trail, Footpath
- Light House

VEGETATION

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — VINEYARD

RAILROADS

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH

revised 11/09/00

07-JUN-2004 06:39
TFDuncan
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PROJECT REFERENCE NO.	SHEET NO.
R-2904	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/99

-L-
Pls Sta 23+02.76
Fs = 3° 00' 56.0"
Ls = 200.00
LT = 133.35
ST = 66.68

NAD 83

STA. 15+90.64 -L- BEGIN STATE PROJECT R-2904

POT Sta. 10+00.00

BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77

BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77

+12
EX. R/W

+50
85'

S 59° 36' 00.4" E

-L-

NC 54 VARIABLE BST

-BL- 134 PINC 12+89.62
-U4026BL-134 PINC 319+69.01

BM #1
-BL- STA 15+13.79
110.23' RIGHT
ELEV. 323.73

-BL- 229 PINC 15+24.83

ZSF/LAND PARCELS LLC
DB 362 PG 972
PB CD 05 PG 220

ZSF/LAND PARCELS LLC
DB 362 PG 972
PB CD 05 PG 220

+70
EX. R/W

+30
EX. R/W, 85' & 100'

+70
EX. R/W, 85' & 100'

TS Sta. 21+69.41

100' MEDIAN TAPER

ELBOWS W/ O-RINGS & GASKETS

PDE

PSH

SBG

GRAU 350

CONC FLUME

SR 899 (DAVIS DRIVE)

SR 1999 (DAVIS DR.)

DAVIS DR. AND NC 54

	27,000 / 56,000	
21,000 / 45,400	7,900 / 16,400	6,000 / 10,900 — NC 54 — 17,800 / 37,700
	3,500 / 6,900	2,200 / 4,700
	18,800 / 40,300	

2005 ADT
2025 ADT

PREFORMED SCOUR HOLE

PLAN VIEW

Pipe or Ditch Outlet

Preformed Scour Hole (see detail for depth)

Stabilize and flush with natural ground.

Seed with mixture of choice for vegetation.

SECTION A-A

Natural Ground

Underlain with filter fabric

B	4.8'
D	2'
W	8' max.
d	0-0.8' max.

FOR -L- PROFILE SEE SHEET 8
PSH: PREFORMED SCOUR HOLE (SEE DETAIL)
SBG: SHOULDER BERM GUTTER

MATCH TO SHEET 5 STA. 23+00

07-JUN-2004 07:14
R:\Projects\2904\Roadway\2904_psh.dgn
TFHUGHES

PROJECT REFERENCE NO.	SHEET NO.
R-2904	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

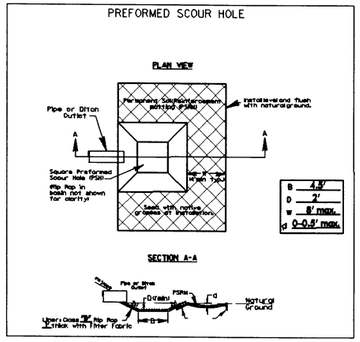
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

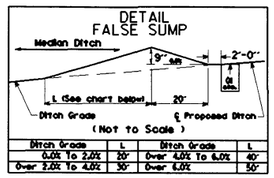
REVISIONS

NAD 83

PREFORMED SCOUR HOLE



DETAIL
FALSE SUMP



(Not to Scale)

Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

-L-

Pls Sta 23+02.76	Pl Sta 25+79.89	Pls Sta 28+55.34
Fs = 3°00' 56.0"	Δ = 12° 38' 33.8" (RT)	Fs = 3°00' 56.0"
Ls = 200.00	D = 3°00' 56.0"	Ls = 200.00
LT = 133.35	L = 419.25	LT = 133.35
ST = 66.68	T = 210.48	ST = 66.68
	R = 1,900.00	
	SE = 0.04	

STATE STREET BANK & TRUST COMPANY, TRUSTEE
DB 3162 PG 790
PB 95 PG 197
PB 99 PG 147

(3)

(1)

BECTON, DICKINSON AND COMPANY
DB 355 PG 136
PB 60 PG 77

(2)

ZSF/LAND PARCELS LLC
DB 3462 PG 912
PB CD 05 PG 220

MATCH TO SHEET 4 STA. 23+00

MATCH TO SHEET 6 STA. 36+00

SC Sta. 23+69.41

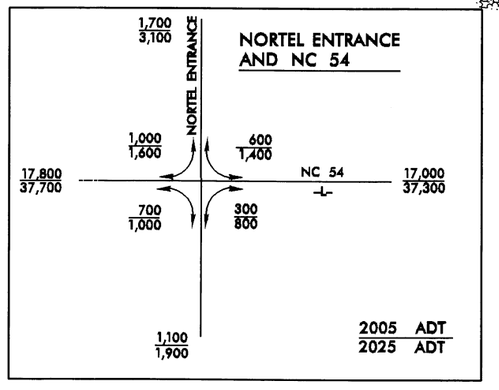
CS Sta. 27+88.66

ST Sta. 29+88.66

-BL- 301
-L- STA 26+15.05
23.74' RT

-BL- 302
-L- STA 32+60.35
36.11' RT

BM #2
-BL- STA 31+65.20
179.52' RIGHT
ELEV. 310.31'



☆ EXIST. SIGNAL

FOR -L- PROFILE SEE SHEET 8

PSH: PREFORMED SCOUR HOLE (SEE DETAIL)

SBG: SHOULDER BERM GUTTER

07-JUN-2004 06:40
R:\proj\r-2904\r2904s05.psh
TF:Duncan AT

8/17/99

REVISIONS

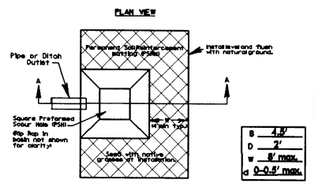
PROJECT REFERENCE NO.	SHEET NO.
R-2904	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

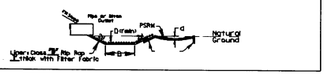
NAD 83

PREFORMED SCOUR HOLE

PLAN VIEW

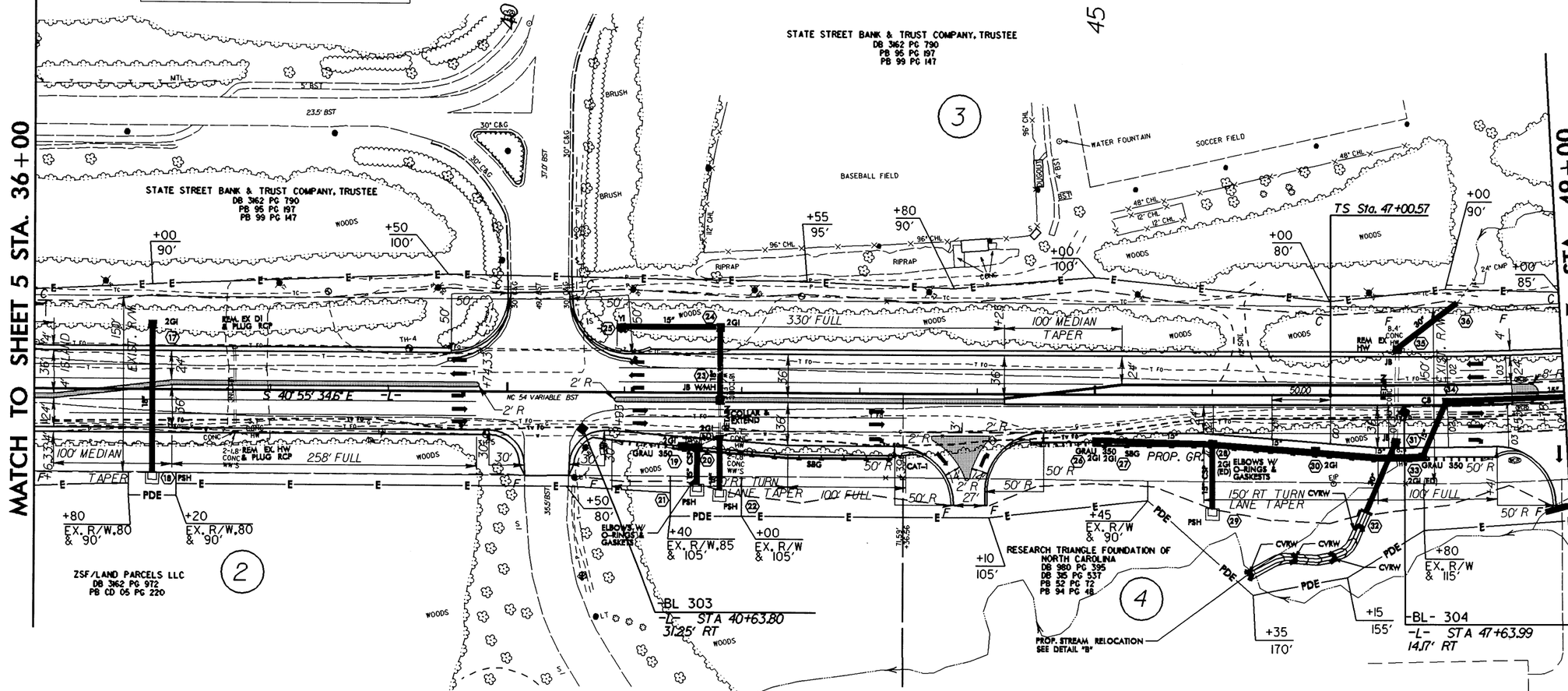


SECTION A-A



-L-
Pls Sta 48+33.92
Fs = 3°00'56.0"
Ls = 200.00
LT = 133.35
ST = 66.68

FOR -L- PROFILE SEE SHEET 9
PSH: PREFORMED SCOUR HOLE (SEE DETAIL)
SBG: SHOULDER BERM GUTTER

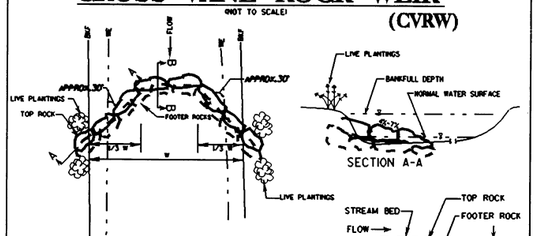


DETAIL B
PROP. STREAM RELOCATION
(Not to Scale)

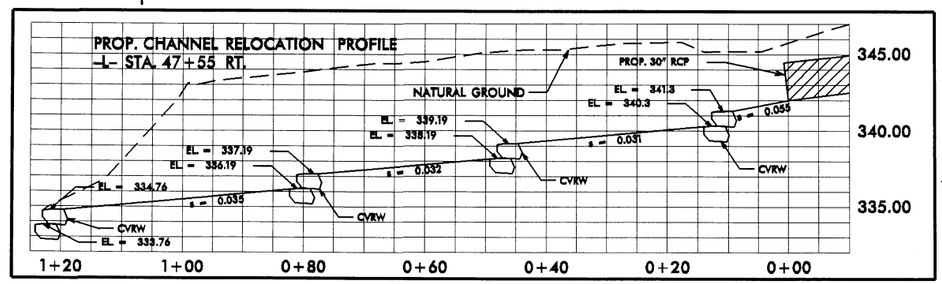
B = 3'
D = 1.0' Min.

STA 46+30 TO 47+30 -L-

CROSS VANE ROCK WEIR
(NOT TO SCALE)
(CVRW)



NOTE: ROCKS SHOULD BE NATIVE STONE OR SHOT ROCK, ANGULAR AND OBLONG WITH AXIS APPROXIMATELY 3.0 FT. IN LENGTH



07-JUN-2004 06:40
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TFDuncan

PROJECT REFERENCE NO.	SHEET NO.
R-2904	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

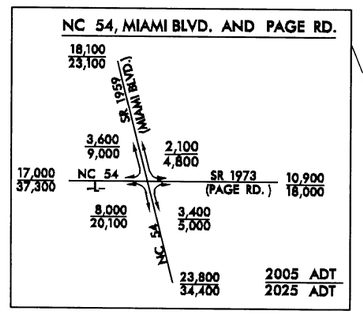
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83

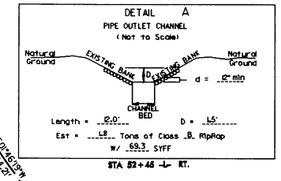
-L-

Pls Sta 48+33.92	Pl Sta 49+85.99	Pls Sta 51+37.98
Fs = 3°00' 56.0"	Δ = 5°08' 54.3" (LT)	Fs = 3°00' 56.0"
Ls = 200.00	D = 3°00' 56.0"	Ls = 200.00
LT = 133.35	L = 171.073	LT = 133.35
ST = 66.68	T = 85.42	ST = 66.68
	R = 1,900.00	
	SE = 0.04	

NC 54, MIAMI BLVD. AND PAGE RD.



DETAIL A
PIPE OUTLET CHANNEL
(Not To Scale)



STA 82+45 -L- RT.

ST Sta. 57+38.87 -L- END STATE PROJECT R-2904

POT Sta. 62+00.58

-BL- 306
-L- STA 56+68.50
50.70' RT

-NCGS CREEKSTONE-
POT 59+09.50
-BY-116+24.17 PINC
-BY2- 5+00.00 POT

BM #3
STA 53+42.80
120.98' RIGHT
ELEV. 405.13'

-BL- 305
-L- STA 53+25.70
18.58' RT

MATCH TO SHEET 6 STA. 49+00

SC Sta. 49+00.57
CS Sta. 50+71.30
ST Sta. 52+71.30

S 52° 06' 21.0" E -LL-

☆ EXIST. SIGNAL

FOR -L- PROFILE SEE SHEET 9

NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard)
Durham County, State Project # 8.1352701,
F.A. Project # STP-54(2)
TIP No. R-2904

ADMINISTRATIVE ACTION

CATEGORICAL EXCLUSION

U. S. Department of Transportation
Federal Highway Administration

and

N. C. Department of Transportation
Division of Highways

APPROVED:

2/27/03 Eric Midkiff
Date Gregory J. Thorpe, Ph.D.
FOR Environmental Management Director
Project Development and Environmental Analysis Branch, NCDOT

2/27/03 Thomas D. Riggsbee
Date Donald J. Voelker
for Acting Division Administrator, FHWA

NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard)
Durham County, State Project # 8.1352701,
F.A. Project # STP-54(2)
TIP No. R-2904

CATEGORICAL EXCLUSION

February 2003

Document Prepared in Project Development and
Environmental Analysis Branch By:

Jackie Obediente 2/27/03
Jackie Obediente
Project Development Engineer

Eric Midkiff 2/27/03
Eric Midkiff, P.E.
Project Development Unit Head

TABLE OF CONTENTS **PAGE**

TABLES

FIGURES

APPENDICES

NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard)
Durham County, State Project # 8.1352701,
F.A. Project # STP-54(2)
TIP No. R-2904

SUMMARY

1. Description of Action

The North Carolina Department of Transportation Division of Highways proposes to widen NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard) in Durham County.

The 1.10 mile (1.77km) project is included in the 2002-2008 Transportation Improvement Program (TIP) with right of way acquisition scheduled for FFY 2006 and construction scheduled for FFY 2008.

The estimated cost is $3,625,000 including $525,000 for right of way acquisition and $3,100,000 for construction. The estimated cost projected by the 2002-2008 Transportation Improvement Program is $5,800,000, including $200,000 for right of way, $5,200,000 for construction, and $400,000 spent in prior years.

2. Summary of Environmental Impacts

Improving NC 54 will have a positive impact on the project area by reducing congestion and travel time, and increasing safety for Research Triangle Park commuters. Based on preliminary designs, no relocatees are anticipated as a result of this project. No historically significant or archaeological sites will be impacted. No publicly owned parks, recreational facilities or wildlife or waterfowl refuges of national, state, or local significance are in the vicinity of the project. The proposed project will not impact any wetlands. Approximately 135ft(41.2m) of stream will be impacted by this project. The project's impact on noise and air quality will not be significant.

3. Summary of Environmental Commitments

PROJECT COMMITMENTS
NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard)
Durham County, State Project # 8.1352701,
F.A. Project # STP-54(2)
TIP No. R-2904

Commitments Developed Through Project Development and Design

NCDOT Construction / Division Construction Engineer
The North Carolina Railroad (NCRR) will design and build all railroad-related improvements associated with this project. However, engineering coordination will occur between the NCRR and NCDOT to ensure that the new railroad bridge provides the necessary clearances for the desired widening. The proposed Triangle Metro Center will be considered in the final design stages of the project.

NCDOT Roadside Environmental Unit
NCDOT will coordinate with the Research Triangle Park Foundation and the City of Durham regarding their request for landscaping at the medians along this project.

NCDOT Construction / Division Construction Engineer / Traffic Engineering
During the final design stages of the project, NCDOT will provide pedestrian crosswalks and signalized crossings depending on the locations of the sidewalks/paved trails.

Roadway Design
Driveway locations and turning movement issues are currently being discussed by NCDOT and the Research Triangle Park Foundation associated with the proposed Triangle Metro Center. NCDOT will coordinate with the Research Triangle Park foundation during the final stages of design.

4. Coordination

The following federal, state, and local officials were consulted regarding this project:

US Army Corps of Engineers
US Environmental Protection Agency
Federal Emergency Management
Federal Railroad Administration
* United States Department of the Interior Fish and Wildlife Service
* USDA – National Resources Conservation Service
Geological Survey
Soil Conservation
* North Carolina Wildlife Resources Commission
* North Carolina Division of Water Quality
* North Carolina Department of Cultural Resources
* North Carolina Department of Administration
* North Carolina Department of Environment and Natural Resources
* North Carolina Division of Environmental Health
* State Historic Preservation Office
Triangle J. Council of Governments
Durham County Commissioner
Mayor of Durham
Research Triangle Park Foundation
Little & Little Landscape Architecture / Planning
Triangle Transit Authority
North Carolina Railroad Company

A citizen's informational workshop was held on August 23, 2001, to obtain public comment on the project (See Appendix C for workshop notice and handout). Comments on the project that were received from the agencies are noted by an asterisk (*). Those comments are included in Appendix A.

5. Additional Information

Additional information concerning the proposal and assessment can be obtained by contacting the following:

Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development and Environmental Analysis Branch
N.C. Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548
(919) 733-3141

Donald J. Voelker, Acting Division Administrator
Federal Highway Administration
Department of Transportation
310 New Bern Avenue, Suite 410
Raleigh, NC 27601-1442
(919) 856-4346

NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard)
Durham County, State Project # 8.1352701,
F.A. Project # STP-54(2)
TIP No. R-2904

I. DESCRIPTION OF PROPOSED ACTION

The North Carolina Department of Transportation Division of Highways proposes to widen NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard) in Durham County. NCDOT and FHWA classify this action as a Categorical Exclusion, due to the fact that no adverse environmental impacts are likely to occur as a result of the project's construction.

The proposed improvements consist of widening NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard). From Davis Drive to approximately 200 feet (60.96 meters) west of the railroad structure, the recommended typical section is a 4-lane divided shoulder section with a 17.5 foot (5.3 meter) raised median, and from 200 feet (60.96 meters) west of the railroad structure to SR 1959 (Miami Boulevard), the recommended typical section is a 5-lane curb and gutter section.

The estimated cost is $3,625,000 including $525,000 for right of way acquisition and $3,100,000 for construction. The estimated cost projected by the 2002-2008 Transportation Improvement Program is $5,800,000, including $200,000 for right of way, $5,200,000 for construction, and $400,000 spent in prior years.

The proposed project is included in the 2002-2008 North Carolina Department of Transportation (NCDOT) Transportation Improvement Program. The project location is shown in Figure 1. No substantial environmental impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

II. PURPOSE OF PROJECT

A. Need for the Improvements

The purpose of the project is to improve the safety and operational capacity of NC 54, so that the facility can support the constantly developing Research Triangle Park corridor. The existing substandard typical section along with high traffic volumes (17,800 vpd) have contributed to a higher than average accident rate along NC 54.

1. Accident Analysis

An accident study for NC 54 was conducted for the time period from January 1, 1998 to December 31, 2000. A summary of the accident rates (in accidents per 100 million vehicle miles) along with the statewide rates for urban two-lane US routes is shown in Table 1.

Table 1 . Accident Rates (Per 100 Million Vehicle Miles)

Accident Type	Rates along NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard)	Average Statewide Rates for Urban 2-Lane North Carolina Routes
All Accidents	726.62	370.51
Fatal	0	1.15
Non-Fatal	181.66	138.15
Nighttime	115.60	72.32
Wet Conditions	107.34	61.34

Eighty eight total accidents occurred along NC 54 during the study period. All the accident rates, except for fatal accident rates, were above the state average for this type of facility during the study period. The overall accident rate during this period was 726.62 accidents per 100 million vehicle miles (acc/100MVM) compared to the statewide average of 390.51 acc/100MVM for rural two-lane US routes during this period. This results in NC 54 having a 51% higher overall accident rate than the statewide average for a two-lane urban North Carolina route.

Out of the eighty eight total accidents occurring in the studied years, there were no fatal accidents and 22 non-fatal injury accidents along NC 54 within the project limits. Of the 88 accidents along the studied facility, the most frequent (36.36%) were rear end collisions. This is indicative of a two-lane facility operating above its operational design limits. The majority of the accidents (92%) occurred between Monday and Friday, and 33% of all accidents occurred between 4 p.m. and 6 p.m. This can be associated with work-related traffic from the many business that lie within the project area. Widening the roadway will improve the safety and reduce the accident experience along NC 54.

B. Existing Conditions

1. Length of Project

The length of the studied section is approximately 0.9 mile (1.45 km).

2. Route Classification

NC 54 is designated as a Major Collector on the North Carolina Statewide Functional Classification System. It is a principal arterial on the Federal Functional Classification System, and a major thoroughfare on the Durham-Chapel Hill-Carrboro Thoroughfare Plan.

3. Existing Cross Section

From Davis Drive to the entrance to Northern Telecom (0.4 miles [0.6 km]), NC 54 is a three-lane roadway (one travel lane in each direction and a center turn lane) with a pavement width of 42ft (12.8m) and soil shoulders with varying widths of 4ft(1.2m) to 8ft(2.4m). From Northern Telecom to Miami Boulevard (0.5 miles [0.8km]), it is generally a 2-lane roadway with a pavement width of 20 to 24 feet and soil shoulders with widths varying from 4ft(1.2m) to 8ft(2.4m).

Immediately west of this project, near Davis Drive, NC 54 is a 5-lane shoulder section with 10ft (3.1m) useable shoulders (64ft [19.5m] edge of pavement to edge of pavement including 2ft [0.6m] paved shoulders), on 150ft (45.7m) of right of way, providing two travel lanes in each direction and a two way center turn lane.

4. Existing Right of Way

The existing right-of-way (ROW) is approximately 150ft (45.7 m).

5. Utilities

Underground telephone cables are located on both sides of NC 54. Cable fiber optics and a natural gas line are located on the south side.

The City of Durham has a sanitary sewer force main and water along the south side of NC 54. Telephone fiber optics, gas, water, and underground power are located along the east side of the Southern railway tracks, approaching from the south. A high voltage transmission line crosses NC 54 just west of the Railroad.

6. Access Control

There is no control of access along NC 54.

7. Speed Limits

The existing speed limit varies from 45mph (72.4km/hr) to 55mph (88.5km/hr).

8. Bridges and Drainage Structures

Bridge #R-126 crosses over NC 54 approximately 500 ft west of Miami Boulevard. This bridge was constructed in 1928, provides only 23.8 feet of horizontal clearance for NC 54,

and is badly deteriorating. This bridge carries a portion of Norfolk Southern Railways H-line over NC 54, which runs from Goldsboro through Raleigh to Greensboro.

There is one drainage structure within the project limits. It carries a tributary of Burdens Creek, and flows from the northeast to the southwest. The existing structure is a single 78 inch reinforced concrete pipe (RCP). The existing pipe has concrete headwall on the upstream end. The distance from the bed to the crown of the stream is approximately 15ft (4.6m) and the normal water depth of the unnamed tributary of Burdens Creek is less than 1ft (0.3m).

9. Intersecting Roads

The intersections of NC 54 with Davis Drive, the entrance to Northern Telecom, and Miami Boulevard have widened approaches to facilitate turning movements, and each intersection is signalized. There is one stop-sign controlled intersection at the second entrance to Northern Telecom. The Southern Railroad Bridge # R-126, spans NC 54 approximately 500 ft (152.4m) west of Miami Boulevard.

10. Project Terminals

The western project terminal is located at the intersection of NC 54 and SR 1999 (Davis Drive). At this project terminal, NC 54 is a three-lane roadway with a pavement width of 42 ft(12.8m) and soil shoulders with varying widths of 4ft to 8 ft (1.2m to 2.4m). The eastern project terminal is located at the intersection of NC 54 and SR 1959 (Miami Boulevard). At this project terminal, NC 54 is a two-lane roadway with a pavement width of 20ft to 24ft (6.1m to 7.3m) and soil shoulders with widths varying from 4ft to 8 ft (1.2m to 2.4m).

11. Schools / School Bus Data

There are no schools within the project study area. Lowe's Grove Middle School is the closest public school to the project area and it is located approximately 3 miles northwest of the project area on Alston Avenue. The Durham Public School system has one bus which utilizes the corridor. The County's Transportation information Management System Supervisor indicated that the improvement would have no impact on service delivery.

12. Railroads

The limits of the proposed widening will involve the existing North Carolina Railroad's (NCRR) bridge (bridge # R-126) over NC 54 at RTP, which is located approximately 500 feet west of Miami Boulevard. This bridge was constructed in 1928, provides only 23.8 feet of horizontal clearance for NC 54, and is badly deteriorating.

This portion of railroad is owned by NCRR and leased to the Norfolk Southern Railways (NS) and is a part of NS's H-line that runs from Goldsboro through Raleigh to Greensboro, NC. This portion of the H-line is considered a part of the Southeast High Speed Rail Corridor (SEHSR). This is one of the federally designated high-speed rail corridors in the

US that runs from Washington, DC through Raleigh to Charlotte. The SEHSR is presently being studied for High Speed Rail.

NS's track charts show a single mainline track across the bridge in non-signalized territory. Based on NCDOT's Public Crossing Investigative Index, upwards of 12 trains per day pass across this bridge inclusive of the State's two Amtrak passenger trains, the Carolinian and the Piedmont. The maximum allowable train speeds are 49 mph for freight trains and 55 mph for passenger trains.

13. Bicycle, Pedestrian, and Greenway Facilities

There is a paved walking path on the northern side of NC 54, from the western project terminal to Northern Telecom (0.2 miles). The paths in the vicinity of this project are owned and maintained by the Durham-Wake County Research and Production Service District. This walking path will likely require relocation. There are currently no bicycle accommodations along NC 54 within the project area.

Crosswalks and signalized pedestrian crossings are currently located at the NC 54 and Nortel signalized intersection, and at the NC 54 and Miami Boulevard intersection.

C. Traffic Volumes and Capacity Analysis

1. Mainline Analysis

Traffic volumes along NC 54 for 2005 range from 17,000 to 17,800 vehicles per day (vpd). The traffic volumes along NC 54 are expected to increase to 37,300 and 37,300 vpd by the 2025 design year (see Figures 3A and 3B). The proposed multilane typical section will adequately accommodate the existing and future traffic along the mainline. However, the level of service (LOS) along the project is dictated by the terminal intersections, which will negatively affect the mainline operation of NC 54. Therefore, the following intersection analysis is a more accurate assessment of the project's operational capacity.

2. Intersection Analysis

Capacity analyses were also performed for the major intersections along the project. The results of these analyses are summarized in Table 2. Each of these intersections are currently signalized.

Table 2. Summary of Intersection Analysis

Intersection	2005 LOS No Build			2025 LOS No Build			2025 LOS Build		
	LOS AM/PM	DELAY (seconds per vehicle)		LOS AM/PM	DELAY (seconds per vehicle)		LOS AM/PM	DELAY (seconds per vehicle)	
		AM	PM		AM	PM		AM	PM
NC 54 and SR 1999 (Davis Drive)	E/F	65.6	91.8	F/F	246.6	268.1	F/F	245.0	301.1
NC 54 and Northern Nortel Entrance	A/A	7.5	8.8	F/F	156.3	102.0	B/B	12.7	11.0
NC 54 and SR 1959 (Miami Boulevard)	F/E	90.8	79.8	F/F	195.6	158.4	F/F	162.3	146.1

For the Davis Drive intersection, even though the 2025 level of service for NC 54 remains LOSF for the Build alternative, the seconds of delay for the AM values are less than that of the No Build alternative. In 2025, for the AM, the Davis Drive intersection experiences delay of 246.6 seconds for the No Build alternative, and it experiences a delay of 245.0 seconds for the Build alternative. This decrease in seconds of delay per vehicle demonstrates an improvement in the intersection for the AM peak hour traffic. However, the seconds of delay for the PM traffic increase for the Build alternative.

The Nortel and Miami Boulevard intersections both experienced improvements when comparing seconds of delay. In 2025, the Nortel intersection exhibits an improved level of service, from F in No Build to a B in Build, along with significantly lower seconds of delay. At the Miami Boulevard intersection, even though the 2025 level of service remains LOS F for the Build alternatives, the seconds of delay is considerably less than the LOS F for the No Build alternative. The Miami Boulevard intersection experiences 162.3 seconds of delay per vehicle in AM and 146.1 seconds of delay per vehicle in PM for the Build alternative, versus 195.6 seconds of delay per vehicle in the AM for the No Build alternative and 158.4 seconds of delay per vehicle for the PM No Build alternative; therefore the intersection operation does improve.

In order to further improve the level of service of this facility, extensive improvements to Miami Boulevard and Davis Drive would be necessary, which is beyond the scope of this project.

D. Other Proposed Highway Improvements in the Project Area

Two projects lie within the project study area:

I-2204 BA - I-40 from NC 147 (Exit 279) in Research Triangle Park to I-540. Widen roadway to eight lanes. Currently under construction.

U-4026 - Proposes to widen SR 1999 (Davis Drive) from Morrisville-Carpenter Road to NC 54 to multi-lanes. Scheduled for Right of Way in FFY 2002 and scheduled to be let in FFY 2003.

III. PROPOSED IMPROVEMENTS

A. Length of Project

The length of the proposed project is approximately 1.1 miles (1.77 km) (See Figure 2 for preliminary design plans).

B. Bridges and Drainage Structures

1. Bridge

The NCDOT is only responsible for the widening of NC 54. The North Carolina Railroad (NCRR) will design and build all railroad-related improvements associated with this project. However, engineering coordination will occur between the NCRR and NCDOT to ensure that the new railroad bridge provides the necessary clearances for the desired widening.

NCRR is proposing to replace the existing railroad bridge with two railroad bridges east of the existing bridge to support the Triangle Transit Authority's regional rail plans.

2. Culverts

There is one drainage structure within the project limits. It carries a tributary of Burdens Creek, and flows from the northeast to the southwest. This drainage structure will be retained and extended to accommodate the proposed widening of NC 54.

C. Typical Section

From Davis Drive to approximately 200ft(60.96m) west of the railroad structure, it is proposed to widen NC 54 to a 4-lane divided shoulder section with a 17.5ft(5.3m) raised median. From 200ft(60.96m) west of the railroad structure to SR 1959 (Miami Boulevard), it is proposed to widen NC 54 to a 5-lane curb and gutter section with a double left and single right turn lane at the NC 54/Miami Boulevard intersection. Traffic will remain open on NC 54 during construction (refer to Figure 4 for typical sections).

D. Speed Limit

The speed limit will be 45mph (72.4 km/hr) throughout the project section.

E. Right of Way

The proposed right of way is approximately 150ft (45.7m) symmetrically along the roadway.

F. Access Control

No control of access is proposed.

G. Intersection Treatment and Type of Control

The intersection at SR 1999 (Davis Drive) will remain as existing as shown in Figure 2, Sheet 1. A single right turn lane will remain, and two thru-lanes will accommodate the widening. This intersection will remain signalized.

The intersection at the signalized Nortel entrance will be modified as shown in Figure 2, Sheet 2. A single right turn lane will be added to the westbound and eastbound approaches along with single left turn lanes at each leg of the intersection. Two thru-lanes will accommodate the widening. This intersection will remain signalized.

The intersection at Miami Boulevard will be modified as shown in Figure 2, Sheet 4. Double lefts will be added to the eastbound approach of NC 54, and two thru-lanes will accommodate the widening.

To accommodate the proposed Regional Rail Station and Mixed-Use Development, NCDOT will provide a driveway entrance west of the railroad (See Figure 2, sheet 4). Additional coordination between NCDOT and the Research Triangle Park Foundation is needed to finalize the driveway and turning movement accommodations (see Project Commitments on page 2 of this report).

H. Bicycle and Pedestrian Accommodations

4ft (1.2m) shoulders along the proposed shoulder section and 14ft(4.3m) wide outside lanes along the proposed curb and gutter section are proposed along the entire project corridor to accommodate bicycles.

Use of the existing walking paths will be temporarily lost during construction. The Research Triangle Foundation (RTF), through the special tax district for the Research Triangle Park (RTP), will provide a paved walking path along the north side of NC 54 from the present terminus of the RTP trail system to the RTP boundary at the North Carolina Railroad. The remaining section of the project that lies east of the railroad tracks lies in the City of Durham city limits. The City of Durham has agreed to the cost-sharing to fund the sidewalks along the remainder of the project (see Page A-16 in Appendix A).

Pedestrian crosswalks and pedestrian crossing signals will be provided as needed.

I. Estimated Costs

The estimated cost is $3,625,000 including $525,000 for right of way acquisition and $3,100,000 for construction. The estimated cost projected by the 2002-2008 Transportation

Improvement Program is $5,800,000, including $200,000 for right of way, $5,200,000 for construction, and $400,000 spent in prior years.

IV. ALTERNATIVES TO PROPOSED ACTION

A. No Build

This alternative would avoid the environmental impacts that are anticipated as a result of the project; however, this alternative does not meet the purpose and need of the project, which is to improve the safety and operational capacity of NC 54, so that the facility can support the constantly developing Research Triangle Park corridor. If the facility were not to be widened, there would be no positive effect on the capacity or safety of the highway. This alternative is not recommended, however, it does serve as a basis for comparison of other alternatives.

V. SOCIAL, ECONOMIC, AND ENVIRONMENTAL EFFECTS

A. Community Profile

1. Geographic and Political Location

Durham County is located in central North Carolina and is home to Research Triangle Park (RTP). Durham County is bounded by Orange County to the west, Chatham County to the southwest, Wake County to the southeast and east, Granville County to the northeast, and Person County to the north. The City of Durham, the sole municipality in the County, is the county seat and is located in the center of the county. Interstate 85 (I-85) crosses the northern portion of the city and Interstate 40 (I-40) skirts the southern and southwest corporate limits.

The project is located in southern Research Triangle Park (Durham County). RTP, established in 1959, is comprised of 7,000 total acres and is approximately 8 miles (12.9km) long and 2 miles (3.2km) wide. Currently, there are 136 organizations located in RTP, 106 of which are research and development-related. There is no residential development in RTP, other than what was already there in 1959.

2. Project Study Area and Definition

The purpose of the project is to improve the traffic carrying capacity and accident experience of NC 54. The project was requested by the City of Durham, Durham County, and Durham-Chapel Hill-Carrboro Urban Area Transportation Advisory Committee and is projected to improve traffic flow and congestion on NC 54 and Page Road while reducing accident potential.

The project corridor serves as a major connector for the southern portion of RTP and directly serves Nortel Networks and Becton Dickinson Technologies. It also links many more businesses in RTP with Davis Drive, Miami Boulevard and I-40. Traffic congestion during

the morning and afternoon peak hours is a serious problem in RTP in general, and in particular, along this section of NC 54.

The project study area is a ½ mile (0.8 m) radius around the project (See Figure 5). For the purposes of determining demographics for the study area, census block groups were used. There are two census block groups in the ½ mile (0.8 m) study area (defined for the purposes of this report as the demographic study area). The census information compiled for the demographic study area is representative of the communities beyond the ½ mile (0.8 m) study area of the project. Field investigation has shown that the ½ mile (0.8 m) project study area contains three residential structures and is made up largely of several business communities.

3. Race, Ethnicity, and Age

The 2000 Census reports the population of Durham County to be 223,314 persons. The racial breakdown is approximately 51 percent Caucasian, 40 percent African-American, and 7.6 percent Hispanic. The total minority population for Durham County is approximately 51.9 percent. The demographic profile of the study area is similar to that of the state of North Carolina (See Table 3). It is assumed that these represent a true picture of the regions in question especially as they represent the growing Hispanic population in the state.

As Shown in Table 4, the age breakdown shows that there is much less of a population of children (0-18) in the demographic study area than in the county or the state. There is also a smaller percentage of elderly in the demographic study area than there is in the county, which in turn has less than the state. The largest portion of the population in the demographic study area is made up of working aged people (19-64). There are approximately 78 percent working aged people in the demographic study area while the county and the state have 66 percent and 62 percent respectively.

Table 3. 2000 Population by Race and Hispanic Origins

	Demographic Study Area		Durham County		North Carolina	
	Number	%	Number	%	Number	%
Total Population – 2000	1,848	100.0%	223,314	100.0%	8,049,313	100.0%
Total Hispanic	69	3.2%	17,039	7.6%	378,963	4.7%
White	1,204	71.7%	113,698	50.9%	5,804,656	72.1%
Hispanic (White)	27	1.1%	6,327	2.8%	157,501	2.0%
Black	394	19.0%	88,109	39.5%	1,737,545	21.6%
Hispanic (Black)	2	0.2%	593	0.3%	14,244	0.2%
American Indian	12	0.9%	660	0.3%	99,551	1.2%
Hispanic (American Indian)	0	0.0%	129	0.1%	4,218	0.1%
Asian/Pacific Islander	158	4.3%	7,429	3.3%	117,672	1.5%
Hispanic (Asian/Pacific Islander)	0	0.0%	53	0.0%	2,091	0.0%
Other	80	4.1%	13,418	6.0%	289,889	3.6%
Hispanic (Other)	40	2.0%	9,937	4.4%	200,909	2.5%
Total Minority[1]	671	29.3%	115,943	51.9%	2,402,158	29.8%

[1] Total minority is the sum of all persons other than white-non-Hispanic.

Table 4. 2000 Population by Age

	Demographic Study Area		Durham County		North Carolina	
	Number	%	Number	%	Number	%
Total Population – 2000	1,848	100.0%	223,314	100.0%	8,049,313	100.0%
0 to 18	283	15.3%	54,537	24.4%	2,073,849	25.8%
19 to 64	1,438	77.8%	147,203	65.9%	5,006,416	62.2%
65 or above	127	6.9%	21,574	9.7%	969,048	12.0%

4. Income, Poverty Status and Unemployment

As listed in Table 5, the median household income (1990 Census) of those that live in the demographic study area is $34,299, higher than both the county ($30,526) and the state ($26,647). The per capita income was also higher than both the county and the state. Only six percent of the demographic study area lives below the poverty level, whereas almost 12 percent of the county and 13 percent of the state live below the poverty level. Less than three percent of those that live in the demographic study area live below 50 percent of the poverty level. This segment of people makes up more than five percent of the county and more than five percent of the state.

5. Housing Characteristics

The median home value (Table 6) of the demographic study area was over $90,000 in 1990. That figure was slightly higher than the county (almost $85,000) and much higher than the state (over $65,000). However, the homeownership rate in the demographic study area was less than 50 percent, less than both the county and state. The median rent in the demographic study area was greater than both the county and state.

Table 5. 1990 Income Measures and Persons Living Below Poverty Level

	Demographic Study Area		Durham County		North Carolina	
	Number	%	Number	%	Number	%
Median H.H. Income[1]	$34,299	128.7%	$30,526	114.6%	$26,647	100.0%
Per Capita Income[1]	$18,712	145.2%	$15,030	116.6%	$12,885	100.0%
Persons below poverty level[2]	70	6.0%	20,651	11.9%	829,855	13.0%
Persons below 50% of poverty level[2]	31	2.7%	9,438	5.4%	332,966	5.2%

[1]Percent based on difference between the demographic study area or county and the same figure for the state
[2]Percent based on persons for whom poverty status is determined

Table 6. 1990 Housing Characteristics

	Demographic Study Area	Durham County	North Carolina
Median Home Value	$90,766	$84,900	$65,300
Homeownership Rate[1]	43.1%	53.0%	68.0%
Median Rent	$480	$444	$382

[1]Based on occupied housing units

6. Business Activity/Employment Centers

The Triangle, as a region, is noted for the absence of a central core or hub for business activity. The Research Triangle Park reflects that regional development pattern, as most businesses in the RTP are located on large tracts. The result of the dispersed development pattern creates a number of employment centers throughout the RTP. The project is located in the southern portion of Research Triangle Park (RTP). An estimated 50,000 employees work in RTP (including contract employees). The project study area is made up almost exclusively of businesses and employment centers. Nortel Networks is a communications and technology firm that employs approximately 4,300 people between the two sites on NC 54. Nortel Networks is the second largest employer in RTP. There could be an additional 300-400 additional employees at the Gateway North site by August 2002. Becton Dickinson Technologies is a medical technologies company and has approximately 150 employees. Ericsson/Sony Ericsson (has satellite offices in flex buildings located southwest of the project corridor at the intersection of Hopson Road and Davis Drive) is another large company in RTP with over 1000 employees, and BASF Corporation (located southwest of the project corridor on Davis Drive) is among the top 20 employers in RTP with 435 employees.

7. Public Facilities, Schools, and Institutions

a. Schools

There are no schools within the project study area. Lowe's Grove Middle School is the closest public school to the project area and it is located approximately 3 miles north west of the project area on Alston Avenue. The Durham Public School system has one bus which utilizes the corridor. The County's Transportation Information Management System Supervisor indicated that the improvement would have no impact on service delivery.

b. Institutions

There is one church, Cedar Fork Baptist Church, in the project area located on Miami Boulevard, just north of its intersection with NC 54. It will not be directly impacted by the project.

c. Public Transportation

The Triangle Transit Authority (TTA) provides regional bus service that utilizes NC 54 and Davis Drive. There are TTA bus stops and shelters along the NC 54, as well. Route 101 of the TTA's Regional Bus Service takes riders from the Research Triangle Park Bus Center, which is located on NC 54, just west of its intersection with Davis Drive, to Moore Square in downtown Raleigh. Twenty-six buses each weekday and 12 buses each Saturday follow route 101.

d. Parks

There is a private athletic field on Nortel Network's campus on the north side of NC 54. These athletic fields will not be impacted by this project. Also in the project area, there are a series of paved trails throughout the RTP. A portion of the paved trails runs along the north side of NC 54 within the project limits. The trail will be impacted by this project, however, the Research Triangle Foundation will provide new paved walking paths in this area (see page 12 under "Bicycle and Pedestrian Accommodations").

8. Police, Fire, EMS and Public Services

The fire station that services the project area is Station 12 of the City of Durham Fire Department. It is located on Carpenter Fletcher Road, approximately two to three miles [3.2km – 4.8km] to the northwest of the project. Emergency vehicles that need to access Becton Dickinson Technologies, Nortel Networks, or other businesses to the east would have to travel along the project corridor. Travel along NC 54 during peak traffic periods is hampered by congestion.

9. Existing and Future Land Uses and Present and Future Zoning

a. Residential

There is one residential area that consists of approximately 10 homes along Hopson Road between NC 54 and Davis Drive, south of the project corridor. Three of the homes are within the ½ mile project study area; the others are beyond that limit. All of the homes on this section of Hopson Road are 1950s style, rural, farm houses.

b. Commercial

East of the Project - Along Miami Boulevard, north of the project terminus, there are three high-rise hotels serving the immediate area of RTP. A few multi-story office complexes are located along Miami Boulevard and along Page Road and Hopson Road to the east of Miami Boulevard. This includes some new high-rise office complexes and several parcels of land that are available, some of which are developed. This portion of the project area is experiencing rapid growth.

Along Miami Boulevard to the south of the project terminus, there is a shopping center (Creekstone Shopping Center) with restaurants, medical offices, and other businesses. Across Miami Boulevard from the shopping center is a new strip center that is currently advertising for tenants.

Along the Project Corridor - Along NC 54 between Miami Boulevard and Davis Drive, there are currently two large technology corporations – Nortel Networks and Becton Dickinson Technologies. The Nortel Networks campus is located north and south of NC 54. Becton Dickinson Technologies offices are located on the north side of NC 54 and east of Davis Drive

West of the Project - Along NC 54 to the west of Davis Drive, there are other large research companies including BASF Corporation. There are also smaller businesses including several banks and the Radisson Governor's Inn.

c. Industrial

Nortel Networks and Becton Dickinson Technologies represent light industrial uses as they produce routing equipment and medical supplies respectively.

d. Future Development

There are several new plans for development in the area. There are plans for a new Regional Rail System by the Triangle Transit Authority (TTA). The system will use the railroad corridor that crosses NC 54 and will involve construction of a new railroad bridge to accommodate the new tracks. One of the proposed Regional Rail Stations is on a vacant parcel of land that is next to Nortel Networks on NC 54. Also on that vacant parcel, there are plans for a mixed use transit oriented development which will include

hotels, residential, office space, parking, and more. These plans and others are discussed in further detail on page 20.

Nortel Networks has expansion capabilities, but no future development is currently planned. Becton Dickinson Technologies has plans to add new buildings in close proximity to the existing building. These two businesses are noted below.

e. Zoning

The majority of the project and the area to the west of the project are zoned Research or Research Applications. The parcels on the northwest corner of NC 54 and Davis Drive and the parcel on the southeast portion of the project are all zoned SC (Shopping Center). The parcel along the south side of the project corridor to the west of the railroad tracks is zoned OI-2 (General Office and Institutional). The parcels to the east of the project are zoned OI-2 (General Office and Institutional), I-1 (Industrial Park) and I-2 (Light Industrial), and GC (General Commercial).

10. Local/Regional Land Use and/or Development Plans

Business Development Plans. Nortel Networks has the capacity to double existing office space; however no future expansion is currently planned. Becton Dickinson Technologies has plans to add new buildings in close proximity to the existing facility. There is no schedule for the improvements.

City of Durham Comprehensive Plan and Small Area Plan. The Durham City Council adopted *The Durham 2020 Comprehensive Plan* in December 1995. The plan embodies the city's desire to create its own future, to manage the changes that come from outside, and to actively direct change within the community. In general, the city wants to continue to grow, but retain the community's comfortable living conditions. Durham's plan encourages more compact development in carefully chosen neighborhoods and corridors in order to absorb a portion of its future growth, maintain livability, and support a multimodal approach to transportation. This form of development, it is hoped, would support transportation alternatives to the automobile and make it easier for people to walk, bike, or take transit than the current dispersed, auto-dependent land uses allow.

The entire Durham 2020 Vision statement, which reflects the 2020 Plan's guiding principles, is as follows:

- "Durham will promote a variety of distinct neighborhoods, emphasizing choice in the types of places our residents can live and work."
- "Durham will identify and support compact corridors in certain places in the community. Compact corridors will be the location for much of our future growth and development activity."
- "Compact neighborhoods in these corridors will include housing areas and employment centers. They will be mixed-use, higher intensity and well designed. Compact neighborhoods will be pedestrian-oriented and will allow less

dependence on the automobile. They will be served by attractive and efficient transit and public facilities."

- "The compact neighborhoods will be sensitive to existing urban neighborhoods."
- "Urban growth will be directed into compact neighborhoods to preserve Durham's rural character and to protect sensitive water supplies."

The primary objective of the compact neighborhoods is to create a series of 15 to 20 high- and moderate-intensity, mixed-use neighborhoods, including transit stations, public parks and plazas, while respecting the integrity of surrounding established neighborhoods. There are several incentives to help create compact neighborhoods listed in the *Durham 2020 Comprehensive Plan.* They include transit service improvements among others. Several additional incentives are suggested for implementation, such as density bonuses, impact fee reductions or offsets, express approval of proposed development, public facilities programming or other incentives.

Durham also has several Small Area Plans, many of which have not been updated since the Comprehensive Plan was adopted. The current Small Area Plan covering the NC 54 project area is the Triangle Township Plan. That plan was adopted by Durham City Council in November, 1993. Each of the Small Area Plans has a common theme: to minimize disruptive influences that transportation improvements have on adjacent residential and non-residential areas. The approach taken by the Triangle Township Plan promotes and supports a managed growth approach to the continued development of the area. This approach encourages economic development and community reinvestment, while at the same time preserving Triangle Township's important environmental resources.

Bicycle Plans. There are three separate plans that show bicycle and or pedestrian facilities in the project area. The RTP Trail System includes a trail along NC 54 from west of Davis Drive to Miami Boulevard. A trail is also included in the plan along Davis Drive from NC 54 north to Cornwallis Road. Hopson Road to the west of Davis Drive is also shown on the RTP Trail System.

The Durham Greenways Master Plan indicates that street trails are planned for Cornwallis Road from Davis Drive to Miami Boulevard, for Miami Boulevard from Cornwallis Road to Chin Page Road, and for Chin Page Road from Miami Boulevard toward the east. A street trail also is indicated along NC 54 from Miami Boulevard to the south.

DCHC has in its Long Range Transportation Plan "bicycle intensive routes." These routes cover an extensive area, particularly through the project area. Bicycle Intensive Routes stretch along NC 54, Miami Boulevard, Davis Drive, Cornwallis Road, and Hopson Road through the NC 54 project area.

Regional Rail System. The Triangle Transit Authority (TTA) is in the planning process for a Regional Rail System that will link Durham, RTP, Morrisville, Cary, Raleigh, and North Raleigh. The Phase I Regional Rail Transit System Draft Environmental Impact

Statement (DEIS) was completed in July 2001. The Final Environmental Impact Statement (FEIS) was signed by the Federal Transit Administration on December 6, 2002 and the Record of Decision was received on January 9, 2003. Authorization to proceed into Final Design is anticipated by the end of February 2003. The first segment of construction will be 27 miles long with 12 stations and is planned to be in service by late 2007, providing Regional Rail Service between the 9th Street Station in Durham and the Government Station in Raleigh every 15 minutes weekday peak hours and every 30 minutes off-peak and weekends. The remaining 4 station will be in service by 2011 at the same service frequency. This Regional Rail System will use the railroad corridor that crosses the southeastern portion of the NC 54 project just west of the intersection with Miami Boulevard. The new crossing will be on two new tracks and will cross NC 54 on a new bridge (either two single track bridges or one double track bridge).

Regional Rail Station and Mixed-Use Development.
In addition to the Regional Rail System traveling through the project area, there is a planned regional rail station at the intersection of the rail corridor and NC 54. The station is anticipated to be surrounded by a mixed-use development that will bring more activity (pedestrians, bicycles, autos, buses, and others) to the area via NC 54.

Future Transit Corridor. The NC 54 corridor is currently being studied by the TTA as a possible route to link Chapel Hill to the Regional Rail System. The NC 54/I-40 Transit Corridor Feasibility Study is being conducted to probe possible transit connections between Chapel Hill, Durham, and Raleigh. The study will examine possible routes and technologies to be used to make the connection between the Triangle Metro Center (described above) and the University of North Carolina at Chapel Hill.

Railroad Bridge and Track Alignment Improvements.
There are plans to improve the NC 54 railroad bridge as a separate project from NCDOT's NC 54 improvements. The current clearance under the railroad bridge will be improved by raising the railroad and lowering the road. The new bridge will have double tracks and the curve to the east will be straightened in anticipation of higher speed trains traveling through this corridor in the near future. This new bridge will be in addition to the new bridge(s) that TTA will be constructing with its Regional Rail System (described above). With this project, the Nortel Networks entrance on the Miami Boulevard side is proposed to be closed (as well as the grade crossing of the railroad tracks) because of safety concerns. The traffic would be diverted to the NC 54 entrance. The construction of the railroad bridge will not necessitate temporary closure of NC 54. North Carolina Railroad Company has stated that the new bridge will be aesthetically pleasing.

Track and Train Control Signal Improvements
The NCDOT Rail Division, in conjunction with the North Carolina Railroad (NCRR) and Norfolk Southern Railway (NS), are currently constructing track and train control signal improvements between Cary and Greensboro that will add capacity to the rail corridor as well as allow existing passenger train speeds to increase from a maximum of 59 mph to 79 mph over the Cary/Greensboro segment of the railroad under which the NC

54 widening is located. The railroad improvements in the NC 54 area should be completed by the end of 2003.

Southeast High Speed Rail. In addition to regional rail and higher speed passenger trains, the rail line that crosses the project is under study for development as a high-speed rail corridor linking Charlotte and Washington, DC. A Draft Environmental Impact Statement has been completed for the Southeast High Speed Rail Corridor (SEHSR). The SEHSR could be completed by 2010. Future expansion is planned to Columbia, SC, Birmingham, AL, and Jacksonville, FL.

I-40 HOV/CMS. The NCDOT is currently studying High Occupancy Vehicle (HOV) lanes along I-40 between Raleigh and Chapel Hill. The I-40 corridor is located less than ½ mile north of the NC 54 project. The purpose of the study is to determine the feasibility and phasing of HOV lanes on I-40 as well as other congestion management strategies. The ongoing study has identified HOV lanes as a means of reducing I-40 congestion and is studying constructing an additional HOV lane in each direction. Several options for design of the HOV system are being analyzed, including concurrent flow lanes with access to existing interchanges and also a barrier-separated system with partial access.

11. Community/Neighborhood Description

The project study area, located in Research Triangle Park, is representative of RTP development patterns, large tracts of land with dense mature hardwood and evergreen trees which provide a visually opaque screen for businesses when viewed from the roadway. Most of the businesses in the park are developed in a campus like atmosphere with structures integrated into the existing landscape with recreation amenities such as walking trails, athletic fields, and on-site exercise facilities. Along the project corridor, the Nortel Networks and Becton Dickinson Technologies sites are typical of the aforementioned RTP development.

The entire study area is in transition from semi-urban rural agrarian to urban. This transition is evidenced by the recent and current development projects, particularly along Miami Boulevard, and the presence of commercial realty signs found on vacant tracts.

12. Community Involvement

A small group meeting was held for the purpose of obtaining community input on February 8, 2002 at the offices of Parsons Brinckerhoff in Morrisville. The largest employers in the project area as well as government entities were invited to participate and submit comments. Those in attendance included representatives of Nortel Networks, Becton Dickinson Technologies, CB Richard Ellis, Craig Davis Properties, the Research Triangle Foundation, Durham City/County Planning, Triangle Transit Authority, North Carolina Railroad Company (and HNTB, their consultant), NCDOT Rail Division, NCDOT Public Involvement Section, and NCDOT Project Development Branch.

To gather input from the smaller businesses in the project area, a door-to-door survey was conducted. Several businesses submitted their opinion of the project during this survey. For many who were not able to be contacted directly, a survey was provided so that businesses had the opportunity to submit comments on the project. The results of this public input have been incorporated into this report.

Survey Results. The input gathered from the community was positive. Everyone contacted was in favor of the project, and most wanted it completed as soon as possible. One business noted that the new shopping center on the east side of NC 54, south of Miami Boulevard, will create new traffic on NC 54. It is currently difficult to exit onto NC 54 from the Creekstone Shopping Center and it was felt that the new development will worsen the problem. A second business suggested creating an exit point from the Creekstone Shopping Center to NC 54 west of Miami Boulevard. All businesses that responded felt that the project would have a positive impact on the community, but were concerned about the disruption to daily business activity and the duration of the construction phase. In addition to this group meeting and survey, a Citizens Information Workshop was held on August 23, 2001 at the Sheraton Imperial Hotel and Convention Center in Durham County (see Section VI).

B. Project Impact Assessment

1. Consistency With Local/Regional Plans

The NC 54 widening project is consistent with all identified land use and development plans. The project complements several of the local plans. The project will allow more traffic to access the area and encourage the development of the Triangle Metro Center (one of the "compact neighborhoods" that centered around a Regional Rail Station that is an objective of *The Durham 2020 Comprehensive Plan)*. The project also is consistent with the Triangle Township Plan in that it helps support managed growth in the project area.

The NC 54 project is compatible with the plans for Regional Rail and the mixed-use development surrounding the Regional Rail Station on NC 54. The Triangle Transit Authority supports this project and anticipates its completion so that the Regional Rail Station and associated development will be further encouraged. Future transit along the NC 54 corridor and future rail plans, including the Southeast High Speed Rail plans, also will be enhanced by the NC 54 widening project.

2. Economic Development Opportunities

Numerous economic development opportunities exist in the project area. The widening of NC 54 between Davis Drive and Miami Boulevard should facilitate continued growth and help to ease the traffic burden created by increased development. The development of the proposed Triangle Metro Center, coupled with the Regional Rail Station, will create tremendous opportunities for new businesses and existing businesses.

3. Traffic Congestion and Safety

The completion of the NC 54 project, in addition to other local improvements; the widening of Davis Drive, HOV lanes along I-40, and the grade separation of Hopson Road, should reduce congestion and travel time and increase safety for RTP commuters.

The roadway improvement will allow traffic to flow more freely and reduce the amount of backups that build along the road at Davis Drive and NC 54. The improvement should make it easier for traffic entering and exiting Nortel Networks and Becton Dickinson Technologies, as well as the Creekstone Shopping Center. Becton Dickinson Technologies receives truck deliveries via both sides of NC 54, thus an improved NC 54 would allow for improved service.

Nortel Cut-Through Traffic and Railroad Grade Crossing. Because traffic flow would be improved with this project, cut through traffic (from NC 54 to Miami) onto Nortel Networks property should be reduced, which would improve internal safety conditions at Nortel Networks. Easing the congestion at the NC 54 entrance to Nortel Networks also would allow Nortel Networks to close the Miami Boulevard entrance. The entrance has been discussed for closure for some time because of the railroad grade crossing on the campus of Nortel Networks in close proximity to Miami Boulevard. The North Carolina Railroad and NCDOT – Rail Division, as well as Nortel Networks, have raised safety concerns because of the grade crossing. With the addition of two tracks with the Regional Rail System and the potential new tracks with High Speed Rail, the safety concern of the Miami Boulevard entrance would only be heightened. Widening NC 54 may help alleviate that problem and allow for safer entrance and egress to Nortel Networks.

Nortel Networks has raised concerns about the duration of roadway construction, both with this project and with others, including the railroad bridge project and the Davis Drive project (TIP No. U-4026). A lengthy construction process would mean the greater likelihood that drivers may choose to cut through Nortel Networks' property. This would be detrimental both in terms of traffic and safety, and Nortel Networks has urged a timely project completion.

Nortel Entrance. Improving traffic flow along NC 54 will allow for better signal timing at the light at the entrance of Nortel Networks. According to Nortel Networks, currently, the light remains red for traffic exiting Nortel Networks for an extended amount of time. This causes many drivers to run the red light or take other action. Signal timing will be investigated during the final design.

Triangle Metro Center. Because of the mixed-use development that is planned at the Triangle Metro Center, Craig Davis Properties would like to see the speed limit along NC 54 reduced to 35 mph in front of the high density development, as they believe it would help safety. This decreased speed limit may create safety concerns at other points along NC 54 which are posted at 45 mph. Changes to the posted speed limit will not be addressed by this project. Speed limits are set by local government agencies in consultation with NCDOT.

Creekstone Shopping Center. Presently, access to the Creekstone Shopping Center from NC 54 is a problem. There is one access point to the shopping center from NC 54 west of Miami Boulevard. It is an entrance point only. There are problems because many drivers try to exit onto NC 54 from this point. Numerous accidents occur at this access point, according to local business owners. A second access point to the shopping center is located along NC 54, south of Miami Boulevard, in the center of the shopping center. This access point is a right-in, right-out design. The third access point is at the southern end of the shopping center onto NC 54. This access point is the only place where drivers can make a left turn onto NC 54 to travel towards RTP, I-40, and points beyond.

One business owner described the problem, stating that it sometimes takes 10 – 12 minutes to exit at this access point, and traffic backs up through the shopping center because every driver wanting to make this turning movement has to travel to the southern part of the shopping center. The business owner indicated that he has been in business in this shopping center for 11 years and has discussed this problem with the building owner, who has stated that he is not able to solve the problem. The proposed improvements should improve egress from the shopping center by reducing congestion along NC 54.

NC 54 South of Miami Boulevard. NC 54, at the intersection with Miami Boulevard, backs up with auto traffic at rush hours down toward Morrisville and Cary. It is a two lane roadway that serves as a major traffic artery between Morrisville, Cary, and RTP. With completion of the NC 54 project between Davis Drive and Miami Boulevard, traffic headed toward Cary and Morrisville could be able to get through this section of RTP faster, however this may cause further backups on the section of NC 54 south of Miami Boulevard.

4. Accessibility and Parking

Businesses along NC 54 will be more accessible with the completion of this project. The roadway improvement will not affect parking.

5. Transit Considerations

The Triangle Transit Authority (TTA) provides regional bus service that utilizes NC 54 and Davis Drive. There are TTA bus stops and shelters along NC 54, as well. Route 101 of the TTA's Regional Bus Service takes riders from the Research Triangle Park Bus Center, which is located on NC 54, just west of its intersection with Davis Drive, to Moore Square in downtown Raleigh. Twenty-six buses each weekday and 12 buses each Saturday follow route 101.

6. Business, Institutional, and Residential Relocations And Impacts

All property acquisitions are subject to the Uniform Relocation and Real Property Acquisition Policies Act of 1970, as amended. This Act provides for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by Federal and federally-assisted programs, and establishes uniform and equitable land acquisition policies.

No homes or businesses will be relocated as a result of this project. See Appendix B for a copy of the relocation report.

7. Community Stability and Neighborhood Cohesion

Impacts to communities and neighborhoods can include splitting neighborhoods, isolating portions of a community, generating new development or changing development patterns, changing property values or creating a barrier separating residents from community facilities.

There are no residential communities in the project area, other than a small number of rural homes along Hopson Road. This project should not have a negative impact on that community. The project also should not have a negative impact on the business community. The strength and vitality of the business community should be increased as a result of this project.

8. Tax Base Changes and Changes In Employment

Because there would not be any relocations, there would not be any loss of employment because of the project. The project would, however, improve traffic flow in a heavily traveled area. This could allow for easier access to and from the area, making it more attractive for continued development. This continued development could increase the tax base and increase the employment in the area.

9. Visual Impacts

There are large trees that buffer Nortel Networks and Becton Dickinson Technologies from views of the road. Some of these trees would be removed with roadway construction, however the majority of trees would remain and the primary visual buffer would remain.

10. Farmland Impacts

The Farmland Protection Policy Act requires all federal agencies or their representatives to consider the impact of land acquisition and construction projects on prime and important farmland soils. North Carolina Executive Order Number 96, Preservation of Prime Agricultural and Forest Lands, requires all state agencies to consider the impact of land acquisition and construction projects on prime farmland soils, as designated by the U.S. Natural Resources Conservation Service (NRCS). These soils are determined by the SCS based on criteria such as crop yield and level of input of economic resources. Land which is planned or zoned for urban development is not subject to the same level of preservation afforded other rural, agricultural areas.

No prime or important farmlands would be lost with construction of this project.

11. Scenic Rivers and Water Supply Watersheds

The Wild and Scenic Rivers Act of 1968, as amended, declared it the policy of the United States to preserve certain selected rivers, "which, with their immediate environments, possess

outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic cultural, or other similar values." The Act established the Wild and Scenic River System. The Natural and Scenic Rivers Act of 1971 declared it the policy of North Carolina to retain "the natural and scenic conditions in some of the State's valuable rivers by maintaining them in a free-flowing state and to protect their water quality and adjacent lands by retaining these natural and scenic conditions." At present, designated state Natural and Scenic Rivers are identical with designated federal Wild and Scenic Rivers.

There are no rivers designated as scenic under the Wild and Scenic Rivers Act of 1968 in the project area.

12. Title VI and Environmental Justice

Title VI of the Civil Rights Act of 1964, and related statutes, requires there be no discrimination in Federally-assisted programs on the basis of race, color, national origin, age, sex, or disability. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," provides that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects[1] of its programs, policies, and activities on minority populations and low-income populations." The Executive Order makes clear that its provisions apply fully to American Indian populations and Indian tribes. Environmental justice refers to the equitable treatment of people of all races, cultures, and income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.

This assessment finds no evidence or indication of benefit, harm, or disproportionate impact of any social group.

13. Secondary/Cumulative Impacts

Secondary effects are indirect impacts which are caused by or result from the project, although these may be later in time or further removed in distance, but are still reasonably foreseeable. Cumulative effects are the results of the incremental impacts of the project when added to other past, present and reasonably foreseeable future activities, regardless of which entities undertake these other activities. Cumulative effects can result from individually minor but collectively significant activities taking place over a period of time.

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[1] Adverse effects means significant cumulative human health or environmental effects, including social and economic effects, which may include, but are not limited to: bodily impairment, infirmity, illness or death; air, noise, and water pollution and soil contamination; vibration; destruction or diminution of aesthetic values; destruction or disruption of man-made or natural resources, of community cohesion or a community's economic vitality, or of the availability of public and private facilities and services; adverse employment effects; displacement of persons, businesses, farms, or nonprofit organizations; increased traffic congestion; isolation, exclusion or separation of minority or low-income individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of, benefits of DOT programs, policies, or activities.
Disproportionately high adverse effect on minority and low-income populations means an adverse effect that: (1) is predominately borne by a minority population and/or a low-income population, or (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population [*adapted from the Final DOT Order on environmental justice*].

One unintended consequence of roadway improvements can be - depending upon local land development regulations, development demand, water/sewer availability, and other factors - encouragement of unplanned development and sprawl[2]. Improvements to levels of service, better accommodation of merging and exiting traffic, and reductions in travel times can have land development impacts outside of the project area.

The improvements are congruent with plans to intensify development in this area and should create a supportive climate for this increased development. The increased level of service that NC 54 will have with the completion of this project along with the Triangle Metro Center development, Regional Rail, the future transit corridor to Chapel Hill, and future High Speed Rail could transform the project area into a hub of activity and development creating a central place in the Triangle region for business activity. Ultimately, this action may continue the trend of the urbanization of the state and the loss of green space.

C. Historic and Cultural Resources

This project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, implemented by the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800. Section 106 requires that for federally funded, licensed, or permitted projects having an effect on properties listed in or eligible for the National Register of Historic Places, the Advisory Council on Historic Preservation be given the opportunity to comment.

1. Historic Architecture

The State Historic Preservation Office (SHPO) conducted a file search and found no structures of historical or architectural importance located within the project area. SHPO recommended no survey for historic architectural resources. Based on this recommendation, no surveys were conducted. See page A-5 in Appendix A for a copy of correspondence from SHPO.

2. Archaeology

According to SHPO, there are no known archaeological sites within the project area, and it is unlikely any archaeological resources eligible for inclusion in the National Register of Historic Places will be affected by the project. SHPO recommended no survey for archaeological resources. Based on this recommendation, no surveys were conducted. See page A-5 in Appendix A for a copy of correspondence from SHPO.

D. Natural Systems

Research was conducted prior to field investigations. Information sources used in this pre-field investigation of the study area include: U.S. Geological Survey (USGS) quadrangle maps (Southeast Durham 1973), Natural Resource Conservation Service soils information for Durham

[2] Some common traits of sprawl are: 1.) unlimited outward expansion and leapfrog development; 2.) low-density residential and commercial settlements; 3.) widespread strip commercial development; 4.) large areas of homogeneous land uses and 5.) poor accesibility of related land uses such as housing, jobs, and services like schools and health care.

County (USDA 1976) and NCDOT aerial photomosaics (scale 1:200) of the project area. Water resource information was obtained from publications of the North Carolina Department of Environment and Natural Resources, Division of Water Quality (NCDENR-DWQ 2000) and from the NC Center for Geographic Information and Analysis (Environmental Sensitivity Base Map of Durham County 1995) and Geographic Information Systems database (July 2001). Information concerning the occurrence of federal and state protected species in the study area was gathered from the U.S. Fish and Wildlife Service (USFWS) list of protected species and federal species of concern and from the North Carolina Natural Heritage Program (NCNHP) database of rare species and unique habitats (Amoroso 1999, LeGrand and Hall 1999).

General field surveys and wetland investigations were conducted along the proposed project area by NCDOT biologists on 11 September 2001, and on 3 December 2001. Plant communities and their associated wildlife were identified and recorded. Wildlife identification involved using one or more of the following observation techniques: active searching and capture, visual observations (binoculars) and identifying characteristic signs of wildlife (sounds, scat, nests, tracks and burrows).

Jurisdictional wetland determinations were performed utilizing delineation criteria prescribed in the "Corps of Engineers Wetland Delineation Manual" (Environmental Laboratory, 1987) and rated using "Guidance for Rating the Values of Wetlands in North Carolina" (Division of Environmental Management, 1995). Jurisdictional surface water determinations were performed using guidance provided by N.C. Division of Water Quality [(DWQ), formerly known as the Division of Environmental Management (DEM)], "Field Location of Streams, Ditches, and Ponding" (NCDENR-DWQ 1997) and the NCDWQ Stream Classification Form (Environmental Sciences Laboratory, 1999a).

1. Physical Resources

Soil and water resources, which occur in the study area, are discussed below. Soils and the availability of water directly influence composition and distribution of flora and fauna in any biotic community.

a. Regional Characteristics

The proposed project lies in Durham County, located in the north-central part of North Carolina within the Piedmont Physiographic province. The topography within the project vicinity is characterized as relatively flat with rolling hills. Elevations in the project area range from approximately 300 to 400 ft (91 m to 122 m) above mean sea level (msl). The project area is located to the southeast corner of Durham County in the Research Triangle Park. The city of Durham is the closest municipality within the project region and is located approximately 4.8. mi (7.7 km) north of the project area.

b. Soils

Three different soil series, which include 5 separate soil phases, are present within the project study area. The 5 separate soil phases are discussed below in order of their relative abundance. All mapped soils within the project area are included in Table 7.

Information contained in this subsection was obtained from the Soil Survey of Durham County (USDA 1976).

White Store sandy loam, 10 to 25 percent slopes consist of nearly level to moderately steep, moderately well drained soil on side slopes adjacent to major drainageways in uplands. Permeability is very slow, infiltration is moderate and runoff is rapid. Most of the soil is well suited for pine and hardwood forests and pasture. The slope and erosion resulting from runoff, high shrink-swell potential and very slow permeability are the major concerns in management.

White Store sandy loam, 6 to 10 percent slopes consists of nearly level to moderately steep, moderately well drained soil on narrow side slopes on uplands. Permeability is very slow, infiltration is moderate and runoff is rapid. Most of the soil is well suited for pine and hardwood forests to the use of pasture and row crops. The slope, erosion resulting from runoff, high shrink-swell potential and very slow permeability are the major concerns in management.

White Store sandy loam, 2 to 6 percent slopes consists of nearly level to moderately steep, moderately well drained soil on broad ridges on uplands. Permeability is very slow and depth to the seasonal high water table is about 1.5 ft. Infiltration is moderate and runoff is medium. Most of this soil is used for pasture or row crops. Erosion resulting from runoff, high shrink-swell potential and very slow permeability are the major concerns in management.

The Cartecay and Chewacla Series consists of about 60 percent Cartecay and 30 percent Chewacla soil. These are somewhat poorly drained soils on flood plains. Both soils are flooded frequently, but for brief periods. Infiltration is moderate and runoff is slow. These soils are well suited to hardwood and pine stands, row crops and pasture. Flooding and wetness are the major concerns in management.

Gullied Land, Clayey Materials is so severely eroded and gullied that it cannot be identified by soil series. In most areas the surface layer is clay, but in some spots it is a sandy loam. This soil has slow infiltration and rapid runoff. It is best suited to trees.

Table 7. Soils Within the Project Study Area

Map Unit Symbol	Specific Map Unit	Percent Slope	Drainage Class	Hydric Class
WsE	White Store sandy loam	10-25	Moderately Well Drained	Non-hydric
WsC	White Store sandy loam	6-10	Moderately Well Drained	Non-hydric
WsB	White Store sandy loam	2-6	Moderately Well Drained	Non-hydric
Cc	Cartecay and Chewacla	0-2	Poorly drained	Hydric Inclusions
Gu	Gullied Land, Clayey Materials			Non-hydric

c. Water Resources

This section contains information concerning those water resources likely to be impacted by the project. Water resource information encompasses physical aspects of the resource, its relationship to major water systems, Best Usage Standards and water quality of the resources. Probable impacts to these water bodies are also discussed, as are means to minimize those impacts.

1. Waters Impacted and Characteristics

The proposed project will impact surface waters of the Cape Fear River Basin, Hydrolic Unit #03030002, Subbasin 03-06-05. The impacted streams include Burdens Creek (UT) [index # 16-41-1-17-10-[0/3] and 3 unnamed tributaries (UT) to Burdens Creek (NCDENR-DWQ 2001a).

Burdens Creek is a perennial stream approximately 10.0 ft (3.0 m) wide within the project area. The substrate within the stream consisted of bedrock, cobble, gravel and sand. The stream had a slight flow. The channel height is approximately 5.0 to 6 .0ft (1.5 to 1.8 m).

Stream (UT) 1 is an intermittent stream approximately 2.0 to 3.0 ft (0.6 to 0.9 m) wide within the project area. The stream contains primarily shallow riffles approximately 6 in to 1.0 ft (0.2 to 0.3 m) deep. Substrate within the stream consisted of gravel, sand and silt.

Stream (UT) 2 is a perennial stream approximately 5.0 to 7.0 ft (1.5 to 2.1 m) wide within the project area. The stream's substrate within the project area consisted of bedrock, cobble, gravel and sand. The stream had a slight flow. The channel height is approximately 6.0 ft (1.8 m).

Stream (UT) 3 is an intermittent stream approximately 3.0 ft (0.9 m) wide within the project area. The substrate within the project area consisted of cobble, gravel and sand. The channel height is approximately 4.0 to 5.0 ft (1.2 to 1.5 m).

2. Best Usage Classification

Streams have been assigned a best usage classification by the Division of Water Quality (DWQ). Unnamed tributaries have the best usage classification of the named receiving stream. The classification of Burden's Creek and its tributaries are "C NSW". The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation and agriculture. The "NSW" classification denotes nutrient sensitive waters which require limitations on nutrient inputs. No waters classified as High Quality Waters (HQW), or Water Supplies (WS-I: undeveloped watersheds or WS-II: predominantly undeveloped watersheds) occur within 1.0 mi (1.6 km) of project study area.

3. Water Quality

This section describes the water quality of the water resources within the project area. Potential impacts to water quality from point and nonpoint sources are evaluated. Water quality assessments are based upon published resource information and field study observations.

a. Nonpoint Source Discharge

Nonpoint source discharge refers to runoff that enters surface waters through stormwater, smowmelt. Many types of land use activities can serve as sources of nonpoint source pollution including land development, construction, crop production, animal feeding lots, failing septic systems, landfills, mining, roads and parking lots (NCDENR-DWQ 1995). Runoff from urban areas is likely to be the primary sources of water quality degradation to the water resources located within the project vicinity.

In urban areas, high concentrations of impervious surfaces greatly increases runoff rates and volumes. Stormwater collection systems then transport runoff waters to receiving stream with little or no filtering by vegetative surfaces. Pollutants from urban development include: lawn care products, such as, pesticides and fertilizers; automobile-related pollutants, such as fuel, lubricants and abraded tire and brake linings; lawn and household wastes; and fecal coliform bacteria (from animals and failing septic tanks) (NCDENR-DWQ 1995). The high velocity and volumes of runoff can also cause increased erosion of stream channels through physical scouring of stream banks and flood plains.

Riparian buffers adjacent to streams remove nitrogen, phosphorus and other pollutants from rainwater that flows into the basins' waterways (NCDENR-DWQ 2001b). The Cape Fear River Basin does not require buffers along its streams at this time.

b. Benthic Macroinvertebrate Ambient Network

The DWQ has initiated a whole basin approach to water quality management for the 17 river basins within the state. To accomplish this goal the DWQ collects biological, chemical and physical data that can be used in basinwide assessment and planning. All basins are reassessed every five years. Prior to the implementation of the basinwide approach to water quality management, the Benthic Macroinvertebrate Ambient Network (managed by the DEM) assessed water quality by sampling for benthic macroinvertebrate organisms at fixed monitoring sites throughout the state.

Many benthic macroinvertebrates have stages in their life cycle that can last from six months to a year, therefore, the adverse effects of a toxic spill will not be

overcome until the next generation. Different taxa of macroinvertebrates have different tolerances to pollution, thereby, long term changes in water quality conditions can be identified by population shifts from pollution sensitive to pollution tolerant organisms (and vice versa). Overall, the species present, the population diversity and the biomass are reflections of long term water quality conditions.

The closest biological monitoring station is located approximately 1.25 mi west of the project area, downstream. This biological monitoring station is located at the crossing of Burdens Creek and SR 1945. This station was last sampled in April 1986 and received a "fair" bioclassification rating (NCDENR-DWQ 1999b).

c. Point Source Discharges

Point source discharge is defined "as any discharge that enters surface waters through a pipe, ditch or other well defined point. The term commonly refers to discharges associated with wastewater treatment plant facilities. In addition, discharges from stormwater collections systems at industrial sites and in large urban areas are now considered point source discharges" (NCDENR-DWQ 1995). Pont source discharges located throughout North Carolina are permitted through the National Pollutant Discharge Elimination System (NPDES) program. Any discharger is required to register for a permit. There are no known permitted point source dischargers to surface waters within 1.0 mi of the project area.

4. Summary of Anticipated Impacts to Water Resources

Construction of the proposed bridge project will impact water resources. The estimated linear stream impacts to Burden's Creek and its tributaries are 135 ft (41.2m). Estimated impacts are derived using the proposed construction limits.

Project construction may result in the following impacts to surface waters:

1. Increased sedimentation and siltation from construction and/or erosion.

2. Changes in light incidence and water clarity due to increased sedimentation and vegetation removal.

3. Alteration of water levels and flows due to interruptions and/additions to surface and ground water flow from construction.

4. Changes in water temperature due to removal of streamside vegetation.

5. Increased nutrient loading during construction via runoff from exposed areas.

6. Increased concentration of toxic compounds from highway runoff, construction, toxic spills, and increased vehicular use.

Precautions should be taken to minimize impacts to water resources in the study area. NCDOT's Best Management Practices for the protection of surface water, water supplies and trout waters must be strictly enforced during the construction stage of the project. Provisions to preclude contamination by toxic substances during the construction interval must also be strictly enforced.

2. Biotic Resources

Biotic resources include aquatic and terrestrial communities. This section describes those communities encountered in the study area as well as the relationships between fauna and flora within these communities. Composition and distribution of biotic communities throughout the project area are reflective of topography, hydrologic influences, and past and present land uses in the study area. Descriptions of the terrestrial systems are presented in the context of plant community classifications and follow descriptions presented by Schafale and Weakley (1990) where possible. Dominant flora and fauna observed, or likely to occur, in each community are described and discussed.

Scientific nomenclature and common names (when applicable) are provided for each animal and plant species described. Plant taxonomy generally follows Radford et al. (1968). Animal taxonomy follows National Geographic (1987), Martof et al. (1980), Menhinick (1991) and Webster et al. (1985). Subsequent references to the same organism will include the common name only. Fauna observed during the site visit are denoted with an asterisk (*). Spoor evidence equates to observation of the species. Published range distributions and habitat analysis are used in estimating fauna expected to be present within the project area.

a. Terrestrial Communities

Two biotic communities are identified in the project study area: Maintained/Disturbed Community and Dry Oak-Hickory Forest Community. Community boundaries within the study area are generally well defined without a significant transition zone between them. Many faunal species likely to occur within the study area may exploit all communities for shelter and foraging opportunities, or as movement corridors.

1. Maintained/Disturbed Community

The maintained/disturbed community consists of road shoulders and commercial landscapes. These landscapes receive frequent mowing, general maintenance, and disturbance.

Vegetation associated with the residential landscape include fescue (*Festuca* sp.), Bermuda grass (*Cynodon dactylon*), white clover (*Trifolium repens*), dandelion (*Taraxacum officinale*), *Lespedeza* sp., foxtail grass (*Sertaria italica*) and bead grass (*Paspalum* sp.)

a. Dry Oak-Hickory Forest Community

The Dry Oak-Hickory community has been greatly disturbed over time within the project area. Canopy species include white oak (Quercus alba), southern red oak (Quercus falcata), loblolly pine (Pinus taeda), sweetgum (Liquidambar styraciflua) and red maple (Acer rubrum). Understory species include hickory (Carya sp.), flowering dogwood (Cornus florida), white oak, red cedar (Juniperus virginiana), sweetgum, southern red oak, red maple, sourwood (Oxydendrum arboreum), American beech (Fagus grandifolia). Woody vines include Japanese honeysuckle (Lonicera japonica), grapevine (Vitus rotundifolia) and greenbrier (Smilax sp.). Herbaceous species are very sparse and include Christmas fern (Polystichum acrostichoides).

b. Aquatic Communities

Several aquatic communities of Burden's Creek will be potentially impacted by the proposed project. Physical characteristics of a water body and the condition of the water resource influence faunal composition of aquatic communities.

3. Wildlife

Many faunal species are highly adaptive and may populate or exploit the entire range of biotic communities discussed. Generally, community boundaries are abrupt, with little transitional area between them. Forested tracts and drainageways provide habitat for species requiring a forest community, and also provide shelter and movement corridors for other species of wildlife within the project vicinity.

a. Terrestrial Fauna

Mammals that commonly exploit habitats found within the project area include: raccoon* (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), Virginia opossum (*Didelphis virginiana*), white-tailed deer* (*Odocoileus virginianus*) and eastern cottontail* (*Sylvilagus floridanus*).

The project area provides excellent foraging and shelter for a variety of avian species, such as the northern cardinal (*Cardinalis cardinalis*), Carolina chickadee* (*Poecile carolinensis*), Carolina wren* (*Thryothorus ludovicianus*), American robin (*Turdus migratorius*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), chipping sparrow (*Spizella passerina*), tufted titmouse* (*Baeolophus bicolor*) and American crow* (*Corvus brachyrhynchos*) (National Geographic 1987).

Reptiles and amphibians that can be expected to utilize the terrestrial communities within the project area include rat snake (*Elaphe obsoleta*), eastern garter snake (*Thamnophis sirtalis*), five-lined skink (*Eumeces fasciatus*), American toad (*Bufo americanus*) and eastern box turtle* (*Terrapene carolina*) (Martof et al. 1980).

b. Aquatic fauna

Aquatic fauna present within the project area depend on physical characteristics of the water body and overall condition of the water resource. Terrestrial communities adjacent to a water resource greatly influence aquatic communities. Fauna associated with the aquatic communities include various invertebrate and vertebrate species.

Representative species of fish that may be found in the project area streams include bluegill (*Lepomis macroshirus*), redbreast sunfish (*Lepomis auritus*), highfin shiner (*Notropis altipinnis*), creek chub (*Semotilus atromaculatus*), margined madtom (*Noturus insignis*), pirate perch (*Aphredoderus sayanus*) and eastern mosquitofish (*Gambusia affinis*) (Menhinick 1991).

The streams in the project are provide habitat for a variety reptiles and amphibians. Species which may be present in this creek within the project area include the marbled salamander (*Ambystoma opacum*), northern dusky salamander (*Desmognathus fuscus*), two-lined salamander (*Eurycea bislineata*), queen snake (*Regina septemvittata*), northern water snake* (*Nerodia sipedon sipedon*), green frog (*Rana clamitans*) and bullfrog* (*Rana catesbeiana*) (Martof et al. 1980).

Invertebrates that would likely be present include: crayfish (Cambaridae); nymphal and larval stages of dragonflies (Odonata), caddisflies (Trichoptera), horseflies (Tabanidae) and snails (Gastropoda).

c. Summary of Anticipated Terrestrial Impacts

Construction of the subject project will have various impacts on the biotic resources described. Any construction related activities in or near these resources have the potential to impact biological functions. This section quantifies and qualifies impacts to the natural resources in terms of area impacted and ecosystems affected. Temporary and permanent impacts are considered here as well.

Calculated impacts to biotic resources reflects the relative abundance of each community present within the study area. Project construction will result in clearing and degradation of portions of these communities. Table 8 summarizes potential quantitative losses to these biotic communities resulting from project construction. The estimated impact to the Maintained/Disturbed Community are 10.4 acres (ac) (4.2 hectacres (ha)). Estimated impacts to the Dry Oak-Hickory Forest are 9.8 ac (4.0 ha). Usually, project construction does not require the use of the entire ROW or study area width, therefore, actual impacts may be considerably less.

Table 8. Anticipated Impacts to Terrestrial Communities [ac (ha)]

Community	Impacts Ac (ha)
Maintained/Disturbed	10.4 (4.2)
Dry Oak-Hickory Forest	9.8 (4.0)
Total	**20.2 (8.2)**

Plant communities found along the proposed project area serve as nesting and sheltering habitat for various wildlife. Project construction will reduce habitat for faunal species, thereby diminishing faunal numbers. However, due to the size and scope of this project, it is anticipated that impacts to fauna will be minimal.

Areas modified by construction (but not paved) will become road shoulders and early successional habitat. Increased traffic noise and reduced habitat will displace some wildlife further from the roadway while attracting other wildlife by the creation of more early successional habitat. Animals temporarily displaced by construction activities will repopulate areas suitable for the species.

d. Summary of Anticipated Aquatic Impacts

Aquatic communities are sensitive to small changes in their environment. Stream channelization, scouring, siltation, sedimentation and erosion from construction- related work would effect water quality and biological constituents. Although direct impacts may be temporary, environmental impacts from these construction processes may result in long term or irreversible effects.

Alterations in the aquatic community will result from the installation of bridges, box culverts and pipes as well as the extension of culverts and/or pipe. Impacts often associated with in-stream construction include increased channelization of water and scouring of stream channels. Water movement through these structures becomes concentrated and direct thereby, increasing the flow velocity. Scouring zones at pipe outflows will likely result from channelization.

In-stream construction alters the stream substrate and may remove streamside vegetation at the site. Disturbances to the substrate will destroy aquatic vegetation and produce siltation, which clogs the gills and/or feeding mechanisms of benthic organisms (sessile filter-feeders and deposit- feeders), fish and amphibian species. Benthic organisms can also be covered by excessive amounts of sediment. These organisms are slow to recover or repopulate a stream.

The removal of streamside vegetation and placement of fill material at the construction site alters the terrain. Alterations of the stream bank enhances the likelihood of erosion and sedimentation. Revegetation stabilizes and holds the soil thus mitigating these processes. Erosion and sedimentation carry soils, toxic compounds and other materials into aquatic communities at the construction site. These processes magnify turbidity and can cause the formation of sandbars at the site and downstream, thereby altering water flow and the growth of vegetation. Streamside alterations also lead to

more direct sunlight penetration and to elevations of water temperatures, which may impact many species.

4. Jurisdictional Topics

This section provides descriptions, inventories and impact analysis pertinent to two important issues--waters of the United States and rare and protected species.

a. Waters of the United States

The U.S. Army Corps of Engineers (USACE) promulgated the definition of "Waters of the United States" under 33 CFR §328.3(a). Waters of the United States include most interstate and intrastate surface waters, tributaries, and wetlands. Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions are considered "wetlands" under 33 CFR §328.3(b). Wetlands generally include swamps, marshes, bogs, and similar areas. Any action that proposes to place dredged or fill materials into waters of the United States falls under the jurisdiction of the USACE, and must follow the statutory provisions under Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344).

1. Characteristics of Wetlands and Surface Waters

Potential wetland communities were investigated pursuant to the 1987 "Corps of Engineers Wetland Delineation Manual". The three parameter approach is used where hydric soils, hydrophytic vegetation and prescribed hydrologic characteristics must all be present for an area to be considered a wetland. Two wetlands are located within the project area. One wetland is located at the western end of the project along UT 1. This small wetland has hydrophytic vegetation of silky dogwood (*Cornus amomum*) and sedges (*Carex* sp.). The soil is a clay loam, saturated to the surface and has a Munsell color notation of 10YR 4/2 with few and faint mottles of 10YR 4/4. Another small wetland is located at the eastern end of the project near UT 2. This soil is a sandy loam and is saturated within the upper 12 inches. Vegetation associated with this wetland are sweetgum, red maple and Christmas fern (*Polystichum acrostichoides*).

Jurisdictional surface waters present within the project area include Burdens Creek and three UT's to Burdens Creek.

2. Summary of Anticipated Impacts

Estimated impacts to surface waters were derived from aerial photographs of the project area, onto which surface water locations were mapped in the field. The proposed construction width and length were used in the calculations. Estimated linear surface water impacts from the project are listed in Table 9. Total stream impacts are 135ft (41.2m).

Table 9. Impacts to Surface Waters

Stream	Impacts linear feet (meters)
Burden's Creek	15(4.6)
UT 1	0(0)
UT 2	90(27.4)
UT 3	30(9.1))
Total	**135ft(41.2m)**

Wetlands were delineated in the field and mapped using the Global Positioning System (GPS). Estimated impacts to wetlands were calculated using GPS and the proposed construction width and length. No impacts to wetlands on this project are anticipated.

3. Permits

Encroachment into jurisdictional wetlands and surface waters as a result of project construction is inevitable. Factors which determine a Section 404 Nationwide Permit (NWP) applicability include: hydrology, juxtaposition with a major resource; whether the impacts occur as part of the widening of an existing facility, or as the result of new location construction. Although a discreet site may qualify under NWP authorizations, overall, cumulative impacts from a single and complete project may require authorization under an Individual Permit (IP). A North Carolina Division of Water Quality (DWQ) Section 401 Water Quality General Certification is required prior to the issuance of the Section 404 Individual Permit.

A North Carolina Division of Water Quality (DWQ) Section 401 Water Quality Certification (WQC) is required prior to the issuance of the section 404 permit. Section 401 Certifications allows surface waters to be temporarily impacted for the duration of the construction or other land manipulations. It is anticipated that a NWP 14, and a Section 401 Certification will be required for the proposed project. A NWP No. 33 may be required if temporary construction such as cofferdams, access and dewatering, are required for this project.

4. Mitigation

The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy which embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological and physical integrity of Waters of the United States, specifically wetlands. Mitigation of impacts has been defined by the CEQ to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time and compensating for impacts (40 CFR 1508.20). Each of these three aspects (avoidance, minimization and compensatory mitigation) must be considered sequentially.

a. Avoidance

Avoidance mitigation examines all appropriate and practicable possibilities of averting impacts to Waters of the United States. According to a 1990 Memorandum of Agreement (MOA) between the Environmental Protection Agency (EPA) and the USACE, in determining "appropriate and practicable" measures to offset unavoidable impacts, such measures should be appropriate to the scope and degree of those impacts and practicable in terms of cost, existing technology and logistics in light of overall project purposes. Encroachment into jurisdictional wetlands and surface waters as a result of project construction is inevitable in order to achieve the purpose and need of the project.

b. Minimization

Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts to Waters of the United States. Implementation of these steps will be required through project modifications and permit conditions. Minimization typically focuses on decreasing the footprint of the proposed project through the reduction of median widths, ROW widths, fill slopes and/or road shoulder widths. Other practical mechanisms to minimize impacts to Waters of the United States crossed by the proposed project include: strict enforcement of sedimentation control BMP's for the protection of surface waters during the entire life of the project; reduction of clearing and grubbing activity; reduction/elimination of direct discharge into streams; reduction of runoff velocity; re-establishment of vegetation on exposed areas, judicious pesticide and herbicide usage; minimization of "in-stream" activity; and litter/debris control.

c. Compensatory Mitigation

Compensatory mitigation is not normally considered until anticipated impacts to Waters of the United States have been avoided and minimized to the maximum extent possible. It is recognized that "no net loss of wetlands" functions and values may not be achieved in each and every permit action. Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts which remain after all appropriate and practicable minimization has been required. Compensatory actions often include restoration, creation and enhancement of Waters of the United States. Such actions should be undertaken in areas adjacent to or contiguous to the discharge site.

b. Rare and Protected Species

Some populations of fauna and flora have been in, or are in, the process of decline either due to natural forces or their inability to coexist with human activities. Federal law (under the provisions of the Endangered Species Act of 1973, as amended) requires that any action likely to adversely affect a species classified as federally-protected, be subject to review by the USFWS. Other species may receive additional protection under separate state laws.

1. Federally-Protected Species

Plants and animals with federal classifications of Endangered (E), Threatened (T), Proposed Endangered (PE) and Proposed Threatened (PT) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of 31 May 2002, the USFWS lists the following federally-protected species for Durham County (Table 10). A brief description of each species' characteristics and habitat follows.

Table 10. Federally-Protected Species for Durham County

SCIENTIFIC NAME	COMMON NAME	STATUS
Echinacea laevigata	Smooth coneflower	E
Haliaeetus leucocephalus	Bald eagle	T
Rhus michauxii	Michaux's sumac	E

"E" denotes Endangered (a species in danger of extinction throughout all or a significant portion of its range).

"T" denotes Threatened (a species that is likely to become an endangered species within the forseeable future throughout all or a significant portion of its range).

"T(S/A)" denotes Threatened due to similarity of appearance (a species that is threatened due to similarity of appearance with other rare species and is listed for its protection). The species are not biologically endangered or threatened and are not subject to Section 7 consultation.

Haliaeetus leucocephalus (bald eagle) **Threatened**
Animal Family: Accipitridae
Date Listed: 3/11/67

Adult bald eagles can be identified by their large white head and short white tail. The body plumage is dark-brown to chocolate-brown in color. In flight bald eagles can be identified by their flat wing soar.

Eagle nests are found in close proximity to water (within a half mile) with a clear flight path to the water, in the largest living tree in an area, and having an open view of the surrounding land. Human disturbance can cause an eagle to abandon otherwise suitable habitat. The breeding season for the bald eagle begins in December or January. Fish are the major food source for bald eagles. Other sources include coots, herons, and wounded ducks. Food may be live or carrion.

BIOLOGICAL CONCLUSION **NO EFFECT**

No large trees or large bodies of water are present within the project area to provide suitable habitat for the bald eagle. The surrounding area is highly developed. Therefore, this project will have "no effect" on this species. Also, a search of the NCNHP database 29 August 2001 found no occurrence of this species within the project vicinity.

Echinacea laevigata (smooth coneflower) **Endangered**
Plant Family: Asteraceae
Federally Listed: December 9, 1991 PE
Flowers Present: June - early July

Smooth coneflower is a perennial herb that grows from simple or branched rhizomes. This herb has a smooth stem and few leaves. The basal leaves are the largest, and these leaves are smooth to slightly rough, tapered to the base and elliptical to broadly lanceolate. Mid-stem leaves have short or no petioles and are smaller than the basal leaves. Flowers are light pink to purplish in color and

solitary. The petal-like rays usually droop. Fruits are gray-brown, oblong-prismatic and four-angled.

Habitat for the smooth coneflower is found in areas of meadows, open woodlands, glades, cedar barrens, roadsides, power line rights-of-way, clearcuts, and dry limestone bluffs. Plants usually grow in soil derived from calcareous parent material. North Carolina populations are found in soils derived from Diabase, a circumneutral igneous rock. Optimal sites are in areas with abundant sunlight and little competition from other herbaceous plants.

BIOLOGICAL CONCLUSION **NO EFFECT**

Some habitat exists on the project site for smooth coneflower along roadsides. Prior to conducting surveys on the project site, a known population of this species was visited in Durham County. A plant by plant survey revealed no species found. A search of the NCNHP database on June 21, 2002 found no occurrence of this species within the project vicinity. Therefore, this project will have "no effect" on the smooth coneflower.

Rhus michauxii (Michaux's sumac) **Endangered**
Plant Family: Anacardiaceae
Federally Listed: September 28, 1989
Flowers Present: June

Michaux's sumac is a densely pubescent rhizomatous shrub. The bases of the leaves are rounded and their edges are simply or doubly serrate. The flowers of Michaux's sumac are greenish to white in color. Fruits, which develop from August to September on female plants, are a red densely short-pubescent drupe.

This plant occurs in rocky or sandy open woods. Michaux's sumac is dependent on some sort of disturbance to maintain the openness of its habitat. It usually grows in association with basic soils and occurs on sand or sandy loams. Michaux's sumac grows only in open habitat where it can get full sunlight. Michaux's sumac does not compete well with other species, such as Japanese honeysuckle, with which it is often associated.

BIOLOGICAL CONCLUSION **NO EFFECT**

Some habitat exists on the project site for Michaux's sumac along roadsides and edges of fields and woodlands. A plant by plant survey revealed no species found. A search of the NCNHP database on June 21, 2002 found no occurrence of this species within the project vicinity. Therefore, this project will have "no effect" on Michaux's sumac.

2. Federal Species of Concern and State Listed Species

There are 11 Federal Species of Concern (FSC) listed for Durham County as of 26 February 2001. Federal Species of Concern are not afforded federal protection under the ESA and are not subject to any of its provisions, including Section 7, until they are formally proposed or listed as Threatened or Endangered. Federal Species of Concern are defined as those species which may or may not be listed in the future. These species were formally candidate species, or species under consideration for listing for which there was insufficient information to support a listing of Endangered, Threatened, Proposed Endangered, and Proposed Threatened.

Organisms which are listed as Endangered, Threatened, Significantly Rare, or Special Concern by the NCNHP list of rare plant and animal species are afforded state protection under the State Endangered Species Act and the North Carolina Plant Protection and Conservation Act of 1979.

Table 11 lists Federal Species of Concern, species state status, and the existence of suitable habitat for each species in the study area. This species list is provided for information purposes as the status of these species may be upgraded in the future.

Surveys for these species were not conducted during the site visit, nor were any of these species observed. As of a 29 January 2003 review of the NCNHP database of the rare species and unique habitats revealed no records of North Carolina rare and/or protected species in or near the project study area.

Table 11. Federal Species of Concern for Durham County.

Scientific Name	Common name	NC Status	Habitat
Delphinium exaltatum	tall larkspur	E	No
Etheostoma collis lepidinion	Carolina darter	SC	No
Fusconaia masoni	Atlantic pigtoe	T(PE)	No
Gomphus septima	Septima's clubtail dragonfly	SR	No
Juglans cinerea	butternut	W5	No
Lampsilis cariosa	yellow lampmussel	T(PE)	No
Lasmigona subviridus	Green floater	E	No
Lythrurus matutinus	pinewoods shiner	SR	No
Monotropsis odorata	sweet pinesap	C	Yes
Plagiochila columbiana	a liverwort	W2	No
Noturus furiosus	"Neuse" madtom	SC	Yes
Somotogyrus virginicus	panhandle pebblesnail	SR	No

"E"--An Endangered species is one whose continued existence as a viable component of the State's flora is determined to be in jeopardy.
"T"--A Threatened species is one which is likely to become endangered species within the foreseeable future throughout all or a significant portion of its range.
"SC"--A Special Concern species is one which requires monitoring but may be taken or collected and sold under regulations adopted under the provisions of Article 25 of Chapter 113 of the General Statutes (animals) and the Plant Protection and Conservation Act (plants). Only propagated material may be sold of Special Concern plants that are also listed as Threatened or Endangered.
"C"--A Candidate species is one which is very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction, direct exploitation or disease. The species is also either rare throughout its range or disjunct in North Carolina from a main range in a different part of the country or the world.
"SR"--A Significantly Rare species is one which is very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction, direct exploitation or disease. The species is generally more common elsewhere in its range, occurring peripherally in North Carolina.

"W2"--A Watch Category 2 species is a species rare to uncommon, but probably not in trouble.

"W3"--A Watch Category 3 species is a species that is poorly known; perhaps needs listing in upcoming years.

"W5"--A Watch Category 5 species is a species with increasing amounts of threats to its habitat; populations may or may not be known to be declining.

"*"--Historic record (last observed in the county more than 50 years ago).

"**"--Obscure record (the date and/or location of observation is uncertain).
(Amoroso, 1997; LeGrand, 1997)

E. Geology and Hazardous Materials Evaluation

A field reconnaissance survey was conducted in the vicinity of the project to determine the potential for underground storage tank (UST) and hazardous materials involvement. In addition to a field survey, a file search of appropriate environmental agencies was conducted to identify any known problem sites along the proposed project alignment. The Geotechnical Unit found one UST site within the project area. The site, Triangle BP, owned by M.M. Fowler, Inc., is located in the northwest quadrant at the intersection of S. Miami Boulevard and NC 54. This facility is an active gas station with three 4,000 gallon UST's in operation. Six former UST's were removed before the current UST system was put into service in 1993. Soil and groundwater contamination was discovered during the UST removal. A combination system of pump and treat, air sparging and soil vapor extraction has been put in place to clean up the contamination for years.

Based on the preliminary project plan, the current UST system is located outside the proposed right of way. Eleven monitoring and recovering wells are located within the existing or proposend right of way. These wells will be abandoned before the project construction begins. The abandoned wells may be replaced, if necessary, after the project construction is complete.

Based on the field reconnaissance and a review of the Geographical Information Service (GIS) map, no Superfund sites were identified in the project study area. Also, no regulated or unregulated landfills or dumpsites occur within the project limits.

Based on the field reconnaissance and records search, there should be no environmental liability concerns for this project. However, unregistered UST's and unknown landfills may be encountered by Right of Way during their initial contacts with the impacted properties. The NCDOT Geotechnical Unit should be notified of their presence prior to acquisition so that the actual condition of the properties can be examined. If a site with unregulated UST or landfill is identified by right of way, a 'Preliminary Site Assessment' (PSA) should be performed prior to right of way acquisition to determine the extent of any contamination.

F. Highway Traffic Noise Analysis and Air Quality Analysis

This project is located in Durham County, which is within the Raleigh-Durham nonattainment area for ozone (O_3) and carbon monoxide (CO) as defined by the EPA. The 1990 Clean Air Act Amendments (CAAA) designated these areas as "moderate" nonattainment area for O_3 and CO. However, due to improved monitoring data, these areas were redesignated as "maintenance" for O_3 on June 17, 1994, and "maintenance" for CO on September 18, 1995. Section 176(c) of the CAAA requires that transportation plans, programs, and projects conform

to the intent of the state air quality implementation plan (SIP). The current SIP does not contain any transportation control measures for Durham County. The Durham-Chapel Hill-Carrboro 2025 Long Range Transportation Plan (LRTP)and the 2000-2008 Metropolitan Transportation Improvement Program (MTIP) has been determined to conform to the intent of the SIP. The USDOT air quality conformity of the LRTP was February 29, 2000 and the USDOT air quality conformity on the MTIP was October 1, 2001. The current conformity determination is consistent with the final conformity rule found in 40 CFR Parts 51 and 93. There has been no significant changes in the project's design concept or scope as used in the conformity analyses.

For the year of 2025, the maximum distances to the 72-dBA and 67-dBA noise level contours are located within the right-of-way. Hence, only one noise impact was identified, which is a recreational area. No receptors are expected to experience a substantial increase in exterior noise levels per NCDOT Noise Abatement Policy.

An air quality intersection analysis was conducted for this project utilizing the MOBILE5A mobile source emissions computer model and "CAL3QHC – A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections". In order to determine the ambient CO concentration at a receptor near a highway, two concentration components must be used: local and background. The local concentration is defined as the CO emissions from cars operating on highways in the near vicinity (i.e., distances within 100 meters) of the receptor location. The background concentration is defined as "the concentration of a pollutant at a point that is the result of emissions outside the locatl vicinity; that is, the concentration at the upwind edge of the local sources." In this study, the local concentration was determined by the NCDOT Traffic Noise/Air Quality Staff using line source computer modeling, and the background component of 1.8 ppm was obtained from the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Air Quality. Once the two concentration components were ascertained, they were added together to determine the ambient CO concentration for the area in question and to compare to the National Ambient Air Quality Standards (NAAQS). The predicted 1-hour CO concentrations for the evaluation build years of 2005, 2010, and 2025 are 6.8, 7.1, 7.6 ppm respectively. Comparison of the predicted CO concentrations with the NAAQS (maximum permitted for 1-hour averaging period = 35 ppm; 8-hour averaging period = 9 ppm) indicates no violation of these standards. Since the results of the worst-case 1-hour CO analysis for the build scenario is less than 9 ppm, it can be concluded that the 8-hour CO level does not exceed the standard. See tables A1 through A3 in Appendix D for input and output data. Hence, the project's impact on noise and air quality will not be significant.

If vegetation is disposed of by burning, all burning shall be done in accordance with applicable local laws and regulations of the North Carolina SIP for air quality in compliance with 15 NCAC 2D.0520. This evaluation completes the assessment requirements for highway traffic noise of Title 23 of the Code of Federal Regulations, Part 772, and for air quality of the 1990 Clean Air Act Amendments and the NEPA process, and no additional reports are necessary.

G. Floodplain Involvement and Hydraulic Concerns

The drainage area of the unnamed tributary to Burdens Creek at the proposed crossing is 0.25 square miles. Durham County is currently participating in the National Flood Insurance Regular Program. The crossing of the tributary is located in a designated flood hazard zone. Figure 6 is a copy of the Flood Insurance Rate Map for Durham County on which the limits of the 500-year flood boundary is delineated in the vicinity of the project. No buildings were observed on the 100-year floodplain within the project vicinity during the field visit. The existing flood plain is primarily comprised of wooded areas along the stream. Erosion and sedimentation will be controlled through the specification, installation, and maintenance of standard erosion and sedimentation control methods. A portion of the project, located south of the Southern Railroad, is in the Neuse River Basin. Riparian Area Rules may be applicable to drainage located in this Basin. North of the Southern Railroad, the remainder of the project is located in the Cape Fear River Basin. This basin has not adopted Riparian Area Rules at this time, and therefore will not apply to this part of the project. This project will not have an adverse impact on the existing floodplain. The proposed project will not have an adverse impact on the existing floodplain.

H. Section 4(f) Resources

Section 4(f) of the U.S. Department of Transportation Act of 1966 specifies that publicly owned land from a park, recreation area, or wildlife or waterfowl refuge or land from historic resources of national, state, or local significance may be used for Federal-Aid projects only if:

(1) There is no feasible and prudent alternative to the use of such land.

(2) Such highway program or project includes all possible planning to minimize harm to 4(f) lands resulting from such use.

The project will not use property from any resource protected by Section 4(f).

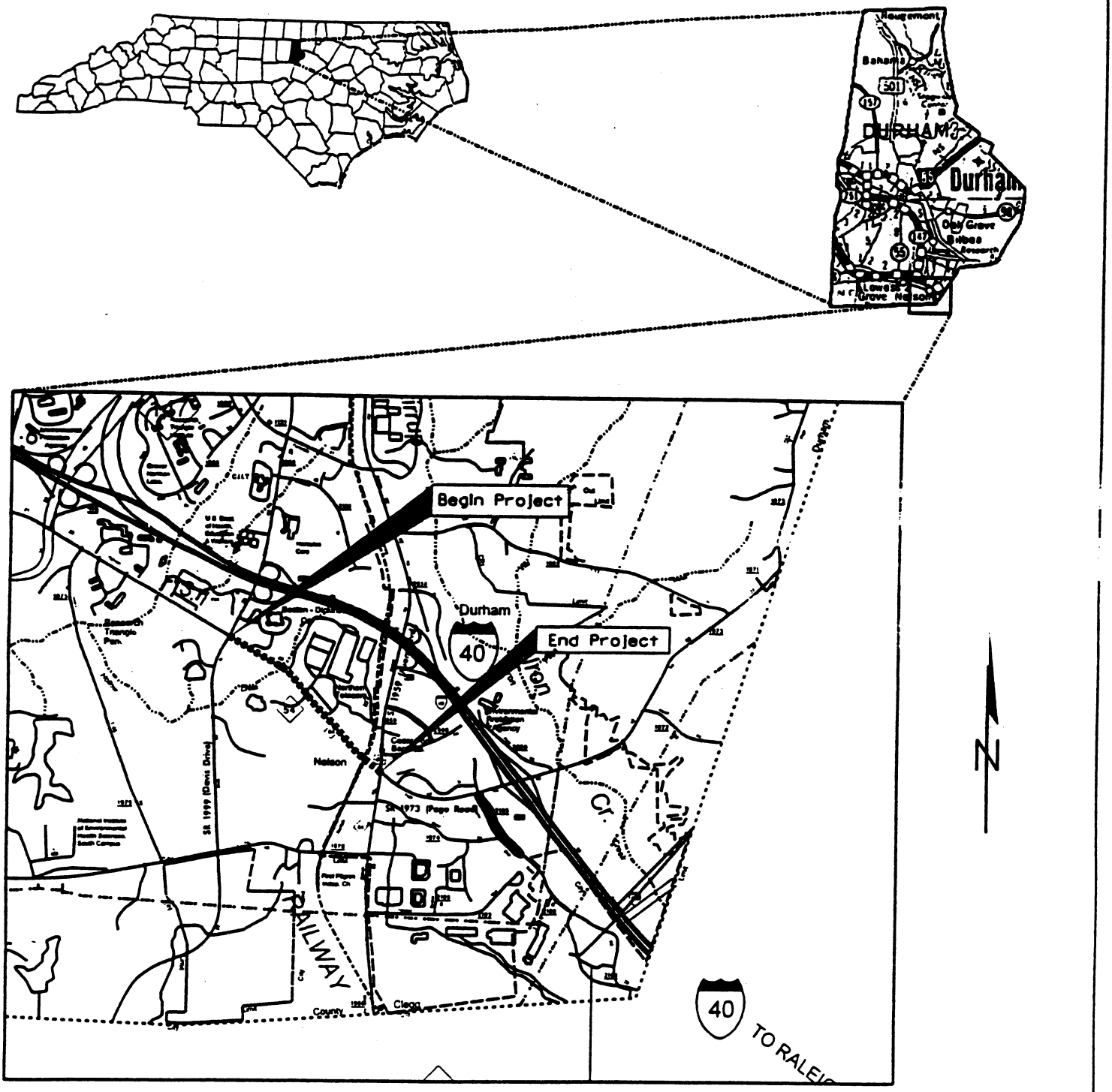
VI. COMMENTS, COORDINATION, AND PUBLIC INVOLVEMENT

On August 23, 2001, a citizen's informational workshop was held in Durham County at the Sheraton Imperial Hotel and Convention Center (see Appendix C for a copy of the Notice of a Citizens Informational Workshop). This workshop was held in order to obtain comments and suggestions about the project from the public.

During the workshop, the North Carolina Department of Transportation displayed an aerial photograph of the project area and vicinity maps showing the proposed project. In addition, the NCDOT supplied each participant with an information packet containing general project information, a vicinity map, and a comment sheet. A copy of this packet is included in Appendix C. Each participant had the opportunity to review the aerial photograph and maps, and ask questions or give comments.

Comments received from those in attendance at the Citizen's Informational Workshop mostly pertained to questions related to the proposed bicycle improvements. Overall, the project was seen as a needed improvement, and comments from the public and local businesses were supportive of this project.

FIGURES



MILES

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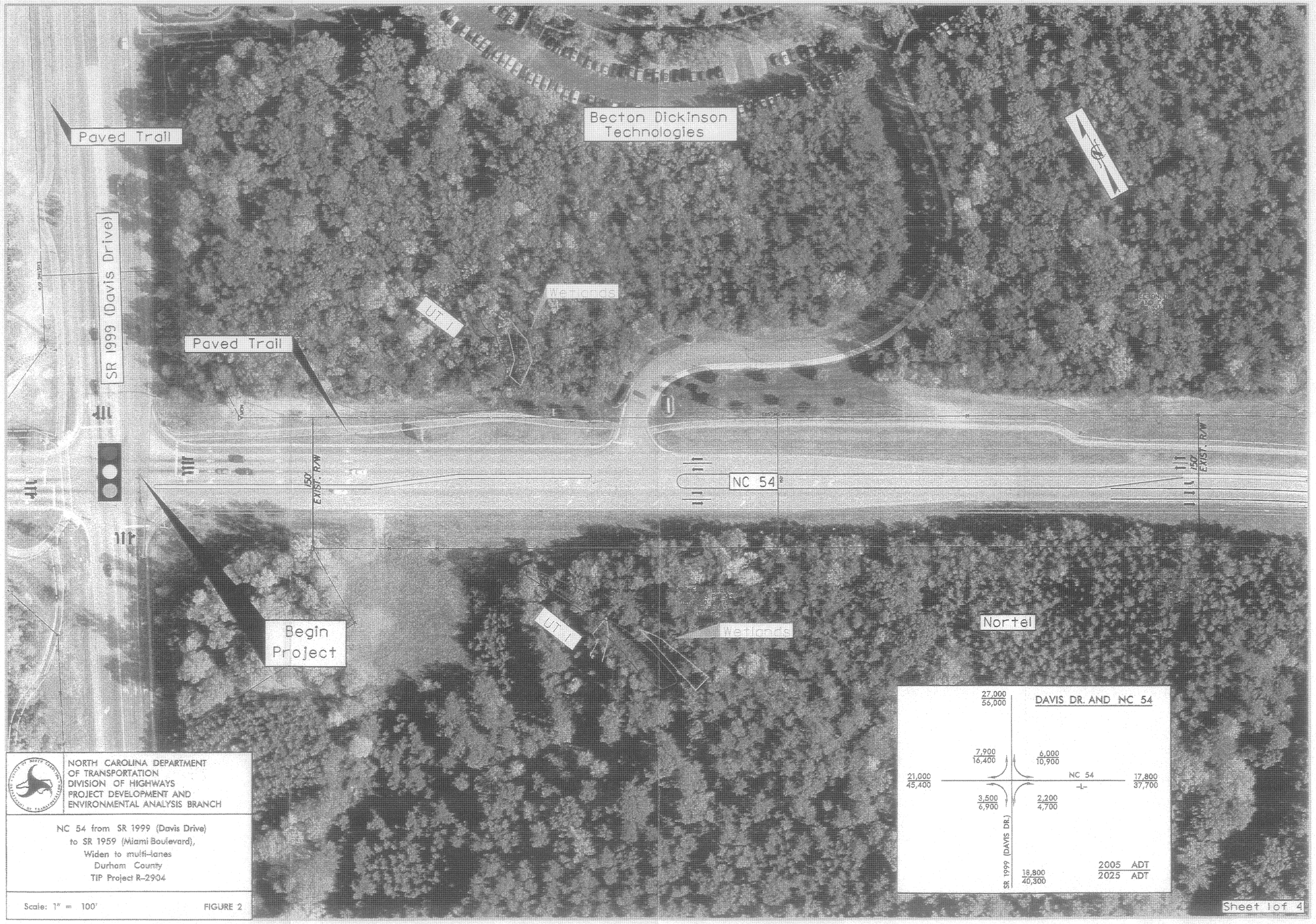
0 0.5 1 1.5

KILOMETERS

NORTH CAROLINA DEPARTMENT
OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND
ENVIRONMENTAL ANALYSIS BRANCH

NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Blvd.)
Durham County, State Project 8.1352701
TIP Project No. R-2904

FIGURE 1



NORTH CAROLINA DEPARTMENT
OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND
ENVIRONMENTAL ANALYSIS BRANCH

NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard),
Widen to multi-lanes
Durham County
TIP Project R-2904

Scale: 1" = 100'

FIGURE 2


NORTEL ENTRANCE AND NC 54
1,700 / 3,100
NORTEL ENTRANCE
1,000 / 1,600
600 / 1,400
17,800 / 37,700
NC 54
17,000 / 37,300
700 / 1,000
300 / 800
1,100 / 1,900
2005 ADT / 2025 ADT
Nortel
Arboretum Nature Trail
Northern Nortel Entrance
NC 54
Burden's Creek
Nortel

NORTH CAROLINA DEPARTMENT
OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND
ENVIRONMENTAL ANALYSIS BRANCH

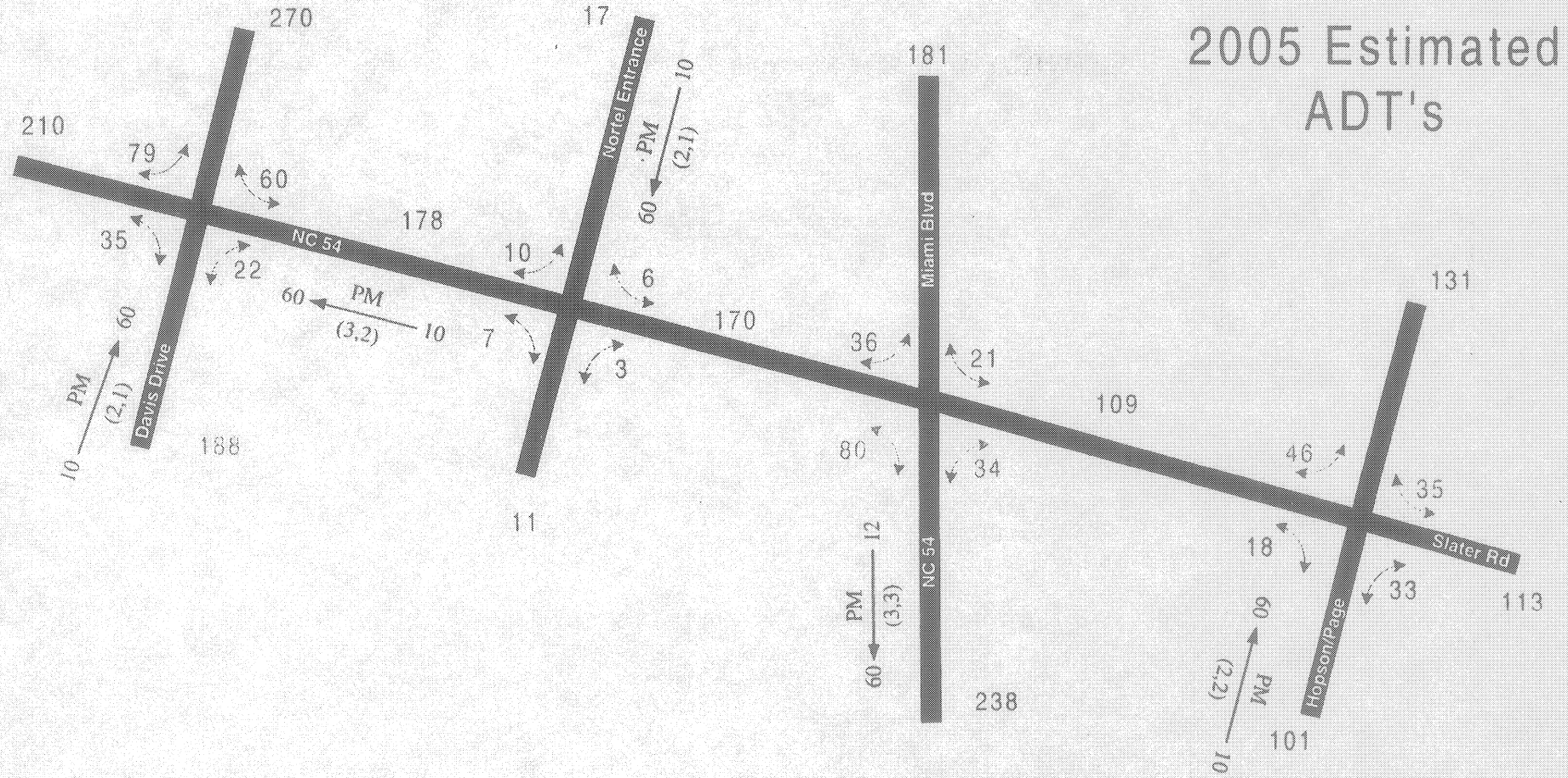
NC 54 from SR 1999 (Davis Drive)
to SR 1959 (Miami Boulevard),
Widen to multi-lanes
Durham County
TIP Project R-2904

Scale: 1" = 100'

FIGURE 2


Cedar Fork Baptist Church
Morris Family Cemetary
SR 1959 (Miami Blvd.)
Shell Gas Station
Nortel Networks
BP Gas Station
R-126 Railroad Bridge
UT-3
UT-2
Wetlands
Creekstone Crossings Shopping Center
End Project
Proposed location of Regional Rail Station and Mixed-Use Development
NC 54, MIAMI BLVD. AND PAGE RD.
18,100 / 23,100
SR 1959 (MIAMI BLVD.)
3,600 / 9,000
2,100 / 4,800
17,000 / 37,300
NC 54
SR 1973 (PAGE RD.)
10,900 / 18,000
8,000 / 20,100
3,400 / 5,000
NC 54
23,800 / 34,400
2005 ADT / 2025 ADT
CEDAR FORK BAPTIST CHURCH DB UNKNOWN
CEDAR FORK BAPTIST CHURCH DB 302 PG 43 PB 48 PG 43
QUALITY OIL COMPANY LIMITED PARTNERSHIP DB 1334 PG 787 PB 103 PG 82
REBECCA J GREEN DB 130 PG 46
CEDAR FORK BAPTIST CHURCH DB UNKNOWN
EXISTING R/W
SANITARY SEWER EASEMENT PB 103 PG 82
HIGHWOODS/FORSYTH LIMITED PARTNERSHIP DB 2066 PG 287 PB 120 PG 135
CENTRAL CAROLINA BANK AND TRUST DB 2940 PG 109 PB 147 PG 133
PRINCIPAL MUTUAL LIFE INSURANCE COMPANY DB 2326 PG 266 PB 147 PG 133
Sheet 4 of 4

2005 Estimated ADT's

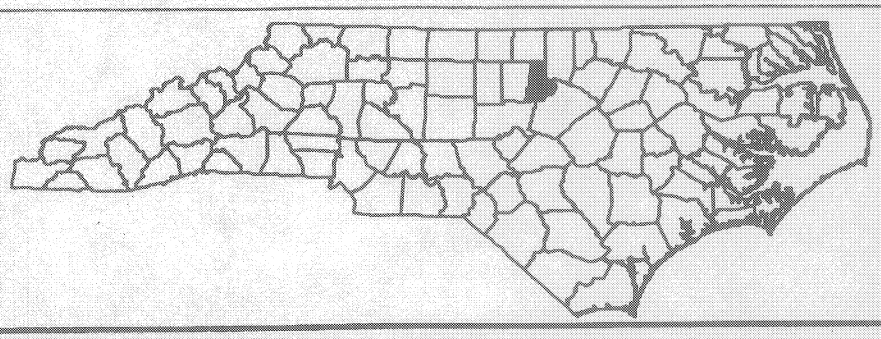


Estimates in 100's

LEGEND

XXX	VPD--VEHICLES PER DAY (IN 100'S)
DHV	DESIGN HOURLY VOLUME (%)
D	DIRECTIONAL FLOW (%)
PM	PM PEAK PERIOD
(X,X)	DUALS, TTST (%)

NOTE: DHV ——→ D
INDICATES THE DIRECTION D
REVERSE FLOW FOR AM PEAK



STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

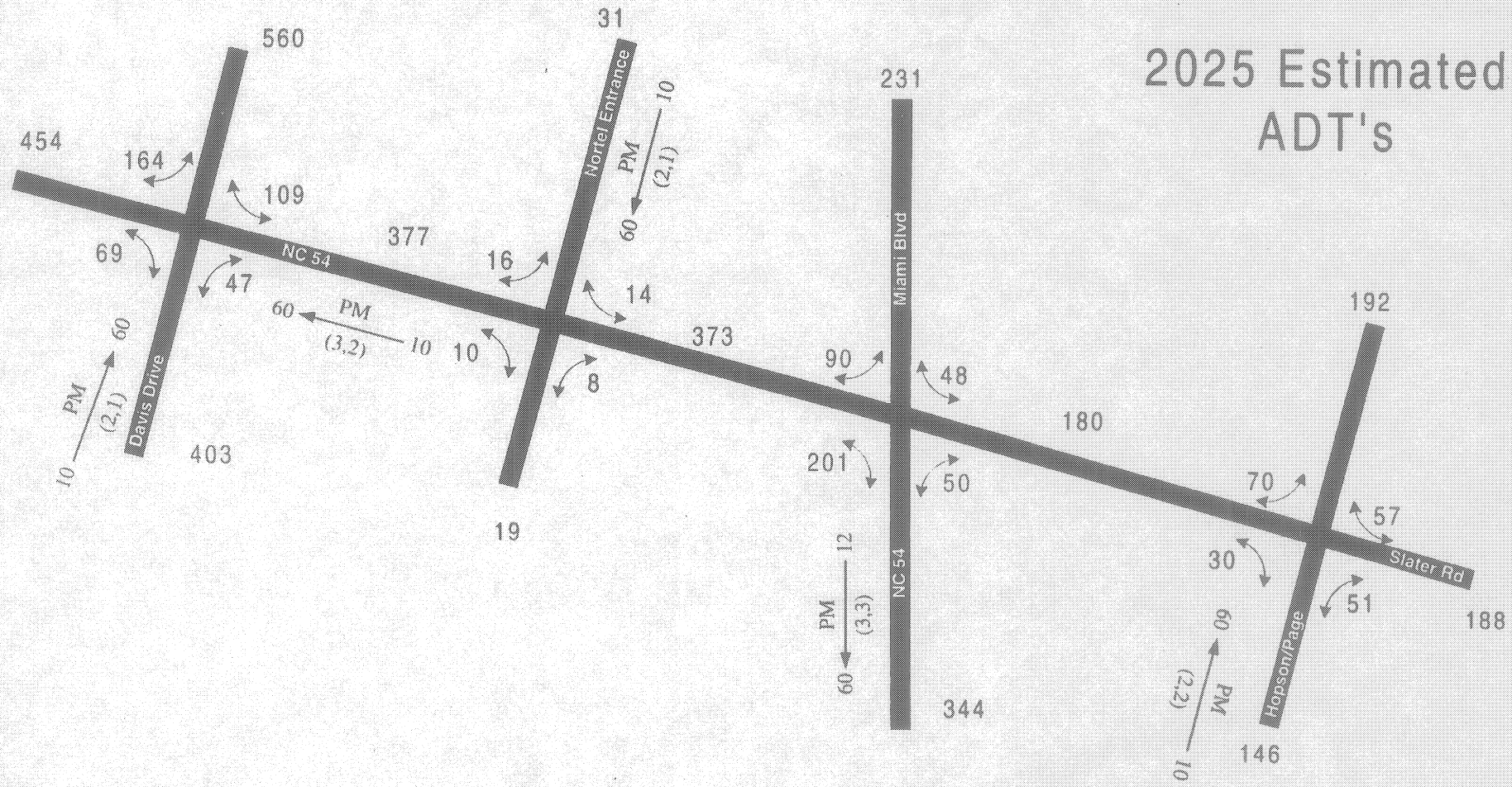
R-2904
NC 54

Durham County — DIVISION 5

TIP # R-2904 — February 2002

WORK ORDER # 8.1352701 — Figure 3A

2025 Estimated ADT's

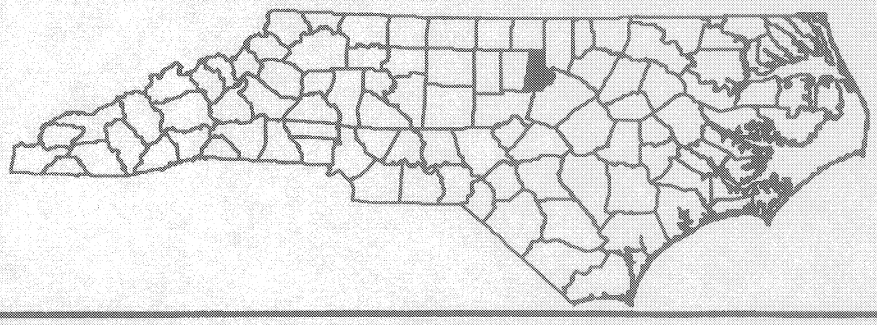


Estimates in 100's

LEGEND

XXX	VPD--VEHICLES PER DAY (1/1/1900's)
DHV	DESIGN HOURLY VOLUME (%)
D	DIRECTIONAL FLOW (%)
PM	PM PEAK PERIOD
(X,X)	DUALS, TTST (%)

NOTE: DHV ——→ D
INDICATES THE DIRECTION D. REVERSE FLOW FOR AM PEAK



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

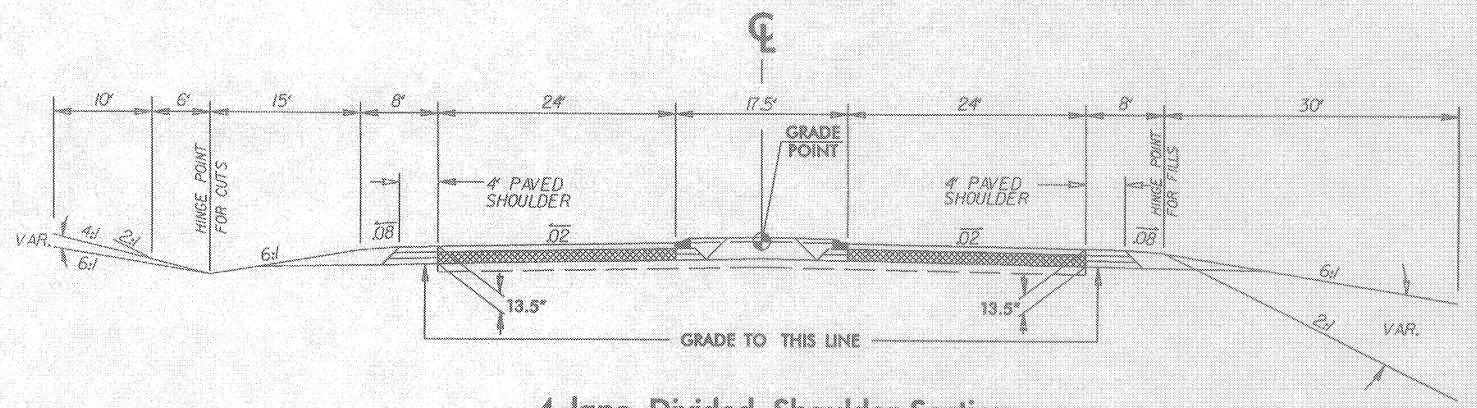
R-2904
NC 54

Durham County | DIVISION 5

TIP # R-2904 | February 2002

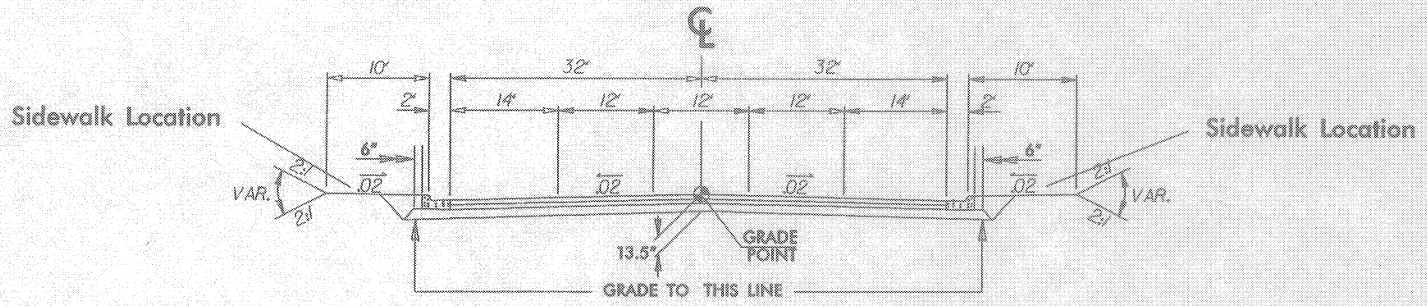
WORK ORDER # 8.1352701

R–2904 Typical Sections



4–lane Divided Shoulder Section

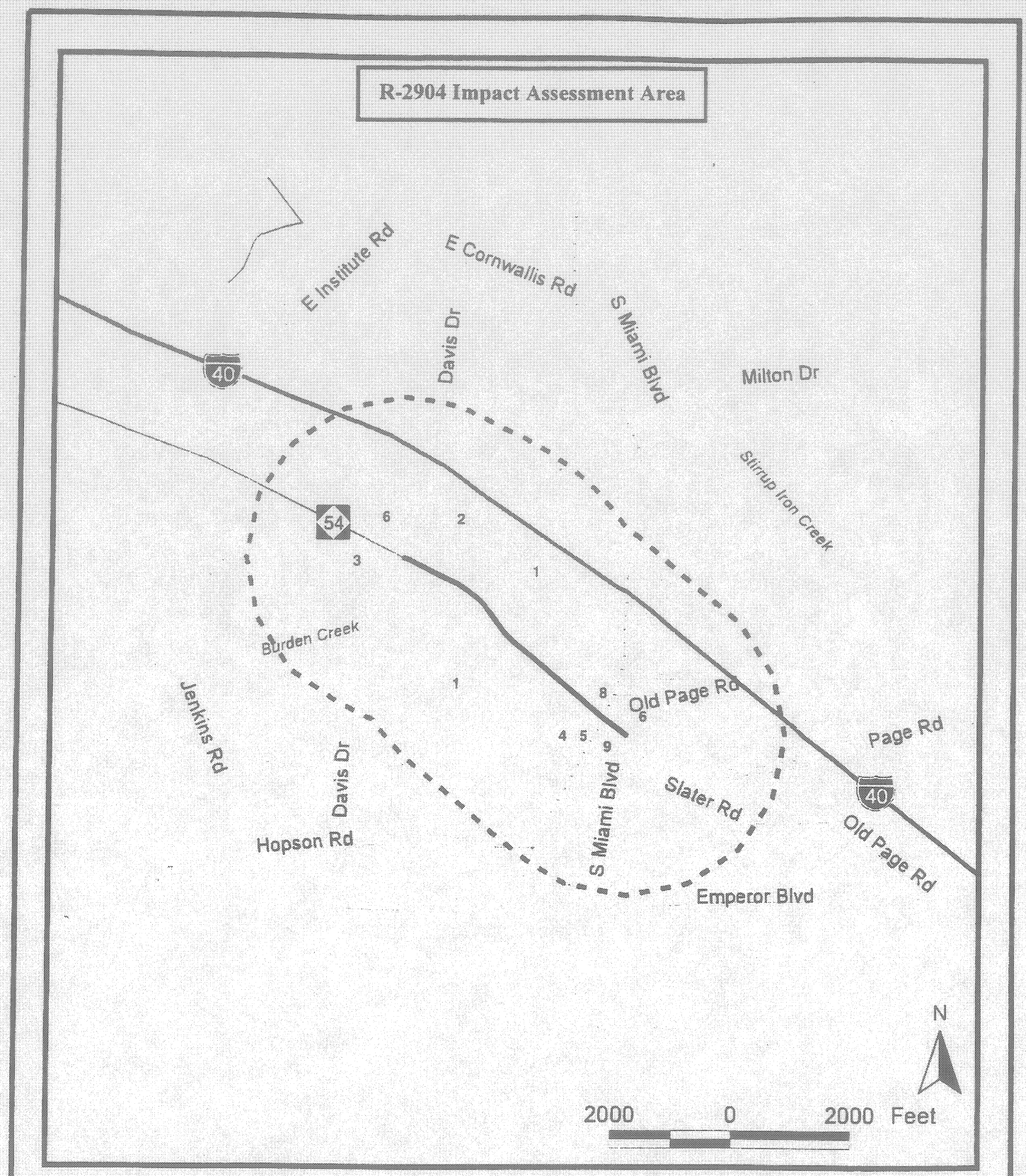
From Davis Drive to 200ft West of the railroad structure



5–lane Curb and Gutter Section

from 200ft West of the railroad structure to Miami Boulevard

Figure 4



T.I.P. Project No. R-2904

1 - Nortel Networks
2 - Becton Dickinson Technologies
3 - BASF
4 - Proposed Triangle Metro Center
5 - Proposed TTA Regional Rail Station
6 - Cedar Fork Baptist Church
7 - TTA Offices
8 - Nortel Athletic Field
9 - Creekstone Shopping Center

Corridor
Impact Assessment Area
Roads
Rivers/Streams
Durham Corporate Limits

Figure 5

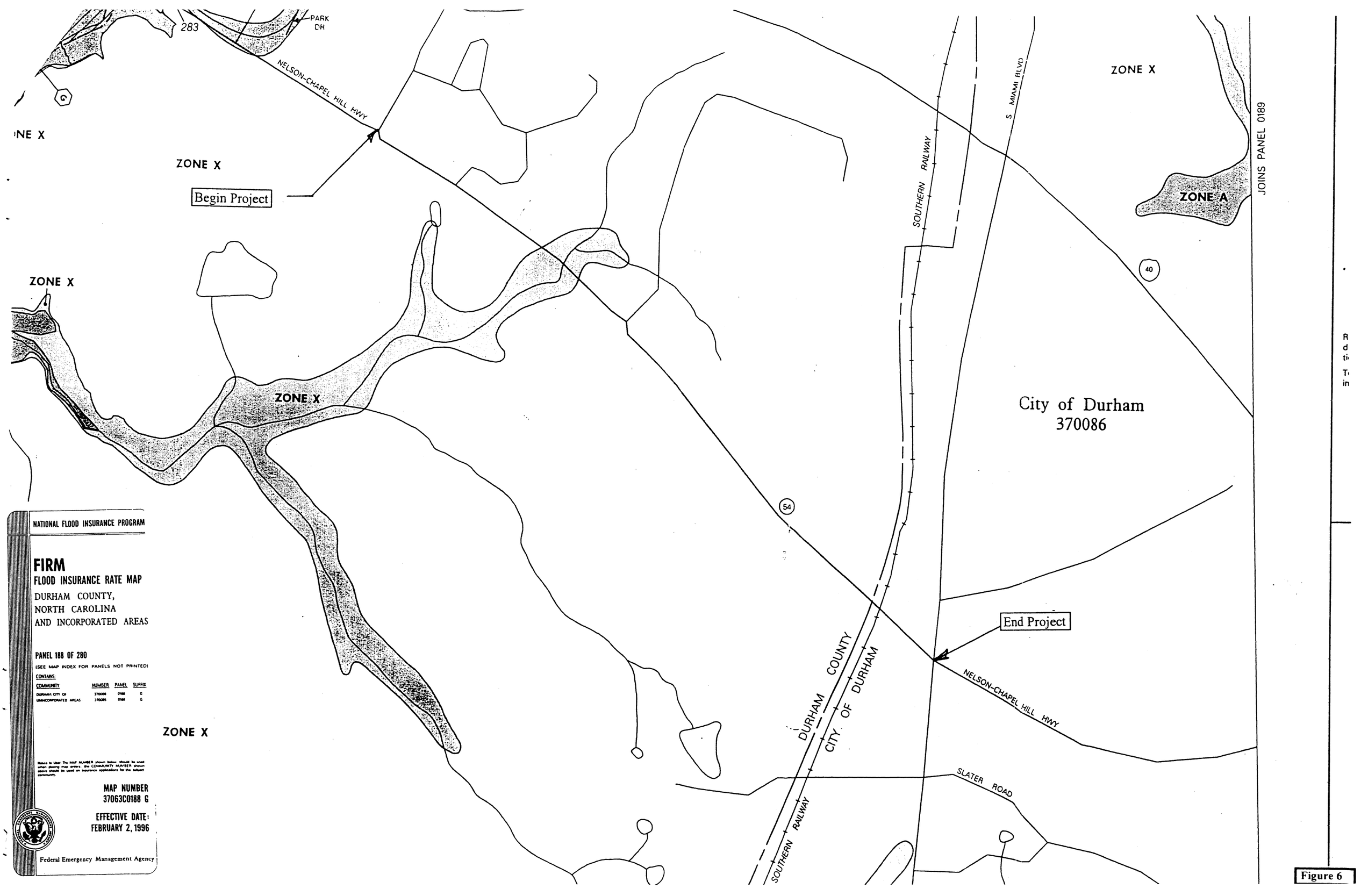

283
PARK DR
NELSON-CHAPEL HILL HWY
ZONE X
Begin Project
ZONE X
ZONE X
ZONE X
ZONE X
SOUTHERN RAILWAY
S MIAMI BLVD
ZONE X
ZONE A
JOINS PANEL 0189
40
City of Durham
370086
54
End Project
DURHAM COUNTY
CITY OF DURHAM
NELSON-CHAPEL HILL HWY
SLATER ROAD
SOUTHERN RAILWAY
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
DURHAM COUNTY,
NORTH CAROLINA
AND INCORPORATED AREAS
PANEL 188 OF 280
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
DURHAM, CITY OF 370086 0188 G
UNINCORPORATED AREAS 370085 0188 G
Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.
MAP NUMBER
37063C0188 G
EFFECTIVE DATE:
FEBRUARY 2, 1996
Federal Emergency Management Agency

Figure 6

APPENDIX A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

August 15, 2001

Mr. William D. Gilmore, P.E., Manager
NCDOT
Project Development and Environmental Analysis Branch
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Mr. Gilmore:

Thank you for your letter of June 5, 2001 requesting information from the U.S. Fish and Wildlife Service (Service) for the purpose of evaluating the potential environmental impacts of the proposed improvements to NC 54, from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard), and SR 1973 (Page Road), from NC 54 to I-40 in Durham County, North Carolina (TIP No. R-2904). This report provides scoping information and is provided in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661-667d) and Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543). This report also serves as initial scoping comments to federal and state resource agencies for use in their permitting and/or certification processes for this project.

The North Carolina Department of Transportation (NCDOT) proposes to widen NC 54 from SR 1999 to SR 1959 and to replace the Southern Railroad Bridge. The proposed improvements to SR 1973 from NC 54 to I-40 will be made under a separate TIP number, U-3853. The North Carolina Railroad will design and build all railroad related improvements associated with this project. NCDOT will only be responsible for the widening of the highway. Therefore, the actual widening limits of R-2904 are from SR 1999 to SR 1959, a distance of 0.8 mile. The following recommendations are provided to assist you in your planning process and to facilitate a thorough and timely review of the project.

Generally, the Service recommends that wetland impacts be avoided and minimized to the maximum extent practical as outlined in Section 404 (b)(1) of the Clean Water Act Amendments of 1977. In regard to avoidance and minimization of impacts, we recommend that proposed highway projects be aligned along or adjacent to existing roadways, utility corridors, or previously developed areas in order to minimize habitat fragmentation and encroachment. Areas exhibiting high biodiversity or ecological value important to the watershed and region should be avoided. Crossings of streams and associated wetland systems should use existing crossings and/or occur on a structure wherever feasible. Where bridging is not feasible, culvert structures that maintain natural water flows and hydraulic regimes without scouring, or impeding fish and wildlife passage, should be employed. Highway shoulder and median widths should be reduced through wetland areas. Roadway embankments and fill areas

should be stabilized by using appropriate erosion control devices and techniques. Wherever appropriate, construction in sensitive areas should occur outside fish spawning and migratory bird nesting seasons.

The National Wetlands Inventory (NWI) map of the Southeast Durham 7.5 Minute Quadrangle indicates there are wetland and stream resources in the specific work area. However, while the NWI maps are useful for providing an overview of a given area, they should not be relied upon in lieu of a detailed wetland delineation by trained personnel using an acceptable wetland classification methodology.

We reserve the right to review any federal permits that may be required for this project, at the public notice stage. Therefore, it is important that resource agency coordination occur early in the planning process in order to resolve any conflicts that may arise and minimize delays in project implementation.

In addition to the above guidance, we recommend that the environmental documentation for this project include the following in sufficient detail to facilitate a thorough review of the action:

1. A clearly defined and detailed purpose and need for the proposed project, supported by tabular data, if available, and including a discussion of the project's independent utility;

2. A description of the proposed action with an analysis of all alternatives being considered, including the upgrading of existing roads and a "no action" alternative;

3. A description of the fish and wildlife resources, and their habitats, within the project impact area that may be directly or indirectly affected;

4. The extent and acreage of waters of the U.S., including wetlands, that are to be impacted by filling, dredging, clearing, ditching, or draining. Acres of wetland impact should be differentiated by habitat type based on the wetland classification scheme of the National Wetlands Inventory (NWI). Wetland boundaries should be determined by using the 1987 Corps of Engineers Wetlands Delineation Manual and verified by the U.S. Army Corps of Engineers (Corps);

5. The anticipated environmental impacts, both temporary and permanent, that would be likely to occur as a direct result of the proposed project. The assessment should also include the extent to which the proposed project would result in secondary impacts to natural resources, and how this and similar projects contribute to cumulative adverse effects;

6. Design features and construction techniques which would be employed to avoid or minimize the fragmentation or direct loss of wildlife habitat value;

7. Design features, construction techniques, or any other mitigation measures which would be employed at wetland crossings and stream channel relocations to avoid or minimize impacts to waters of the United States; and,

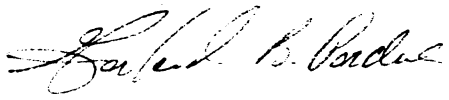
8. If unavoidable wetland impacts are proposed, we recommend that every effort be made to identify compensatory mitigation sites in advance. Project planning should include a detailed compensatory mitigation plan for offsetting unavoidable wetland impacts. Opportunities to protect mitigation areas in perpetuity, preferably via conservation easement, should be explored at the outset.

The enclosed list identifies the federally-listed endangered and threatened species, and Federal Species of Concern (FSC) that are known to occur in Durham County. The Service recommends that habitat requirements for these federally-listed species be compared with the available habitat at the project site. If suitable habitat is present within the action area of the project, biological surveys for the listed species should be conducted. Environmental documentation should include survey methodologies and results.

FSC's are those plant and animal species for which the Service remains concerned, but further biological research and field study are needed to resolve the conservation status of these taxa. Although FSC's receive no statutory protection under the ESA, we would encourage the NCDOT to be alert to their potential presence, and to make every reasonable effort to conserve them if found. The North Carolina Natural Heritage Program should be contacted for information on species under state protection.

The Service appreciates the opportunity to comment on this project. Please continue to advise us during the progression of the planning process, including your official determination of the impacts of this project. If you have any questions regarding these comments, please contact Tom McCartney at 919-856-4520, Ext. 32.

Sincerely,



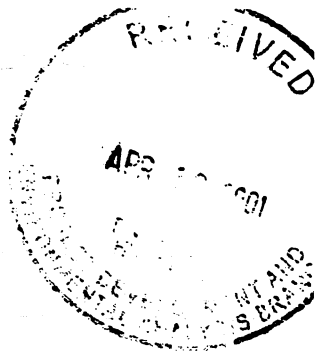
Dr. Garland B. Pardue
Ecological Services Supervisor

Enclosure

cc: COE, Raleigh, NC (Eric Alsmeyer)
NCDWQ, Raleigh, NC (John Hennessy)
NCDNR, Creedmoor, NC (David Cox)
EPA, Atlanta, GA (Ted Bisterfeld)

FWS/R4:TMcCartney:TM:08/10/01:919/856-4520 extension 32:\U-2904.tip

COMMON NAME	SCIENTIFIC NAME	STATUS
DAVIE COUNTY		
Vascular Plants		
Heller's trefoil	*Lotus helleri*	FSC*
Michaux's sumac	*Rhus michauxii*	Endangered
DUPLIN COUNTY		
Vertebrates		
American alligator	*Alligator mississippiensis*	T(S/A)*
Southern hognose snake	*Heterodon simus*	FSC*
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Invertebrates		
Croatan crayfish	*Procambarus plumimanus*	FSC
Vascular Plants		
Venus flytrap	*Dionaea muscipula*	FSC
Savanna cowbane	*Oxypolis ternata*	FSC
DURHAM COUNTY		
Vertebrates		
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Invertebrates		
Atlantic pigtoe	*Fusconaia masoni*	FSC
Septima's clubtail dragonfly	*Gomphus septima*	FSC
Yellow lampmussel	*Lampsilis cariosa*	FSC
Green floater	*Lasmigona subviridus*	FSC
Panhandle pebblesnail	*Somotogyrus virginicus*	FSC
Vascular Plants		
Tall larkspur	*Delphinium exaltatum*	FSC
Smooth coneflower	*Echinacea laevigata*	Endangered
Butternut	*Juglans cinerea*	FSC
Sweet pinesap	*Monotropsis odorata*	FSC
Michaux's sumac	*Rhus michauxii*	Endangered
Nonvascular Plants		
A liverwort	*Plagiochila columbiana*	FSC



North Carolina Department of Cultural Resources

State Historic Preservation Office

David L. S. Brook, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary

Division of Archives and History
Jeffrey J. Crow, Director

April 16, 2001

MEMORANDUM

To: William D. Gilmore
Project Development & Environmental Analysis

From: David Brook RSH for David Brook

Re: Scoping for NC 54 from SR 1999 (Davis Dr) to SR 1959 (Miami Blvd), Durham County, R-2904, ER01-9127

Thank you for your memorandum of March 20, 2001, concerning the above project. No one from our staff will be able at attend the May 7, 2001, meeting. Thus, we wish to provide our comments in writing and advance. We have checked our maps and files and determined that there are no properties of architectural, historical, or archaeological significance in the project' area of potential effect and we do not recommend any surveys of the area.

The above comments are offered in accordance with Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's regulations at 36 CFR 800. Please contact Renee Gledhill-Earley, if you have any questions. Thank you.

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount St., Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919) 733-4763 • 733-8653
RESTORATION	515 N. Blount St., Raleigh NC	4613 Mail Service Center, Raleigh NC 27699-4613	(919) 733-6547 • 715-4801
SURVEY & PLANNING	515 N. Blount St., Raleigh NC	4618 Mail Service Center, Raleigh NC 27699-4618	(919) 733-6545 • 715-4801

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

RECEIVED
JUN 7 2001
HISTORIC PRESERVATION OFFICE

STATE NUMBER: 01-E-4220-0778 **F02**
DATE RECEIVED: 06/06/2001
AGENCY RESPONSE: 07/17/2001
REVIEW CLOSED: 07/22/2001

same as ER01-9127 & 9848

MS RENEE GLEDHILL-EARLEY
CLEARINGHOUSE COORD
DEPT OF CUL RESOURCES
ARCHIVES-HISTORY BLDG - MSC 4617
RALEIGH NC

REVIEW DISTRIBUTION
CC&PS - DEM, NFIP
DENR LEGISLATIVE AFFAIRS
DEPT OF AGRICULTURE
DEPT OF CUL RESOURCES
TRIANGLE J COG

PROJECT INFORMATION
APPLICANT: N.C. Dept. of Transportation
TYPE: National Environmental Policy Act
ERD: Scoping
DESC: Proposed Improvements to NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Blvd.) and SR 1973 (Page Rd.) from NC 54 to I-40 in Durham County; TIP #R-2904

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date. If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED:

(NC) Dolores A Hall
Archaeologist
6/12/01

☒ NO COMMENT

☐ COMMENTS ATTACHED

SIGNED BY: Renee Gledhill-Earley

DATE: 7/01/01

RECEIVED
JUL 5 2001
N.C. STATE CLEARINGHOUSE

JUN 1 1 2001

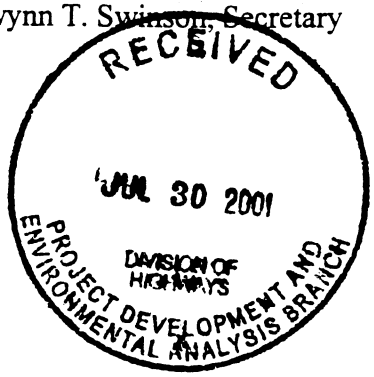
S. Obediente

North Carolina
Department of Administration

Michael F. Easley, Governor

Gwynn T. Swinson, Secretary

July 24, 2001



Mr. William Gilmore
N.C. Dept. of Transportation
Project Dev. & Env. Analysis Branch
Transportation Bldg. - 1548 MSC
Raleigh, NC 27699-1548

JUL 30 2001

Dear Mr. Gilmore:

Re: SCH File # 01-E-4220-0778; Scoping Proposed Improvements to NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Blvd.) and SR 1973 (Page Rd.) from NC 54 to I-40 in Durham County; TIP #R-2904

The above referenced project has been reviewed through the State Clearinghouse Intergovernmental Review Process. Attached to this letter are comments made by agencies reviewing this document.

Should you have any questions, please do not hesitate to call me at (919) 807-2425.

Sincerely,

Chrys Baggett

Ms. Chrys Baggett
Environmental Policy Act Coordinator

Attachments

cc: Region J

116 West Jones Street Raleigh, North Carolina 27603-8003 Telephone 919-807-2425

North Carolina
Department of Environment and Natural Resources

Michael F. Easley, Governor
William G. Ross Jr., Secretary

MEMORANDUM

TO: Chrys Baggett
State Clearinghouse

FROM: Melba McGee
Environmental Review Coordinator

SUBJECT: 01-E-0778 Scoping, Widening of NC 54, Durham County

DATE: July 18, 2001

The Department of Environment and Natural Resources has reviewed the proposed information. The attached comments are for the applicant's information and consideration.

Thank you for the opportunity to review.

Attachments

1601 Mail Service Center, Raleigh, North Carolina 27699-1601
Phone: 919 - 733-4984 \ FAX: 919 - 715-3060 \ Internet: www.enr.state.nc.us/ENR/

State of North Carolina
Department of Environment
and Natural Resources
Division of Water Quality

Michael F. Easley, Governor
William G. Ross, Jr., Secretary
Kerr T. Stevens, Director

July 9, 2001

MEMORANDUM

To: Melba McGee

Through: John Dorney

From: John E. Hennessy

Subject: Scoping comments on proposed widening of NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard) and SR 1973 (Page Road) from NC 54 to I-40 in Durham County, Federal Aid Project No. STP-54(2), State Project No. 8.1352701, TIP R-2904, DENR No. 01E-0778.

Reference your correspondence dated June 5, 2001 in which you requested comments for the referenced project. Preliminary analysis of the project reveals the potential for multiple impacts to perennial streams and jurisdictional wetlands in the project area. More specifically, impacts to tributaries of the Northeast Creek (Class C NSW waters, DWQ index No. 16-41-1-17 (0.3)) located in the Cape Fear River Basin is possible. Further investigations at a higher resolution should be undertaken to verify the presence of other streams and/or jurisdictional wetlands in the area. In the event that any jurisdictional areas are identified, the Division of Water Quality requests that NCDOT consider the following environmental issues for the proposed project:

A. The document should provide a detailed and itemized presentation of the proposed impacts to wetlands and streams with corresponding mapping.

B. There should be a discussion on mitigation plans for unavoidable impacts. If mitigation is required, it is preferable to present a conceptual (if not finalized) mitigation plan with the environmental documentation. While the NCDWQ realizes that this may not always be practical, it should be noted that for projects requiring mitigation, appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.

C. Review of the project reveals that no Outstanding Resource Waters, Water Supply Water, High Quality Waters, or Trout Waters will be impacted during the project implementation. However, should further analysis reveal the presence of any of the aforementioned waters, the DWQ requests that DOT strictly adhere to North Carolina regulations entitled "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0024) throughout design and construction of the project. This would apply for any area that drains to streams having WS (Water Supply), ORW (Outstanding Resource Water), HQW (High Quality Water), SA (Shellfish Water) or Tr (Trout Water) classifications.

1650 Mail Service Center, Raleigh, North Carolina 27699-1650 Telephone 919-733-5083 FAX 919-715-6048

D. When practical, the DWQ requests that bridges be replaced on the existing location with road closure. If a detour proves necessary, remediation measures in accordance with the NCDWQ requirements for General 401 Certification 2726/Nationwide Permit No. 33 (Temporary Construction, Access and Dewatering) must be followed.

E. Review of the project reveals that no High Quality Waters or Water Supply Waters will be impacted by the project. However, should further analysis reveal the presence of any of the aforementioned water resources, the DWQ requests that hazardous spill catch basins be installed at any bridge crossing a stream classified as HQW or WS (Water Supply). The number of catch basins installed should be determined by the design of the bridge, so that runoff would enter said basin(s) rather than flowing directly into the stream.

F. If applicable, DOT should not install the bridge bents in the creek, to the maximum extent practicable.

G. Wetland and stream impacts should be avoided (including sediment and erosion control structures/measures) to the maximum extent practical. If this is not possible, alternatives that minimize wetland impacts should be chosen. Mitigation for unavoidable impacts will be required by DWQ for impacts to wetlands in excess of one acre and/or to streams in excess of 150 linear feet.

H. Borrow/waste areas should not be located in wetlands. It is likely that compensatory mitigation will be required if wetlands are impacted by waste or borrow.

I. DWQ prefers replacement of bridges with bridges. However, if the new structure is to be a culvert, it should be countersunk to allow unimpeded fish and other aquatic organisms passage through the crossing.

J. In accordance with the NCDWQ Wetlands Rules {15A NCAC 2H.0506(b)(6)}, mitigation will be required for impacts of greater than 150 linear feet to any single perennial stream. In the event that mitigation becomes required, the mitigation plan should be designed to replace appropriate lost functions and values. In accordance with the NCDWQ Wetlands Rules {15A NCAC 2H.0506 (h)(3)}, the Wetland Restoration Program may be available for use as stream mitigation.

K. Sediment and erosion control measures should not be placed in wetlands.

L. The 401 Water Quality Certification application will need to specifically address the proposed methods for stormwater management. More specifically, stormwater should not be permitted to discharge directly into the creek. Instead, stormwater should be designed to drain to a properly designed stormwater detention facility/apparatus.

M. While the use of National Wetland Inventory (NWI) maps and soil surveys is a useful office tool, their inherent inaccuracies require that qualified personnel perform onsite wetland delineations prior to permit approval.

Thank you for requesting our input at this time. The DOT is reminded that issuance of a 401 Water Quality Certification requires that appropriate measures be instituted to ensure that water quality standards are met and designated uses are not degraded or lost. If you have any questions or require additional information, please contact John Hennessy at (919) 733-5694.

cc: Eric Alsmeyer, Corps of Engineers
Tom McCartney, USFWS
David Cox, NCWRC
Personal Files
File Copy

C:\ncdot\TIP R-2904\comments\R-2904 scoping comments.doc

North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

MEMORANDUM

TO: Melba McGee
Office of Legislative and Intergovernmental Affairs, DENR

FROM: David Cox, Highway Project Coordinator
Habitat Conservation Program

DATE: July 16, 2001

SUBJECT: Request for information from the N. C. Department of Transportation (NCDOT) regarding fish and wildlife concerns for the NC 54 widening, from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard), Durham County, North Carolina. TIP No. R-2904, SCH Project No. 01-E-0778.

This memorandum responds to a request from Mr. William D. Gilmore of the NCDOT for our concerns regarding impacts on fish and wildlife resources resulting from the subject project. Biologists on the staff of the N. C. Wildlife Resources Commission (NCWRC) have reviewed the proposed improvements. Our comments are provided in accordance with certain provisions of the National Environmental Policy Act (42 U.S.C. 4332(2)(c)) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

We have no specific concerns regarding this project. However, to help facilitate document preparation and the review process, our general informational needs are outlined below:

1. Description of fishery and wildlife resources within the project area, including a listing of federally or state designated threatened, endangered, or special concern species. Potential borrow areas to be used for project construction should be included in the inventories. A listing of designated plant species can be developed through consultation with:

   The Natural Heritage Program
   N. C. Division of Parks and Recreation
   1615 Mail Service Center
   Raleigh, N. C. 27699-1615
   (919) 733-7795

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 733-3633 • Fax: (919) 715-7643

and,

NCDA Plant Conservation Program
P. O. Box 27647
Raleigh, N. C. 27611
(919) 733-3610

2. Description of any streams or wetlands affected by the project. The need for channelizing or relocating portions of streams crossed and the extent of such activities.

3. Cover type maps showing wetland acreages impacted by the project. Wetland acreages should include all project-related areas that may undergo hydrologic change as a result of ditching, other drainage, or filling for project construction. Wetland identification may be accomplished through coordination with the U. S. Army Corps of Engineers (COE). If the COE is not consulted, the person delineating wetlands should be identified and criteria listed.

4. Cover type maps showing acreages of upland wildlife habitat impacted by the proposed project. Potential borrow sites should be included.

5. The extent to which the project will result in loss, degradation, or fragmentation of wildlife habitat (wetlands or uplands).

6. Mitigation for avoiding, minimizing or compensating for direct and indirect degradation in habitat quality as well as quantitative losses.

7. A cumulative impact assessment section which analyzes the environmental effects of highway construction and quantifies the contribution of this individual project to environmental degradation.

8. A discussion of the probable impacts on natural resources which will result from secondary development facilitated by the improved road access.

9. If construction of this facility is to be coordinated with other state, municipal, or private development projects, a description of these projects should be included in the environmental document, and all project sponsors should be identified.

Thank you for the opportunity to provide input in the early planning stages for this project. If we can further assist your office, please contact me at (919) 528-9886.

cc: USFWS, Raleigh

State of North Carolina
NCDENR Department of Environment and Natural Resources Project Number: 01E-0118 Due Date: 7/12/01

INTERGOVERNMENTAL REVIEW - PROJECT COMMENTS

After review of this project it has been determined that the DENR permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of this form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (Statutory Time Limit)
☐	Permit to construct & operate wastewater treatment facilities, sewer system extensions & sewer systems not discharging into state surface waters.	Application 90 days before begin construction or award of construction contracts. On-site inspection. Post-application technical conference usual.	30 days (90 days)
☐	NPDES-permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begin activity. On-site inspection preapplication conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90 - 120 days (N/A)
☐	Water Use Permit	Preapplication technical conference usually necessary	30 days (N/A)
☐	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a well.	7 days (15 days)
☐	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Preapplication conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
☐	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.0100, 2Q.0300, 2H.0600)	N/A	60 days
☑	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
☐	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 2D.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-733-0820.		
☐	Complex Source Permit required under 15 A NCAC 2D.0800		
☐	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Section) at least 30 days before beginning activity. A fee of $40 for the first acre or any part of an acre.		20 days (30 days)
☐	The Sedimentation Pollution Control Act of 1973 must be addressed with respect to the referenced Local Ordinance.		30 days
☐	Mining Permit	On-site inspection usual. Surety bond filed with DENR. Bond amount varies with type mine and number of acres of affected land. Any are mined greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
☐	North Carolina Burning permit	On-site inspection by N.C. Division of Forest Resources if permit exceeds 4 days	1 day (N/A)
☐	Special Ground Clearance Burning Permit-22 counties in coastal N.C. with organic soils.	On-site inspection by N.C. Division of Forest Resources required "if more than five acres of ground clearing activities are involved. Inspections should be requested at least ten days before actual burn is planned."	1 day (N/A)
☐	Oil Refining Facilities	N/A	90 - 120 days (N/A)
☐	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction, certify construction is according to DENR approved plans. May also require permit under mosquito control program, and a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of $200.00 must accompany the application. An additional processing fee based on a percentage or the total project cost will be required upon completion.	30 days (60 days)

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (Statutory Time Limit)
☐	Permit to drill exploratory oil or gas well	File surety bond of $5,000 with DENR running to State of N.C. conditional that any well opened by drill operator shall, upon abandonment, be plugged according to DENR rules and regulations.	10 days (N/A)
☐	Geophysical Exploration Permit	Application filed with DENR at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days (N/A)
☐	State Lakes Construction Permit	Application fees based on structure size is charged. Must include descriptions & drawings of structure & proof of ownership of riparian property.	15 - 20 days (N/A)
☐	401 Water Quality Certification	N/A	55 days (130 days)
☐	CAMA Permit for MAJOR development	$250.00 fee must accompany application	60 days (130 days)
☐	CAMA Permit for MINOR development	$50.00 fee must accompany application	22 days (25 days)
☐	Several geodetic monuments are located in or near the project area. If any monument needs to be moved or destroyed, please notify: N.C. Geodetic Survey, Box 27687 Raleigh, N.C. 27611		
☐	Abandonment of any wells, if required must be in accordance with Title 15A. Subchapter 2C.0100.		
☐	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
☐	Compliance with 15A NCAC 2H 1000 (Coastal Stormwater Rules) is required.		45 days (N/A)
*	Other comments (attach additional pages as necessary, being certain to cite comment authority)		

LQS: SEDIMENT & EROSION CONTROL MUST BE ADDRESSED IN ACCORDANCE W/ NCDOT'S APPROVED PROGRAM. PARTICULAR ATTENTION MUST BE GIVEN TO DESIGN OF PERIMETER SEDIMENT TRAPPING DEVICES AS WELL AS STABILIZATION CONVEYANCES & OUTLETS.

REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

☐ **Asheville Regional Office**
59 Woodfin Place
Asheville, N.C. 28801
(828) 251-6208

☐ **Fayetteville Regional Office**
225 Green Street, Suite 714
Fayetteville, N.C. 28301
(910) 486-1541

☐ **Mooresville Regional Office**
919 North Main Street
Mooresville, N.C. 28115
(704) 663-1699

☐ **Raleigh Regional Office**
3800 Barrett Drive, P.O. Box 27687
Raleigh, N.C. 27611
(919) 571-4700

☐ **Washington Regional Office**
943 Washington Square Mall
Washington, N.C. 27889
(252) 946-6481

☐ **Wilmington Regional Office**
127 Cardinal Drive Extension
Wilmington, N.C. 28405
(910) 395-3900

☐ **Winston-Salem Regional Office**
585 Waughtown Street
Winston-Salem, N.C. 27107
(336) 771-4600

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Project Number
01E-0778
County
Durham

Inter-Agency Project Review Response

Project Name Hwy 54 Improvements Davis Dr to Miami Blvd Type of Project Roadway

☐ The applicant should be advised that plans and specifications or all water system improvements must be approved by the Division of Environmental Health prior to the award of a contract or the initiation of construction (as required by 15A NCAC 18C .0300et. seq.). For information, contact the Public Water Supply Section, (919) 733-2321.

☐ This project will be classified as a non-community public water supply and must comply with state and federal drinking water monitoring requirements. For more information the applicant should contact the Public Water Supply Section, (919) 733-2321.

☐ If this project is constructed as proposed, we will recommend closure of _____ feet of adjacent waters to the harvest of shellfish. For information regarding the shellfish sanitation program, the applicant should contact the Shellfish Sanitation Section at (252) 726-6827.

☐ The soil disposal area(s) proposed for this project may produce a mosquito breeding problem. For information concerning appropriate mosquito control measures, the applicant should contact the Public Health Pest Management Section at (252) 726-8970.

☐ The applicant should be advised that prior to the removal or demolition of dilapidated structures, a extensive rodent control program may be necessary in order to prevent the migration of the rodents to adjacent areas. For information concerning rodent control, contact the local health department or the Public Health Pest Management Section at (919) 733-6407.

☐ The applicant should be advised to contact the local health department regarding their requirements for septic tank installations (as required under 15A NCAC 18A. 1900 et. sep.). For information concerning septic tank and other on-site waste disposal methods, contact the On-Site Wastewater Section at (919) 733-2895.

☐ The applicant should be advised to contact the local health department regarding the sanitary facilities required for this project.

☒ If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Environmental Health, Public Water Supply Section, Technical Services Branch, 1634 Mail Service Center, Raleigh, North Carolina 27699-1634, (919) 733-2321.

☒ For Regional and Central Office comments, see the reverse side of this form.

Jerry Rollins	Public Water Supply	7-3-01
Reviewer	Section/Branch	Date

DURHAM
1869
CITY OF MEDICINE

CITY OF DURHAM
DEPARTMENT OF PUBLIC WORKS
TRANSPORTATION DIVISION
101 CITY HALL PLAZA • DURHAM, NC 27701
919.560.4366 • fax 919.560.4561
www.ci.durham.nc.us

July 16, 2002

Ms. Jackie Obediente
Project Development Engineer
Project Development and Environmental Analysis
North Carolina Department of Transportation
1548 Mail Service Drive
Raleigh, NC 27699-1548

Re: Sidewalks for the Widening of NC 54 from Davis Drive to Miami Boulevard (Project R-2904)

Dear Ms. Obediente:

Pursuant to your letter of July 3, 2002 this is to advise that the City of Durham intends to financially participate in the provision of sidewalks along both sides of NC 54 for that portion of the project located within the City limits (i.e., from approximately 200 feet west of the railroad structure to Miami Boulevard). This participation may either be in accordance with the Pedestrian Policy Guidelines (50% NCDOT, 50% City) or through the use of STP DA funds (80% federal, 20% non-federal). If STP DA funds were used, we would request that NCDOT provide the 20% non-federal share. Municipal participation in the provision of sidewalks would be reflected in the Municipal Agreement for this project.

Please note correction in letter to reflect Mr. Ahrendsen (not Mr. Wylie) and City of Durham (not City of High Point). We look forward to initiating this project as soon as possible.

Sincerely,

Mark D Ahrendsen

Mark D. Ahrendsen
Transportation Manager

cc: Kathryn R. Kalb, Public Works Director
Lee Murphy, City Engineer
Wesley Parham, Transportation Engineer
Ed Venable, Civil Engineer
Felix Nwoko, Acting Transportation Planning Manager

July 20, 2001

From: James Cape
Soil Conservation Technician
USDA, Natural Resources Conservation Service
721 Foster Street
Durham, NC 27701
(919) 560–0557

To: Jackie Obediente
Project Development Engineer
NC Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548
(919) 733-7844 X228

RE: Letter of June 5, 2001 (Enclosed)

Dear Jackie Obediente,
I am the USDA, NRCS (formerly Soil Conservation Service) employee, who is stationed in Durham County. I am responding to the enclosed letter, per the instructions of my supervisor.

There is a request for comments to be used in preparation of an Environmental Assessment. The area of question does not involve any farmland. In this area, Nortel, Inc. has development on both the North and South sides of NC Highway 54.

From Soil Survey determinations, there is an intermittent stream drainage area of Burdens Creek on both sides of Highway 54. There are hydric soils (Cartecay and Chewacla) in the bottom of this drainage area, extending beneath the highway and to the North of the highway.

If there is any way that I might be of assistance, please let me know.

Sincerely,
James Cape

P.S. The USDA, NRCS, State Conservationist for North Carolina is Mary K. Combs.

Public Schools of North Carolina

State Board of Education
Phillip J. Kirk, Jr., Chairman

www.ncpublicschools.org

Department of Public Instruction
Michael E. Ward, State Superintendent

June 25, 2001

MEMORANDUM

TO: Jackie Obediente, NC Department of Transportation

FROM: Gerald H. Knott, Section Chief, School Planning

SUBJECT: Proposed Improvements to NC 54, from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard) and SR 1973 (Paqge Road), from NC 54 to I-40 in Durham County, Federal Aid Project No. STP-54(2), State Project No. 8.1352701, TIP R-2904

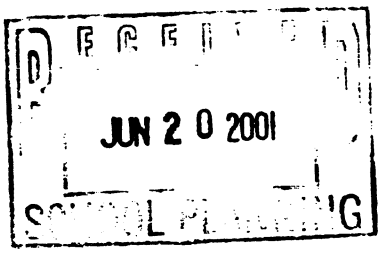
Enclosed is the response from Durham County Schools to our impact inquiry.

/ed
Enclosure

301 N. Wilmington Street, Raleigh, North Carolina 27601-2825
Telephone (919) 807-3300

DURHAM PUBLIC SCHOOLS

Office of Human Resource Services



June 18, 2001

Mr. Gerald H. Knott, AIA
Section Chief
School Planning
North Carolina Department of Public Instruction
301 N. Wilmington Street
Raleigh, North Carolina 27601-2825

Dear Mr. Knott:

Your letter to Dr. Denlinger has been forwarded to me to assess the impact of the Davis Drive project, on the Durham Public School buses. I have reviewed your proposal and it is my opinion that there will be some slight problems with traffic during the construction phase, but we will be able to manage.

If you need further information let me know.

Sincerely,

Henry Kirby
Executive Director of Transportation Services

c: Mr. Calvin Dobbins
Dr. Ann Denlinger
Mr. Hugh Osteen

APPENDIX B

RELOCATION REPORT

North Carolina Department of Transportation
AREA RELOCATION OFFICE

[X] E.I.S. [ ] CORRIDOR [ ] DESIGN

PROJECT:	8.1352701	COUNTY	Durham	Alternate 1 of 1 Alternate	
I.D. NO.:	R-2904	F.A. PROJECT	STP-54 (2)		
DESCRIPTION OF PROJECT:	Widening of NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Blvd)				

ESTIMATED DISPLACEES

Type of Displacees	Owners	Tenants	Total	Minorities
Residential	0	0	0	0
Businesses	0	0	0	0
Farms	0	0	0	0
Non-Profit	0	0	0	0

ANSWER ALL QUESTIONS

Yes	No	Explain all "YES" answers.
	X	1. Will special relocation services be necessary?
	X	2. Will schools or churches be affect by displacement?
X		3. Will business services still be available after project?
	X	4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc.
	X	5. Will relocation cause a housing shortage?
		6. Source for available housing (list).
	X	7. Will additional housing programs be needed?
	X	8. Should Last Resort Housing be considered?
	X	9. Are there large, disabled, elderly, etc. families?
	X	10. Will public housing be needed for project?
	X	11. Is public housing available?
	NA	12. Is it felt there will be adequate DSS housing housing available during relocation period?
	X	13. Will there be a problem of housing within financial means?
	NA	14. Are suitable business sites available (list source).
		15. Number months estimated to complete RELOCATION? NA

INCOME LEVEL

0-15M	15-25M	25-35M	35-50M	50 UP
0	0	0	0	0

VALUE OF DWELLING				DSS DWELLING AVAILABLE			
Owners		Tenants		For Sale		For Rent	
0-20M		$ 0-150		0-20M		$ 0-150	
20-40M		150-250		20-40M		150-250	
40-70M		250-400		40-70M		250-400	
70-100M		400-600		70-100M		400-600	
100 UP		600 UP		100 UP		600 UP	
TOTAL							

REMARKS (Respond by Number)

NONE

Leonard G. Scarborough/tsg
Division Right of Way Agent

10-3-02
Date

Ann Simpson
Approved by

11-22-02
Date

Form 15.4 Revised 02/95 d

Original & 1 Copy: State Relocation Agent
2 Copy Area Relocation Office

APPENDIX C

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

NCDOT to Hold Citizens Informational Workshop for Proposed Improvements on N.C. 54 in Durham County

Raleigh – The North Carolina Department of Transportation (NCDOT) will hold a citizens informational workshop for the proposed improvements to N.C. 54 from Davis Drive (S.R. 1999) to Miami Boulevard (S.R. 1959) in Durham County.

The meeting will be held on Thursday, August 23, 2001, from 4 p.m. – 7 p.m. at the Sheraton Imperial Hotel and Convention Center, 4700 Emperor Boulevard, Durham.

Representatives from NCDOT will be available to answer questions and receive comments from the public about the proposed project. This project proposes making improvements to N.C. 54 which include the widening of this 0.8-mile section of N.C. 54 to multi-lanes.

For more information, contact Jackie Obediente at (919) 733-7844, Ext. 228, e-mail jyobediente@dot.state.nc.us, or write to:

PROJECT DEVELOPMENT & ENVIRONMENTAL ANALYSIS
MAIL SERVICE CENTER 1548
RALEIGH, N.C. 27699-1548

NCDOT will provide auxiliary aids and services for disabled persons who wish to participate in this workshop to comply with the American Disability Act. Anyone requiring special services should contact Jackie Obediente one week prior to the date of the hearing.

NCDOT

MAILING ADDRESS:

NC DEPT OF TRANSPORTATION
PUBLIC INFORMATION OFFICE
1503 MAIL SERVICES CENTER
RALEIGH NC 27699-1503

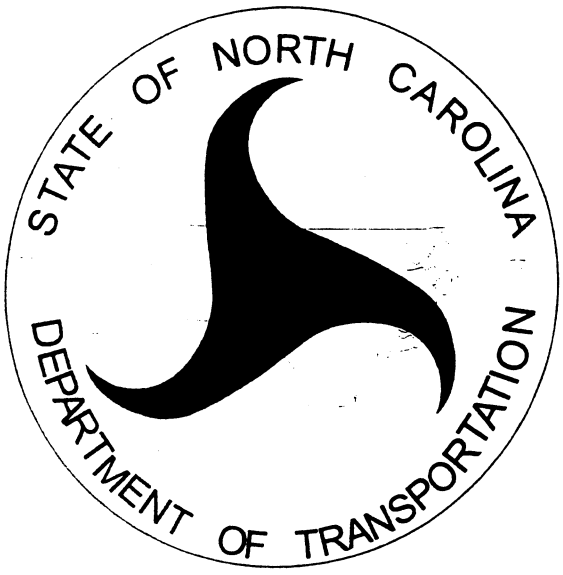
TELEPHONE: 919-733-2522
FAX: 919-733-9980

LOCATION:

1 South Wilmington Street
Raleigh, NC

State Courier: 51-31-00

North Carolina Department of Transportation
Project Development and Environmental Analysis Branch



WIDENING NC 54 FROM SR 1999 (DAVIS DRIVE) TO SR 1959 (MIAMI BOULEVARD) DURHAM COUNTY TIP PROJECT NO. R-2904

AUGUST 23, 2001

Citizens Informational Workshop

CITIZENS INFORMATIONAL WORKSHOP

NC 54 FROM SR 1999 (DAVIS DRIVE) TO SR 1959 (MIAMI BOULEVARD), DURHAM COUNTY, TIP PROJECT R-2904

Purpose of the Citizens Informational Workshop

The purpose of the Citizens Informational Workshop is to involve the public in the project planning process. If you have comments or suggestions about the proposed improvements described in this handout, please let a representative of the North Carolina Department of Transportation know. A comment sheet is provided for you to write down your questions or concerns so that we can keep a record of and fully consider your ideas, comments, and suggestions.

The North Carolina Department of Transportation realizes individuals living close to a proposed project want to be informed of the possible effects of the project on their homes and businesses. However, exact information is not available at this stage of the planning process. Additional design work is necessary before the actual right of way limits can be established. More detailed information will be available at a later date.

A comment sheet is included in this handout. Written comments on this project may be left with North Carolina Department of Transportation representatives at the Citizens Informational Workshop or submitted through the mail. If additional information is needed or you would like to submit comments after the Citizens Informational Workshop, please address your requests and comments to:

Mr. William D. Gilmore, P.E., Manager
Program Development and Environmental Analysis Branch
North Carolina Department of Transportation
P.O. Box 25201
Raleigh, North Carolina 27611

Description of the Project

The North Carolina Department of Transportation's 2002-2008 Transportation Improvement Program (TIP) proposes to widen NC 55 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard). The purpose of the project is to improve the traffic carrying capacity and accident experience along NC 54.

Project Schedules

The proposed TIP schedule includes a FFY 2006 Right of Way acquisition date, and a FFY 2008 Construction date. The current cost estimate from the TIP is $5,400,000, which includes $5,200,000 for construction and $200,000 for right of way acquisition.

Current Status

Currently, planning and environmental studies are in progress. A Categorical Exclusion is scheduled to be complete in November 2002. A public hearing will be scheduled following the completion of the Categorical Exclusion. At this public hearing, the public will have an opportunity to review a map showing the proposed design. Factors which may affect the design of this project include engineering criteria and environmental factors such as relocation of homes or businesses, wetlands, historic sites, etc. A form is available from NCDOT representatives if you feel you have or know of a structure which has historical significance. The improvements currently under investigation are described in the next paragraphs.

Proposed Improvements

The proposed improvements consist of widening NC 54 from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard). From Davis Drive to approximately 200 feet west of the railroad structure, the recommended typical section is a 4-lane divided shoulder section with a 17.5 foot median, and from 200 feet west of the railroad structure to SR 1959 (Miami Boulevard), the recommended typical section is a 5-lane curb and gutter section. Intersections along the project will be evaluated for any needed improvements.

Sidewalks - NCDOT will coordinate with the Research Triangle Park (RTP) Foundation and local governments concerning the reconstruction of sidewalks along the project.

Bicycles - Extra pavement will be provided in order to accommodate bicycles. The 4-lane divided median section will include 4' paved shoulders, and the 5-lane curb and gutter section will include 14' wide outside lanes to accommodate bicycles.

The North Carolina Railroad (NCRR) will design and build all railroad related improvements associated with this project. It is anticipated that the new bridge carrying the railroad over NC 54 will be constructed by January 2004, near its existing location.

Anticipated Right of Way Impacts

It is anticipated that between 150' and 200' of right of way will be needed to accommodate the proposed improvements.

NCDOT will use the results of the environmental and engineering studies within the study corridor to develop an alignment which is safe and cost effective and which minimizes impacts to existing development and historic and natural resources.

No final decisions have been made regarding this project. Therefore, the above information and schedule are preliminary and subject to change. As planning for the project continues, we will include all comments and suggestions to the extent possible.

COMMENT SHEET

NC 54 FROM SR 1999 (DAVIS DRIVE) TO SR 1959 (MIAMI BOULEVARD), DURHAM COUNTY TIP PROJECT R-2904

(You do not have to answer all the questions on these sheets, but please take the time to give us your comments and concerns regarding this project. Please continue any responses on the back of this sheet.)

NAME: _____
(Please print)

ADDRESS: _____
(Please print)

COMMENTS, CONCERNS AND/OR QUESTIONS REGARDING PROJECT R-2904:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(If you need additional space, please continue on the back.)

WE WOULD APPRECIATE YOUR RESPONSES TO THE FOLLOWING QUESTIONS.

WAS THE PROJECT ADEQUATELY EXPLAINED TO YOU? _____ WERE NCDOT REPRESENTATIVES UNDERSTANDABLE AND CLEAR IN THEIR EXPLANATIONS? _____ PLEASE EXPLAIN. _____

_____

_____

WERE DISPLAY MAPS EASY TO READ AND UNDERSTAND? _____
PLEASE EXPLAIN. _____

_____

_____

WERE NCDOT REPRESENTATIVES COURTEOUS AND HELPFUL? _____
PLEASE EXPLAIN. _____

_____

_____

HOW MIGHT WE BETTER PRESENT PROPOSED PROJECTS AND ADDRESS CITIZEN'S CONCERNS IN FUTURE INFORMATIONAL WORKSHOPS?

_____

_____

_____

HOW DID YOU HEAR ABOUT THIS MEETING TODAY? _____

_____

_____

DO YOU FEEL THE MEETING WAS ADEQUATELY PUBLICIZED? _____
PLEASE EXPLAIN. _____

_____

Additional comments can be sent to Mr. William D. Gilmore, P.E., Manager of the Project Development and Environmental Analysis Branch, North Carolina Department of Transportation, P.O. Box 25201, Raleigh, North Carolina 27611.

APPENDIX D

Table A1

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0, JANUARY 1992

JOB: R-2904 NC 54/DAVIS DRIVE DURHAM COUNTY RUN: R 2904 Y05NC 54/DAVIS DRIVE Durham Count

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 4.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. Link 1 EB Appr	-1000.0	-18.0	.0	-18.0	1000.	90.		1050.	10.9	.0	32.0		
2. Link 2 EB LT Q	-36.0	.0	-117.4	.0	81.	270.		713.	100.0	.0	12.0	1.05	13.6
3. Link 3 EB THRU/RT	-36.0	-18.0	-1165.2	-18.0	1129.	270.		531.	100.0	.0	12.0	1.60	188.2
4. Link 4 EB DEPT	.0	-18.0	1000.0	-18.0	1000.	90.		890.	10.9	.0	32.0		
5. Link 5 WB App	1000.0	24.0	.0	18.0	1000.	270.		890.	10.9	.0	44.0		
6. Link 6 WB LT	36.0	.0	195.3	.0	159.	90.		804.	100.0	.0	12.0	4.23	26.6
7. Link 7 WB THRU	36.0	24.0	105.1	24.0	69.	90.		1244.	100.0	.0	24.0	.95	11.5
8. Link 8 WB RT	36.0	12.0	58.3	12.0	22.	90.		622.	100.0	.0	12.0	.42	3.7
9. Link 9 WB DEPT	.0	18.0	-1000.0	24.0	1000.	270.		1050.	10.9	.0	32.0		
10. Link 10 NB APPR	18.0	-1000.0	18.0	.0	1000.	360.		940.	11.2	.0	32.0		
11. Link 11 NB LT	.0	-36.0	.0	-54.8	19.	180.		748.	100.0	.0	12.0	.76	3.1
12. Link 12 NB THRU/R	18.0	-36.0	18.0	-353.7	318.	180.		398.	100.0	.0	12.0	1.08	53.0
13. Link 13 NB DEPT	18.0	.0	18.0	1000.0	1000.	360.		1400.	11.2	.0	32.0		
14. Link 14 SB APPR	-18.0	1000.0	-18.0	.0	1000.	180.		1400.	11.2	.0	32.0		
15. Link 15 SB LT	.0	36.0	.0	385.7	350.	360.		783.	100.0	.0	12.0	2.83	58.3
16. Link 16 SB THRU/RT	-18.0	36.0	-18.0	1827.3	1791.	360.		433.	100.0	.0	12.0	1.74	298.5
17. Link 17 SB DEPT	-18.0	.0	-18.0	-1000.0	1000.	180.		940.	11.2	.0	32.0		

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Link 2 EB LT Q	120	102	2.0	195	1600	312.70	1	3
3. Link 3 EB THRU/RT	120	76	2.0	855	1600	312.70	1	3
6. Link 6 WB LT	120	115	2.0	55	1600	312.70	1	3
7. Link 7 WB THRU	120	89	2.0	685	1600	312.70	1	3
8. Link 8 WB RT	120	89	2.0	150	1600	312.70	1	3
11. Link 11 NB LT	120	107	2.0	90	1600	312.70	1	3
12. Link 12 NB THRU/R	120	57	2.0	850	1600	312.70	1	3
15. Link 15 SB LT	120	112	2.0	150	1600	312.70	1	3
16. Link 16 SB THRU/RT	120	62	2.0	1250	1600	312.70	1	3

Table A1 (continued)

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Receptor 1	120.0	375.0	1.8
2. Receptor 2	115.0	225.0	1.8
3. Receptor 3	170.0	130.0	1.8
4. Receptor 4	300.0	130.0	1.8
5. Receptor 5	285.0	-90.0	1.8
6. Receptor 6	150.0	-100.0	1.8
7. Receptor 7	100.0	-200.0	1.8
8. Receptor 8	100.0	-350.0	1.8
9. Receptor 9	-110.0	-370.0	1.8
10. Receptor 10	-105.0	-200.0	1.8
11. Receptor 11	-185.0	-105.0	1.8
12. Receptor 12	-335.0	-115.0	1.8
13. Receptor 13	-340.0	140.0	1.8
14. Receptor 14	-200.0	160.0	1.8
15. Receptor 15	-140.0	250.0	1.8
16. Receptor 16	-150.0	380.0	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
MAX	5.6	5.9	6.1	5.6	6.0	6.8	6.5	5.8	5.4	6.3	6.1	5.6	5.1	5.6	5.8	5.4
DEGR.	235	225	218	249	293	327	348	350	13	10	37	62	100	118	132	142

THE HIGHEST CONCENTRATION IS 6.80 PPM AT 327 DEGREES FROM REC6 .

Table A2

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0, JANUARY 1992

JOB: R-2904 NC 54/DAVIS DRIVE DURHAM COUNTY RUN: R 2904 Y10NC 54/DAVIS DRIVE Durham Count

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 4.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	*	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. Link 1 EB Appr	*	-1000.0	-18.0	.0	-18.0	*	1000.	90.		1340.	10.6	.0	32.0		
2. Link 2 EB LT Q	*	-36.0	.0	-294.5	.0	*	258.	270.		685.	100.0	.0	12.0	1.34	43.1
3. Link 3 EB THRU/RT	*	-36.0	-18.0	-1918.2	-18.0	*	1882.	270.		511.	100.0	.0	12.0	2.05	313.7
4. Link 4 EB DEPT	*	.0	-18.0	1000.0	-18.0	*	1000.	90.		1123.	10.6	.0	32.0		
5. Link 5 WB App	*	1000.0	24.0	.0	18.0	*	1000.	270.		1123.	10.6	.0	44.0		
6. Link 6 WB LT	*	36.0	.0	249.4	.0	*	213.	90.		773.	100.0	.0	12.0	5.38	35.6
7. Link 7 WB THRU	*	36.0	24.0	365.8	24.0	*	330.	90.		1196.	100.0	.0	24.0	1.21	55.0
8. Link 8 WB RT	*	36.0	12.0	62.8	12.0	*	27.	90.		598.	100.0	.0	12.0	.50	4.5
9. Link 9 WB DEPT	*	.0	18.0	-1000.0	24.0	*	1000.	270.		1340.	10.6	.0	32.0		
10. Link 10 NB APPR	*	18.0	-1000.0	18.0	.0	*	1000.	360.		1209.	10.9	.0	32.0		
11. Link 11 NB LT	*	.0	-36.0	.0	-66.2	*	30.	180.		719.	100.0	.0	12.0	.93	5.0
12. Link 12 NB THRU/R	*	18.0	-36.0	18.0	-91.8	*	56.	180.		383.	100.0	.0	12.0	.75	9.3
13. Link 13 NB DEPT	*	18.0	.0	18.0	1000.0	*	1000.	360.		1751.	10.9	.0	32.0		
14. Link 14 SB APPR	*	-18.0	1000.0	-18.0	.0	*	1000.	180.		1751.	10.9	.0	32.0		
15. Link 15 SB LT	*	.0	36.0	.0	487.5	*	451.	360.		753.	100.0	.0	12.0	3.40	75.2
16. Link 16 SB THRU/RT	*	-18.0	36.0	-18.0	2841.2	*	2805.	360.		417.	100.0	.0	12.0	2.18	467.5
17. Link 17 SB DEPT	*	-18.0	.0	-18.0	-1000.0	*	1000.	180.		1209.	10.9	.0	32.0		

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Link 2 EB LT Q	*	120	102	2.0	249	1600	300.60	1	3
3. Link 3 EB THRU/RT	*	120	76	2.0	1091	1600	300.60	1	3
6. Link 6 WB LT	*	120	115	2.0	70	1600	300.60	1	3
7. Link 7 WB THRU	*	120	89	2.0	872	1600	300.60	1	3
8. Link 8 WB RT	*	120	89	2.0	181	1600	300.60	1	3
11. Link 11 NB LT	*	120	107	2.0	111	1600	300.60	1	3
12. Link 12 NB THRU/R	*	120	57	2.0	587	1600	300.60	1	3
15. Link 15 SB LT	*	120	112	2.0	180	1600	300.60	1	3
16. Link 16 SB THRU/RT	*	120	62	2.0	1571	1600	300.60	1	3

Table A2 (continued)

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Receptor 1	120.0	375.0	1.8
2. Receptor 2	115.0	225.0	1.8
3. Receptor 3	170.0	130.0	1.8
4. Receptor 4	300.0	130.0	1.8
5. Receptor 5	285.0	-90.0	1.8
6. Receptor 6	150.0	-100.0	1.8
7. Receptor 7	100.0	-200.0	1.8
8. Receptor 8	100.0	-350.0	1.8
9. Receptor 9	-110.0	-370.0	1.8
10. Receptor 10	-105.0	-200.0	1.8
11. Receptor 11	-185.0	-105.0	1.8
12. Receptor 12	-335.0	-115.0	1.8
13. Receptor 13	-340.0	140.0	1.8
14. Receptor 14	-200.0	160.0	1.8
15. Receptor 15	-140.0	250.0	1.8
16. Receptor 16	-150.0	380.0	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
MAX	5.9	6.1	6.2	6.4	6.8	7.1	6.7	5.9	5.7	6.4	6.3	6.2	5.8	6.2	6.3	5.9
DEGR.	210	227	214	239	306	329	350	352	7	11	37	64	106	109	125	134

THE HIGHEST CONCENTRATION IS 7.10 PPM AT 329 DEGREES FROM REC6 .

Table A3

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0, JANUARY 1992

JOB: R-2904 NC 54/DAVIS DRIVE DURHAM COUNTY RUN: R 2904 Y25NC 54/DAVIS DRIVE Durham Count

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 4.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. Link 1 EB Appr	-1000.0	-18.0	.0	-18.0	1000.	90.		2205.	11.0	.0	32.0		
2. Link 2 EB LT Q	-36.0	.0	-822.4	.0	786.	270.		674.	100.0	.0	12.0	2.20	131.1
3. Link 3 EB THRU/RT	-36.0	-18.0	-4164.6	-18.0	4129.	270.		502.	100.0	.0	12.0	3.37	688.1
4. Link 4 EB DEPT	.0	-18.0	1000.0	-18.0	1000.	90.		1820.	11.0	.0	32.0		
5. Link 5 WB App	1000.0	24.0	.0	18.0	1000.	270.		1820.	11.0	.0	44.0		
6. Link 6 WB LT	36.0	.0	411.7	.0	376.	90.		760.	100.0	.0	12.0	8.85	62.6
7. Link 7 WB THRU	36.0	24.0	1266.0	24.0	1230.	90.		1176.	100.0	.0	24.0	1.99	205.0
8. Link 8 WB RT	36.0	12.0	78.9	12.0	43.	90.		588.	100.0	.0	12.0	.77	7.2
9. Link 9 WB DEPT	.0	18.0	-1000.0	24.0	1000.	270.		2205.	11.0	.0	32.0		
10. Link 10 NB APPR	18.0	-1000.0	18.0	.0	1000.	360.		2015.	11.8	.0	32.0		
11. Link 11 NB LT	.0	-36.0	.0	-299.8	264.	180.		714.	100.0	.0	12.0	1.65	44.0
12. Link 12 NB THRU/RT	18.0	-36.0	18.0	-3470.2	3434.	180.		377.	100.0	.0	12.0	2.34	572.4
13. Link 13 NB DEPT	18.0	.0	18.0	1000.0	1000.	360.		2800.	11.8	.0	32.0		
14. Link 14 SB APPR	-18.0	1000.0	-18.0	.0	1000.	180.		2800.	11.8	.0	32.0		
15. Link 15 SB LT	.0	36.0	.0	792.7	757.	360.		740.	100.0	.0	12.0	5.09	126.1
16. Link 16 SB THRU/RT	-18.0	36.0	-18.0	5822.8	5787.	360.		403.	100.0	.0	12.0	3.45	964.5
17. Link 17 SB DEPT	-18.0	.0	-18.0	-1000.0	1000.	180.		2015.	11.8	.0	32.0		

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Link 2 EB LT Q	120	102	2.0	410	1600	295.60	1	3
3. Link 3 EB THRU/RT	120	76	2.0	1795	1600	295.60	1	3
6. Link 6 WB LT	120	115	2.0	115	1600	295.60	1	3
7. Link 7 WB THRU	120	89	2.0	1430	1600	295.60	1	3
8. Link 8 WB RT	120	89	2.0	275	1600	295.60	1	3
11. Link 11 NB LT	120	108	2.0	175	1600	295.60	1	3
12. Link 12 NB THRU/R	120	57	2.0	1840	1600	295.60	1	3
15. Link 15 SB LT	120	112	2.0	270	1600	295.60	1	3
16. Link 16 SB THRU/RT	120	61	2.0	2530	1600	295.60	1	3

Table A3 (continued)

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Receptor 1	120.0	375.0	1.8
2. Receptor 2	115.0	225.0	1.8
3. Receptor 3	170.0	130.0	1.8
4. Receptor 4	300.0	130.0	1.8
5. Receptor 5	285.0	-90.0	1.8
6. Receptor 6	150.0	-100.0	1.8
7. Receptor 7	100.0	-200.0	1.8
8. Receptor 8	100.0	-350.0	1.8
9. Receptor 9	-110.0	-370.0	1.8
10. Receptor 10	-105.0	-200.0	1.8
11. Receptor 11	-185.0	-105.0	1.8
12. Receptor 12	-335.0	-115.0	1.8
13. Receptor 13	-340.0	140.0	1.8
14. Receptor 14	-200.0	160.0	1.8
15. Receptor 15	-140.0	250.0	1.8
16. Receptor 16	-150.0	380.0	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
MAX	6.2	6.6	7.0	6.8	7.2	7.6	7.3	6.8	6.5	6.9	7.1	7.0	6.5	7.0	6.6	6.3
DEGR.	211	194	208	225	305	344	347	348	13	11	79	73	104	106	132	132

THE HIGHEST CONCENTRATION IS 7.60 PPM AT 344 DEGREES FROM REC6 .