STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

August 3, 2006

MEMORANDUM TO: Mr. Jon G. Nance, PE
Division Five Engineer

FROM: Philip S. Harris, III, P.E., Unit Head
Natural Environment Unit
Project Development and Environmental Analysis Branch

SUBJECT: Wake County, Widening of SR 3015 From NC 54 to McCrimmon Parkway; T.I.P. Number U-3344 A; State Project 9.8051709

Attached is the U. S. Army Corps of Engineers 404 Nationwide Permit Number 14 and the general conditions for the 401 Water Quality Certification for the above referenced project. All environmental permits have been received for the construction of this project.

PSH/gyb

Attachment

Cc:

Mr. Majed Alghandour, P. E., Programming and TIP
Mr. Jay Bennett, P.E., Roadway Design
Dr. David Chang, P.E., Hydraulics
Mr. Randy Garris, P.E. State Contract Officer
Mr. Art McMillan, P.E., Highway Design
Mr. Greg Perfetti, P.E., Structure Design
Mr. Mark Staley, Roadside Environmental
Mr. John F. Sullivan, FHWA
Mr. Eric Midkiff, P.E., PDEA Central Region Unit Head
Mr. Chris Murray, Division Environmental Officer

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

TELEPHONE: 919-733-3141
FAX: 919-715-1501

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

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

PROJECT COMMITMENTS

Wake County
Widening of SR 3015
From NC 54 to McCrimmon Parkway
State Project 9.8051709
WBS No. 34934.1.1
TIP No. U-3344 A

In additions to the standard Nationwide Permit No. 14 Conditions, Regional Conditions, State Consistency Conditions, NCDOT's Guidelines for Best Management Practices for the Protection of Surface Waters, Design Standards for Sensitive Watersheds, and Section 401 Conditions of Certification, the following special commitments have been agreed to by NCDOT:

Commitments Developed Through Project Development and Design

Project Development & Environmental Analysis and Roadway Design Unit

All Standard procedures and measures, including Best Management Practices, will be implemented to avoid or to minimize environmental impacts.

The final designs will be coordinated with the appropriated state and local officials and the Federal Emergency Management Agency (FEMA) to assure compliance with the FEMA, state and local floodway regulations.

Division 5 Engineer

Any underground storage tanks discovered during construction will be reported to the North Carolina Division of Environmental Management.

Sedimentation and erosion control measures will be used wherever necessary to protect streams.

Commitments Developed Through 404/401 Permitting

No commitments were made during the project's permit process.

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August 3, 2006

To: File

From: Deanna Riffey, Permit Specialist

Subject: U-3344 A Section 404 Permit by Default

The Section 404 permit for this project has been issued by default, as the U.S. Army Corps of Engineers review time period has exceeded 45 days (per Nationwide Permit General Condition number 13, a., 3). Therefore, NCDOT must comply with all conditions, descriptions, and mitigation allowance in the attached permit application dated 3/3/2006, Pre-Construction Notification Form, Permit Drawings, 404 General Conditions and Ecosystem Enhancement Program mitigation acceptance letter. A permit modification will be required if any of the above conditions, descriptions, and mitigation allowances cannot be met.

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William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E. Director
Division of Water Quality

R. Tiffey

April 24, 2006
Wake County
DWQ Project No. 20060367
SR 3015
TIP No. U-3344A

APPROVAL of 401 WATER QUALITY CERTIFICATION and NEUSE BUFFER AUTHORIZATION with ADDITIONAL CONDITIONS

Dr. Gregory Thorpe, Ph.D
NCDOT Project Development & Environmental Analysis Branch
1598 Mail Service Center
Raleigh, NC 27699-1598

Dear Dr. Thorpe:

You have our approval, in accordance with the conditions listed below, for the following impacts for the purpose of widening SR 3015 (Airport Blvd) in Wake County:

Stream Impacts in the Neuse River Basin

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
2	0	0	109	0	109	N/A
Total	**0**	**0**	**109**	**0**	**109**	N/A

Total Stream Impact for Project: 109 linear feet.

Wetland Impacts in the Neuse River Basin

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Area under Bridge (ac)	Total Wetland Impact (ac)
1	0.07	0	0	0	0	0	0.07
Total	**0.07**	**0**	**0**	**0**	**0**	**0**	**0.07**

Total RiverineWetland Impact for Project: 0.07 acres.

Transportation Permitting Unit
1650 Mail Service Center, Raleigh, North Carolina 27699-1650
2321 Crabtree Boulevard, Suite 250, Raleigh, North Carolina 27604
Phone: 919-733-1786 / FAX 919-733-6893 / Internet: http://h2o.enr.state.nc.us/ncwetlands

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Neuse Riparian Buffer Impacts

Site	Zone 1 Impact (sq ft)	*minus* Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)	Zone 2 Impact (sq ft)	*minus* Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
1	2050	0	2050	N/A	1811	0	1811	N/A
2	8412	0	8412	N/A	4921	0	4921	N/A
Totals	**10462**	**0**	**10462**	**0**	**6732**	**0**	**6732**	**0**

* n/a = Total for Site is less than 1/3 acre and 150 linear feet of impact, no mitigation required

Total Buffer Impact for Project: 17194 square feet.

The project shall be constructed in accordance with your application dated received March 8, 2006. After reviewing your application, we have decided that these impacts are covered by General Water Quality Certification Number 3404. This certification corresponds to the Nationwide Permit 14 issued by the Corps of Engineers. This approval is also valid for the Neuse Riparian Buffer Rules (15A NCAC 2B .0233). In addition, you should acquire any other federal, state or local permits before you proceed with your project including (but not limited to) Sediment and Erosion Control, Non-Discharge and Water Supply Watershed regulations. This approval will expire with the accompanying 404 permit.

This approval is valid solely for the purpose and design described in your application (unless modified below). Should your project change, you must notify the DWQ and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all the conditions. If total wetland fills for this project (now or in the future) exceed one acre, or of total impacts to streams (now or in the future) exceed 150 linear feet, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you must adhere to the conditions listed in the attached certification as well as those listed below.

Condition(s) of Certification:

1. Placement of culverts and other structures in waters, streams, and wetlands shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by DWQ. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NC DWQ for guidance on how to proceed and to determine whether or not a permit modification will be required.

2. If concrete is used during construction, a dry work area should be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete should not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.

3. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers.

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4. The dimension, pattern and profile of the stream above and below the crossing should not be modified. Disturbed floodplains and streams should be restored to natural geomorphic conditions.

5. The use of rip-rap above the Normal High Water Mark shall be minimized. Any rip-rap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage.

6. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water.

7. Heavy equipment shall be operated from the banks rather than in the stream channel in order to minimize sedimentation and reduce the introduction of other pollutants into the stream.

8. Heavy equipment may be operated within the stream channels however, its usage shall be minimized.

9. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials.

10. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification.

11. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.

12. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If DWQ determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, DWQ may reevaluate and modify this certification.

13. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification..

14. A copy of this Water Quality Certification shall be posted on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager.

15. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification.

16. Upon completion of the project, the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify DWQ when all work included in the 401 Certification has been completed.

17. Native riparian vegetation must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.

18. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities.

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19. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards:

a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual.*
b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*
d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.

20. Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved by this Certification. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, they shall be removed and the natural grade restored upon completion of the project.

21. All stormwater runoff shall be directed as sheetflow through stream buffers at nonerosive velocities, unless otherwise approved by this certification.

22. All riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegated. Maintained buffers shall be permanently revegetated with non-woody species by the end of the growing season following completion of construction. For the purpose of this condition, maintained buffer areas are defined as areas within the transportation corridor that will be subject to regular DOT maintenance activities including mowing. The area with non-maintained buffers shall be permanently revegetated, with native woody species before the next growing season following completion of construction.

23. Pursuant to NCAC15A 2B .0233(6), sediment and erosion control devices shall not be placed in Zone 1 of any Neuse Buffer without prior approval by the NCDWQ. At this time, the NCDWQ has approved no sediment and erosion control devices in Zone 1, outside of the approved project impacts, anywhere on this project. Moreover, sediment and erosion control devices shall be allowed in Zone 2 of the buffers provided that Zone 1 is not compromised and that discharge is released as diffuse flow.

24. If multiple pipes or barrels are required, they should be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.

25. Riprap should not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed.

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Alan W. Klimek, P.E. Director
Division of Water Quality

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition that conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699. This certification and its conditions are final and binding unless you ask for a hearing. This letter completes the review of the Division of Water Quality under Section 401 of the Clean Water Act. If you have any questions, please contact Rob Ridings at (919) 733-9817.

Sincerely,

Alan W. Klimek, P.E.

Attachments (General Certification and Certificate of Completion form)

cc: Wilmington US Army Corp District Office
Chris Murray, Division 5 Environmental Officer
Jon G. Nance, PE, Division 5 Engineer
Eric Alsmeyer, US Army Corps of Engineers, Raleigh Field Office
Travis Wilson, NC Wildlife Resources Commission
DWQ Raleigh Regional Office copy
Central Files
File Copy

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Division of Water Quality

DWQ Project No.: _____ **County:** _____

Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion
Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the 401 Transportation Permitting Unit, North Carolina Division of Water Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650. This form may be returned to DWQ by the applicant, the applicant's authorized agent, **or** the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification
I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification
I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date:_____

Engineer's Certification
_____ Partial _____ Final
I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project,for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____

Date _____

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WQC #3404

GENERAL CERTIFICATION FOR PROJECTS ELIGIBLE FOR CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBER 14 (ROAD CROSSINGS) AND REGIONAL GENERAL PERMIT 198200031 (WORK ASSOCIATED WITH BRIDGE CONSTRUCTION, MAINTENANCE OR REPAIR CONDUCTED BY NCDOT OR OTHER GOVERNMENT AGENCIES) AND RIPARIAN AREA PROTECTION RULES (BUFFER RULES)

This General Certification is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality (DWQ) Regulations in 15A NCAC 2H, Section .0500 and 15A NCAC 2B .0200 for the discharge of fill material to waters and adjacent wetland areas or to wetland areas that are not a part of the surface tributary system to interstate waters or navigable waters of the United States (i.e., isolated wetlands) as described in 33 CFR 330 Appendix A (B) (14) of the Corps of Engineers regulations (Nationwide Permit No. 14 and Regional General Permit 198200031) and for the Riparian Area Protection Rules (Buffer Rules) in 15A NCAC 2B .0200. The category of activities shall include any fill activity for road crossings and is limited to fill less than one-third acre in tidal waters and less than one-half acre in non-tidal waters. This Certification replaces Water Quality Certification Number 2177 issued on November 5, 1987, Water Quality Certification Number 2666 issued on January 21, 1992, Water Quality Certification Number 2732 issued on May 1, 1992, Water Quality Certification Number 3103 issued on February 11, 1997, Water Quality Certification Number 3289 issued on June 1, 2000 and Water Quality Certification Number 3375 issued March 18, 2002. This WQC is rescinded when the Corps of Engineers re-authorizes Nationwide Permit 14 or Regional General Permit 198200031or when deemed appropriate by the Director of DWQ.

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Conditions of Certification:

1. Enumerating and Reporting of Impacts:

   - Streams - Impacts to streams as determined by the Division of Water Quality shall be measured as length of the centerline of the normal flow channel. Permanent and/or temporary stream impacts shall be enumerated on the entire project for all impacts regardless of which 404 Nationwide Permits are used. Stream relocations and stream bed and/or bank hardening are considered to be permanent stream impacts. Any activity that results in a loss of use of stream functions including but not limited to filling, relocating, flooding, dredging and complete shading shall be considered stream impacts. Enumeration of impacts to streams shall include streams enclosed by bottomless culverts, bottomless arches or other spanning structures when a 404 Permit is used anywhere in a project unless the entire structure (including construction impacts) spans the entire bed and both banks of the stream, is only used for a road, driveway or path crossing, and is not mitered to follow the stream pattern. Impacts for dam footprints and flooding will count toward the threshold for stream impacts, but flooding upstream of the dam will not (as long as no filling, excavation, relocation or other modification of the existing stream dimension, pattern or profile occurs) count towards mitigation requirements.
   - Wetlands - Impacts to wetlands as determined by the Division of Water Quality shall be measured as area. Permanent and/or temporary wetland impacts shall be enumerated on the entire project for all impacts regardless of which 404 Nationwide Permits are used. Any activity that results in a loss of use of wetland functions including but not limited to filling, draining, and flooding shall be considered wetland impacts. Enumeration of impacts to wetlands shall include activities that change the hydrology of a wetland when a 404 Permit is used anywhere in a project.

   - Lakes and Ponds – Lake and Pond Impacts Enumeration- Impacts to waters other than streams and wetlands as determined by the Division of Water Quality shall be measured as area. Permanent and/or temporary water impacts shall be enumerated on the entire project for all impacts proposed regardless of which 404 Nationwide Permits are used. Any activity that results in a loss of use of aquatic functions including but not limited to filling and dredging shall be considered waters impacts;

2. Proposed fill or substantial modification of wetlands or waters (including streams) under this General Certification requires application to and prior written concurrence from the Division of Water Quality;

3. Application to and payment of a fee to DWQ is not required for construction of a driveway to a single family lot as long as the driveway impacts less than 25 feet of stream channel including any in-stream stabilization needed for the crossing;

4. Impacts to any stream length in the Neuse, Tar-Pamlico or Randleman River Basins (or any other major river basins with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) requires written concurrence for this Certification from DWQ in accordance with 15A NCAC 2B.0200. Activities listed as "exempt" from these rules do not need to apply for written concurrence under this Certification. New development activities located in the protected 50-foot wide riparian areas (whether jurisdictional wetlands or not) within the Neuse and Tar-Pamlico River Basins shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 2B .0200. All new development shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices;

5. Irrespective of other application thresholds in this General Certification, all impacts to perennial waters and their associated buffers require written approval from DWQ since such impacts are allowable as provided in 15A NCAC 2B. 0212 (WS-I), 2B .0213 (WS-II), 2B .0214 (WS-III) and 2B .0215 (WS-IV). Only water dependent activities, public projects and structures with diminimus increases in impervious surfaces will be allowed as outlined in those rules. All other activities require a variance from the delegated local government and/or the NC Environmental Management Commission before the 401 Water Quality Certification can be processed. In addition, a 30 foot wide vegetative buffer for low density development or a 100 foot wide vegetative buffer for high density development must be maintained adjacent to all perennial waters except for allowances as provided under the Water Supply Watershed Protection Rules. For the purposes of this condition, perennial waters are defined as those shown as perennial waters on the most recent USGS 1:24,000 topographic map or as otherwise determined by local government studies;

6. Additional site-specific stormwater management requirements may be added to this Certification at DWQ's discretion on a case by case basis for projects that have or are anticipated to have impervious cover of greater than 30 percent. Site-specific stormwater management shall be designed to remove 85% TSS according to the latest version of DWQ's Stormwater Best Management Practices manual at a minimum.

   Additionally, in watersheds within one mile and draining to 303(d) listed waters, as well as watersheds that are classified as nutrient sensitive waters (NSW), water supply waters (WS), trout waters (Tr), high quality waters (HQW), and outstanding resource waters (ORW), the Division shall require that extended detention wetlands, bio-retention areas, and ponds followed by forested filter strips (designed according to latest version of the NC DENR Stormwater Best Management Practices Manual) be constructed as part of the stormwater management plan when a site-specific stormwater management plan is required.

   Alternative designs may be requested by the applicant and will be reviewed on a case-by-case basis by the Division of Water Quality.

   Approval of stormwater management plans by the Division of Water Quality's other existing state stormwater programs including appropriate local programs are sufficient to satisfy this Condition as long as the stormwater management plans meet or exceed the design requirements specified in this condition. This condition applies unless more stringent requirements are in effect from other state water quality programs.

   - Unless specified otherwise in the approval letter, the final, written stormwater management plan shall be approved in writing by the Division of Water Quality's Wetlands Unit before the impacts specified in this Certification occur.
   - The facilities must be designed to treat the runoff from the entire project, unless otherwise explicitly approved by the Division of Water Quality.
   - Also, before any permanent building or other structure is occupied at the subject site, the facilities (as approved by the Wetlands Unit) shall be constructed and operational, and the stormwater management plan (as approved by the Wetlands Unit) shall be implemented.

- The structural stormwater practices as approved by the Wetlands Unit as well as drainage patterns must be maintained in perpetuity.
- No changes to the structural stormwater practices shall be made without written authorization from the Division of Water Quality.

7. Compensatory stream mitigation shall be required at a 1:1 ratio for not only perennial but also intermittent stream impacts that require application to DWQ in watersheds classified as ORW, HQW, Tr, WS-I and WS-II unless the project is a linear, publicly-funded transportation project, which has a 150-foot per-stream impact allowance;

8. In accordance with North Carolina General Statute Section 143-215.3D(e), any application for a 401 Water Quality Certification must include the appropriate fee. If a project also requires a CAMA Permit, one payment to both agencies shall be submitted through the Division of Coastal Management and will be the higher of the two
fees;

9. In accordance with 15A NCAC 2H .0506 (h) compensatory mitigation may be required for impacts to 150 linear feet or more of streams and/or one acre or more of wetlands. For linear public transportation projects, impacts equal to or exceeding 150 feet per stream may require mitigation. In addition, buffer mitigation may be required for any project with Buffer Rules in effect at the time of application for buffer impacts resulting from activities classified as "allowable with mitigation" within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules. A determination of buffer, wetland and stream mitigation requirements shall be made for any Certification for this Nationwide Permit. The most current design and monitoring protocols from DWQ shall be followed and written plans submitted for DWQ approval as required in those protocols. When compensatory mitigation is required for a project, the mitigation plans must be approved by DWQ in writing before the impacts approved by the Certification occur, unless otherwise specified in the approval letter. The mitigation plan must be implemented and/or constructed before any permanent building or structure on site is occupied. In the case of public road projects, the mitigation plan must be implemented before the road is opened to the travelling public. Projects may also be implemented once payment is made to a private mitigation bank or other in-lieu fee program, as specified in the written concurrence of 401 Certification for a project. Please note that if a stream relocation is conducted as a stream restoration as defined in *The Internal Technical Guide for Stream Work in North Carolina* , April 2001, the restored length can be used as compensatory mitigation for the impacts resulting from the relocation;

10. For any project involving re-alignment of streams, a stream relocation plan must be included with the 401 application for written DWQ approval. Relocated stream designs should include the same dimensions, patterns and profiles as the existing channel, to the maximum extent practical. The new channel should be constructed in the dry and water shall not be turned into the new channel until the banks are stabilized. Vegetation used for bank stabilization shall be limited to native woody species, and should include establishment of a 30 foot wide wooded and an adjacent 20 foot wide vegetated buffer on both sides of the relocated channel to the maximum extent practical. A transitional phase incorporating coir fiber and seedling establishment is allowable. Also, rip-rap may be allowed if it is necessary to maintain the physical integrity of the stream, but the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage requested. If suitable stream mitigation is not practical on-site, then stream impact will need to be mitigated elsewhere;

11. Placement of culverts and other structures in waters, streams, and wetlands must be placed below the elevation of the streambed to allow low flow passage of water and aquatic life unless it can be shown to DWQ that providing passage would be impractical. Design and placement of culverts including open bottom or bottomless arch culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in aggradation, degradation or significant changes in hydrology of wetlands or stream beds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium shall be maintained if requested to do so in writing by DWQ. Additionally, when roadways, causeways or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges must be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in aggradation, degradation or significant changes in hydrology of streams or wetlands;

12. That appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of the "North Carolina Sediment and Erosion Control Planning and Design Manual" or the "North Carolina Surface Mining Manual" whichever is more appropriate (available from the Division of Land Resources (DLR) in the DENR Regional or Central Offices) shall be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to assure compliance with the appropriate turbidity water quality standard;

13. All sediment and erosion control measures placed in wetlands and waters shall be removed and the original grade restored within two months after the Division of Land Resources has released the project;

14. That additional site-specific conditions may be added to projects proposed under this Certification in order to ensure compliance with all applicable water quality and effluent standards;

15. Measures shall be taken to prevent live or fresh concrete from coming into contact with freshwaters of the state until the concrete has hardened;

16. If an environmental document is required, this Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse;

17. If this Certification is used to access building sites, all lots owned by the applicant must be buildable without additional fill beyond that explicitly allowed under other General Certifications. For road construction purposes, this Certification shall only be utilized from natural high ground to natural high ground;

18. When written concurrence is required, the applicant is required to use the most recent version of the Certification of Completion form to notify DWQ when all work included in the 401 Certification has been completed;

19. Concurrence from DWQ that this Certification applies to an individual project shall expire three years from the date of the cover letter from DWQ or on the same day as the expiration date of the corresponding Nationwide Permit 14 or Regional General Permit 198200031, whichever is sooner.

Non-compliance with or violation of the conditions herein set forth by a specific fill project may result in revocation of this Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity that requires written concurrence under this certification, if it is determined that the project is likely to have a significant adverse effect upon water quality or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: 28 March 2003

DIVISION OF WATER QUALITY
Signed By
Alan W. Klimek, P.E.
Director

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 3, 2006

US Army Corps of Engineers
Regulatory Branch
6508 Falls of the Neuse Road
Suite 120
Raleigh, NC 27615

ATTENTION: Mr. Eric Alsmeyer
NCDOT Coordinator

Dear Sir:

SUBJECT: **Nationwide 14 Permit Application and Riparian Buffer Certification** for the widening of SR 3015 (Airport Boulevard) from NC 54 to McCrimmon Parkway, in Wake County. NCDOT Division 5, State Project No. 98051709, T.I.P. No.U-3344 A, $200.00 Debit work order 98051709, WBS Element No. 34934.1.1.

Please find enclosed a copy of the half-size roadway designs plans, Pre-construction Notification, Stormwater Management Plan, Indirect and Cumulative Effect Assessment, North Carolina Ecosystem and Enhancement Program (EEP) Acceptance letter, and permit drawings for the subject project.

The North Carolina Department of Transportation (NCDOT) proposes to widen Airport Boulevard (SR 3015) from NC 54 to McCrimmon Parkway. The proposed project will widen the existing two-lane roadway equilaterally to a five lane with curb and gutter along both sides of the roadway. The improved facility will include a 12-foot wide center turn lane and 2 through lanes in each direction. The proposed improvement will impact two existing stream crossings and a wetland. The first crossing, Unnamed Tributary #2 (UT2), is a 5' stream section between a 28"x 32" arched corrugated metal pipe (CMP) and a 48" CMP (Site 1). The second crossing, UT3, is at a 66" CMP crossing through the roadway embankment (Site 2). This pipe is to be removed and replaced with an 8' x 8' reinforced concrete box culvert (RCBC). The wetland located at Site 1 will be filled to allow for placement of a lateral base ditch. Traffic will be maintained on existing road. The total project length is 0.61miles.

The purpose of this project is to improve the traffic flow and safety along Airport Boulevard. Construction of the proposed project will necessitate impacts to jurisdictional waters. This project is located in the Neuse River Basin within HUC 03020201. There will be a total of 109 feet of jurisdictional stream channel impacted, 0.07 acres of wetland, and 17,194 square feet of impacts to protected buffers within the Neuse Watershed. Impacts from this project will qualify

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

TELEPHONE: 919-715-1334
FAX: 919-715-5501
WEBSITE: WWW.NCDOT.ORG

LOCATION:
2728 CAPITOL BOULEVARD
PARKER LINCOLN BUILDING, SUITE 240
RALEIGH NC 27699

for permitting under a Nationwide Permit 14. The EEP will provide compensatory mitigation. This project has a let date of August 15, 2006.

NEPA Document Status

An Environmental Assessment (EA) was prepared by the North Carolina Department of Transportation and approved July 18, 1996. A Finding of No Significant Impact (FONSI) was approved on June 12, 1997. In addition, existing and projected conditions in the study area were described including natural systems and wetlands. Alignments were evaluated with respect to costs, social and economic impacts, and environmental consequences. The EA and FONSI have been provided to regulatory review agencies involved in the approval process. Additional copies will be provided upon request.

The subject project is in compliance with 23 CFR Part 771.111(f) which lists the Federal Highway Administration (FHWA) characteristics of independent utility of a project:

(1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope;
(2) The project is usable and a reasonable expenditure, even if no additional transportation improvements are made in the area;
(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Resource Status

Waters of the United States: One unnamed tributary (UT 3) to Crabtree Creek and one wetland community are the only water resources within the project area. UT 3 is located at Site 2. It is a perennial stream approximately 10-foot wide at the streambed with 3 to 5-foot banks and that has a substrate composed of rock, silt and cobble. The wetland located at Site 1 is associated with UT 2 and is classified as palustrine forested broad-leaved deciduous (PFO1).

Jurisdictional Delineations: On May 24, 2002, the U.S. Army Corps of Engineers (USACOE) verified the wetland delineation at Site 1. On January 5, 2006, UT 2 (Site 1) was classified as an ephemeral channel and is not considered jurisdictional by the USACOE. UT 3 is a jurisdictional perennial stream. Impacts are reported in Table 1.

Table 1. Stream and Wetland Impacts for TIP Project U-3344A Wake County.

Site	Station	Stream Name	DWQ Index No.	Stream Impacts feet	Wetland Impacts (ac)
1	20+92-L- to 22+25-L-				0.07
2	37+30-L- to 37+68-L-	UT #3 to Crabtree Creek	27-33-(3.5)	109	

Permanent Impacts: There are two sites in the project area that impact jurisdictional areas. Site 1 is located at station 20+92-L to 21+82-L. A lateral base ditch and standard base ditch will be constructed parallel to the road followed by a rock weir. The impact will be 0.07 acres of riverine wetland. Site 2 is located at station 37+30-L to 37+68-L. There will be 109 feet of impacts to the jurisdictional perennial UT 3 due to the removal of a 66" CMP and placement of an 8' x 8' RCBC. The NCDOT plans to mitigate for the impacts by compensatory mitigation provided by EEP (see attached EEP Acceptance Letter).

Impacts from dewatering at either Site are not expected. Site 1: the replacement of the 24" and 30" pipe at station 23+00-L with a 42" pipe is expected to be occur during no flow conditions. Flow through this pipe network is a resultant of stormwater from the surround parking areas and roadway. Site 2: During the placement of the culvert one side of the roadway will be constructed at a time to allow traffic flow. A temporary flexible pipe will be used to convey the water during the phase build.

Neuse Buffers

The proposed road project impacts UT 2 & 3, which are protected by the Neuse Buffer Rules. UT 2, although considered non-jurisdictional by USACE, is subject to the buffer rules according to NCDWQ (June 12, 2002 field meeting). Therefore, impacts to stream buffers are comprised of:

- Site1: 2,050 ft^2 in Zone 1 and 1,811 ft^2 in Zone 2 are exempt impacts. Impacts are a result of the addition of riprap in the 8-foot section between the end of one pipe conveying UT #2 and the beginning of the second pipe conveying UT #2. Pipe 1 (24") is being replaced with at larger 42" pipe. The second pipe (48") is not within the project area.
- Site 2: 8,412 ft^2 in Zone 1 and 4,921 ft^2 in Zone 2 are allowable impacts. Impacts result from the placement of riprap at the input and outfall of RCBC.

The NCDOT does not plan to mitigate for the buffer impacts due to the impacts being either exempt or allowable. According to the Neuse Buffer Rules, buffer impacts resulting from road crossings of streams are exempt if they impact equal to or less than 40 ft and allowable if they impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third acre of riparian buffer. Impacts at Site 1 are 0.09 acres (35 ft) - exempt and at Site 2 impacts are 0.31 acres (120 ft) – allowable.

Indirect and Cumulative Effects

Considering the current and projected population and employment for the project area, this project is likely to induce land use changes. While the area would likely experience growth regardless of the project, the project will cumulatively increase the attractiveness of the project area to industrial businesses and improve the flow of commuter traffic during peak hours. The increased proportion of the project area devoted to urban land uses will put more strains on the water resources. Long term, these strains can alter the availability and quality of hydrologic resources, both groundwater and surface water. Modifications in land use may also affect the proportions of ground water and surface runoff in rivers and stream. However, the following federal, state, and local regulations are in place to protect surface water quality and accommodate future growth.

- EPA National Pollution Discharge Elimination System (NPDES)
- North Carolina – Watershed Supply Watershed Protection Act
- North Carolina – Neuse River Basin Nutrient Sensitive Waters Management
- Neuse River Basin Buffer Rules
- North Carolina – Nonpoint Source Program
- Wake County – Land Use and Stormwater Regulations

Adhering to these regulations for the protection of surface waters should limit direct and indirect effects to this important resource (see attached Indirect and Cumulative Effects Assessment).

Federally Protected Species

Plants and animals with federal classifications of Endangered (E), Threatened (T), Proposed Endangered (PE), Proposed Threatened (PT), are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of January 29, 2003, the United States Fish and Wildlife Service lists four federally protected species for Wake County: bald eagle (*Haliaeetus leucocephalus*), red-cockaded woodpecker (*Picoides borealis*), dwarf wedgemussel (*Alasmidonta heterodon*), and Michaux's sumac (*Rhus michauxii*). Since the original EA was prepared no species have been added to or removed from the list. Descriptions and biological conclusions of "No Effect" were given for each species in the referenced EA.

The project site was revisited on August 26, 2004 and overall habitat conditions have not changed. Suitable habitat is not present within the project area for bald eagle or red-cockaded woodpecker. However, suitable habitat is present for Michaux's sumac. All areas containing suitable habitat were examined for Michaux's sumac. No Michaux's sumac species were found. Additionally, a review of the Natural Heritage Program database (last updated on March 31, 2005) revealed no occurrences of these three species within 1.0 mile of the project study area. Therefore, the biological conclusion of "No Effect" remains valid for all three species.

In reference to the dwarf wedgemussel, a survey was conducted during the March 1996 natural resource investigation. No mussel fauna was observed and a biological conclusion of "No Effect" in the project area was given. NCDOT environmental biologists, Karen M. Lynch and Logan Williams conducted a re-survey for the dwarf wedgemussel on December 16, 2003. It was concluded that suitable habitat does not exist for the dwarf wedgemussel and no mussels were found to occur in the unnamed tributaries. Additionally, a review of the Natural Heritage Program database (updated March 2005) revealed that no known occurrences of dwarf wedgemussel exist in the project area. Therefore, the biological conclusion for the **dwarf wedgemussel** of **"No Effect"** remains valid.

Cultural Resources

Archaeological and Historic Resources: According to a memo dated November 9, 1995 from the State Historic Preservation Office (SHPO), there are no known properties of historical, architectural, or archaeological significance which would be affected by the project (Appendix A of the EA).

Avoidance, Minimization, and Compensatory Mitigation

Despite the minimization strategies employed for the proposed project, the resulting permanent wetland and stream impacts will be 0.07 acres and 109 feet. Consequently, the project will require compensatory mitigation.

Avoidance, Minimization, and Mitigation: The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning and NEPA compliance stages; minimization measures were incorporated as part of the project design.

According to the Clean Water Act (CWA) §404(b)(1) guidelines, NCDOT must avoid, minimize, and mitigate, in sequential order, impacts to waters of the US. The following is a list of the project's jurisdictional stream avoidance/minimization activities proposed or completed by NCDOT:

Avoidance/Minimization:

- Limited instream activity
- Design Standards for Sensitive Watersheds and the Environmental Sensitive Areas Provision implementation.
- Use of 2:1 fill slopes in jurisdictional area.
- Use of grass swales (11+00 –Y3 to 21+82 –L-RT & 26+00 to 29+00 –L-RT), a level spreader and preformed scour hole (38+17 –L-RT), and rock weir (22+05 –L-RT) to diffuse water flow and for treatment before it enters the buffer and wetland areas.
- No staging of construction equipment or storage of construction supplies will be allowed in wetlands or near surface waters.
- Widening on existing alignment.
- A 16" water line will be placed under the new reinforced concrete box culvert at Site 2 during the time the box culvert is placed. The box culvert is replacing the existing 66" corrugated metal pipe (CMP).

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in jurisdictional Waters of the U.S. and that the proposed action includes all practicable methods to avoid and/or minimize jurisdictional wetland impacts that may result from such use.

COMPENSATION: The primary emphasis of the compensatory mitigation is to reestablish a condition that would have existed if the project were not built. As previously stated, mitigation is limited to reasonable expenditures and practicable considerations related to highway operation. Mitigation is generally accomplished through a combination of methods designed to replace stream loss as a result of construction of the project.

EEP will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for NCDOT in accordance with the Memorandum of Agreement (MOA) signed July 22, 2003 by the U.S. Army Corps of Engineers (USACE), the North Carolina Department of Environment and Natural Resources (NCDENR) and the NCDOT.

Compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act will be provided by the EEP. An acceptance letter dated January 4, 2005 from EEP is attached. The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. The unavoidable impacts to 109 feet of jurisdictional stream and 0.07 acres of riverine wetland will be offset by compensatory mitigation provided by the EEP program.

Regulatory Approvals

Application is hereby made for the Department of Army Section 404 Nationwide 14 for the above-described activities. We are also hereby requesting a 401 Water Quality Certification and Neuse Buffer Certification from the Division of Water Quality. In compliance with Section 143-215.3D(e) of the NCAC we will provide $200.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line). We are providing seven copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their review.

A copy of this permit application will be posted on the NCDOT website at: http://www.ncdot.org/doh/preconstruct/pe/. If you have any questions or need additional information please call Ms. Deanna Riffey at (919) 715-1409.

Sincerely,

Gregory Thorpe, Ph.D
Environmental Management Director, PDEA

Cc:

W/attachment

Mr. John Hennessy, Division of Water Quality (7 copies)
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan, USFWS
Mr. Greg Perfetti, P.E., Structure Design
Dr. David Chang, P.E., Hydraulics
Mr. Mark Staley, Roadside Environmental
Mr. Jon Nance, P.E., Division Engineer
Mr. Chris Murray, DEO

W/o attachment

Mr. David Franklin, USACE, Wilmington
Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Joseph Qubain, PDEA Project Planning Engineer
Ms. Beth Harmon, EEP
Ms. Laurie P. Smith, CPA, NCDOT, Program Management

Office Use Only: Form Version March 05

USACE Action ID No. _____ **DWQ No.** _____

(If any particular item is not applicable to this project, please enter "Not Applicable" or "N/A".)

I. Processing

1. Check all of the approval(s) requested for this project:
   - ☒ Section 404 Permit
   - ☐ Section 10 Permit
   - ☒ 401 Water Quality Certification
   - ☒ Riparian or Watershed Buffer Rules
   - ☐ Isolated Wetland Permit from DWQ
   - ☐ Express 401 Water Quality Certification

2. Nationwide, Regional or General Permit Number(s) Requested: NW 14 & Neuse Buffer

3. If this notification is solely a courtesy copy because written approval for the 401 Certification is not required, check here: ☐

4. If payment into the North Carolina Ecosystem Enhancement Program (NCEEP) is proposed for mitigation of impacts, attach the acceptance letter from NCEEP, complete section VIII, and check here: ☐

5. If your project is located in any of North Carolina's twenty coastal counties (listed on page 4), and the project is within a North Carolina Division of Coastal Management Area of Environmental Concern (see the top of page 2 for further details), check here: ☐

II. Applicant Information

1. Owner/Applicant Information
   Name: NCDOT
   Mailing Address: Project Development & Environmental Analysis Branch
   1598 Mail Service Center
   Raleigh, NC 27699-1598

   Telephone Number: (919) 733-3141 Fax Number: (919) 733-3794
   E-mail Address: gthorpe@dot.state.nc.us

2. Agent/Consultant Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)
   Name: _____
   Company Affiliation: _____
   Mailing Address: _____

   Telephone Number: _____ Fax Number: _____
   E-mail Address: _____

III. Project Information

Attach a **vicinity map** clearly showing the location of the property with respect to local landmarks such as towns, rivers, and roads. Also provide a detailed **site plan** showing property boundaries and development plans in relation to surrounding properties. Both the vicinity map and site plan must include a scale and north arrow. The specific footprints of all buildings, impervious surfaces, or other facilities must be included. If possible, the maps and plans should include the appropriate USGS Topographic Quad Map and NRCS Soil Survey with the property boundaries outlined. Plan drawings, or other maps may be included at the applicant's discretion, so long as the property is clearly defined. For administrative and distribution purposes, the USACE requires information to be submitted on sheets no larger than 11 by 17-inch format; however, DWQ may accept paperwork of any size. DWQ prefers full-size construction drawings rather than a sequential sheet version of the full-size plans. If full-size plans are reduced to a small scale such that the final version is illegible, the applicant will be informed that the project has been placed on hold until decipherable maps are provided.

1. Name of project: Widening of Airport Boulevard (SR 3015) from NC 54 to McCrimmon Parkway

2. T.I.P. Project Number or State Project Number (NCDOT Only): U-3344 A

3. Property Identification Number (Tax PIN): _____

4. Location
   County: Wake Nearest Town: Morrisville
   Subdivision name (include phase/lot number): N/A
   Directions to site (include road numbers/names, landmarks, etc.): From Raleigh – I-40 West, Exit 284 (Airport Blvd), Left on Airport Blvd

5. Site coordinates (For linear projects, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)
   Decimal Degrees (6 digits minimum): 35° 50' 35" °N 78° 49' 43" °W

6. Property size (acres): 0.61 acres

7. Name of nearest receiving body of water: Unnamed Tributary to Crabtree Creek

8. River Basin: Neuse
   (Note – this must be one of North Carolina's seventeen designated major river basins. The River Basin map is available at http://h2o.enr.state.nc.us/admin/maps/.)

9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: SR 3015 is classified as a Major Thoroughfare in the Greater Urban Area Thoroughfare Plan.

10. Describe the overall project in detail, including the type of equipment to be used: (see cover letter)

11. Explain the purpose of the proposed work: Purpose of this project is to improve level of service for the projected traffic volumes.

IV. Prior Project History

If jurisdictional determinations and/or permits have been requested and/or obtained for this project (including all prior phases of the same subdivision) in the past, please explain. Include the USACE Action ID Number, DWQ Project Number, application date, and date permits and certifications were issued or withdrawn. Provide photocopies of previously issued permits, certifications or other useful information. Describe previously approved wetland, stream and buffer impacts, along with associated mitigation (where applicable). If this is a NCDOT project, list and describe permits issued for prior segments of the same T.I.P. project, along with construction schedules. N/A

V. Future Project Plans

Are any future permit requests anticipated for this project? If so, describe the anticipated work, and provide justification for the exclusion of this work from the current application.
N/A

VI. Proposed Impacts to Waters of the United States/Waters of the State

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. Each impact must be listed separately in the tables below (e.g., culvert installation should be listed separately from riprap dissipater pads). Be sure to indicate if an impact is temporary. All proposed impacts, permanent and temporary, must be listed, and must be labeled and clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) should be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Provide a written description of the proposed impacts: (see cover letter)

2. Individually list wetland impacts. Types of impacts include, but are not limited to mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

Wetland Impact Site Number (indicate on map)	Type of Impact	Type of Wetland (e.g., forested, marsh, herbaceous, bog, etc.)	Located within 100-year Floodplain (yes/no)	Distance to Nearest Stream (linear feet)	Area of Impact (acres)
Site 1	Permanent	Riverine	No	5	0.07
Total Wetland Impact (acres)					0.07

3. List the total acreage (estimated) of all existing wetlands on the property: 0.09

4. Individually list all intermittent and perennial stream impacts. Be sure to identify temporary impacts. Stream impacts include, but are not limited to placement of fill or culverts, dam construction, flooding, relocation, stabilization activities (e.g., cement walls, rip-rap, crib walls, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included. To calculate acreage, multiply length X width, then divide by 43,560.

Stream Impact Number (indicate on map)	Stream Name	Type of Impact	Perennial or Intermittent?	Average Stream Width Before Impact	Impact Length (linear feet)	Area of Impact (acres)
Site 2	UT to Crabtree Creek	Permanent	Perennial	10 ft	109 ft	0.04
Total Stream Impact (by length and acreage)					109 ft	0.04

5. Individually list all open water impacts (including lakes, ponds, estuaries, sounds, Atlantic Ocean and any other water of the U.S.). Open water impacts include, but are not limited to fill, excavation, dredging, flooding, drainage, bulkheads, etc.

Open Water Impact Site Number (indicate on map)	Name of Waterbody (if applicable)	Type of Impact	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)	Area of Impact (acres)
N/A				
Total Open Water Impact (acres)				

6. List the cumulative impact to all Waters of the U.S. resulting from the project:

Stream Impact (acres):	0.04
Wetland Impact (acres):	0.07
Open Water Impact (acres):	
Total Impact to Waters of the U.S. (acres)	0.11
Total Stream Impact (linear feet):	109

7. Isolated Waters
Do any isolated waters exist on the property? ☐ Yes ☒ No
Describe all impacts to isolated waters, and include the type of water (wetland or stream) and the size of the proposed impact (acres or linear feet). Please note that this section only applies to waters that have specifically been determined to be isolated by the USACE.

8. Pond Creation
If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.
Pond to be created in (check all that apply): ☐ uplands ☐ stream ☐ wetlands
Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.):
Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.):
Current land use in the vicinity of the pond:
Size of watershed draining to pond:_____ Expected pond surface area:_____

VII. Impact Justification (Avoidance and Minimization)

Specifically describe measures taken to avoid the proposed impacts. It may be useful to provide information related to site constraints such as topography, building ordinances, accessibility, and financial viability of the project. The applicant may attach drawings of alternative, lower-impact site layouts, and explain why these design options were not feasible. Also discuss how impacts were minimized once the desired site plan was developed. If applicable, discuss construction techniques to be followed during construction to reduce impacts. (see cover letter)

VIII. Mitigation

DWQ - In accordance with 15A NCAC 2H .0500, mitigation may be required by the NC Division of Water Quality for projects involving greater than or equal to one acre of impacts to freshwater wetlands or greater than or equal to 150 linear feet of total impacts to perennial streams.

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on January 15, 2002, mitigation will be required when

necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

If mitigation is required for this project, a copy of the mitigation plan must be attached in order for USACE or DWQ to consider the application complete for processing. Any application lacking a required mitigation plan or NCEEP concurrence shall be placed on hold as incomplete. An applicant may also choose to review the current guidelines for stream restoration in DWQ's Draft Technical Guide for Stream Work in North Carolina, available at http://h2o.enr.state.nc.us/ncwetlands/strmgide.html.

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.
   Mitigation required for wetland and stream impacts – EEP. See cover letter for details.

2. Mitigation may also be made by payment into the North Carolina Ecosystem Enhancement Program (NCEEP). Please note it is the applicant's responsibility to contact the NCEEP at (919) 715-0476 to determine availability, and written approval from the NCEEP indicating that they are will to accept payment for the mitigation must be attached to this form. For additional information regarding the application process for the NCEEP, check the NCEEP website at http://h2o.enr.state.nc.us/wrp/index.htm. If use of the NCEEP is proposed, please check the appropriate box on page five and provide the following information:

   Amount of stream mitigation requested (linear feet): 109 ft
   Amount of buffer mitigation requested (square feet):
   Amount of Riparian wetland mitigation requested (acres): 0.07 ac
   Amount of Non-riparian wetland mitigation requested (acres):
   Amount of Coastal wetland mitigation requested (acres):

IX. Environmental Documentation (required by DWQ)

1. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land? Yes ☒ No ☐

2. If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)? Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation. Yes ☒ No ☐

3. If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter. Yes ☒ No ☐

X. Proposed Impacts on Riparian and Watershed Buffers (required by DWQ)

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to required state and local buffers associated with the project. The applicant must also provide justification for these impacts in Section VII above. All proposed impacts must be listed herein, and must be clearly identifiable on the accompanying site plan. All buffers must be shown on a map, whether or not impacts are proposed to the buffers. Correspondence from the DWQ Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

1. Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 02B .0243 (Catawba) 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify_____)? Yes ☒ No ☐

2. If "yes", identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1	10,462	3 (2 for Catawba)	Allowable
2	6,732	1.5	Allowable
Total	17,194		Allowable

* Zone 1 extends out 30 feet perpendicular from the top of the near bank of channel; Zone 2 extends an additional 20 feet from the edge of Zone 1.

If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Riparian Buffer Restoration / Enhancement, or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0244, or .0260. No mitigation is required. Buffer impacts resulting from road crossings of streams are either exempt or allowable if they impact equal to or less than 40 ft and allowable if they impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third acre if riparian buffer. Impacts at Site 1 are 0.09 acres (35 ft) - exempt and at Site 2 impacts are 0.31 acres (120 ft) – allowable.

XI. Stormwater (required by DWQ)

Describe impervious acreage (existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property. If percent impervious surface exceeds 20%, please provide calculations demonstrating total proposed impervious level. N/A

XII. Sewage Disposal (required by DWQ)

Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.
N/A

XIII. Violations (required by DWQ)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?
Yes ☐ No ☒

Is this an after-the-fact permit application? Yes ☐ No ☒

XIV. Cumulative Impacts (required by DWQ)

Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality? Yes ☐ No ☒
If yes, please submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent North Carolina Division of Water Quality policy posted on our website at http://h2o.enr.state.nc.us/ncwetlands. If no, please provide a short narrative description:
See Indirect and Cumulative Effects Assessment Report

XV. Other Circumstances (Optional):

It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).
N/A

3/6/06

Applicant/Agent's Signature **Date**

(Agent's signature is valid only if an authorization letter from the applicant is provided.)

Ecosystem Enhancement PROGRAM

January 4, 2005

Mr. Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development and Environmental Analysis Branch
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Dr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

U-3344A, SR 3015 (Airport Boulevard) Widening, Wake County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide stream mitigation for the subject project. Based on the information supplied by you in a letter dated December 29, 2004, the impacts are located in CU 03020201 of the Neuse River Basin in the Central Piedmont (CP) Eco-Region, and are as follows:

Riverine Wetland Impacts:	0.07 acre
Stream Impacts:	109 feet (Warm)

As stated in your letter, the subject project is listed in Exhibit 2 of the Memorandum of Agreement among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U. S. Army Corps of Engineers, Wilmington District dated July 22, 2003. The mitigation for the subject project will be provided in accordance with this agreement.

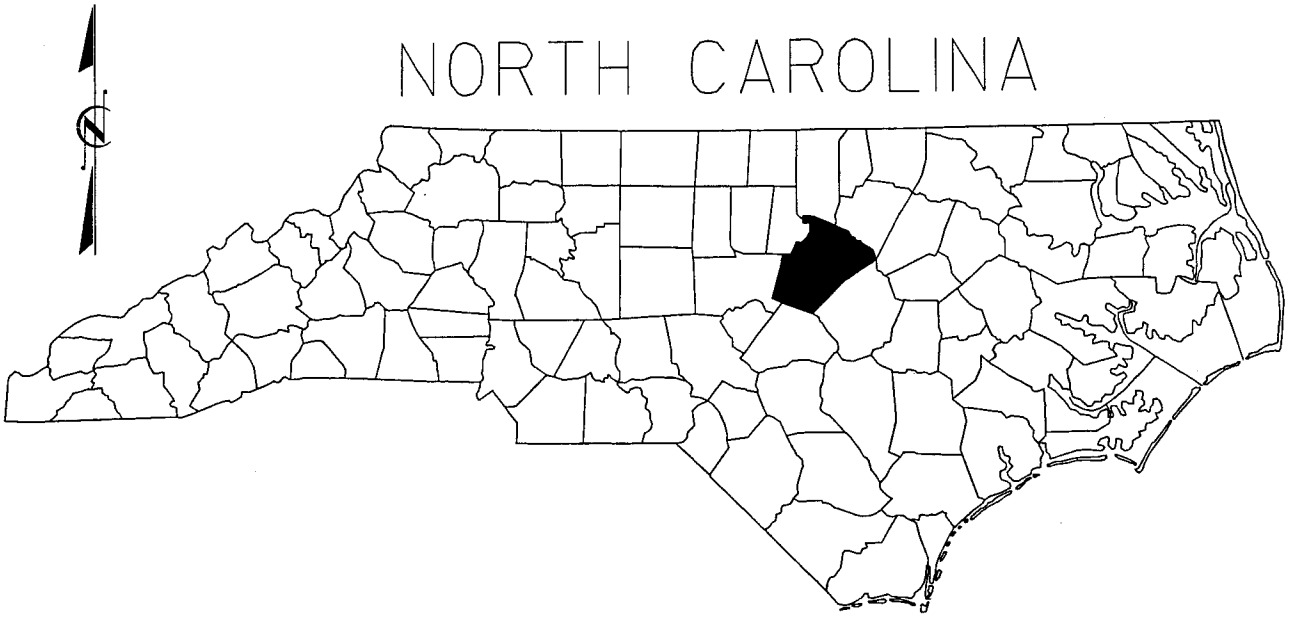
If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-715-1929.

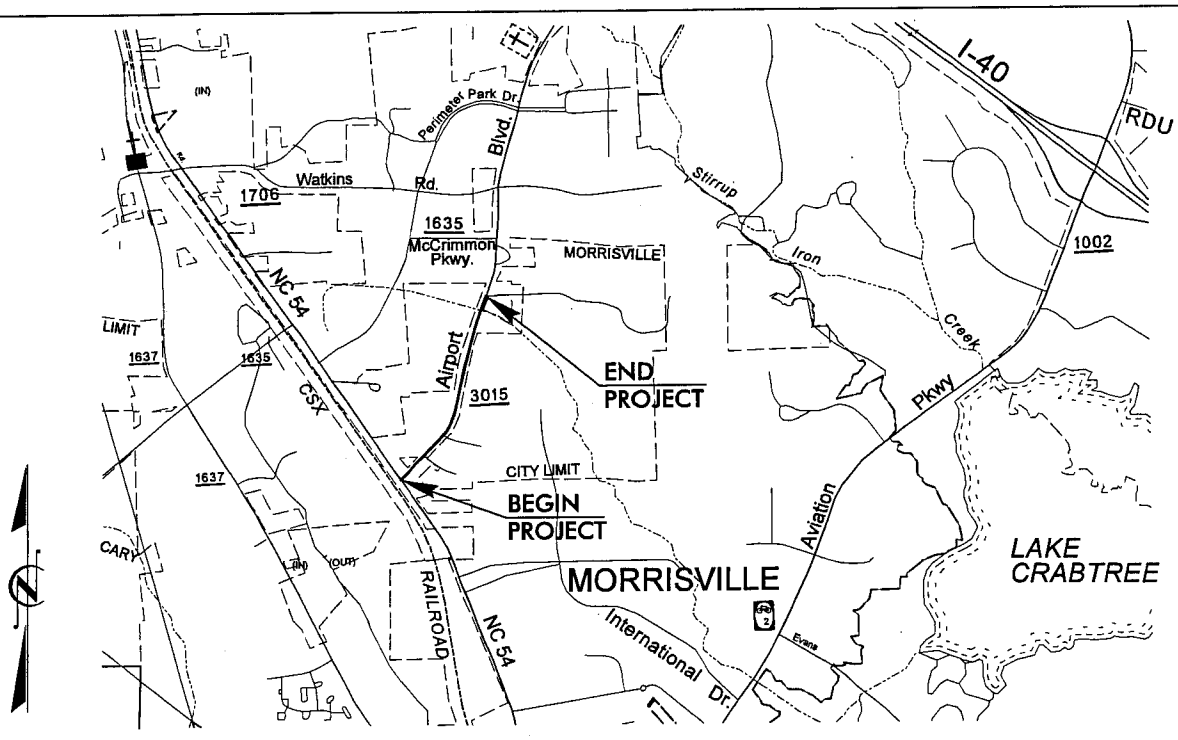
Sincerely,

James B. Stanfill for

William D. Gilmore, P.E.
EEP Director

cc: Mr. Eric Alsmeyer, USACE-Raleigh
Mr. John Hennessy, Division of Water Quality, Wetlands/401 Unit
File: U-3344A





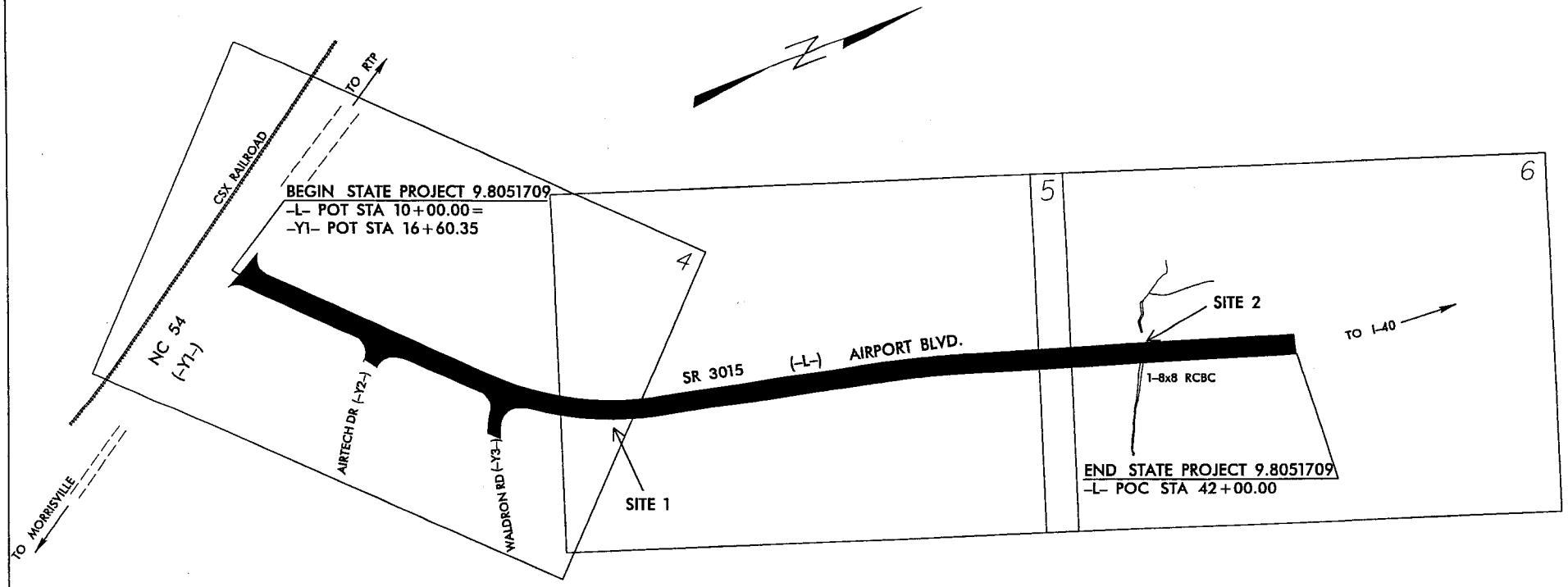
Buffer

VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

SHEET 1 OF 8 9/4/02



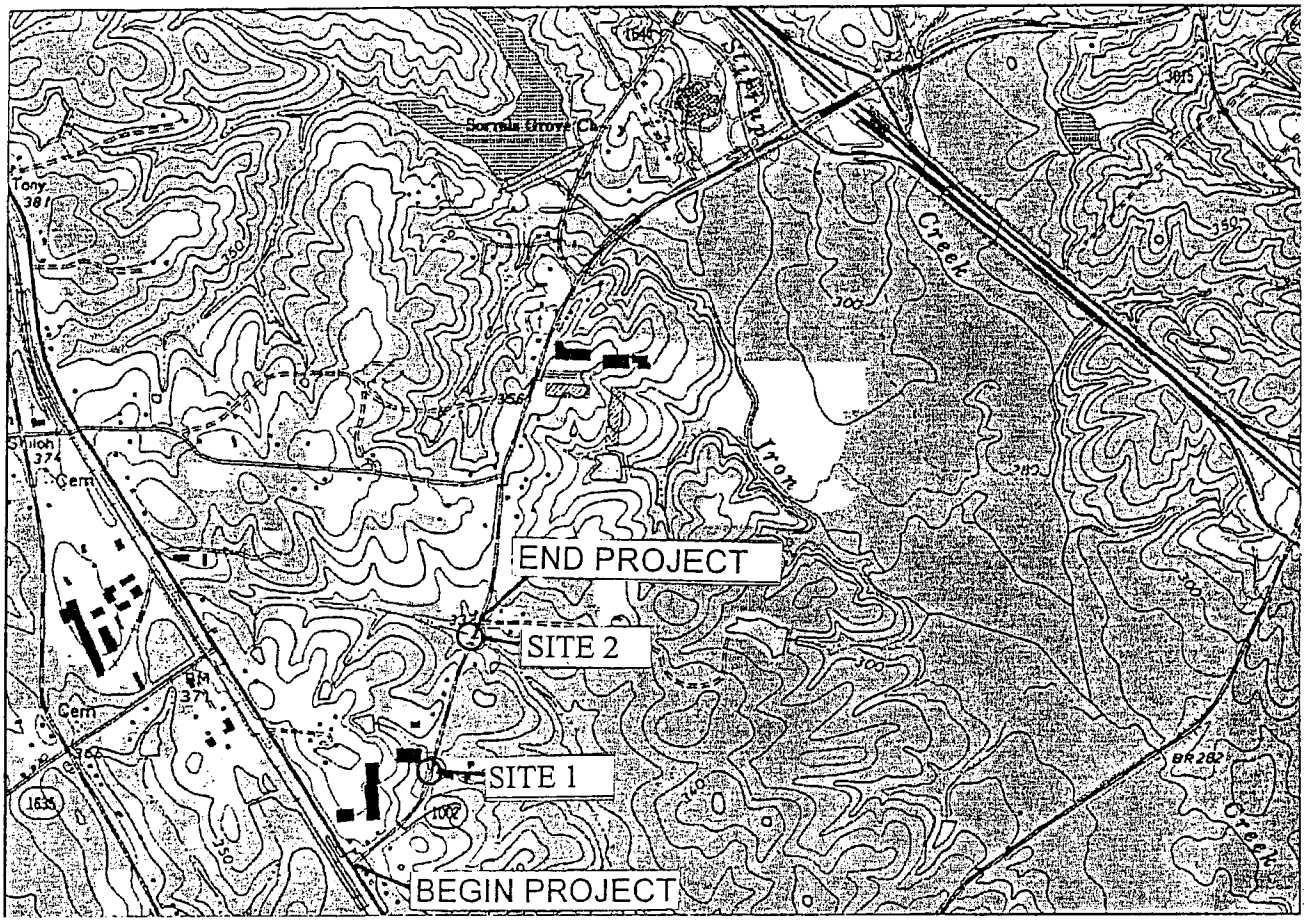
SITE MAP

Buffer

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

9/4/02



9° W

SCALE 1" = 1000'

QUAD MAP

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

SHEET 3 OF 8

9/4/02

BUFFER LEGEND

WLB — WETLAND BOUNDARY

WLB / WLB — WETLAND

PERMANENT IMPACTS ZONE 1

PERMANENT IMPACTS ZONE 2

TEMPORARY IMPACTS

BZ — RIPARIAN BUFFER ZONE

BZ1 — RIPARIAN BUFFER ZONE 1
30 ft (9.2m)

BZ2 — RIPARIAN BUFFER ZONE 2
20 ft (6.1m)

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

DITCH / SWALE

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

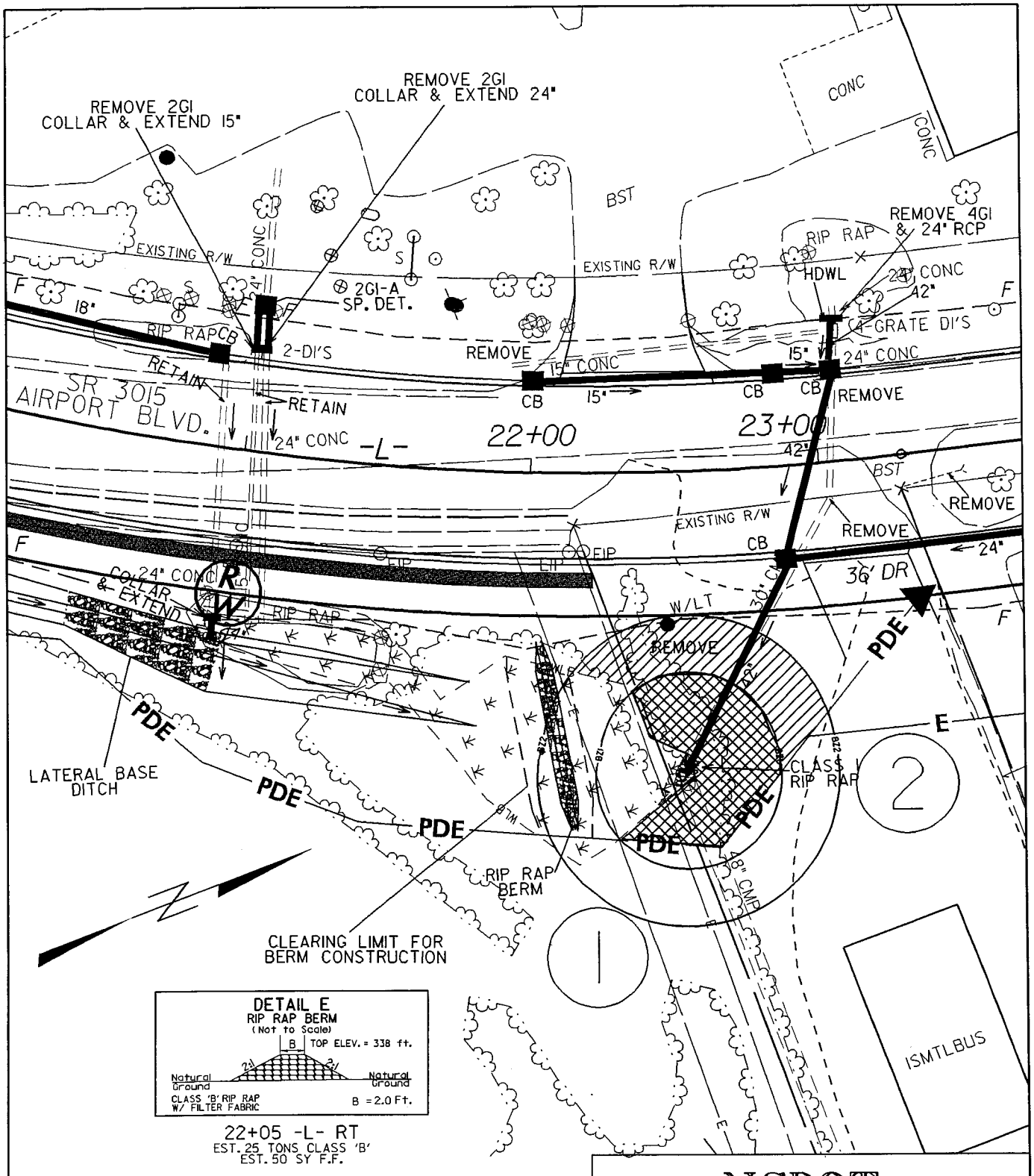
5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

NCDOT
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 9.80517091 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

SHEET 4 OF 8 9/4/02



DETAIL E
RIP RAP BERM
(Not to Scale)

22+05 -L- RT
EST. 25 TONS CLASS 'B'
EST. 50 SY F.F.

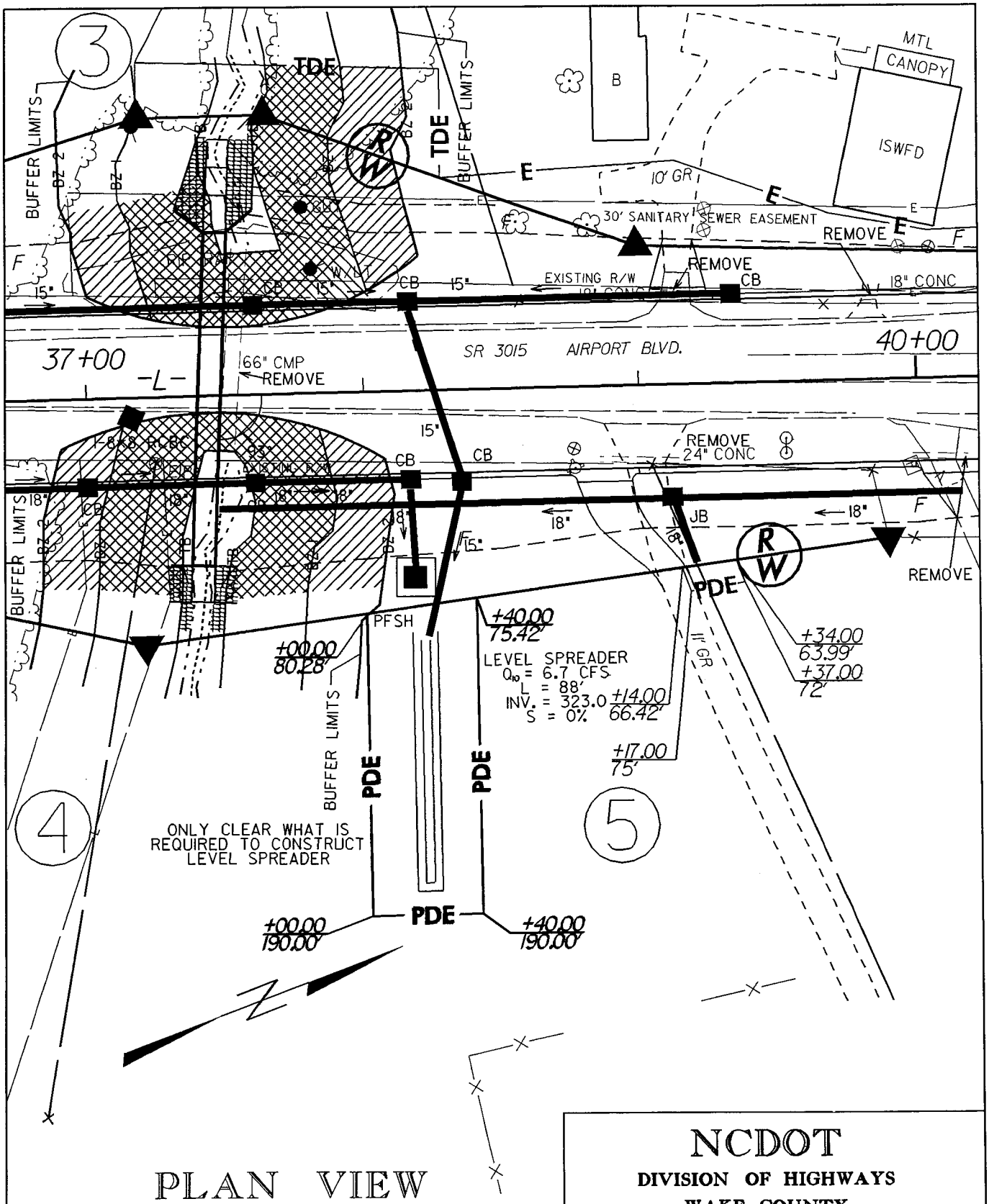
PLAN VIEW
SITE 1
BUFFER
IMPACT
SCALE 1" = 50'

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

Rev 12/04
Rev 11/04
Rev 8/19/04
1/13/03

SHEET 5 **OF** 8



PLAN VIEW
SITE 2
BUFFER
IMPACTS
SCALE 1" = 50'

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

Rev 2/16/05
Rev 8/19/04
12/18/02

SHEET 6 **OF** 8

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
1	DOVE ASSOCIATES IV LLC	P.O. BOX 4128 CARY, NC 27519-4128
2	FANELLI, THOMAS & BARBARA	1381 KILDAIRE FARM RD., STE. 281 CARY, NC 27511-5525
3	HOLLOWELL, EDWARD E. & TRUSTEES FOR DOVE IVESTMENT ASSOCIATES, LLC	P.O. BOX 4128 CARY, NC 27519-4128
4	FRITZ, ROBERT & JULIE	17 STREAMVIEW CT. DURHAM, NC 27713
5	WATKINS, RANDY W.	508 AIRPORT BLVD. MORRISVILLE, NC 27560-9187

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

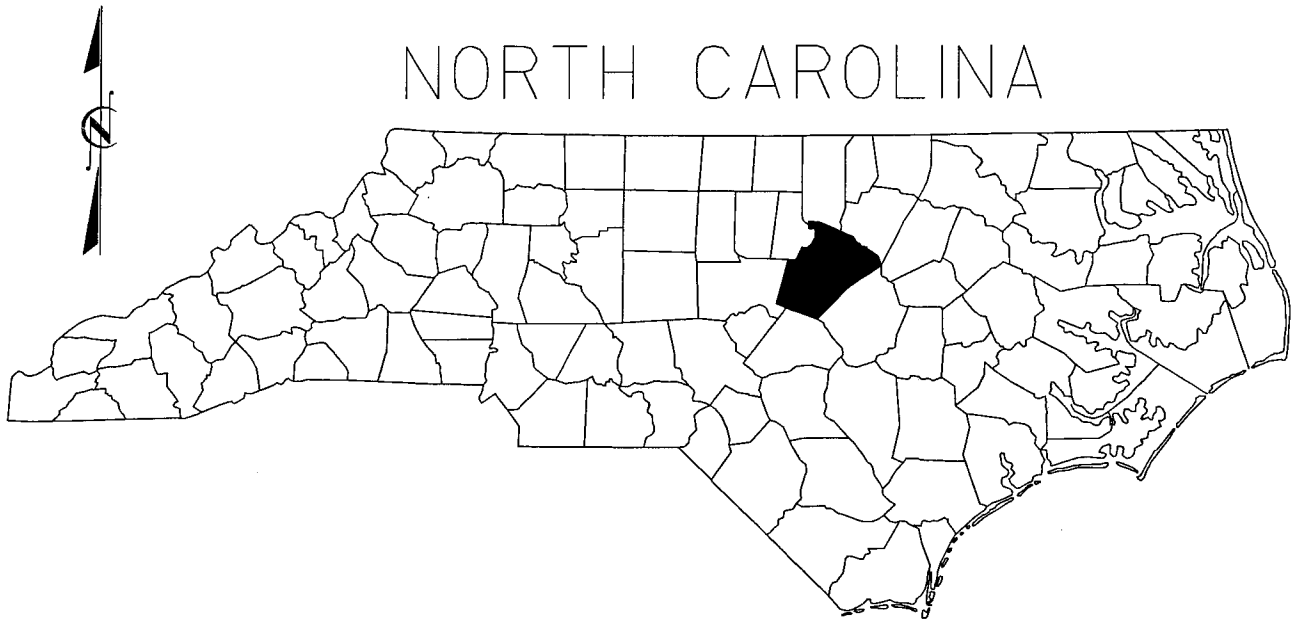
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

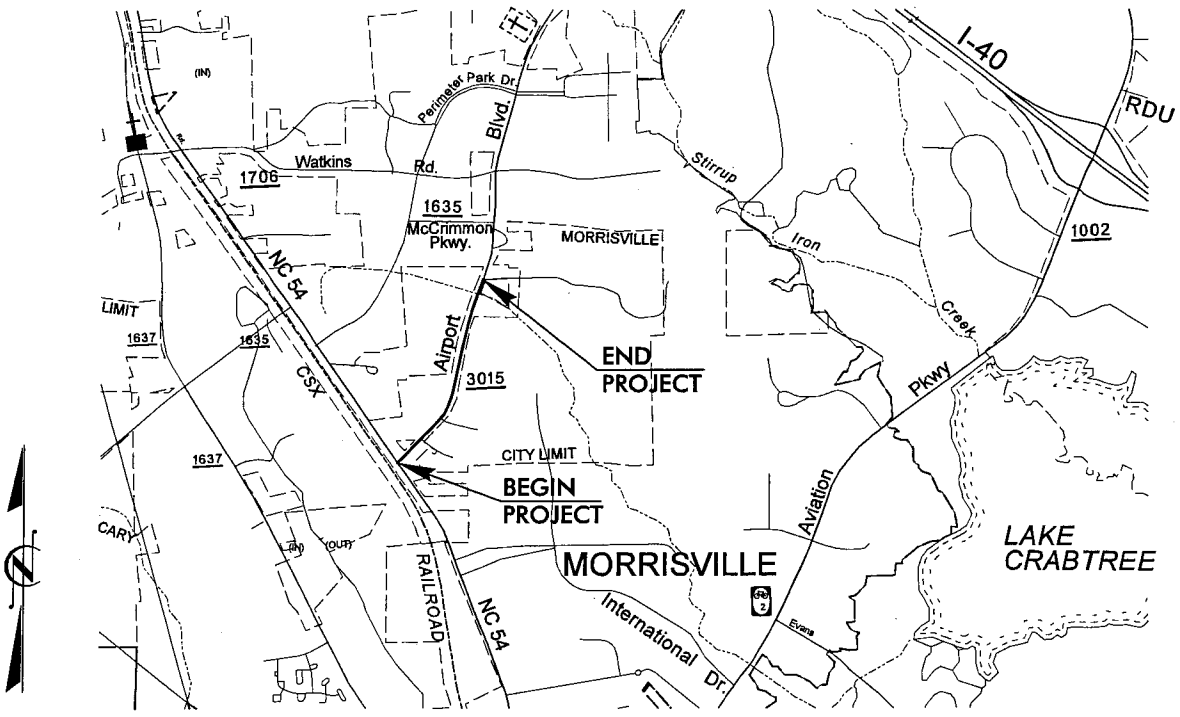
9/4/02

BUFFER IMPACTS SUMMARY

			IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	42" PIPE	-L- 22+50	X		2050	1811	3861					
2	1 @ 8'x8' RCBC	-L- STA 37+40	X		8412	4921	13333					
TOTAL:					10462	6732	17194	0	0	0		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY
12/18/2002 Rev 8/23/04
SHEET 8 OF 8

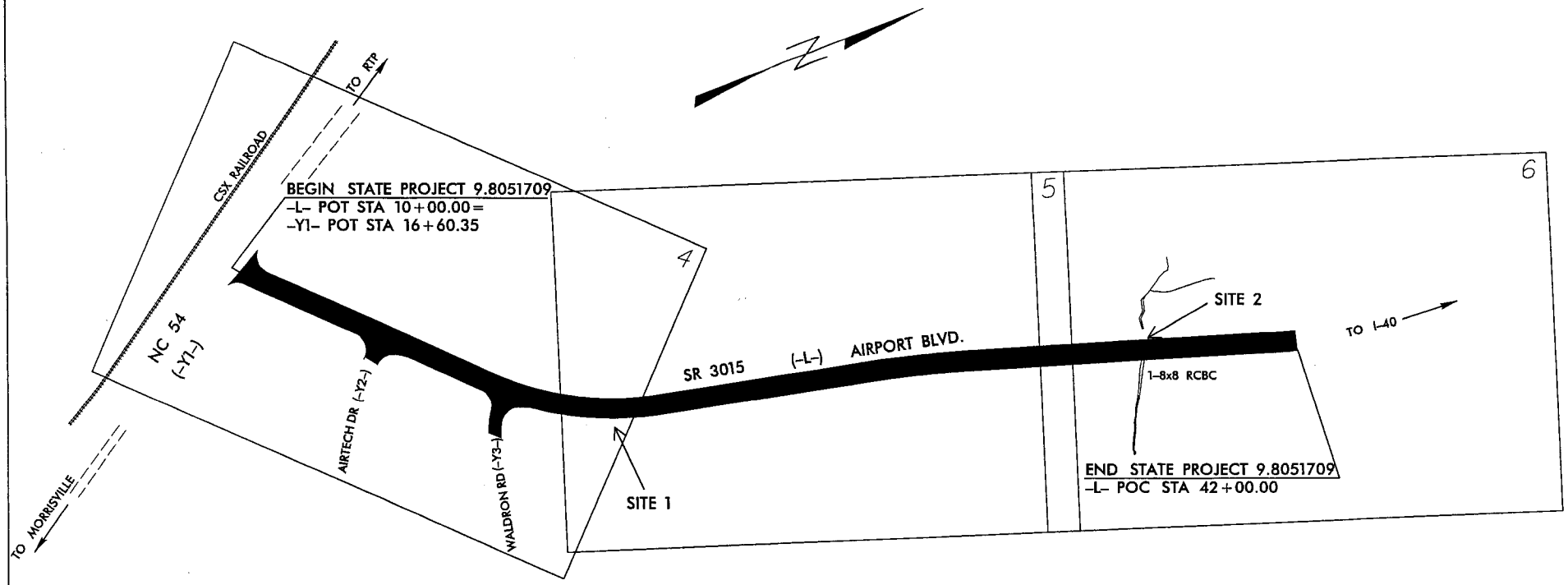




VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

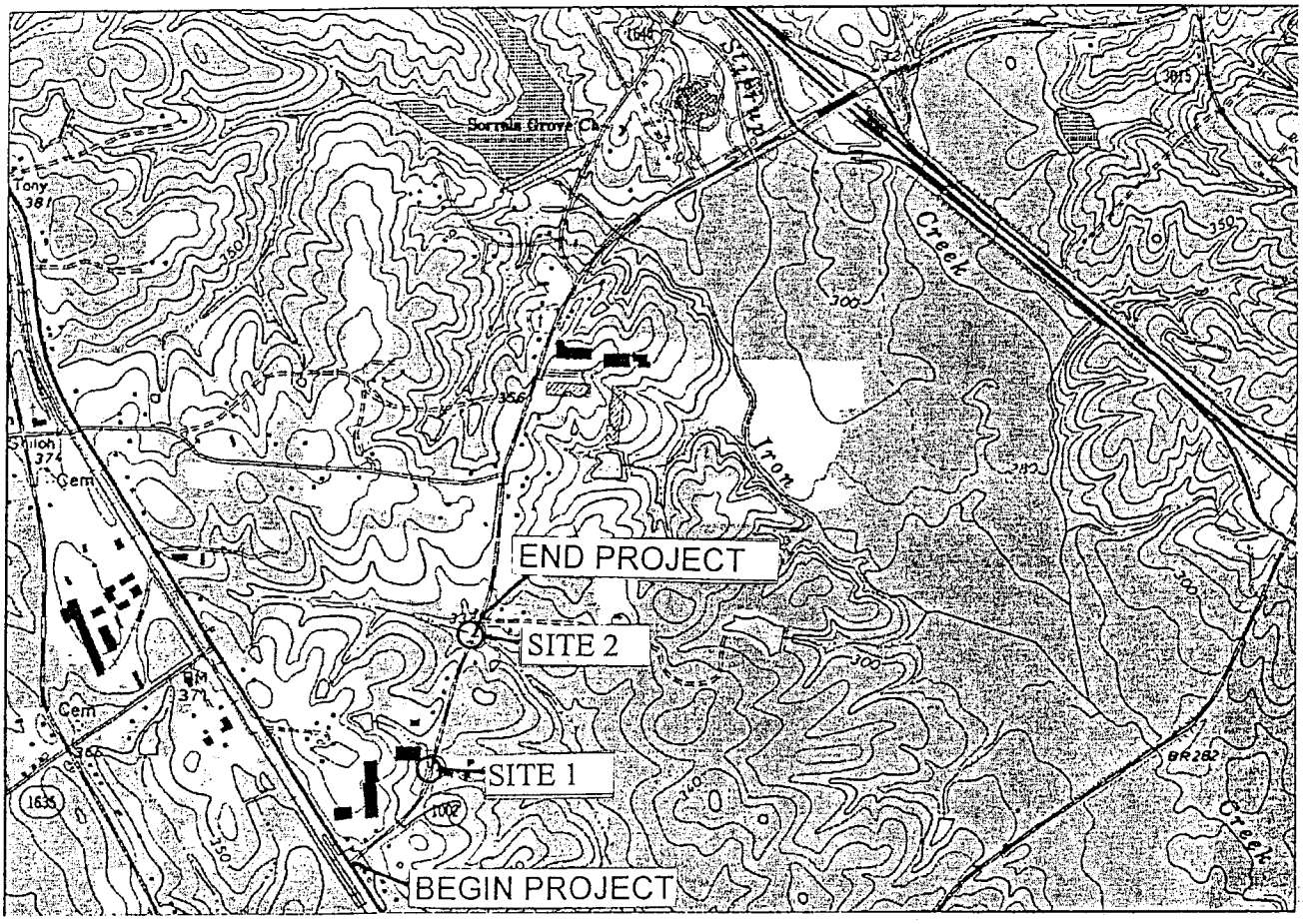


SITE MAP

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

SHEET 2 OF 8 9/4/02



9° W

SCALE 1" = 1000'

QUAD MAP

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

SHEET 3 OF 8

9/4/02

WETLAND LEGEND

WLB — WETLAND BOUNDARY

WETLAND

F F — DENOTES FILL IN WETLAND

S S — DENOTES FILL IN SURFACE WATER

P P — DENOTES FILL IN SURFACE WATER (POND)

T T — DENOTES TEMPORARY FILL IN WETLAND

E E — DENOTES EXCAVATION IN WETLAND

TS TS — DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

DITCH / GRASS SWALE

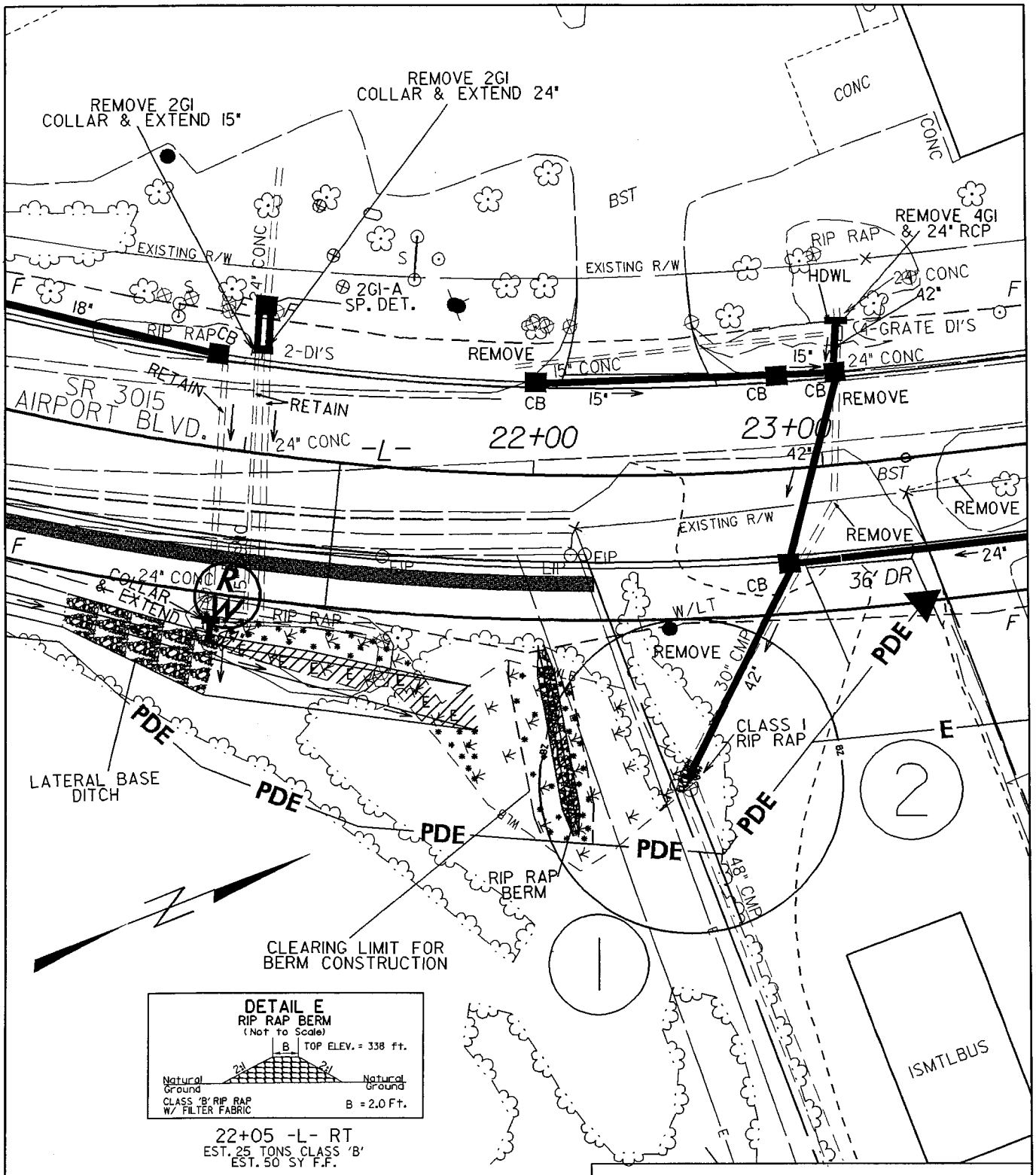
NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY



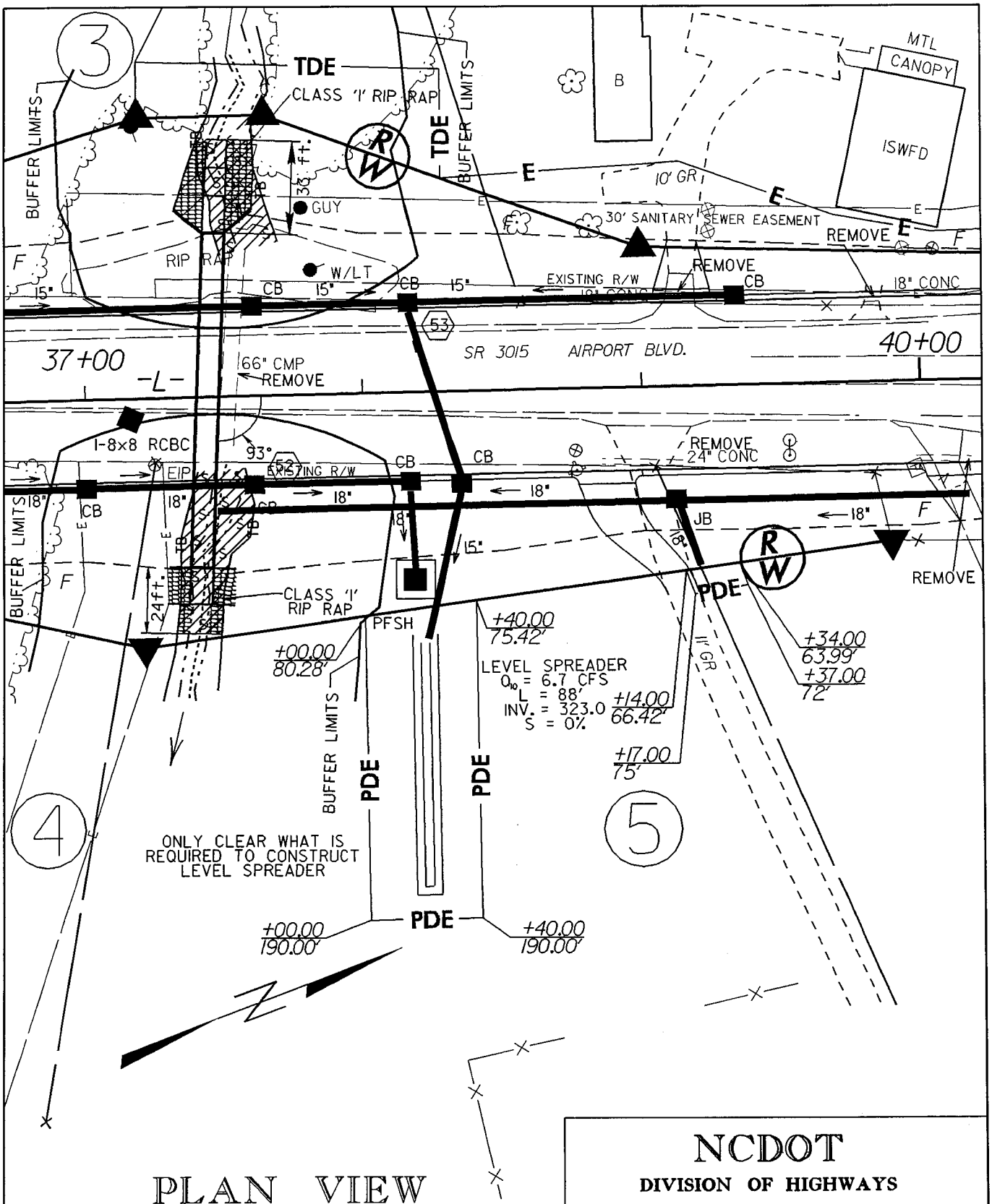
DETAIL E
RIP RAP BERM
(Not to Scale)

22+05 -L- RT
EST. 25 TONS CLASS 'B'
EST. 50 SY F.F.

PLAN VIEW
SITE 1
WETLANDS
IMPACT
SCALE 1" = 50'

NCDOT
DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

Rev 12/04
Rev 11/04
1/13/03



PLAN VIEW
SITE 2
STREAM
IMPACTS
SCALE 1" = 50'

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

Rev 2/16/05
Rev 8/19/04
12/18/02

SHEET 6 **OF** 8

PROPERTY OWNERS

NAMES AND ADDRESSES

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3	HOLLOWELL, EDWARD E. & TRUSTEES FOR DOVE IVESTMENT ASSOCIATES, LLC	P.O. BOX 4128 CARY, NC 27519-4128
4	FRITZ, ROBERT & JULIE	17 STREAMVIEW CT. DURHAM, NC 27713
5	WATKINS, RANDY W.	508 AIRPORT BLVD. MORRISVILLE, NC 27560-9187

NCDOT

DIVISION OF HIGHWAYS

WAKE COUNTY

PROJECT: 9.8051709 (U-3344A)

MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

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 20+92 TO 22+25		0.0076		0.0185	0.0411					
2	L 37+30 TO 37+68	8' x 8' RCBC					0.0438			109	
TOTALS:			0.0076	0	0.0185	0.0411	0.0438	0	0	109	0

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT 9.8051709 (U-3344A)
MORRISVILLE - SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY

9/4/2002

Form Revised 3/22/01

SUBJECT: Stormwater Management Plan for U-3344A, Wake County. Widening SR 3015 (Airport Boulevard) from NC 54 to McCrimmon Parkway.

ROADWAY DESCRIPTION:

The U-3344A project goal is to complete the widening for SR 3015 (Airport Boulevard) to a five lane, curb and gutter section from McCrimmon Parkway to NC 55. This will provide a continuous five lane section from I-40 to NC 55. The length of the project is 0.62 miles. There are two existing stream crossings on the project. The first is a 5' stream section between a 28" x 32" arched CMP and a 48" CMP. The second crossing is at a 66" CMP in place to convey the water through the roadway embankment. This pipe is proposed to be removed and replaced with a box culvert.

ENVIRONMENTAL DESCRIPTION:

The two stream crossings on the project are both within the Neuse River Basin. The first is a 5' stream section between two existing pipes. Since less than 40 linear feet of buffer will be impacted, this crossing is exempt. The second is an unnamed tributary to Crabtree Creek. The tributary is not currently listed on the DENR stream classification list, but Crabtree Creek, at the mouth of the tributary, is classified as Class C-NSW (aquatic life, secondary recreation, and nutrient sensitive waters). There is one wetland area within the project vicinity with a total impact of 0.07 Ac. Also, the proposed widening will impact 109 feet of perennial stream and 0.39 Ac. of riparian buffer.

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES:

Best Management Practices (BMP's) utilized on this project consist of Grassed Swales and Level Spreaders.

The following summarizes the location of each BMP:

Grassed Swale:

Station 11+00 -Y3- to 20+50 –L- Right, Length = 170 ft.
Station 26+00 to 29+00 –L- Right, Length = 300 ft.

Level Spreader:

Station 38+17 –L- Right, Length = 88 ft.

Major Structures:

Station 37+40 –L- (Unnamed Tributary to Crabtree Creek), the existing 66" CMP is proposed to be replaced with a single 8' x 8' Reinforced Concrete Box Culvert. The proposed culvert will be buried 1.0 foot below the stream bed to promote passage for aquatic life.

June 11, 2002

Subject: Draft Minutes Interagency Hydraulic Design Review Meeting on June 11, 2002, for U-3344A, Wake County to discuss 401 and Buffer Issues.

Participants:
David Chang – NCDOT Hydraulics
John Hennessy – NCDWQ
Marshall Clawson – NCDOT Hydraulics
Anne Hunt – NCDOT Hydraulics

There were only two possible buffer areas.

1. Station 23+25: This site is shown on the soils map as a stream but is now encased in a pipe system with a 10' stream between pipes. Marshall Clawson described the proposed drainage system and showed the swale provided to supply treatment. John Hennessy requested the 50' buffer outside the 10' gap be preserved and the length of the swale be adequate for treatment.
2. Station 37+50: This site has an existing 72" pipe to be replaced with an 8' x 8' box culvert. Marshall Clawson presented the drainage design and concrete level spreader provided for treatment. John Hennessy commented on the excellence of the design.

June 20, 2002

Subject: Draft Minutes Interagency Hydraulic Design 4B Review Meeting on June 20, 2002, for U-3344A, Wake County.

Team Members: Eric Alsmeyer – USACE (Present)
John Hennessy – NCDWQ (Present)
David Cox – NCWRC (*Absent)

Participants: David Chang – NCDOT Hydraulics
Jenny Fleming – Barbara H. Mulkey Engineering
Heather Montague – NCDOT PDEA
Marshall Clawson – NCDOT Hydraulics
Anne Hunt – NCDOT Hydraulics

* David could not attend due to a schedule conflict but did provide a set of half size plans with comments. Comments reviewed and included in minutes.

The meeting began with Marshall Clawson giving a brief description of the project. The project is the A section of the widening of a four lane shoulder section to a five lane curb and gutter which abuts to the constructed B section of five lane curb and gutter. Two sites were discussed.

1. Station 23+25: This site is shown on the soils map as a stream but is now encased in a pipe system with a 7.5' stream between pipes. A rock check dam used during the construction of an industrial area was not removed after construction and created a wetland. Various discussions about the swale through the wetland were conducted. It was decided that the swale was allowed with a rock weir to be constructed at the elevation of 338 outside of sewer system easement. Only the wetlands downstream of the constructed rock weir are to be counted as impacted.
2. Station 37+50: This site has an existing 72" pipe to be replaced with an 8' x 8' box culvert. Marshall Clawson presented the drainage design and concrete level spreader provided for treatment. It was decided to contain the buffer adjacent to the level spreader inside the PDE.

Subject: Minutes from Interagency Permit Review Meeting on October 17, 2002 for U-3344A (Airport Boulevard Widening), Wake County

Participants:	**Team Members:**
Anne Gamber, NCDOT Hydraulics	John Hennessy, NCDWQ (present)
David Chang, NCDOT Hydraulics	David Cox, NCWRC (present)
Galen Cail, NCDOT Hydraulics	Eric Alsmeyer, USACE (present)
*Zak Hamidi NCDOT Design Services	Chris Militscher, EPA (absent)
	Howard Hall, USFWS (absent)
	Heather Montague, NCDOT PD&EA

*Zak was present at the meeting until it was determined there were no alignment issues.

The meeting began with Anne giving an overview of the project.

1) Buffer Limits: John brought up that the buffer limits were not shown correctly at the inlet and outlets of drainage structures. The correction will show more area of buffer, but as John noted, would not have any effect on mitigation since impacts are exempt. Show quantity on the summary sheet as "Allowable".

2) Proposed Berm at Buffer: John questioned why there was not a proposed swale coming to berm. Anne informed there is a natural swale that transports drainage to the berm. It was mentioned that the berm was requested by John at the Hydraulic Design Review Meeting on June 20, 2002.

Morrisville
Airport Boulevard (SR 3015) Widening
From NC 54 to McCrimmon Parkway
Wake County
State Project No. 9.8051709
TIP U-3344A

INDIRECT AND CUMULATIVE EFFECTS ASSESSMENT

Prepared for:

North Carolina Department of Transportation

Prepared By:

URS Corporation North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560

January 2005

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Executive Summary

The purpose of this document to the extent reasonable and practical is to assess the potential indirect and cumulative effects (ICE) that may result from the incremental effects of the proposed Airport Boulevard Widening Project (TIP U-3344A), from McCrimmon Parkway to NC 54, and other past, present, and future development activities in the same geographic region. The assessment of indirect and cumulative effects is identified as a requirement under the National Environmental Policy Act (NEPA) of 1969, the North Carolina Environmental Policy Act (SEPA), and the Council on Environmental Quality (CEQ) regulations implementing NEPA. This document applies the North Carolina Department of Transportation (NCDOT) Eight Step ICE Assessment Process to the proposed Airport Boulevard Widening Project.

Airport Boulevard (SR 3015) is a heavily traveled north-south corridor providing connectivity between NC 54 at the south and Interstate 40 (I-40) and the Raleigh-Durham International Airport (RDU) at the north. From NC 54 to McCrimmon Parkway, Airport Boulevard is a rural two-lane roadway and from McCrimmon Parkway to I-40, it is an urban five-lane curb and gutter roadway. The reduction in travel lanes at McCrimmon Parkway contributes to congestion in the southbound direction during peak commuter travel times. With anticipated growth in this region, improvements to Airport Boulevard will be an important part of the future transportation network in the region, which will include the McCrimmon Parkway Extension and the Raleigh Outer Loop (I-540). The cumulative effects of this project and other past, present, and future transportation projects will have an impact on land development, travel patterns, and water resources.

The project will improve the level of service and provide adequate capacity for the increasing volumes of motorists using Airport Boulevard. The 2000 ADT for the project corridor was 9,500. By 2025, the projected ADT is 24,200. Increasing capacity will create a safer and more efficient road that will directly benefit commuters who work along the route or who rely on it to reach other major employment centers in the Research Triangle Park and nearby communities. Completion of the project will fulfill local, county, and state planning objectives.

Alteration of the behavior and functioning of the affected environment caused by project encroachment can be characterized into two broad categories: socioeconomic and ecological. A summary analysis of indirect and cumulative effects attributed to the proposed project is provided below.

Socioeconomic Effects - Socioeconomic effects of transportation projects are the result of changes in the physical nature of a community. These physical changes can cause indirect/cumulative effects that can be magnified by the cumulative impacts of other actions. Possible socioeconomic effects of the project include alterations to:

- *Population Trends* - The study area's population is expected to remain relatively flat through 2020, while the employment levels are expected to grow at a steady rate. This is because the area is considered an employment center and contains only a small amount of housing. However, with the development of more mass transit opportunities and as land becomes scarcer the population is expected to rise as future plans for high-density mixed use developments are realized.

- *Land Use/Development* – The study area contains a variety of land uses, which include offices/institutional, industrial, retail, and residential. The office uses are mainly concentrated on the northwest side of Airport Boulevard in planned office parks. Industrial sites are predominately located on the southeast side of Airport Boulevard. Retail sites are scattered throughout the study area, but are clustered around key intersections. The majority of the housing sites are scattered intermittently along the corridor. Most of the remaining housing units are remnants from the area before the extensive office, industrial, and retail development.

  The Morrisville Land Use Plan takes into account the community's principles and goals in guiding future development. In the study area, numerous developments have taken place in recent years that serve as indicators as to how the undeveloped vacant parcels in the areas designated for office space, industrial, and retail uses will be built out. In addition, new residential developments are expected in the future that will likely be part of high density, mixed use projects. These future land uses are highly probable based on the existing land uses, proximity to Interstate 40, the future Western Wake County Expressway (I-540), RDU, Triangle Transit Authority light rail system, and expected employment growth in the region. In addition, extensions of McCrimmon Parkway and Airport Boulevard will improve access to the area, increasing its attractiveness for development.

- *Travel patterns* – The project will improve the overall flow of traffic between several existing and planned thoroughfares in Morrisville, including Airport Boulevard, NC 54, and McCrimmon Parkway to I-40 and the Raleigh-Durham International Airport.

Ecological Effects - Ecological effects of transportation projects are the result of changes to the natural environment. Ecological changes likely as a result of this project include:

- *Water Resources* –The increased proportion of the study area devoted to urban land uses will put more strains on the water resources. Long term, these strains can alter the availability and quality of hydrologic resources, both groundwater and surface water. Modifications in land use may also affect the proportions of ground water and surface runoff in rivers and streams. However, the following federal, state, and local regulations are in place to protect surface water quality and accommodate future growth.

  - *EPA National Pollution Discharge Elimination System (NPDES) - Phase II Stormwater Rules*
  - *North Carolina – Water Supply Watershed Protection Act*
  - *North Carolina –Neuse River Basins Nutrient Sensitive Waters Management*
  - *Neuse River Basin Buffer Rules*
  - *North Carolina - Nonpoint Source Program*

- *Wake County – Land Use and Stormwater Regulations*

  Adhering to these regulations for the protection of surface waters should limit direct and indirect effects to this important resource.

- *Impaired Waters* – A review of DWQ information shows that there are no 303(d) waters within, nor adjacent to, the project study area.

General direction for assessing consequences and mitigation development is provided in the *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volume II: Practitioners Handbook.*[1]

1.0 Introduction

The purpose of this document to the extent reasonable and practical is to assess the potential indirect and cumulative effects that may result from the incremental effects of the proposed widening of Airport Boulevard (SR 3015), from NC 54 to McCrimmon Parkway (TIP U-3344A), and other past, present, and future development activities in the same geographic region as the project. Indirect effects are those effects that may result from activities induced by the proposed action. For example, providing improved access to rural areas could induce residential and commercial development. This, in turn, could induce changes in population, travel patterns, and economic conditions, which could consequently have indirect and cumulative impacts on air quality, ecosystems, protected species, water quality, quality of life, etc.

The Council on Environmental Quality (CEQ) for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) defines "indirect effects" (also referred to as "secondary effects") as "impacts on the environment, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable."[2] The CEQ regulations further state that indirect effects "...may include growth-inducing effects and other effects related to induced changes in the patterns of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." The CEQ defines "cumulative impacts" as those "...which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions."[3]

Much of the general background information for this document was obtained from the *Morrisville, SR 3015 (Airport Boulevard) Widening Environmental Assessment*,[4] completed by the Project Development and Environmental Analysis (PDEA) branch of the North Carolina Department of Transportation (NCDOT) in consultation with the Federal Highway Administration (FHWA). Knowledge of current study area characteristics was obtained through field visits, phone interviews with local officials, and the *Airport Boulevard Indirect and Cumulative Effects Survey* (Appendix A). The analysis of the indirect and cumulative effects associated with this project was conducted using the latest guidance available from federal and state regulatory agencies. These include:

NCDOT/NCDENR's Revised Draft "Indirect and Cumulative Impact Assessment Guidance: Integrated NEPA/SEPA/401 Eight-Step ICE Assessment Process" (May 2003).

CEQ Guidance "Considering Cumulative Effects Under the National Environmental Policy Act" (1997).

NCDOT's "Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina" (November 2001).

North Carolina Wildlife Resource Commission's "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality" (August 2002).

The following sections of this document include a description of the project and its background, and the ICE assessment process. The *NCDOT/NCDENR Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina*[5] entails a systematic approach to indirect and cumulative impacts that includes an eight-step assessment process. This ICE assessment specifically incorporates procedures to address impacts from a water quality perspective by evaluating the relationship between transportation, land use, and the hydrology, channel stability, water quality, and biodiversity of affected streams.

2.0 Project Description and Background

This section describes the proposed action and states the purpose and need for the project. The project description and purpose and need are obtained from the *Morrisville, Airport Boulevard Widening from NC 54 to I-40, Environmental Assessment* (EA).[6]

2.1 Description

The proposed project will widen existing Airport Boulevard (SR 3015) in Morrisville from NC 54 to McCrimmon Parkway. The length of the project is approximately 0.6 miles. The proposed cross-section is a five-lane roadway with curb and gutter. Best fit widening (a combination of symmetric and asymmetric widening that minimizes impacts to the human and natural environment) will be implemented.

2.2 Need for Action

The project will improve the level of service and provide adequate capacity for the increasing volumes of motorists using Airport Boulevard (SR 3015). The 2000 ADT for the project corridor was 9,500. By 2025, the projected ADT is 24,200. Increasing capacity of Airport Boulevard from McCrimmon Parkway to Chapel Hill Road will create a safer and more efficient road that will directly benefit daily commuters who work along the route or who rely on it to reach other major employment centers in the Research Triangle Park and nearby communities. Completion of the project will fulfill local, county, and state planning objectives. With anticipated growth in this region, improvements to Airport Boulevard will be an important part of the future transportation network in the region, which will include the McCrimmon Parkway Extension, the Raleigh Outer Loop (I-540), and the expansion of the Raleigh-Durham International Airport facilities.

3.0 Eight Step ICE Assessment Process

The assessment of indirect and cumulative effects is identified as a requirement under the National Environmental Policy Act (NEPA) of 1969, the North Carolina Environmental Policy Act (SEPA), and under the Council on Environmental Quality (CEQ) regulations implementing NEPA. The purpose of the NCDOT Eight Step ICE Assessment Process is to provide a standardized procedure for implementing the rules and legislation required for analysis and assessment of indirect and cumulative effects of transportation projects as part of the NEPA/SEPA process. The eight steps in the assessment process are:

1. Defining the Study Area Boundaries

2. Identify the Study Area's Directions and Goals

3. Inventory Notable Features
4. Identify Impact-Causing Activities
5. Identify Potential Indirect/Cumulative Impacts for Analysis
6. Analyze Indirect/Cumulative Effects
7. Evaluate Analysis Results
8. Assess the Consequences and Develop Appropriate Mitigation and Enhancement Strategies

This document applies the eight-step assessment process to the Airport Boulevard widening project. Work products of each step are provided in the form of supporting text, tables, figures, technical memorandums, and comprehensive checklists.

3.1 Step 1 – Study Area Boundaries

3.1.1 Overview/Background

A study area was developed to serve as a basis from which to gather specific demographic, socioeconomic, land use, and environmental data for identification of potential indirect and cumulative effects.

The project is located in Morrisville within Wake County and the Piedmont Region of North Carolina (See Figure 1). The Piedmont Region is a transitional area between the Appalachian Mountains and the flat coastal plains consisting of pine and hardwood woodlands. The dominant natural features are the Neuse River and its associated floodplains and wetland systems.

A study area was developed to serve as a basis from which to gather specific demographic, socioeconomic, land use, and environmental data for identification of potential indirect and cumulative effects. According to the *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina*, in general, "study areas should encompass the project or plan alternatives in their entirety and also include the surrounding physical, social, and natural resources that could be expected to be impacted by the project or plan."[7] Because of this, no one set distance is used to define the study area. Factors considered when determining the study area are discussed below.

Political/Geographic

Transportation Analysis Zone (TAZ) boundaries are determined by Municipal Planning Organizations (MPO) and are used to measure socioeconomic and demographic trends to help plan for transportation needs. When using TAZ for study areas, they should always be chosen to increase the size of the study area, rather than decrease the size. This is done so that all potential impacts are taken into account. Demographic and socioeconomic trend and projection data at the TAZ level was obtained from the Capital Area Metropolitan Planning Organization (CAMPO).

Commute Shed/Labor Shed

A commute shed measures the distance and time traveled by residents of a particular area to work. On the other hand, a labor shed measures the distance and time traveled by employees of an area from their residences. Therefore, this factor is important when considering projects that encompass bedroom communities, employment centers, or major thoroughfares that connect residential and employment areas.

Airport Boulevard is a major thoroughfare used predominately by commuters who work near the roadway as they commute to and from work. However, when considering the scope of the project compared to the size of the labor shed; it was determined that the commute shed/labor shed boundaries are not appropriate to include as a part of the study area.

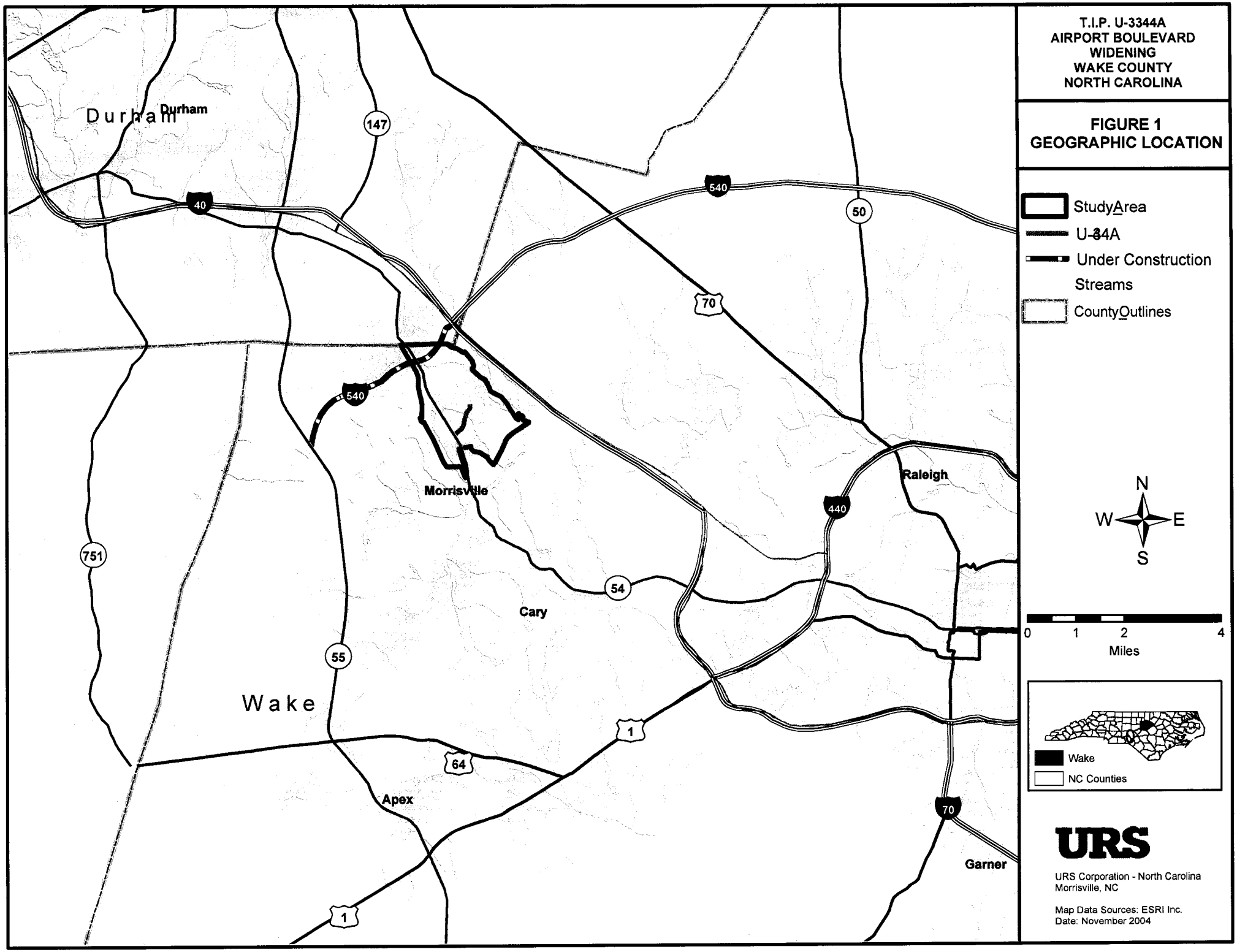
Growth Boundaries/Service Area Limits

Growth boundaries and service area limits restrict the land area with which a unit of government has agreed to provide municipal services and infrastructure. This often includes water, sewer, garbage collection, police and fire protection, and public transportation. The purpose of growth boundaries is to prevent sprawl and to keep down the costs of providing services by concentrating development in specific areas. According to the Morrisville Land Use Plan, the Airport Boulevard widening project is located within the urban services area. The urban services area extends north to I-40 and south to Davis Drive.

Watershed

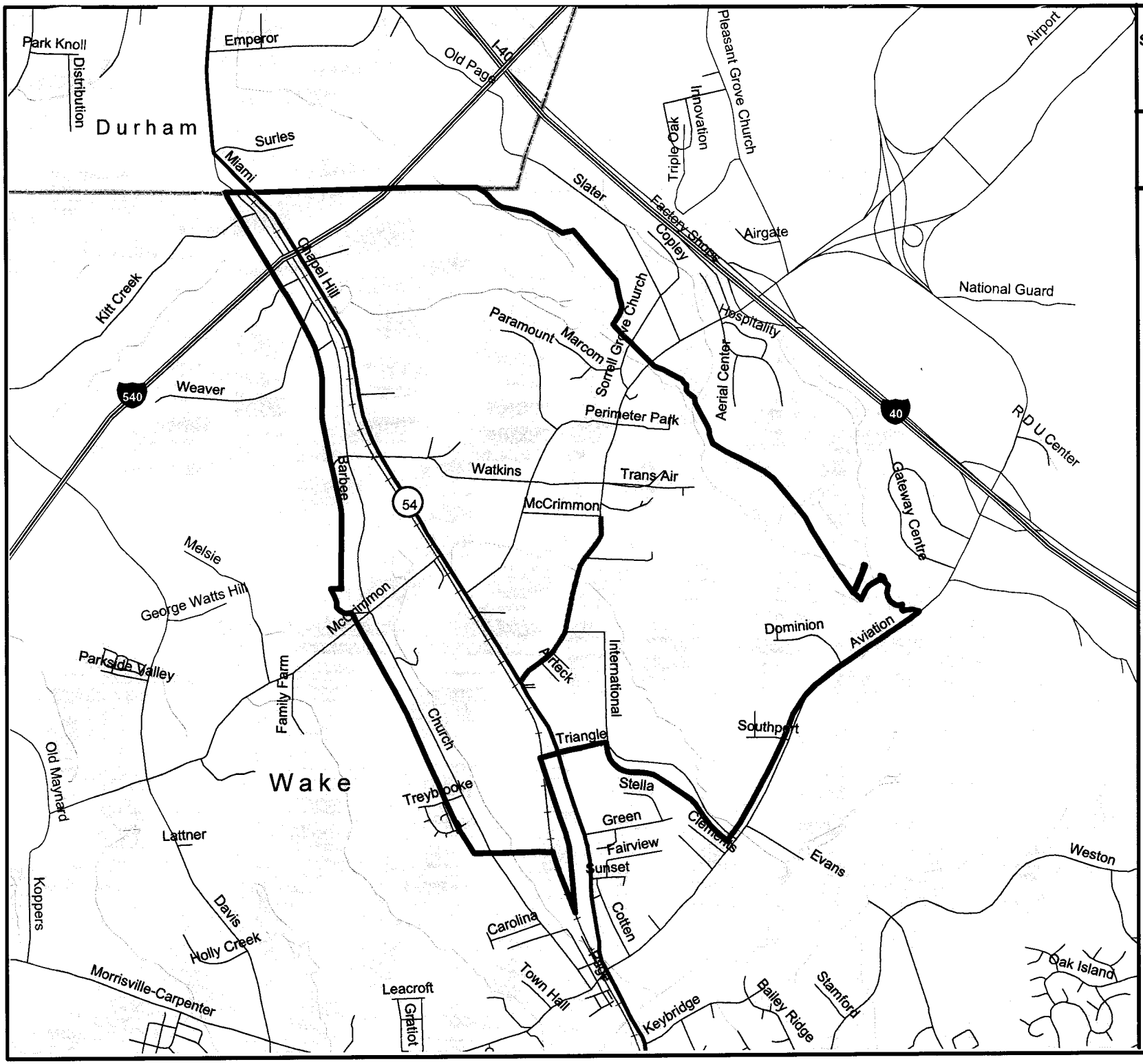
The project is contained within the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality's (DWQ) Neuse River Basin watershed. The river basin is located entirely within the state's boundaries and flows southeast from the Piedmont near Roxboro to the Pamlico Sound near New Bern.

The Neuse River Basin is divided into 14 subbasins. The Airport Boulevard widening project is located entirely within subbasin 03-04-02 in the northern region of the Neuse River Basin.


T.I.P. U-3344A
AIRPORT BOULEVARD
WIDENING
WAKE COUNTY
NORTH CAROLINA
FIGURE 1
GEOGRAPHIC LOCATION
Study Area
U-3344A
Under Construction
Streams
County Outlines
N
W
E
S
0
1
2
4
Miles
Wake
NC Counties
URS
URS Corporation - North Carolina
Morrisville, NC
Map Data Sources: ESRI Inc.
Date: November 2004
Durham
Durham
147
40
540
50
70
540
Morrisville
Raleigh
440
751
54
Cary
55
Wake
1
64
Apex
70
Garner
1

3.1.2 ICE Study Area Delineation

The project team considered likely project impacts to the surrounding physical, social, and natural resources in the study area delineation process. Boundary delineation was based on TAZ geography provided by the CAMPO. The study area surrounds the project corridor and includes portions of the Town of Morrisville within Wake County. Figure 2 shows the ICE assessment study area.



T.I.P. U-3344A
SR 3015 (AIRPORT BOULEVARD)
WIDENING
WAKE COUNTY
NORTH CAROLINA

FIGURE 2
STUDY AREA

Project

Study Area

Urban Areas

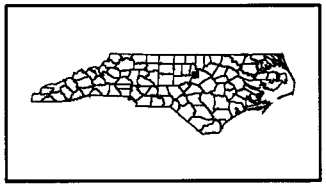
Water Bodies

County Boundary

Streams

N
W E
S

0 0.125 0.25 0.5
Miles



URS

URS Corporation - North Carolina
Morrisville, NC

Map Data Sources: ESRI Inc.
Date: May 2004

3.2 *Step 2 – Study Area Characteristics, Directions, and Goals*

3.2.1 Overview

The purpose of this section is to describe the setting of the study area, which will serve as a basis from which to evaluate potential indirect and cumulative effects associated with the project. The information developed in this section will also support the future growth assumptions used to assess the project's potential to induce growth and development.

To derive perspective and develop a comprehensive understanding of the issues in the evaluation of indirect/cumulative effects, it is necessary to identify the growth and development trends affecting the study area. Understanding characteristics of the study area such as community, municipality, and agency goals and directions and, demographic, economic, social, transportation and ecological trends provides essential context for understanding project-induced growth.

3.2.2 Population, Development, and Employment

Population

The Research Triangle Region had the fastest growing population rate between 1990 and 2000 of any region in North Carolina.[8] Table 1: Population Trends presents relevant population trends of the study area from 1980 to 2000, which include the State of North Carolina, Research Triangle, Morrisville, and Wake County.[9]

Table 1: Population Trends

				Change (%)	
	1980	1990	2000	1980-1990	1990-2000
Study Area*	No Data	No Data	168	No Data	No Data
Morrisville**	251	1,022	5,208	307.2	409.6
Wake County**	301,429	423,380	627,846	40.5	48.3
Research Triangle**	927,768	1,151,397	1,549,822	24.1	34.6
North Carolina**	5,880,095	6,632,448	8,049,477	12.8	21.4

*Source: Capital Area Metropolitan Planning Organization, http://www.raleigh-nc.org/campo/Index.htm. October 2004.
**Source: US Census, 2000 (Information supplied by N.C. Department of Budget & Management, 2000 & 2001).

Population Projections

Wake County is projected to grow at a higher percentage rate than the state of North Carolina through 2030. The study area's population is expected to remain relatively flat until 2020. Between 2020 and 2030, however, the study area is expected to experience a significant change in population from a projected 205 to 1,781. Table 2 shows population projections for the State of North Carolina, Wake County, and the Study Area through 2030.[10]

Table 2: Population Projections

	2002	2010	2020	2030	2002-2030 %Change
Study Area**	168	168	205	1,781	960.1
Morrisville**	14,452	16,649	21,410	28,499	97.2
Wake County**	735,243	880,865	1,168,295	1,381,645	87.9
North Carolina*	8,307,748	9,441,440	10,943,973	12,467,232	50.1

*North Carolina State Demographics Unit, County/State Population Projections, http://demog.state.nc.us/, October 2004
** Source: Capital Area Metropolitan Planning Organization, http://www.raleigh-nc.org/campo/Index.htm. October 2004.

Development

Strong economic conditions in the Triangle region have spurred development in a pattern that has radiated out from the major regional employment centers of Chapel Hill, Durham, Research Triangle Park, and Raleigh. This pattern of growth has substantially affected development in western Wake County and Morrisville, as it has experienced substantial growth in both population and employment. Airport Boulevard has become a major center for development since it serves as the primary link between the Raleigh-Durham International Airport and I-40 to and NC 54. The development that has recently occurred in the study area has been in the sectors of offices, light industry, and commercial. The proximity of the area to major transportation facilities has made land along Airport Boulevard attractive to developers, businesses, and industry.

Employment

The major employment center of the Research Triangle Region is Wake and Durham counties. Due to a high concentration of jobs in Wake and Durham counties, many people commute into these counties from the surrounding communities. Raleigh, the state capital, is located in Wake County where there are approximately 23,230 state employees. Table 4 lists the major employers in the Research Triangle Region, their location, and the number of employees.[11]

Table 3: Major Employers in the Triangle Region

Company	County	Employees.
State of North Carolina	Wake	23,230
Duke University & Medical Center	Durham	17,421
University of North Carolina	Orange	15,588
International Business Machine (IBM)	Durham	14,000
Wake County Public School System	Wake	12,500
North Carolina State University	Wake	7,787
UNC Healthcare	Orange	5,473
GlaxoSmithKline	Durham and Wake	5,000
Wake Medical Center	Wake	5,000
SAS Institute	Wake	4,841
Durham Public School System	Durham	4,500
Moore Regional Hospital	Moore	4,500
NORTEL Networks	Durham	4,000
Blue Cross & Blue Shield of NC	Durham and Orange	3,873
Rex Healthcare	Wake	3,779
Progress Energy (CP&L)	Wake	3,428
Wake County Government	Wake	3,300
City of Raleigh	Wake	3,000
Cisco Systems	Wake	2,800
Verizon Communications	Durham and Wake	2,800
Revlon	Granville	2,610
Durham Regional Hospital	Durham	2,263
Harnett County Public Schools	Harnett	2,055
MCI WorldCom	Wake	2,000

Source: Research Triangle Regional Partnership, www.researchtriangle.org, 11 November 2004.

Based on the strong and diverse economy of Research Triangle Park and the larger metropolitan region, employment growth is expected to remain strong in future years. Wake County is expected to increase over 134 percent from 2002 to 2030. The study area will be a large part of this growth as it is projected to increase from 5,731 to 58,688 employees. Table 4shows the projected employment levels for Wake County and the study area.[12]

Table 4: Employment Projections

	2002	2010	2020	2030	Percent Change
Study Area*	5,731	9,098	19,339	58,688	924
Morrisville	7,249	13,347	29,165	79,720	999
Wake County*	387,333	520,204	717,236	908,020	134

* Source: Capital Area Metropolitan Planning Organization, http://www.raleigh-nc.org/campo/Index.htm. November 2004.

3.2.3 Zoning, Land Use, and Transportation Planning

Overview

The study area is located within the municipal boundaries of the Town of Morrisville. Morrisville has a zoning ordinance, land use plan, and transportation plan in place. In addition, CAMPO conducts transportation planning for Wake County.

Zoning and Land Use Planning

Zoning is a legal mechanism that local governments use to 1) Promote the health, safety, and general welfare of the people by facilitating development that does not hinder these core values, 2) Promote the most appropriate land uses by taking into account the character of the land, 3) Provide adequate provisions in relation to the infrastructure improvements that accompany development (transportation, water, sewer, schools, parks, etc.), and 4) Prevent a conflict of land use by regulating the size, use, and type of structure. Therefore, the zoning within the study area will help determine how and where the land uses may change in the future.

Similar to zoning, land use planning is set up to guide the development and redevelopment process of land. However, instead of identifying and restricting the land use at the individual parcel level, land use plans are set up to consider the use of land more broadly in context to the character, vision, and goals of the neighborhood and community. But, it still takes into account the principles of zoning in that it looks at compatibility of land uses and the availability of resources. Often, the zoning of individual parcels is based on land use plans. The study area is within the Town of Morrisville's Future Land Use Plan that was adopted in 1999, and amended in 2003. It contains information on existing land uses and what the planned future land uses are.

Existing Zoning and Land Use

The study area contains a variety of land uses, which include offices/institutional, industrial, retail, and residential. The office uses are mainly concentrated on the northwest side of Airport Boulevard in planned office parks (See Figure 3). Industrial sites are predominately located on the southeast side of Airport Boulevard (See Figure 4). Retail sites are scattered throughout the study area, but are clustered around key intersections. The majority of the housing sites are scattered intermittently along the corridor. Most of the remaining housing units are remnants from the area before the extensive office, industrial, and retail development. The current Land Use Map is shown in Figure 7.

Figure 3: Office Land Use

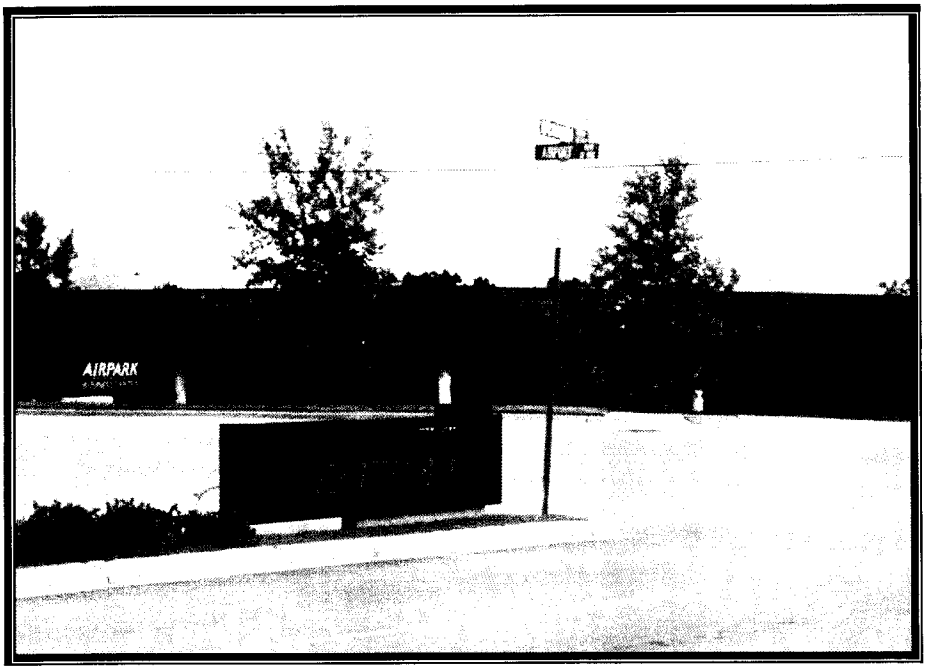


Figure 4: Industrial Land Use

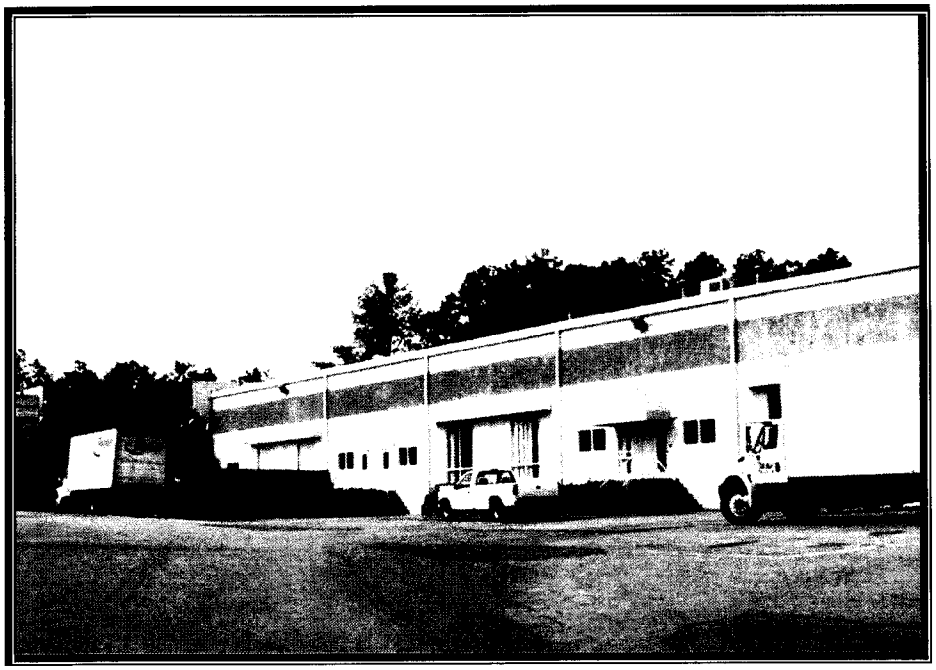


Figure 5: Retail Land Use

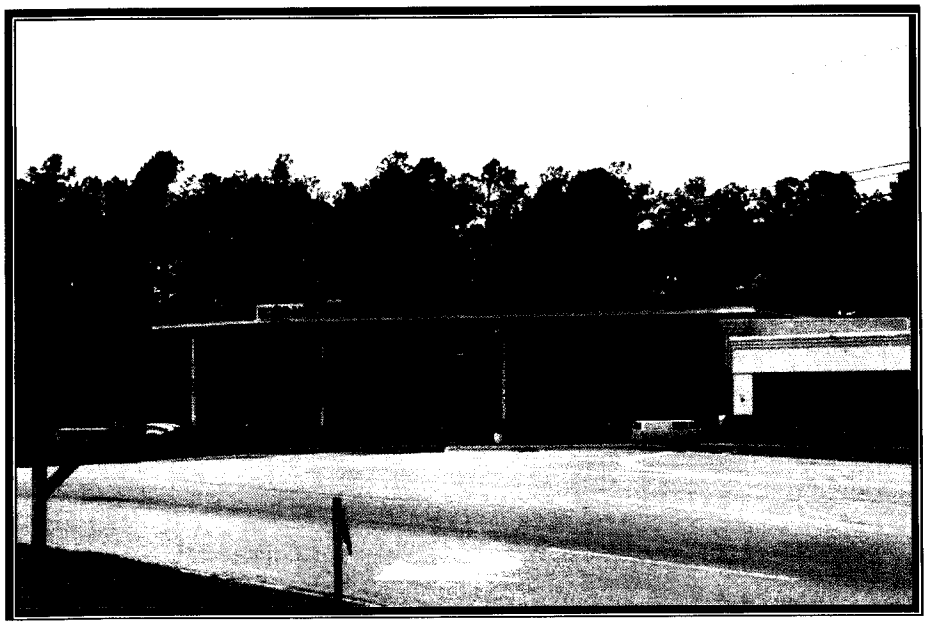
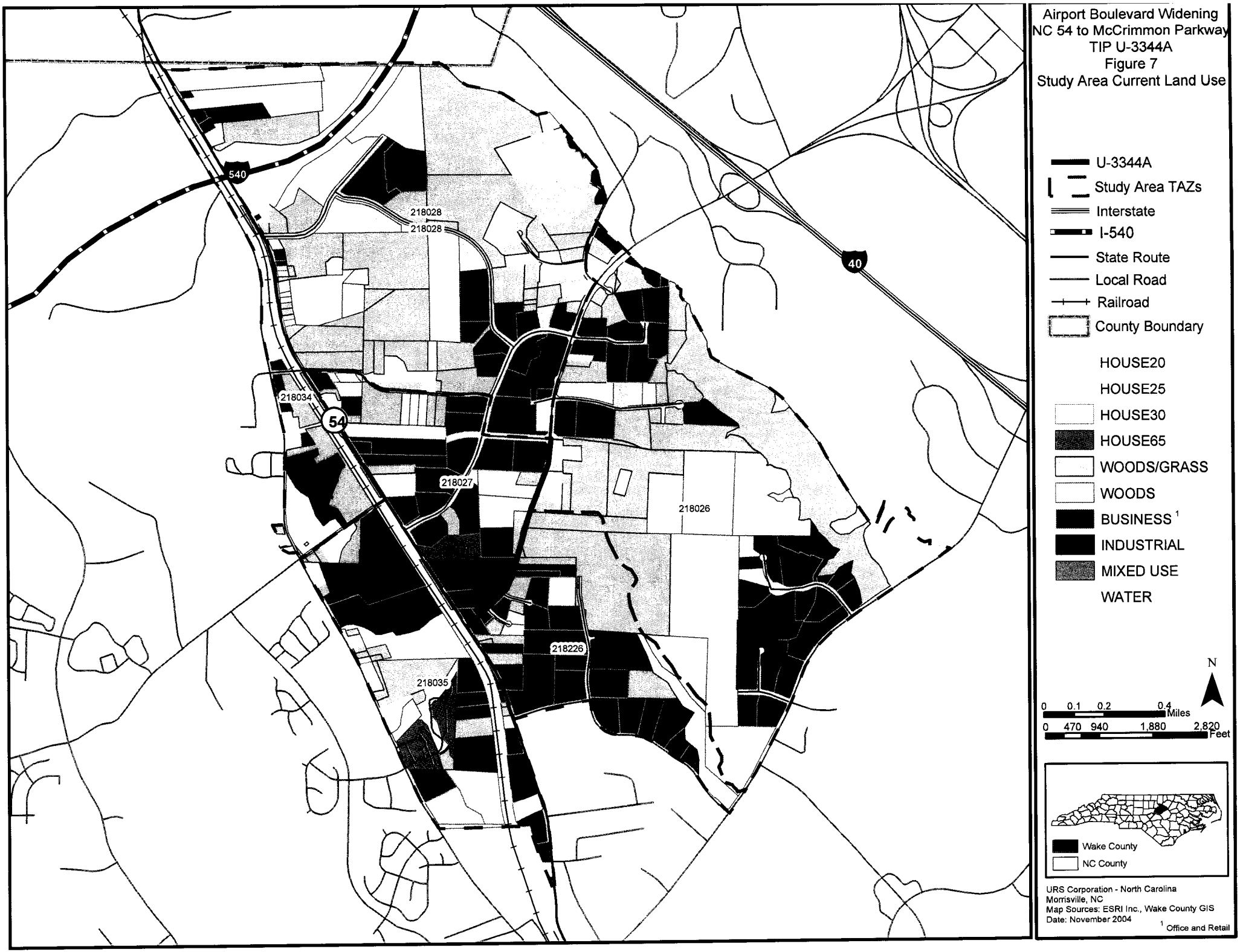


Figure 6: Residential Land Use


Airport Boulevard Widening
NC 54 to McCrimmon Parkway
TIP U-3344A
Figure 7
Study Area Current Land Use
U-3344A
Study Area TAZs
Interstate
I-540
State Route
Local Road
Railroad
County Boundary
HOUSE20
HOUSE25
HOUSE30
HOUSE65
WOODS/GRASS
WOODS
BUSINESS [1]
INDUSTRIAL
MIXED USE
WATER
N
0 0.1 0.2 0.4 Miles
0 470 940 1,880 2,820 Feet
Wake County
NC County
URS Corporation - North Carolina
Morrisville, NC
Map Sources: ESRI Inc., Wake County GIS
Date: November 2004
[1] Office and Retail
540
40
54
218028
218028
218034
218027
218026
218226
218035

Future Land Use

The Morrisville Land Use Plan takes into account the community's principles and goals in guiding future development. In the study area, numerous developments have taken place in recent years that serve as indicators as to how the undeveloped land will ultimately be developed. It is expected that over the next 20 to 30 years, the vacant parcels in the areas designated for office space, industrial, and retail uses will be built out. In addition, new residential developments are expected in the future that will likely be part of high density, mixed use projects. These future land uses are highly probable based on the existing land uses, proximity to Interstate 40, the future Western Wake County Expressway (I-540), the Raleigh-Durham International Airport, the Triangle Transit Authority light rail system, and expected employment growth in the region.

Transportation Planning

The study area is located in the transportation planning jurisdiction of CAMPO. CAMPO serves as an intergovernmental agency to bring local public officials, citizens, and the NCDOT together to facilitate a cooperative effort in handling transportation issues and long range multi-modal transportation planning. CAMPO consists of the Towns of Apex, Cary, Fuquay-Varina, Garner, Holly Springs, Knightdale, Morrisville, Rolesville, Wake Forest, Wendell, Zebulon, the City of Raleigh, the County of Wake, the Triangle Transit Authority (TTA) and the NCDOT in cooperation with the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA).

In 2004, CAMPO updated its Long Range Transportation Plan. The plan set the design year for 2030 and included current and future projections and analysis of travel and land use, based on population, economic conditions, anticipated land use patterns, and field investigations of proposed thoroughfare alternatives.[13]

In addition to CAMPO, the Town of Morrisville has created its own transportation plan. The Morrisville Transportation Plan compares the current infrastructure to the expected growth in population and employees in relation to land uses. Based on this analysis, it makes recommendations for future transportation improvements that will adequately handle future transportation needs.[14]

3.2.4 River Basin Overview/Water Quality Plans and Programs

Basinwide water quality planning is a non-regulatory watershed-based approach to restoring and protecting the quality of North Carolina's surface waters prepared by the North Carolina Department of Environment and Natural Resources, Division of Water Quality (DWQ) for each of the 17 major river basins in the state. The plans are revised at five-year intervals.

The goals of basinwide planning are to:

- Identify water quality problems and restore full use to impaired waters;
- Identify and protect high value resource waters; and
- Protect unimpaired waters yet allow for reasonable economic growth.

DWQ accomplishes these goals through the following objectives:

- Collaborate with other agencies to develop appropriate management strategies;
- Assure equitable distribution of waste assimilative capacity;
- Better evaluate cumulative effects of pollution; and
- Improve public awareness and involvement.

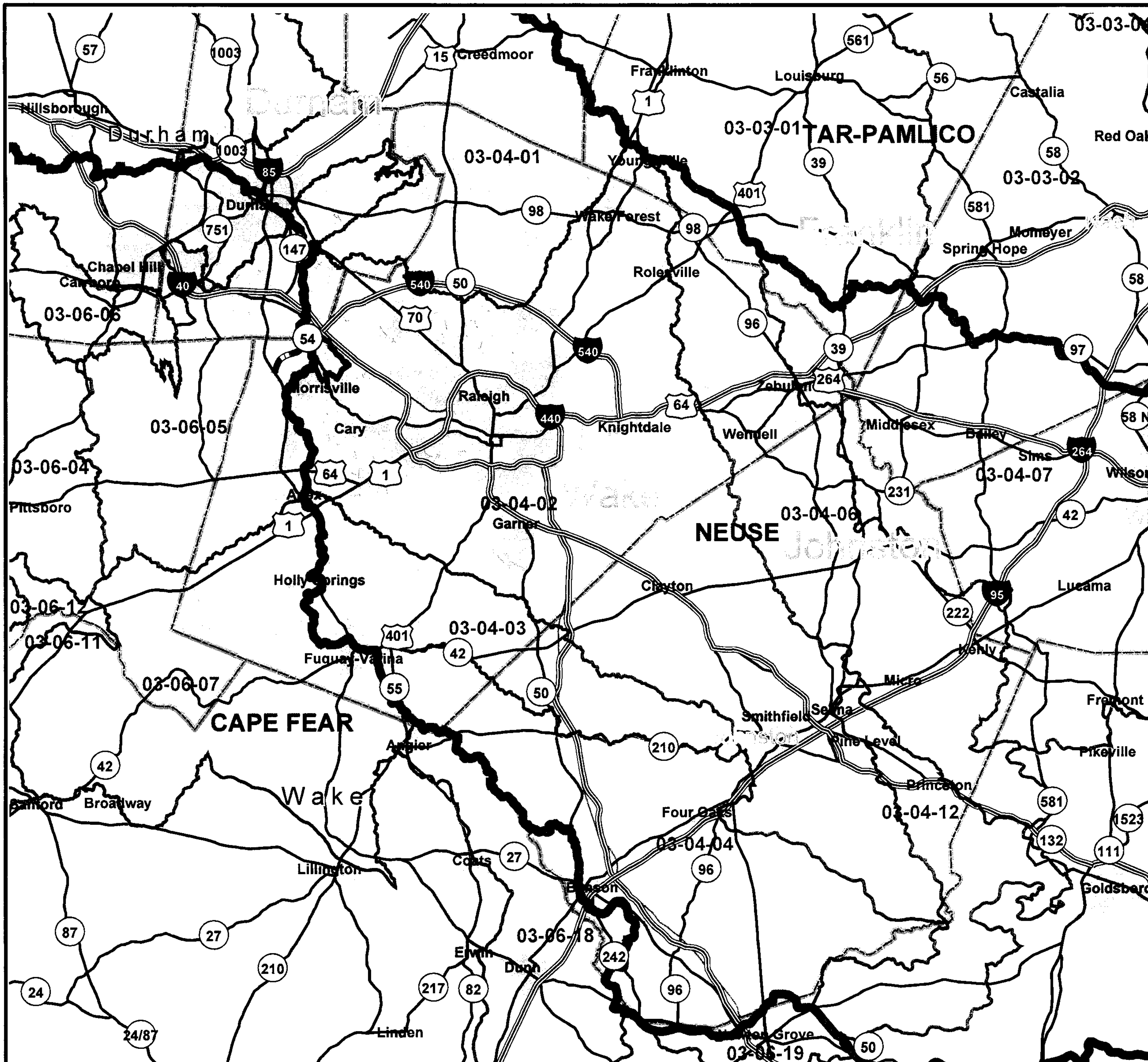
The long-range mission of basinwide management is to provide a means of addressing the complex problem of planning for increased development and economic growth, while protecting and/or restoring the quality and intended uses of the Neuse River basin's surface waters. In striving towards its mission, DWQ's highest priority goals are to:

- Identify and restore impaired waters in the basin;
- Identify and protect high value resource waters and biological communities of special importance; and
- Protect unimpaired waters while allowing for reasonable economic growth.

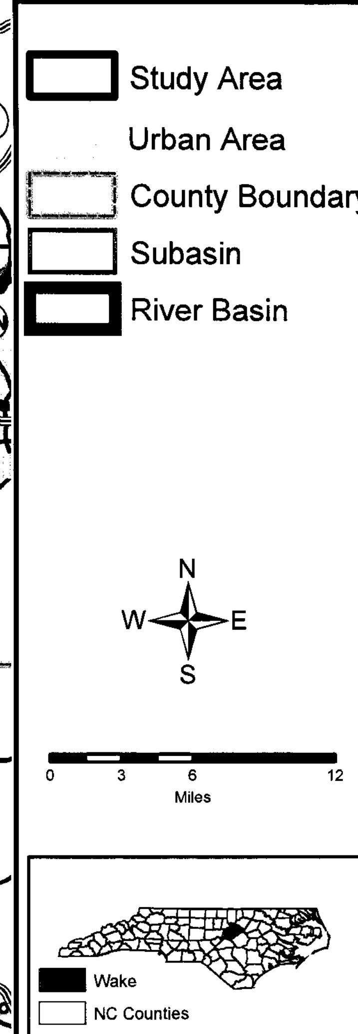
The project study area designated for the assessment of the ICE for the Airport Boulevard Widening (TIP No. U-3344) is contained within the Neuse River Watershed subbasin 03-04-02, which is a NCDENR; DWQ watershed. General information about each basin and respective subbasin is included below. See Figure 8 for the geographic setting of the subasin. See Figure 9 for the location of the ICE project study area in relation to the watershed features.

T.I.P. U-3344A
AIRPORT BOULEVARD
WIDENING
WAKE COUNTY
NORTH CAROLINA

FIGURE 8
WATER BASIN
GEOGRAPHIC LOCATION



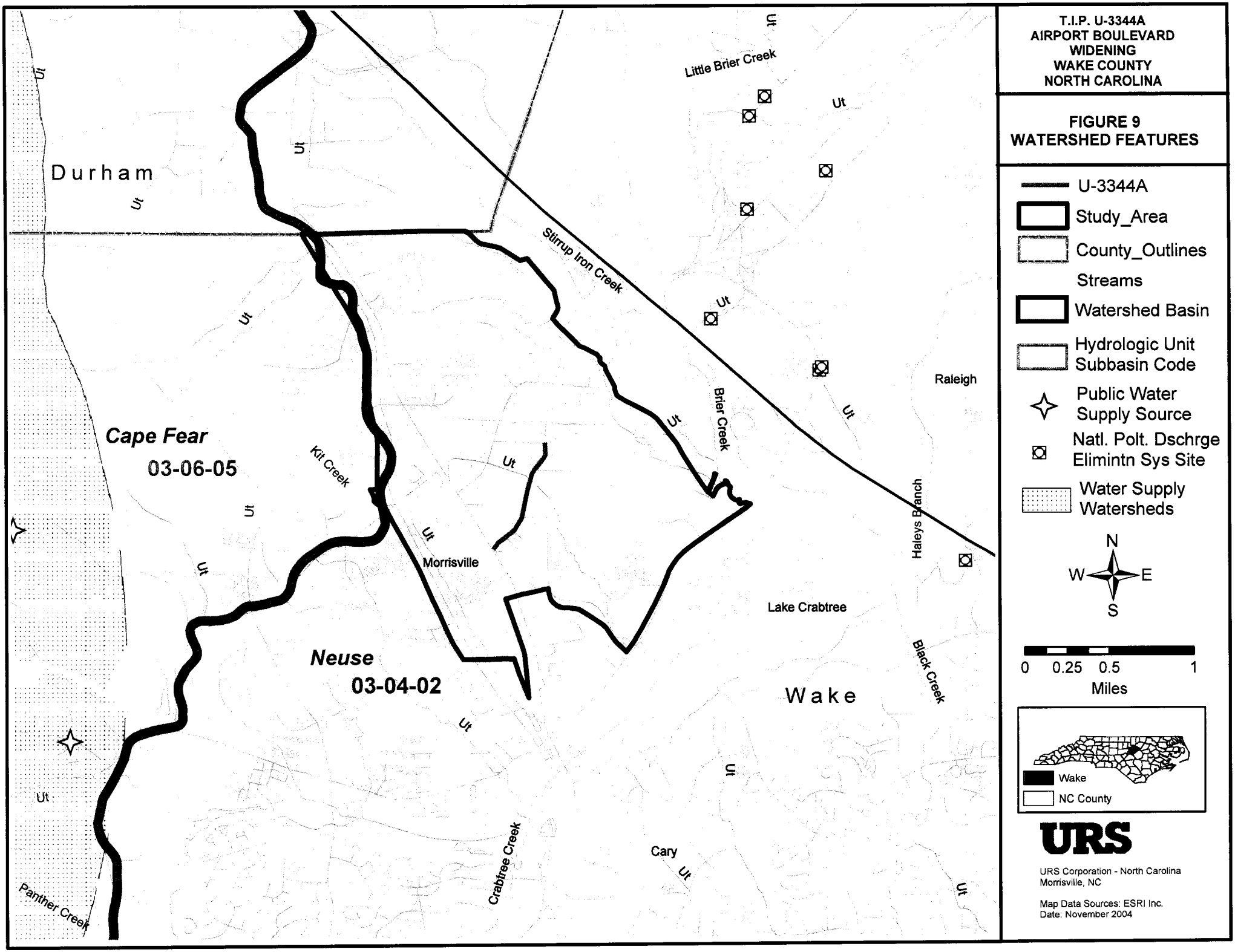
TAR-PAMLICO
NEUSE
CAPE FEAR
03-03-01
03-03-02
03-03-04
03-04-01
03-04-02
03-04-03
03-04-04
03-04-06
03-04-07
03-04-12
03-06-04
03-06-05
03-06-06
03-06-07
03-06-11
03-06-18
03-06-19
Durham
Wake
Hillsborough
Creedmoor
Franklinton
Louisburg
Castalia
Red Oak
Youngsville
Wake Forest
Rolesville
Spring Hope
Momeyer
Chapel Hill
Carrboro
Morrisville
Raleigh
Cary
Knightdale
Wendell
Zebulon
Middlesex
Bailey
Sims
Wilson
Pittsboro
Apex
Garner
Holly Springs
Clayton
Lucama
Kenly
Micro
Fremont
Fuquay-Varina
Smithfield
Selma
Pine Level
Princeton
Pikeville
Angier
Broadway
Lillington
Four Oaks
Coats
Benson
Goldsboro
Erwin
Dunn
Linden



URS

URS Corporation - North Carolina
Morrisville, NC

Map Data Sources: ESRI Inc.
Date: December 2004


T.I.P. U-3344A
AIRPORT BOULEVARD
WIDENING
WAKE COUNTY
NORTH CAROLINA
FIGURE 9
WATERSHED FEATURES
U-3344A
Study_Area
County_Outlines
Streams
Watershed Basin
Hydrologic Unit
Subbasin Code
Public Water
Supply Source
Natl. Polt. Dschrge
Elimintn Sys Site
Water Supply
Watersheds
N
W
E
S
0 0.25 0.5 1
Miles
Wake
NC County
URS
URS Corporation - North Carolina
Morrisville, NC
Map Data Sources: ESRI Inc.
Date: November 2004
Durham
Cape Fear
03-06-05
Neuse
03-04-02
Wake
Raleigh
Cary
Morrisville
Lake Crabtree
Little Brier Creek
Stirrup Iron Creek
Brier Creek
Haleys Branch
Black Creek
Kit Creek
Crabtree Creek
Panther Creek
Ut

General Water Quality in the Neuse River Basin

The Neuse River Basin is the state's third largest river basin. The river basin is located entirely within the state's boundaries and originates in north central North Carolina in Person and Orange counties and flows southeasterly until it reaches tidal waters upstream of New Bern where the river broadens and changes to a tidal estuary that eventually flows into the Pamlico Sound. Major tributaries of the Neuse River include the Eno and Flat Rivers, Crabtree Creek, Swift Creek, Little River, Contentnea Creek, and the Trent River.

The Neuse River Basin encompasses all or portions of 18 counties and 74 municipalities. The most populated regions of the basin are in and around the cities of Raleigh, Durham, Hillsborough, Cary, Apex, and Wake Forest, and around other larger municipalities such as Goldsboro, Wilson, Greenville, Kinston, New Bern, and Havelock. The overall population density is 211 persons per square mile compared to a statewide average of 152 persons per square mile. The Neuse River Basin contains some of the most heavily populated areas in the State.

The basin contains a full array of estuarine wetland communities such as salt marsh, as well as nonriverine and riverine wetlands and important upland communities due to its extensive landscape position across the State. A wide variety of species inhabit these communities, including many rare plants and animals. Freshwater mussel species are also an important resource in the Neuse River Basin with 18 species being found in the Basin and 7 of those species currently receiving federal protection. The majority of Neuse River Basin mollusks inhabit small streams within rapidly developing areas of the Piedmont and upper Coastal Plain regions. Freshwater fish species of recreational importance are found throughout the basin ranging from small streams to the estuary waters of the Trent River and Pamlico Sound. Anadromous fish species are found in the Neuse River and it's associated tributaries, several of these have recently been designated as Inland Primary Nursery Areas.

Waters are classified according to their best-intended uses. Determining how well a waterbody supports its designated use is an important method of interpreting water quality data and assessing water quality. The use support ratings refer to whether the classified uses of the water are fully supported, partially supported, or not supported. Streams rated as either partially or not supporting are considered "impaired". In 2001, approximately 91 percent of estuarine and freshwater acres in the basin were monitored for aquatic life use. Of those acres monitored, approximately 9 percent of the estuarine waters were considered impaired. There were no impaired freshwater acres.

In addition to monitoring for aquatic life usage, a fish consumption category is also applied to all waters in the state. Approximately two percent of stream miles and 100 percent of coastline miles in the Basin were monitored. All waters are considered to be impaired and the North Carolina Department of Health and Human Services (NCDHHS) has issued corresponding fish consumption advisories. [15]

Water Quality Plans for the Neuse River Basin

The first basinwide plan for the Neuse River Basin was completed in March 1993 with subsequent revisions in December and July 2002.

The long-range mission of basinwide management is to provide a means of addressing the complex problem of planning for increased development and economic growth, while protecting and/or restoring the quality and intended uses of the Neuse River Basin's surface waters.

Neuse River Subbasin 03-04-02

This subbasin is located in the eastern Piedmont physiographic region of North Carolina. Four counties have land area in this subbasin; Durham, Franklin, Johnston, and Wake and also contains the municipalities of Raleigh, Wake Forest, Cary, Garner, Clayton, Smithfield, and Knightdale. Population growth in this subbasin is one of the highest in the State and population density ranges between 1,600 – 3,200 persons/square mile.

Land use within the 03-04-02 subbasin is divided between the more intensive land uses of urban development (30 percent) and agricultural (16 percent) with "protected" land uses such as forested and wetland areas (53 percent).

There are 52 permitted National Pollutant Discharge Elimination System (NPDES) dischargers in the subbasin. The largest are Raleigh Neuse WWTP (60 MGD), Central Johnston WWTP (4.5 MGD), Cary North WWTP (12 MGD), Little Creek WWTP (1.9 MGD), and Wake Forest WWTP (2.4 MGD). There are also 5 individual NPDES stormwater permits in the subbasin.

Streams in Subbasin 03-04-02 are typically low-gradient with sluggish pools separated by riffles with occasional small rapids. These streams tend to have low summer flows and limited ability to assimilate oxygen-consuming wastes.

Table 5 gives an overview of Subbasin 03-04-02.

Table 5: Subbasin 03-04-02

Land and Water Area	
Total area:	726 mi²
Land area:	724 mi²
Water area:	2 mi²
Population Statistics	
2000 Population:	547,580
Pop. Density:	808 persons/mi²
Land Cover (%)	
Forest/Wetland:	53
Surface Water:	1
Urban:	30
Cultivated Crop:	13
Pasture/Managed Herbaceous:	3
County (s)	
Durham, Franklin, Johnston, Wake	
Municipalities	
Raleigh, Wake Forest, Cary, Garner, Clayton, Smithfield, Knightdale	

Source: NCDENR's Neuse River Basinwide Water Quality Plan, (July 2002).

Impaired Waters in Subbasin 03-04-02

There were 243 stream miles (47 percent) and 1,065 reservoir acres (95 percent) monitored during this assessment period in the aquatic life category. Approximately 28 percent of the stream miles are considered "impaired" by nonpoint source pollution. Specifically, a portion of Black Creek, Crabtree Creek, Hare Snipe Creek, Little Creek, Marsh Creek, Mine Creek, Perry Creek, Pidgeon House Branch, Richlands Branch, Swift Creek, and Toms Creek were identified as impaired in the NCDENR; DWQ Neuse River Basinwide Water Quality Plan (2002).

Section 303(d) of the Clean Water Act (CWA) requires states to develop a list of waters not meeting water quality standards or which have impaired uses. Listed waters must be prioritized, and a management strategy or total maximum daily load (TMDL) must be developed for all listed waters. Based on this listing of impaired waters located in Subbasin 03-04-02, there are not any impaired waters located in the project study area.

Watershed Classifications

In addition to the priority areas discussed previously, the study area is located between two water supply watersheds. The water supply watershed to the west is located in the Cape Fear River Basin. This watershed is categorized as WS-IV NSW, which are waters used as sources of water supply for drinking, culinary, or food processing purposes for those users where a WS-I, WS-II, or WS-III classification is not feasible. WS-IV waters are generally located within moderately to highly developed watersheds. The project

area does not drain into the Cape Fear River; therefore, no adverse effects are anticipated. The water supply watershed, also categorized as WS-IV NSW, to the east drains to the Neuse River but is located approximately 8 miles from the study area. Due to the distance, no adverse effects are anticipated.

All other major and minor tributaries located within the ICE project study area have a best usage classification of C (freshwater) with a NSW modifier (See Table 6). The C classification means waters suitable for aquatic life propagation and maintenance of biological integrity (including fishing, fish and primary nursery areas), wildlife, secondary recreation, agriculture, and any other usage except for primary recreation or as a source of water supply for drinking, culinary, or food processing. The NSW or Nutrient Sensitive Waters supplemental modifier is a particular set of water quality standards establishing the level of water quality that must be maintained in the water body to support the uses associated with it. NSW classification outlines protective management strategies aimed at controlling point and non-point source pollution.

Table 6: Surface Water Classifications for Bodies of Water within the ICE Project Study Area

Name of Stream	Classification	Subbasin	Stream Index No#
Brier Creek	C NSW	03-04-02	27-33-4
Stirrup Iron Creek	C NSW	03-04-02	27-33-4-2
Unnamed Tributary to Stirrup Iron Creek	C NSW	03-04-02	N/A
Unnamed Tributary to Stirrup Iron Creek	C NSW	03-04-02	N/A
Unnamed Tributary to Stirrup Iron Creek	C NSW	03-04-02	N/A
Unnamed Tributary to Crabtree Creek	C NSW	03-04-02	N/A
Unnamed Tributary to Crabtree Creek	C NSW	03-04-02	N/A

Source: NCDENR; DWQ website http://h2o.enr.state.nc.us/bims/Reports/reportsWB.html (Accessed November 2004).

Existing Federal, State and Local Regulatory Mechanisms Related to Limiting Potential Cumulative Effects to Waters of the Neuse River Basin

North Carolina – Water Supply Watershed Protection Act

The North Carolina General Assembly adopted the Water Supply Watershed Protection Act, in 1989.[16] The resulting Water Supply Watershed Protection Rules, adopted in 1992, required that all local governments having land use jurisdiction within water supply watersheds adopt and implement water supply watershed protection ordinances, maps, and a management plan. State water supply protection rules describe five protective classifications for surface water supplies: WS-I, WS-II, WS-III, WS-IV, and WS-V.[17] The State uses these classifications to determine the type of point source discharges it will permit in each water supply watershed. The classifications are also used to determine what set of water supply watershed standards local governments must implement to control non-point source pollution (mainly storm water runoff). Each water supply watershed, however classified, has a "critical area," which is that part of the watershed closest to the water supply source, where it is most important to minimize the discharge, and maximize the filtration, of potential pollutants.

North Carolina –Neuse River Basins Nutrient Sensitive Waters Management

The Neuse River Basin Nutrient Sensitive Waters Management Strategies were established by the Environmental Management Commission (EMC) and codified as state law. Under these rules all waters in each basin, regardless of primary use classification, are also classified as Nutrient Sensitive Waters (NSW). The established rules relate to, among others, protection and maintenance of riparian areas, wastewater discharges, and urban stormwater management.

The Rules established protections regarding encroachment and impact to existing 50-foot wide riparian buffers directly adjacent to all intermittent streams, perennial streams, lakes, ponds, and estuaries in the Neuse River Basin to maintain their nutrient removal functions. Minimum nutrient control requirements applicable to all NPDES permitted wastewater treatment facilities that receive nitrogen-bearing wastewater were established to maintain and restore water quality in the Neuse River Estuary and protect their designated uses.

In addition, under the Rules local governments within the respective basins were required to develop and implement local stormwater management program plans that address nitrogen reductions for both existing and new development, including the stipulation that the nitrogen load contributed by new development activities is held at 70 percent of the average nitrogen load contributed by the 1995 land uses of the non-urban areas of the basins. The City of Raleigh has such programs in place and in addition, based on population growth and other factors, the Town of Morrisville and/or other incorporated areas in the project planning area may be required by the EMC to comply with these stormwater requirements by establishing a stormwater management plan.

North Carolina - Nonpoint Source Program

The North Carolina Nonpoint Source Management Program consists of a broad framework of federal, state, and local resource and land management agencies. These agencies administer programs that are directly related to nonpoint source pollution management within the state. The nature of nonpoint source pollution is such that

involvement at the local level is imperative. Basinwide Water Quality Plans identify watersheds that are impaired by nonpoint sources of pollution. Identification, status reports, and recommendations are intended to provide the best available information to local groups and agencies interested in improving water quality. The plans also make available information regarding federal, state, and local water quality initiatives aimed at reducing or preventing nonpoint source pollution.

Neuse River Basins – Buffer Rules

In conjunction with the Nonpoint Source Program, the North Carolina Environmental Management Commission adopted rules to protect 50-foot riparian buffers in both the Tar-Pamlico and Neuse River Basins. The purpose of the rules is to protect and conserve existing riparian buffers to maintain their nutrient removal functions. These rules apply to all jurisdictional surface waters within the respective river basins, and are administered by the Division of Water Quality (DWQ).

Wake County – Land Use and Stormwater Regulations

As previously mentioned, the state Water Supply Watershed Protection Act makes local governments primarily responsible for controlling non-point source discharges within water supply watersheds, by requiring local governments to adopt land use regulations that meet the state's minimum water supply watershed requirements. Wake County's water supply watershed protection regulations are intended to meet all of the state's minimum requirements, and to exceed those requirements as needed, based on past County practices and policies, which predated the State's Water Supply Watershed Protection Act.

Wake County protects water quality in water supply watersheds by applying land use and development regulations that are designed to keep impervious surface coverage low and to provide adequate infiltration of runoff water into the ground. They do so through the following measures:

- Limiting the density of residential development,
- Limiting the impervious surface coverage of nonresidential development,
- Requiring vegetated buffers along watercourses,
- Limiting nonresidential land uses to those with characteristics less likely to adversely affect water quality,
- Controlling the storage and use of hazardous materials, and
- Applying design standards to minimize adverse water quality impacts.

Wake County requires new development in all water supply watersheds to maintain watershed buffers along perennial streams (as shown on U.S.G.S. topographic maps) as well as along any other streams that drain at least 25 acres. It also requires new development to maintain drainageway buffers along drainageways, or around water impoundments, that drain at least 5 acres, but less than 25 acres. Further, Wake County also helps ensure protection of water supply sources by applying certain design

standards to all development within a water supply watershed. Those standards require all new development, to the maximum extent practicable, to minimize impervious surface coverage, direct storm water runoff away from surface waters, incorporate Best Management Practices (BMPs) to minimize water quality impacts, and transport storm water runoff by vegetated conveyances.

These Wake County land use and development regulations help to maintain water quality and direct more dense growth out of water supply watersheds and into urbanizing areas.

Potential Impacts

Direct project related impacts to water quality features are described in Section 4.10.6 of the Environmental Assessment (EA) approved in July 1996. [18] Indirect and long-term cumulative effects on water resources, whether groundwater or surface water, are more difficult to quantify. The increased proportion of the study area devoted to urban land uses will be accompanied by more impervious surfaces that block or redirect recharge and more storm drains that divert precipitation into streams instead of aquifers and increase erosion rates over time. Long term, this can alter the availability and quality of hydrologic resources, both groundwater and surface water. Modifications in land use may also affect the proportions of ground water and surface runoff in rivers and streams, which can affect the chemistry, temperature, and general quality of water for human consumption, aquatic habitats, and general wildlife uses.

In addition, multiple federal, state and local regulations are in place in the study area protecting surface water quality and designed to accommodate future growth. Adhering to established Best Management Practices and other local regulations for the protection of surface waters should limit direct and indirect impacts to these important features. Avoidance and minimization measures designated during the planning study, often requiring long-term interagency cooperation, should not be discarded after NEPA compliance is established. Only by actively adhering to all regulations and commitments, can the potential indirect and long-term cumulative effects be mitigated.

In the end, the decision to protect water quality or to increase development is a matter of local political will and long-range planning. Based on the recent policies of the Wake County Commission, this project is expected to have limited impact on growth within their watershed protection area.

3.2.5 Transportation System Characteristics and Trends

Intermodal Relationships

The proposed project passes through the Town of Morrisville, in an area characterized by office and industrial parks and commercial properties. The predominant mode of transportation is the automobile. The immediate project area has limited railroad, airport, and bus service to supplement the transportation system provided by the proposed project, I-40, NC 54, and other major roadways. The following section describes the other types of transportation available within or near the study area.

- *Passenger Rail* – Currently, the nearest passenger rail service available in the project study area is an Amtrak station in Cary, approximately 5 miles from the project. Service is offered throughout the state, and to other Amtrak destinations nationwide. In addition, the TTA expects to begin a passenger light rail system in

2007, which will serve the Triangle Region. This plan includes a route that will pass through the southern section of the project study area, just to the south of NC 54. A train station to serve this route is expected to be located in downtown Morrisville.

- *Freight Rail* – There is one railroad that runs through the southern portion of the project study area. It is owned by the North Carolina Railroad Company, but CSX, Norfolk Southern, and Amtrak each operate on the track. There are also several other freight carriers that have rail lines that cross through the Triangle Region that operate as both local short line railroads and carriers that offer service throughout the eastern seaboard and nationwide.

- *Trucking* – The location of Morrisville and Wake County in the geographic center of North Carolina and its proximity to national trade routes makes it an attractive location for expanding manufacturing businesses and trucking operations. Within half days trucking to deep-water ports in Wilmington, North Carolina; Morehead City, North Carolina; Charleston, South Carolina, and Norfolk, Virginia that handle containerized and break-bulk cargo.

- *Bus Service* – The TTA offers bus service through Morrisville along NC 54 (Chapel Hill Road). The TTA also provides a Vanpool service and an Airport Shuttle to RDU. In addition to local transit service, Greyhound offers bus transportation throughout the state and nationwide. The nearest Greyhound stop to the project study area is in downtown Durham, approximately 14 miles from the project.

- Sidewalks – No sidewalks currently exist along the widening project. However, in the Morrisville Transportation Plan, it calls for sidewalks to be installed as roadway work is done.

- Greenways – Morrisville has plans for a greenway system along McCrimmon Parkway. While not fully constructed yet, it is included in the Morrisville Transportation Plan and land has been set aside for the project.

- Bicycle Accommodations – There currently are no bicycle routes along the project corridor. However, The Morrisville Transportation Plan recommends that wide outside lanes be included in roadways to accommodate bicyclists, including along Airport Boulevard. In addition, there are plans for off street paths and private pathways throughout Morrisville.

- Airports – The Raleigh-Durham International Airport is located just to the north of the study area, near the I-40 and I-540 interchanges. The airport is open to public use. It has several lighted asphalt runways that range in length from 3,570 feet to 10,000 feet long and range from 100 to 150 feet wide. The airport serves as a regional airport for passengers seeking domestic flights throughout the country, as well as a select number of international flights. Aside from commercial flights, the airport also is used for charter, cargo, and military flights.

Appendix B-1 provides an organization and tabulation of study area goals checklist. Appendix B-2 provides a study area directions and goals checklist.

System Linkage and Transportation Demand

The existing segment of Airport Boulevard from McCrimmon Parkway to NC 54 (Chapel Hill Road) is a two-lane roadway. The project will create a continuous five-lane corridor along Airport Boulevard from Interstate 40 to NC 54. The project will improve the flow of traffic along this major corridor that connects Morrisville to the Raleigh-Durham International Airport and Interstate 40. The road is predominately used by commuters who work in Morrisville and the Research Triangle Park.

Current and Projected Traffic Volumes

The analysis of existing and projected traffic volumes is a major consideration when evaluating thoroughfares. Future traffic volumes were projected for this project based on the existing system's 1995 traffic volumes, expected growth in the corridor, and the impacts of other proposed major facilities. Traffic volumes were projected and evaluated for both the existing system with no improvements and considering the proposed project.

Traffic operating conditions are described using Levels of Service (LOS). This concept relates traffic volumes to quality of flow and is based on the Highway Capacity Manual, Transportation Research Board, 1985. LOS is a measure of quality of flow and is represented by letter designations 'A' through 'F.'

A capacity analysis of the existing system between intersections was prepared for both current and projected volumes for key intersections along the proposed route with the results shown in Table 7. This table shows the expected results in a "no build" situation and with the widening of Airport Boulevard completed by the design year 2025.

Table 7: Capacity Analysis and Levels of Service (Peak Hours)

Section	Segment	1995 LOS	2020 LOS "No Build"	2020 LOS Build
Airport Boulevard	At NC 54 (Chapel Hill Road)	C	F	D
	At McCrimmon Parkway	F	F	D

Source: *Administrative Action State Environmental Assessment, Airport Boulevard Widening, 1996.*

The results of this study indicate that the LOS along Airport Boulevard will improve from the widening project. In both the "No Build" and the "Build" alternatives, the projected LOS for 2020 improved from an LOS of "F" to "D." According to the Morrisville Transportation Plan, the proposed section of Airport Boulevard that is to be widened had an ADT of 9,500 in 2000 and is projected to have an ADT of 24,200 by 2025.

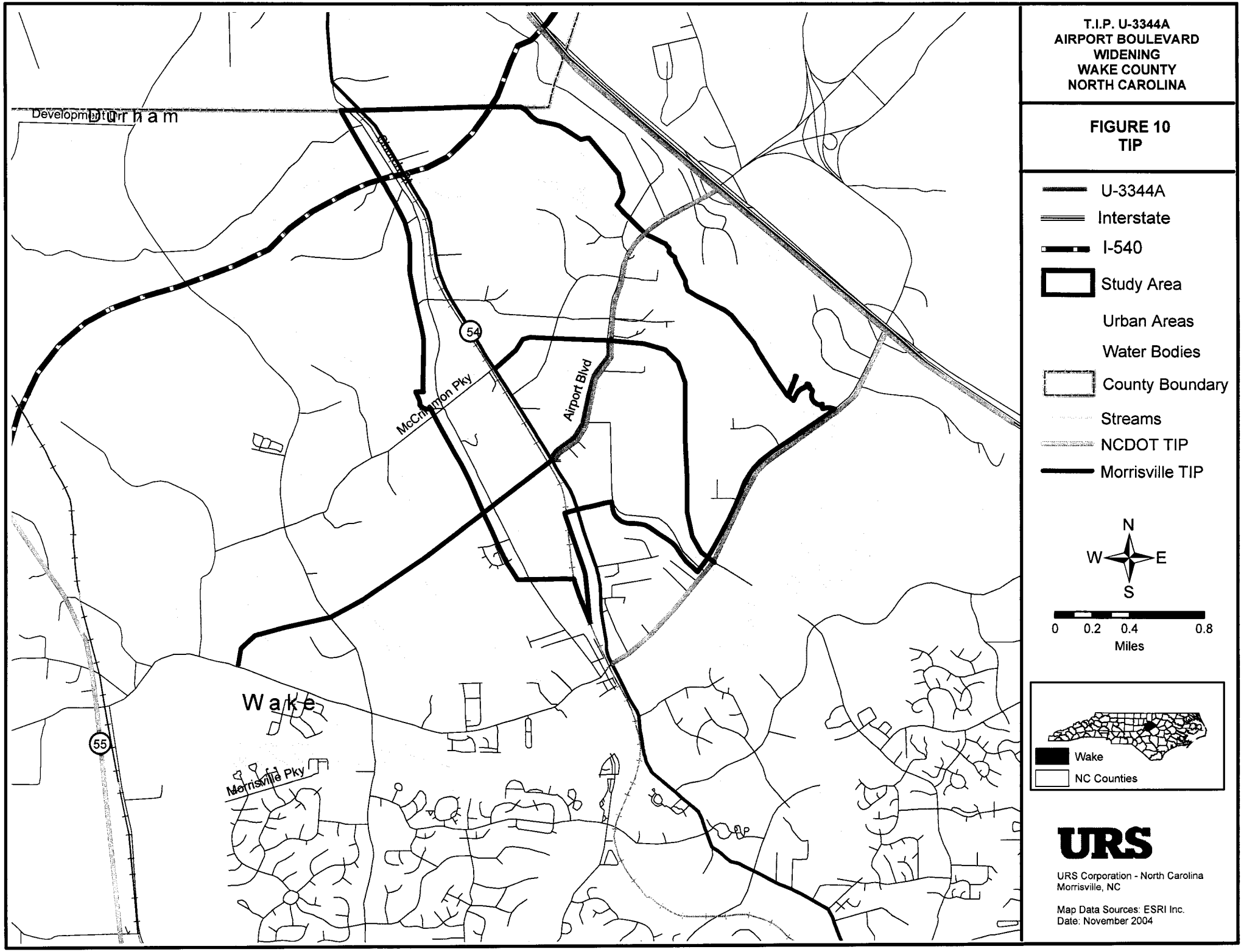
Transportation Improvement Program (TIP)

Table 8 lists transportation projects in the vicinity of the study area. The TIP projects are shown on a map in Figure 10.

Table 8: Morrisville Vicinity Transportation Projects

PROJECT NUMBER	PROJECT NAME	PROPOSED IMPROVEMENT	PROJECTED SCHEDULE
U-3344	Airport Boulevard Widening	Widen to five lanes, curb and gutter from I-40 to NC 54	Part Completed
I-2204*	I-40	Widen to eight lanes from NC 147 to Wade Avenue	Completed
R-2000*	I-540	Six lane freeway on new location from I-40 to US 64	Under Construction
R-2906*	NC 55	Widen to multi-lanes from US 64 in Wake County to Cornwallis Road in Durham County	Construction scheduled for 2004-2007
U-3343*	Aviation Parkway	Widen to five lanes, curb and gutter from I-40 to NC 54	Post Years
U-3620*	McCrimmon Parkway	Five-lane, curb and gutter on new location from NC 54 to Airport Boulevard	Post Years
TE-4705*	Regional Rail Service	Phase 1 of the TTA Regional Rail Service	FY04-08
**	Airport Boulevard Extension	Extend Airport Boulevard from NC 54 to Davis Drive	
**	McCrimmon Parkway	Extend McCrimmon Parkway to Aviation Parkway	

*Source: NC DOT 2004-2008 TIP Program, October 2004.
**Source: Town of Morrisville Transportation Plan, October 2004.


T.I.P. U-3344A
AIRPORT BOULEVARD
WIDENING
WAKE COUNTY
NORTH CAROLINA
FIGURE 10
TIP
U-3344A
Interstate
I-540
Study Area
Urban Areas
Water Bodies
County Boundary
Streams
NCDOT TIP
Morrisville TIP
N
W
E
S
0 0.2 0.4 0.8
Miles
Wake
NC Counties
URS
URS Corporation - North Carolina
Morrisville, NC
Map Data Sources: ESRI Inc.
Date: November 2004
Durham
Development
Wake
McCrimmon Pky
Airport Blvd
Morrisville Pky
54
55

3.3 Step 3 – Notable Environmental Features Inventory

3.3.1 Overview

The notable features inventory describes baseline environmental conditions within the indirect/cumulative effects analysis study area against which the project may be assessed. The term notable features depends on perspective and scale; this document assesses various geographic scales in accordance with the CEQ regulations (40 CFR 1500-1508). Consideration of the project's indirect and cumulative effects from encroachment-alteration, project-induced, or in combination with other actions, helps to establish the degree of change. Acceptance of the degree of change differs depending on the affected locale or population. Section 3.5 presents the potential indirect and cumulative impacts that could occur to the notable features identified in this section. Section 3.6 presents the analysis of indirect and cumulative impacts.

3.3.2 Ecosystem Conditions

Documentation of ecosystem conditions depends upon the characteristics of the project's setting as defined by the following categories of notable features:

- *Sensitive species and habitats* - EPA uses the term sensitive species and habitats to describe ecologically valuable species and habitat and those vulnerable to impact.

- *Valued environmental components* – Are defined as a "characteristic or attribute of the environment that society seeks to use, protect, or enhance."[19]

- *Relative uniqueness, recovery time, and unusual landscape features* – Relative uniqueness is a "measure of how many comparable examples of this landscape element exist at different levels of scale, from the local area to the nation, even the globe". Recovery time is "a measure of how long it would take to replace the existing landscape element in comparable form if it were disturbed or destroyed."[20]

The study area, located in Wake County, falls within the Northern Outer Piedmont ecoregion of the Piedmont physiographic province of North Carolina.[21] The parts of Wake County that are northeast of Morrisville are broad, gently sloping uplands dissected by a number of tributaries flowing into Stirrup Iron Creek, Crabtree Creek, or Lake Crabtree and then eventually into the Neuse River. Elevation ranges from 390 to 280 feet above sea level. Soils in the northwestern part of Wake County are known as Trassic basin soils. These soils have severe limitations for development due to very slow permeability and high shrink-swell potential.[22]

Biotic Communities

The vegetative communities identified are mixed pine/hardwood forest[23], successional field, and urban/disturbed (NCDOT 1996). Plant community composition is reflective of the physiography, topography, moisture regime, and current and prior land uses of the area. Habitat complexity and the abundance of mast producing plants provide forage and shelter opportunities for faunal communities. Vegetative communities also provide travel corridors between habitat patches. Fragmentation and loss of these communities due to development impacts this function and is likely to result in declining biological

diversity. May of the forest tracts within the project area have already been fragmented by development. Since new alignment is not proposed, increased fragmentation of plant communities is not anticipated. The proposed roadway widening project will only impact the plant communities directly adjacent to the existing roadway. Vegetation will be cleared to allow for construction.

Wetlands

Wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil condition."[24] Potential wetland communities were delineated using the criteria specified in the "1987 Corps of Engineers Wetlands Delineation Manual." For an area to be considered a "wetland," the following three specifications must be met; 1) presence of hydric soils, 2) presence of hydrophytic vegetation, and 3) evidence of hydrology.

Only one wetland was identified in the Environmental Assessment study area. The total impact of this forested wetland is 0.03 acres. The alignment was designed to avoid/minimize impacts to wetlands. Any required mitigation will be addressed based on final design plans.

Threatened and Endangered Species

Federally protected species with endangered, threatened, or proposed threatened or endangered status receive protection under the Endangered Species Act of 1973, as amended. As of February 25, 2003, the US Fish and Wildlife Service (USFWS) listed four species as either Threatened or Endangered and potentially occurring in Wake County. [25] The North Carolina Natural Heritage Program (NC-NHP) has also listed the same four species as either Threatened or Endangered and potentially occurring in Wake County.[26]

Habitat surveys were performed for federally listed threatened and endangered species. Either no habitat for these species or no individuals were identified within the project area (NCDOT 1996).

Study area ecosystem characteristics are inventoried in Appendix B-3.

3.3.3 Socioeconomic Conditions

Basic socioeconomic conditions are inventoried through identification of characteristics of the human social environment. As recognized by the field of social impact assessment (ICOGP, 1993), v*ulnerable elements of the population* include the elderly, children, the disabled, and members of low-income or minority groups. Table 9 provides information on these groups for Wake County and the State of North Carolina.

Table 9: Vulnerable Elements of the Population

Vulnerable Elements of Population	Wake County	North Carolina
Population, 2000	627,846	8,049,313
Persons under 5 years old, percent, 2000	7.2	6.7
Persons under 18 years old, percent, 2000	25.1	24.4
Persons 65 years old and over, percent, 2000	7.4	12.0
Black or African American persons, percent, 2000 (a)	19.7	21.6
American Indian and Alaska Native persons, percent, 2000 (a)	0.3	1.2
Asian persons, percent, 2000 (a)	3.4	1.4
Native Hawaiian and Other Pacific Islander, percent, 2000 (a)	Z	Z
Persons reporting some other race, percent, 2000 (a)	2.5	2.3
Persons reporting two or more races, percent, 2000	1.6	1.3
Persons of Hispanic or Latino origin, percent, 2000 (b)	5.4	4.7
Persons with a disability, age 5+, 2000	13.4	20.5
Persons below poverty, percent, 1999	7.8	12.3

(a) Includes persons reporting only one race
(b) Hispanics may be of any race, so also are included in applicable race categories
Source: US Census Bureau State & County Quick Facts, 2004

Appendix B-4 provides a socioeconomic conditions inventory illustrating details of economic, demographic, social, and physical conditions and their connection to notable features.

3.3.4 Notable Features Inventory Summary

The notable features inventory facilitates planning of transportation systems by considering features notable on a broad scale, typically less detailed than information suitable for project evaluation.

Appendix B-5 provides a notable features checklist in which major types of ecosystem and socioeconomic features are outlined. Appendix B-6 lists substantial federal and state statutes that place value on certain resources or determine that certain resources require special consideration.

3.4 Step 4 – Impact-Causing Activities

Impact-causing activities consist of impacts of the proposed transportation project as well as other existing and potential activities that may affect study area notable features. The two major types of indirect/cumulative effects caused by project impacts are:

- *Encroachment-Alteration Effects* – Effects that alter the behavior and functioning of the physical environment are related to project design features but are indirect in nature because they can be separated from the project in time or distance. These effects can be considered cumulative in nature when they are additive over time or have an interactive (non-linear) net effect on the environment.

- *Access-Alteration Effects (Project-Induced Growth)* – Changes in traffic patterns and the alteration of accessibility attributable to the design of the project can induce residential and commercial growth in the study area.

The general types of project impact causing activities (existing, potential, and proposed) include:

- Modification of Regime – alteration of habitat, flora, hydrology, and other features;

- Land Transformation and Construction – construction method, ancillary elements;

- Resource Extraction – excavation and dredging;

- Processing – storage and supplies;

- Land Alteration – landscaping, erosion control;

- Resource Renewal Activities – remediation, reforestation;

- Changes in Traffic – traffic patterns on project and adjoining facilities;

- Waste Emplacement – landfill, waste discharge;

- Chemical Treatment – fertilization, deicing; and

- Access Alteration – substantial changes in access, circulation patterns, travel demand and travel times between major attractors/generators (employment, housing, and commercial development, etc.).

Appendix B-7 documents other activities (existing and proposed) that may cumulatively affect notable features. Appendix B-8 documents project impact-causing activities.

3.5 Step 5 – Potential Indirect/Cumulative Impacts

3.5.1 Overview

The objective of Step 5 is to identify the effects of the project that require detailed analysis. This is done by comparing the lists of impact-causing activities developed in Step 4 with the inventory of goals, trends and notable features that make up the baseline conditions identified in Steps 2 and 3. The comparison is designed to explore cause-effect relationships and to establish which effects merit subsequent detailed analysis or, conversely, which effects are not potentially noteworthy and require no further assessment. The following sections review main categories of effects; Step 5 concludes with an evaluation matrix of effects for analysis in Step 6.

3.5.2 Encroachment – Alteration Effects

Alteration of the behavior and functioning of the affected environment caused by project encroachment can be characterized into two broad categories: ecological effects and socioeconomic effects. These effects can be linked to project impact-causing activities identified in the previous step. The two main effects are discussed below.

3.5.3 Potential Ecological Effects

The ecosystem approach embodied in CEQ's biodiversity document (1993) recognizes the "fundamental interconnections within and among various levels of ecological organization." Reduction of diversity at any level will have effects at the other levels. Therefore, an understanding of the interconnections can help reveal the chain of events delayed in time or space from the original transportation project action of disturbance on or within a particular level of ecological organization.

The following indirect and cumulative effects of transportation project actions can have important consequences for ecosystems:

- Habitat fragmentation from physical alteration of the environment;
- Lethal, sublethal and reproduction effects from pollution;
- Degradation of habitat from pollution;
- Disruption of ecosystem functioning from direct mortality impacts; and
- Disruption of natural processes (e.g., hydrology, species competition, predator-prey relations, etc.) from altered energy flows.

3.5.4 Potential Socioeconomic Effects

Socioeconomic effects of transportation projects are the result of a change in the physical nature of a community. The two major changes are:

- Alteration of traffic patterns and access; and
- Relocation of homes and business, or relocation or alteration of public facilities.

These direct effects can result in indirect/cumulative effects that can be magnified by the cumulative impacts of other actions and include alterations to:

- Neighborhood cohesion;
- Neighborhood stability;
- Travel patterns of commuters and shoppers;
- Recreation patterns at public facilities;
- Pedestrian dependency and mobility;
- Perceived quality of the natural environment;
- Personal safety and privacy;
- Aesthetic and cultural values;
- Environmental Justice – disproportionate effects to vulnerable elements of the population; and
- Perceived quality of life.

3.5.5 Potential Induced Growth Effects

Transportation project improvements often reduce the time-cost of travel, enhancing the attractiveness of surrounding land to developers and consumers. Development of vacant land, or conversion of the existing environment to more intensive uses, is often a consequence of transportation projects. Growth in employment and population attributable to a project is an indirect effect that, in turn, produces its own effects on the environment.

Induced growth effects fall into three general categories: effects of projects planned to serve specific land development, effects of projects likely to stimulate complementary development, and effects of projects likely to influence interregional location decisions. These induced growth types are discussed in detail below.

3.5.6 Land Development

Transportation projects designed specifically to serve existing or planned large land development projects or groups of projects require a thorough analysis of induced growth and related effects. This is because:

- Land development is not just probable but highly likely;
- The magnitude and timing of the development is known or generally predictable; and
- Details of development projects are known and can be analyzed for environmental effects.

Since details of the land development projects are known, analysis of this type of growth is of considerable importance to indirect/cumulative effects analysis and can focus on

impacts related to the magnitude and timing of development rather than its probability of occurrence.

3.5.7 Complementary Land Development

Complementary land development, such as highway-oriented businesses (e.g. gas stations, rest stops, motels), is more likely near interchanges in rural areas where property values were originally low. Interchanges in suburban or urban areas where property values were higher before project planning and implementation are more likely to support a greater proportion of higher density uses, as well as a greater mix of uses. Factors influencing the likelihood and rate of development near rural interchanges include:

- Distance to major urban area or regional center
- Traffic volume on the intersecting road
- Presence of frontage road
- Availability of water and sewer and other infrastructure

3.5.8 Intraregional Location Decisions

Apart from the complementary development described above, on a regional basis, the impact of transportation projects is generally minimal. The localized effect of such projects on land use can be substantial, however. If the conditions for development are generally favorable in a region, then transportation projects can become one of the major factors that influence where development will occur.

Where transportation projects do influence land development, the general tendency is toward relatively high-density commercial or multi-family residential development near facility nodes in urban and suburban areas and single-family residential development in the urban fringe.

3.5.9 Project Evaluation Context

To evaluate potential indirect and cumulative effects of the project, the Project Team considered all information set forth in this report as well as background information and base conditions established in the EA. Table 10 and Table 11 give examples of indirect and cumulative effects; these tables, together with all previously discussed background information, are used as the basis for decisions made in the Table 12 evaluation matrix. This matrix lists potential effects under major categories and presents indirect/cumulative effects that warrant further analysis.

Table 10: Direct and Possible Indirect Effects of the Airport Blvd Widening

	DIRECT EFFECT	INDIRECT EFFECT	INDIRECT EFFECT	INDIRECT EFFECT	INDIRECT EFFECT
Socioeconomics and Land Use	Improved access to suburban/rural land suitable for development.	Highway-oriented business locates on land adjacent to new interchanges	Business declines in older downtown area which was bypassed	Residential Development	Loss of farmlands
Water Quality	Improved access	Land use development	Increased non-point source water pollution	Decline in surface water quality, contaminants enter water supply aquifer	Health problems, contamination of groundwater
Wetlands	Improved access, alteration of surface water drainage patterns	Land use development, elimination or degradation of downstream wetlands	Many small wetlands eliminated during development	Substantial aggregate loss of wetlands due to development	
Ecology	Improved access, removal of vegetation and habitat	Fragmentation of large habitat area	Elimination of species which require this large habitat		
Air Quality	Improved access	Concentrated development adjacent to new interchanges	Creation of air quality contamination "hot spot" exceeding standards	Reduction in available increment for future highway projects	
Noise	Increase in noise due to construction	Additional traffic on collector roads producing noise above standards	Nearby residential property values are lowered		
Cultural Resources	Improved access to nearby rural area	Development of land uses in vicinity of interchange	Substantial visual impact to historic farm property		
Transportation	Improvement of traffic flow, stabilization of vehicular speeds	Reduce fuel usage for vehicles using new highway	Reduce utilization of fossil fuels	Improves freight movement	

Source: *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina*, 2001

Table 11: Examples of Cumulative Effects

TYPE	MAIN CHARACTERISTICS	EXAMPLE
1. Time Crowding	Frequent and Repetitive Effects on an Environmental System	Forest Harvesting Rate Exceeds Regrowth
2. Time Lags	Delayed Effects	Exposure to Carcinogens
3. Space Crowding	Highly Spatial Density of Effects on an Environmental System	Pollution Discharges into Streams from Nonpoint Sources
4. Cross-Boundary	Effects Occur Away from Source	Acidic Precipitation
5. Fragmentation	Change in Landscape Pattern	Fragmentation of Historic District
6. Compounding Effects	Effects Arising from Multiple Sources or Pathways	Synergism Among Pesticides
7. Triggers and Thresholds	Fundamental Changes in System Behavior or Structure	Global Climate Change

Source: *Considering Cumulative Effects Under the National Environmental Policy Act*, Council on Environmental Quality, 1997.

Table 12: Evaluation Matrix

Indirect and Cumulative Effects Requiring Detailed Analysis

Indirect / Cumulative Effect Type		Potential Negative Effect? (Check Below)		Potential Manifestation(s) in Study Area
		No (Assessment Complete)	Yes (Detailed Evaluation Required)	
Encroachment – Alteration Indirect Effects Single Source Additive (Type 1) and Interactive (Type 2) Cumulative Effects	*Ecosystem Related:* Habitat Fragmentation/ Degradation Ecosystem Disruption Natural Process Disruption Air Quality Water Quality Noise Other	 ✓ ✓ ✓ ✓	 ✓ ✓	When considered as a segment of Airport Boulevard in addition to other area TIP projects, the cumulative effect of increased traffic in Wake County could negatively impact air quality in these 8-hour ozone non-attainment areas and increase ambient noise levels
	Socioeconomic / Land Use Related: Community Cohesion / Stability Alteration of Travel Patterns Quality of Life Effects Historic Resources Aesthetic Effects Other	 ✓ ✓ ✓ ✓ ✓ ✓		
Induced Growth (Access – Alteration Indirect Effects)	Serves Specific Development	✓		
	Stimulates Complementary Development		✓	Highway oriented retail, industrial, office, and residential.
	Influences Location Decisions		✓	Improved access to area
Indirect Effects Related to Induced Growth Multiple Source Additive (Type 3) and Interactive (Type 4) Cumulative Effects	*Ecosystem Related:* Habitat Fragmentation / Degradation Ecosystem Disruption Natural Process Disruption Air Quality Water Quality Noise Other	 ✓ ✓ ✓	✓ ✓ ✓	When considered as a segment of Airport Boulevard in addition to other TIP projects, the project leads to induced growth, such as, additional businesses, industries, and firms that will increase employment levels and traffic in the area. Each of which could negatively impact air quality and ambient noise levels and further fragment habitat.
	Socioeconomic / Land Use Related: Conflict with Goals / Plans Economic / Fiscal Impacts Community Cohesion / Stability Alteration of Travel Patterns Quality of Life Effects Historic / Cultural Resources Aesthetic Effects Other	 ✓ ✓ ✓ ✓ ✓ ✓ ✓		

3.6 *Step 6 – Indirect/Cumulative Effects Analysis*

3.6.1 Overview

The purpose of this step is to evaluate the effects identified in Step 5 and determine magnitude, probability of occurrence, timing and duration, and degree to which the effect can be controlled or mitigated. Table 13 provides an overview of direct, indirect, and cumulative effects of the project

Table 13: Overview of Direct, Indirect, and Cumulative Effects

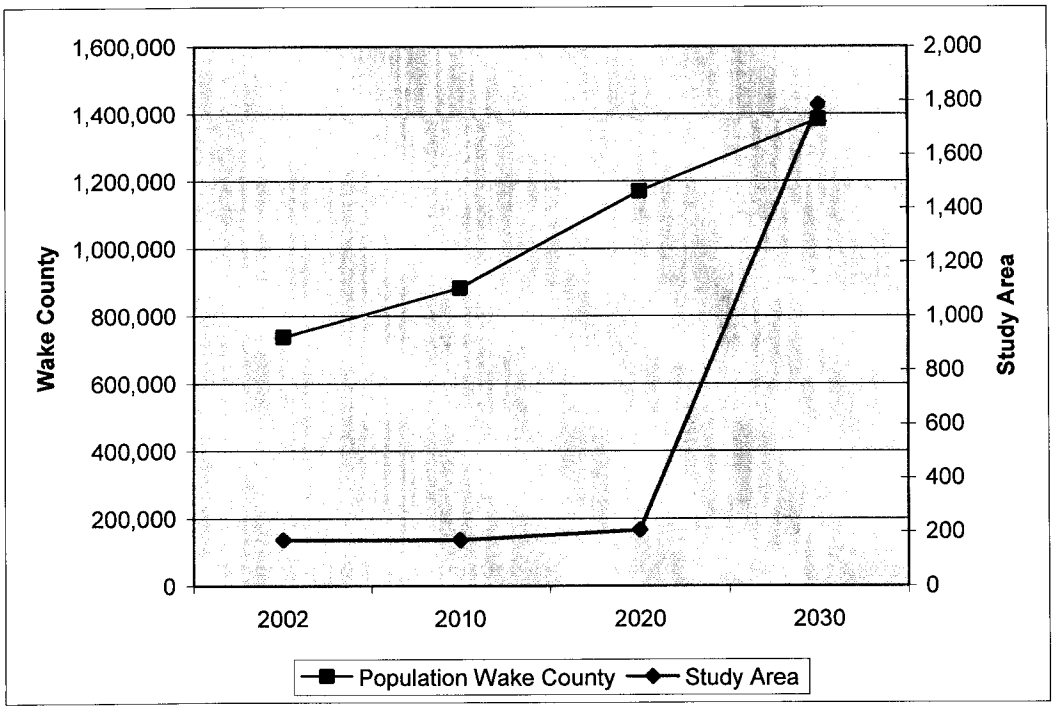
Impact Type	No-Action Future Conditions *(Conditions Without the Proposed Action)*		Impacts of the Proposed Action *(Incremental Effect of the Proposed Action)*			Cumulative Effect *(Future Conditions with the Proposed Action*)
	Other Past / Present Action	Other Future Actions	Direct Impacts	Indirect Effects: Encroachment Alteration Effects	Indirect Effects: Effects Related to Induced Growth	
Habitat Fragmentation / Degradation	Low	Moderate	Negligible	Low	Moderate	High
Ecosystem Disruption	Low	Moderate	Negligible	Low	Moderate	Moderate
Natural Process Disruption	Low	Moderate	Negligible	Low	Moderate	Moderate
Water Quality	Low	Moderate	Low	Low	Moderate	Moderate
Community Cohesion / Stability	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Alteration of Travel Patterns	Positive	Positive	Positive	Positive	Moderate	Moderate

KEY: Low Adverse Effect Moderate Adverse Effect High Adverse Effect
Positive Effect Negligible Effect

3.6.2 Future Conditions /Induced Development Analysis

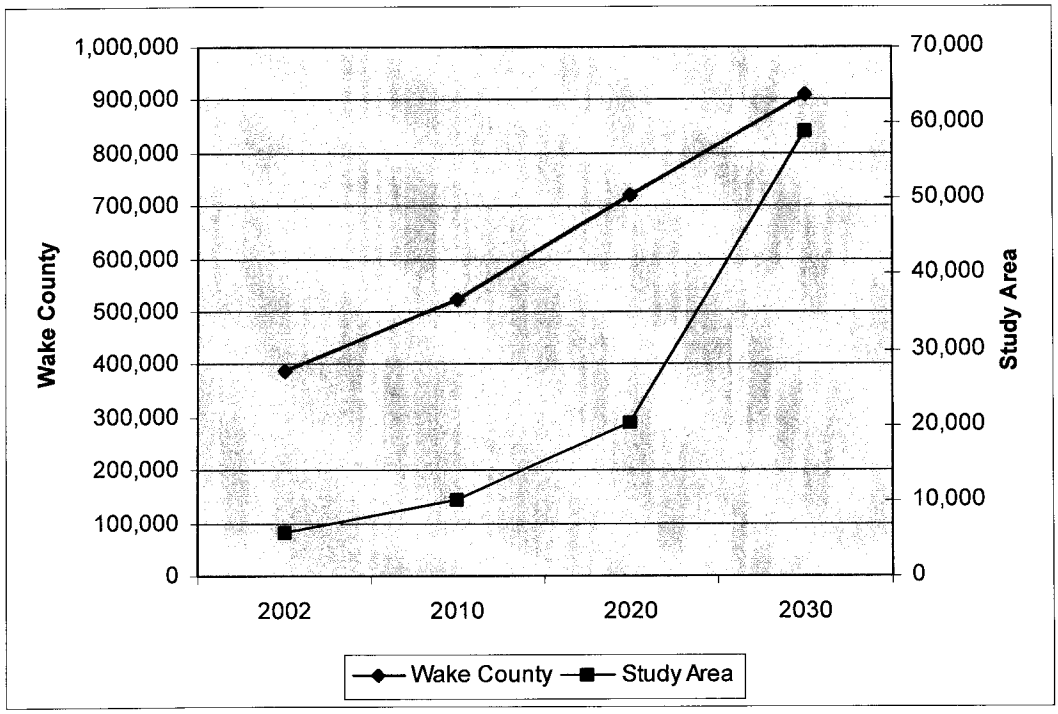
Understanding likely future study area conditions is necessary to assess potential indirect and cumulative effects that may result from the incremental effects of the project and other development activities in the same geographic region. Wake County and the study area population projections are shown in Figure 11 and employment projections are shown in Figure 12. Population and Employment projections were obtained from CAMPO's 2030 Long Range Transportation Plan released in February 2004.

Figure 11: Population Projections



Source: 2030 Long Range Transportation Plan, Capital Area Metropolitan Planning Organization. February 2004.

Figure 12: Employment Projections



Source: 2030 Long Range Transportation Plan, Capital Area Metropolitan Planning Organization. February 2004.

Over the past several decades, the Triangle Region has experience substantial growth in both population and employment. The region growth rate is one the highest projected in the state and is expected to continue through 2030. This growth rate can be attributed to the diverse economy, investment in infrastructure, top research facilities and institutions, and a high quality of life.

The study area's population is expected to remain relatively flat through 2020, while the employment levels are expected to grow at a steady rate. This is because the area is considered an employment center and contains only a small amount of housing. However, with the development of more mass transit opportunities and as land becomes scarcer the population is expected to rise as future plans for high-density mixed use developments are realized.

3.7 Step 7 – Analysis Results Evaluation

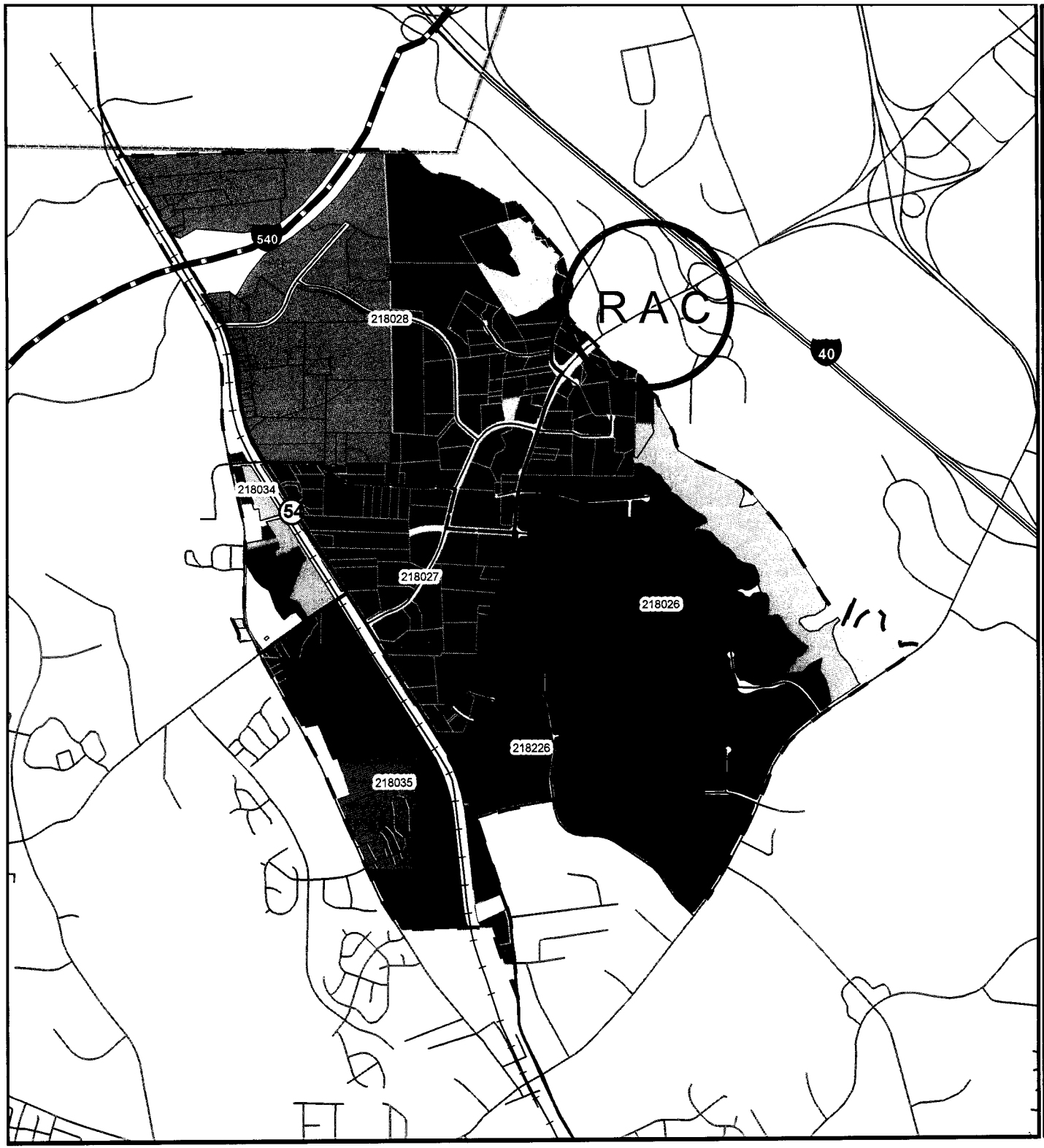
3.7.1 Overview

The purpose of this step is to evaluate the results of analyses done for this study. Results of the GIS future land use analysis are discussed below.

3.7.2 GIS Land Use Analysis

Baseline and future population and employment data from CAMPO, land use/zoning data from the Town of Morrisville, and results of the indirect and cumulative effects evaluation matrixes (Table 12 and Table 13) were analyzed using GIS to create the future land use map shown in Figure 13. This future land use scenario shows changes in land use according to the Morrisville Land Use Plan and CAMPO 2030 population and employment projections. The future land use scenario also identifies a Regional Activity Center (RAC). The RAC is a location that has been identified in the land use plans as an area likely to see significant development that will draw people from the region based on its location.

Airport Boulevard Widening
NC 54 to McCrimmon Parkway
TIP U-3344A
Figure 13
Study Area Future Land Use [1]



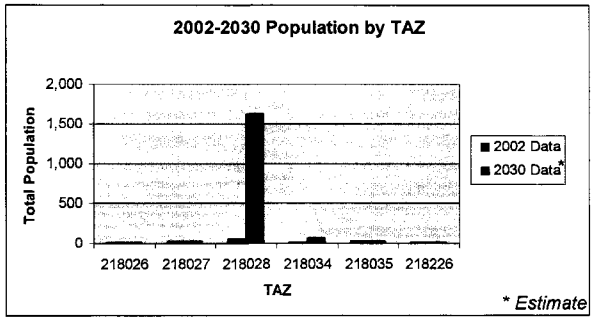
HOUSE20
HOUSE25
HOUSE30
HOUSE65
WOOD/GRASS
WOODS
BUSINESS [2]
INDUSTRIAL
MIXED USE
WATER

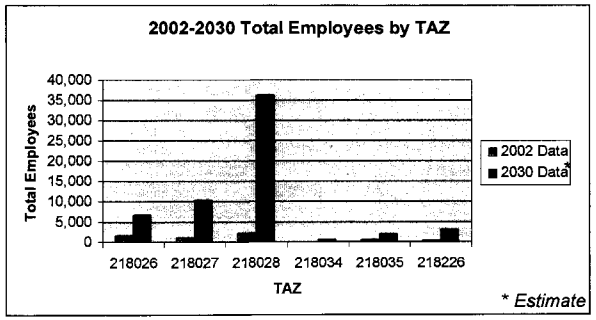
U-3344A
Study Area TAZs
Interstate
I-540
State Route
Local Road
Railroad
County Boundary
Regional Activity Center (RAC) [1]

N

0 0.25 0.5 1 Miles

0 1,150 2,300 4,600 6,900 Feet





[1] Town of Morrisville Future Land Use Plan
[2] Office and Retail

URS Corporation - North Carolina
Morrisville, NC
Map Sources: ESRI Inc., Wake County GIS
Date: November 2004

3.7.3 Conclusions

According to the Town of Morrisville Land Use Plan and estimates made by the CAMPO, the study area will experience significant growth in the number of employees throughout the next 30 years. The population is expected to remain relatively stable over the next 20 years, and then experience substantial growth between years 2020 and 2030.

Considering the current and projected population and employment for the study area, this project is likely to induce land use changes. While the area would likely experience growth regardless of the project, the project will cumulatively increase the attractiveness of the study area to industrial businesses and improve the flow of commuter traffic during peak hours. The cumulative effects of this project and other past, present, and future transportation projects will have an impact on land development, travel patterns, and water resources.

A summary of noteworthy future study area conditions is presented below.

- *Land Use/Development* – The Morrisville Land Use Plan designates the majority of the study area for office/institutional and industrial development. Development will likely occur in a steady manner throughout the near future, gradually reaching the study area's build out. Extensions of McCrimmon Parkway and Airport Boulevard will improve access to the area, increasing its attractiveness for development.

- *Travel patterns* – The project will improve the overall flow of traffic between several existing and planned thoroughfares in Morrisville, including Airport Boulevard, NC 54, and McCrimmon Parkway to I-40 and the Raleigh-Durham International Airport.

- *`Water Resources* –The increased proportion of the study area devoted to urban land uses will put more strains on the water resources. Long term, these strains can alter the availability and quality of hydrologic resources, both groundwater and surface water. Modifications in land use may also affect the proportions of ground water and surface runoff in rivers and streams. However, the following federal, state, and local regulations are in place to protect surface water quality and accommodate future growth.

    - *EPA National Pollution Discharge Elimination System (NPDES) - Phase II Stormwater Rules*

    - *North Carolina – Water Supply Watershed Protection Act*

    - *North Carolina –Neuse River Basins Nutrient Sensitive Waters Management*

    - *Neuse River Basin Buffer Rules*

    - *North Carolina - Nonpoint Source Program*

    - *Wake County – Land Use and Stormwater Regulations*

Adhering to these regulations for the protection of surface waters should limit direct and indirect effects to this important resource.

3.8 Step 8 – Assessing the Consequences/Mitigation Development

The purpose of this step is to assess the consequences of effects and determine the need for modifications to avoid effects, or strategies to mitigate unavoidable effects. General direction for assessing consequences and mitigation development is provided in the *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volume II: Practitioners Handbook*. Mitigation techniques appropriate to this project are presented below.

3.8.1 Mitigation Techniques for Encroachment-Alteration Effects

Encroachment-alteration indirect/cumulative effects, although often distant in time and space from the project, are similar to many direct project effects and can be addressed with similar mitigation strategies. As with direct effects, in many cases these strategies involve altering one of the following aspects of the project or plan within the control of the NCDOT:

- Facility type;
- Facility alignment;
- Facility design features;
- Techniques used during construction; and
- Facility maintenance.

3.8.2 Mitigation Techniques for Induced Growth

Project-induced growth can be mitigated to some extent through a variety of access control by NCDOT or land use control techniques by local municipalities. These techniques are described below as they related to the primary types of induced growth.

3.8.3 Techniques Available to the NCDOT

Access Management is one primary technique in which NCDOT can work under its own authority and initiative with local government to influence the magnitude and location of induced growth activity. The extent and location of complementary development and regional development shifts can be controlled to some extent through modifications to the access plan for the facility. For highway facilities, aspects of the project that can be modified include the location of interchanges, the type of the interchange (partial, one-way access or full access), connectivity to local arterials, traffic patterns on connecting roadways, the presence of frontage roads, and curb-cut regulations on connecting roadways. Some of these features such as the type and location of interchanges are within the jurisdiction of the sponsoring agency. Other issues, such as traffic patterns and curb-cut regulations may be within the jurisdiction of local agencies.

3.8.4 Techniques Available to Other Entities

Several techniques for regulating and managing growth induced by the proposed project or other actions are available for implementation by local governments and other

agencies. Where induced growth has been determined to be an issue requiring mitigation, the environmental document must describe techniques for growth management that may be implemented by other parties. These techniques fall into the following general categories:

Zoning/Comprehensive Planning – Local zoning controls and comprehensive planning are outside the jurisdiction of the NCDOT, but are often the most effective tools at controlling induced growth. Zoning involves the regulation of both the density and use to which land may be put. When combined with comprehensive planning, zoning allows communities to shape patterns of growth and development within their boundaries.

To use zoning and planning effectively as a tool to mitigate project induced growth, the land planning process should ideally run concurrent with the transportation planning process. If the land planning process occurs as a later time, particularly in areas that are clearly in the path of future development, anticipation of the project among developers and landholders may make the planning process more difficult. NCDOT can play a role in this process by encouraging local agencies to consider transportation facilities in land use planning through early consultation and coordination with local governments throughout the planning and environmental review process.

A zoning response to a transportation plan or project is also most effective when it involves an area-wide or region-wide approach to distinguishing areas suitable for growth from those requiring conservation. In circumstances where numerous planning jurisdictions are present in the impact area, the involvement of NCDOT or other regional planning agencies may be necessary to produce a coordinated response.

In cooperative efforts with local governments and agencies, it should be noted that zoning regulations enacted as a response to the induced growth effects of transportation facilities should balance other needs of the community including employment and housing for all income groups.

Growth Management Regulation – Several jurisdictions have pursued regulatory strategies that allow for regulation of the timing and location of residential and commercial development in a manager not addressed by traditional zoning regulations. Examples of growth management techniques that may be suggested for implementation in North Carolina include the following:

> *Adequate Public Facilities Ordinances* (APFOs) – This type of growth management strategy links approval for certain types of projects (those requiring subdivisions or variances, for example) to a review of the capacity of infrastructure to serve those projects. Infrastructure types often considered in these ordinances include water/sewer service, local transportation facilities, and other government services. Long range plans for the programming of infrastructure projects in Capital Improvement Plans are prepared as part of the ordinance and projects exceeding the capacity of infrastructure before improvements will be in place do not receive approval. Conditional approval of subdivisions based on provision of infrastructure at the developers expense (exactions) is provided for under North Carolina law, but ordinarily limited to streets, utilities, and parks, and does not cover schools, fire stations, or other community facilities. Requirements for the dedication of land (for purposes other

than parks or utility easements) or the payment of impact fees is not expressly provided for under North Carolina law. (Lawrence & Wicker, 1996).

Development Moratoria – Similar to APFOs, moratoria give local jurisdictions the authority to halt new development projects until public facilities are improved to an appropriate level. Moratoria have also been used to preserve corridors slated for transportation improvements.

Urban Growth Boundaries – Some metropolitan regions outside of North Carolina have adopted growth boundaries surrounding metropolitan areas to preserve open space around cities, slow the growth of suburban sprawl, and focus development into urban cores where infrastructure levels provide capacity for growth. These growth boundaries are often designed to accommodate growth projected for 20- to 30-year periods. Growth boundaries are effectuated by strictly regulating densities outside the growth boundaries or limiting the provision of infrastructure beyond the boundary (planning techniques that are permissible under North Carolina law). Regional authorities are often given the responsibility of regulating and planning the growth boundary system. Formal regional management of growth beyond county boundaries would likely require special enabling legislation in North Carolina. Portland, Oregon's experience shows that growth boundaries can be successful in preserving green space and promoting development of the core, but regulations need to be reviewed frequently to prevent spillover growth just outside protected areas.

Extraterritorial Zoning/Annexation – In some fast growing metropolitan regions, cities are given special authority over zoning issues and development applications in unincorporated areas outside city limits. Annexation and extraterritorial zoning powers are provided for under North Carolina statute. (Lawrence & Wicker, 1996.) This authority is meant to promote the orderly growth of the metropolitan area and compatibility between the city center and the periphery. Extraterritorial zoning authority is also granted with the expectation that city boundaries will eventually expand to keep pace with urban development. Policies meant to ease the process of annexation of incorporated or unincorporated suburban or fringe lands into a city's jurisdiction can mitigate against the induced growth impacts of transportation improvements by allowing planning, zoning, and growth management strategies to be implemented on a regional basis.

3.8.5 Mitigation Techniques for Effects Related to Induced Growth

In addition to managing residential and commercial growth induced by a transportation project, a local jurisdiction may also choose among strategies designed to mitigate the environmental and social effects related to induced growth.

3.8.6 Techniques Available to NCDOT

Context Sensitive Design – A major goal of context-sensitive design is to allow for local public input early in the design process so that costly delays and revisions can be avoided. Examples of context sensitive design and flexible standards include deviation from the standard length of an acceleration or deceleration lane to protect a notable feature, modifying the design of an arterial that passes through a downtown area to allow for a boulevard that would better fit with the local context, and inclusion of special

materials or design features to allow the facility to fit the scale and style of its surroundings.

3.8.7 Techniques Available to Other Entities

Resource Management and Preservation Regulations – Specific regulations designed to protect vital resources and work to guide the path and intensity of development and limit impacts on notable features related to induced growth. There are several examples of implementation of resource management in North Carolina. General categories include:

- Coastal areas where development areas are delineated and development is permitted only under special circumstances in critical areas.

- Stream buffers where development is regulated to protect the quality and quantity of water resources, prevent flooding, and promote water-related tourism and recreation.

Performance Standards – North Carolina law makes provision for the use of performance standards in local zoning and subdivision regulations. Performance standards can define uses as of right or the standards required for obtaining a conditional use permit. Performance standards encompass the following types of regulation:

- Regulation of height, bulk, setback, lot size and other dimensional features;

- Regulation of uses within zones and standards that define and distinguish uses;

- Specification of site design features such as off-street parking, impervious surface, vegetative cover removal, landscaping and screening, and signage;

- Specifications of standards for noise and pollutant emissions allowed in manufacturing or agricultural activities; and

- Standards for community appearance or historic preservation with review and limited enforcement powers vested in a planning agency or special commission.

Land Acquisition/Conservation Easements – A technique for preservation of green space, habitat, or other important resource areas that is seeing increasing use is the acquisition of land or development rights by government agencies, non-profit groups, or other private initiatives. These groups purchase or accept donations of land and pledge to keep the land permanently undeveloped. Development rights can also be purchased while the underlying title and use is retained by a landholder through the use of conservation easements. These easements once written into a deed can permanently prevent development on a parcel regardless of future ownership. Carefully planned acquisitions can work to focus growth and protect notable features from growth related impacts.

3.8.8 Techniques for Systems Planning Stage

Many of the techniques previously outlined are applicable to the transportation systems planning as well as to project development. As noted above, comprehensive planning, resource preservation regulations, and other techniques meant to shape growth when integrated with the planning of transportation systems will minimize the likelihood of

indirect/cumulative effects on notable features and conflicts with community goals. Additional techniques applicable to transportation systems planning include Comprehensive Performance Measures and Promoting Regional Coordination; these techniques are discussed below.

Comprehensive Performance Measures – Traditionally in the planning of transportation systems, the assessment of need for a transportation project has been based in part on measures of mobility in the existing transportation system. These measures focus on the efficient movement of vehicles. This is often measured in level of service (LOS) ratings describing various states of traffic conditions. Mobility measures provide no linkage, however, with land use conditions in the vicinity of projects. This disconnect can lead to the potential for conflict with notable features or goals later in the process. Evaluating projects with performance measures related to accessibility will help better connect transportation needs, land use considerations, and concerns regarding sustainability. Such measures include:

- Vehicle Miles Traveled (VMT) or Vehicle Hours Traveled (VHT);
- Accessibility to Jobs and Commercial Centers; and
- Impact on Jobs/Housing Balance.

The use of integrated transportation and land use models that employ a feedback loop between transportation and land use choices will also help integrate evaluation of induced growth concerns into the systems planning process.

Promoting Regional Coordination – Early coordination on a regional level is the best method for evaluation and mitigation of indirect/cumulative effects. Regional coordination is especially important in controlling induced growth because a variety of uncoordinated local regulatory responses may work to intensify effects in the least regulated areas.

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[1] North Carolina Department of Transportation. Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volumes I and II. Raleigh, NC: The Lois Berger Group, Inc. November 2001

[2] Council on Environmental Quality. CEQ Regulations for Implementing NEPA: Federal Regulation 49750. Washington D.C., 21 December 1984.

[3] CEQ Regulations for Implementing NEPA: Federal Regulation 49750, December 1984.

[4] North Carolina Department of Transportation, Division of Highways. Morrisville SR 3015 (Airport Boulevard) Widening from NC 54 to I-40 Administrative Action State Environmental Assessment. (Raleigh, NC: July 1996).

[5] Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, November 2001.

[6] Morrisville SR 3015 (Airport Boulevard) Widening from NC 54 to I-40 Administrative Action State Environmental Assessment. July 1996.

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[8] Research Triangle Regional Partnership. Data Book. No date. <www.researchtriangle.org> (11 November 2004).

[9] US Census Bureau. American Factfinder: Data Sets 2000 Summary File-1. <http://factfinder.census.gov> (2 November 2004).

[10] Capital Area Metropolitan Planning Organization. 2030 Long Range Transportation Plan. Raleigh, NC: September 2004. <http://www.raleigh-nc.org/campo/> (11 November 2004).

[11] Research Triangle Regional Partnership. 11 November 2004.

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[15] North Carolina Department of Environment and Natural Resources, Division of Water Quality. Basinwide Planning Program: 2002 Neuse River Basinwide Water Quality Plan. July 2002. <http://h2o.enr.state.nc.us/basinwide/> (12 November 2004).

[16] North Carolina State Government. Water Supply Watershed Protection Act. NCGS 143-214.5 (1989, c. 426, s. 1; 1991, c. 342, s. 9; c. 471, s. 2; c. 579, s. 1; 1991 (Reg. Sess., 1992), c. 890, s. 14; 1998-215, s. 62.) and 143-214.6 (1989, c. 426, s. 2, c. 603, s. 2, c. 727, s. 159; 2001-452, s. 1.2.)

[17] North Carolina Department of Environment and Natural Resources, Division of Water Quality. 15A NCAC 02B .0100 & .0200 Amended Effective: April 1, 2003 and Water Supply Watershed Classifications. <http://h2o.enr.state.nc.us/wswp/wsclasses.html> (15 November 2003).

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[19] F.H. Irwin and B. Rodes. Choosing Appropriate Scales for Making Decisions on Cumulative Impacts: A Guide for Managers. World Wildlife Fund and the Conservation Foundation. Washington, D.C. (1990)

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[21] Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B., 2002, Ecoregions of North Carolina and South Carolina, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

[22] Town of Morrisville. Town of Morrisville Land Use Plan. Adopted by the Morrisville Board of Commissioners November 8, 1999. Prepared by the Wooten Company.

[23] M.P. Schafale and A.S. Weakley, 1990. Classification of the Natural Communities of North Carolina, A Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment, Health and Natural Resources, Raleigh, NC.

[24] Environmental Laboratory. (1987). Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

[25] U.S. Fish and Wildlife Service. Lists of Endangered, Threatened, Proposed and Candidate Species for the Southeast Region. Wake County, North Carolina. Internet Database. February 25, 2003. http://southeast.fws.gov/es/county%20lists.htm.

[26] North Carolina Natural Heritage Program (NHP) Element Occurrence Database. North Carolina Natural Heritage Program, Division of Parks and Recreation, NC Department of Environment, Health, and Natural Resources. Internet database search at http://www.ncsparks.net/nhp/search.html. (January 2004).

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North Carolina Department of Transportation. Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina. Vol. I and II. Raleigh, NC: The Lois Berger Group, Inc., 2001.

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Research Triangle Partnership. Data Book. No Date. <www.researchtriangle.org> (11 November 2004).

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U.S. Fish and Wildlife Service. Lists of Endangered, Threatened, Proposed and Candidate Species for the Southeast Region. Wake County, North Carolina. Internet Database. February 25, 2003. http://southeast.fws.gov/es/county%20lists.htm.

Appendix A: Correspondences

Correspondence with CAMPO concerning Airport Boulevard ICE Questionnaire

Mr. Wilmot,

For the most part the questions on the ICE Questionnaire are best answered by the involved planning departments. I believe the widening of Airport Boulevard from McCrimmon Parkway to NC 54 will be beneficial; however, there may be problems when and if Airport Blvd. is extended as intended (As stated in the Town of Morrisville Draft Transportation Plan (Page 3-17))

http://www.ci.morrisville.nc.us/planning/Draft_Morrisville_Report1.pdf

The Town of Morrisville Transportation Plan calls for a square loop interchange at the intersection of Airport Blvd. and NC 54. This will require a grade separation and, inherently, significant disruption of the commercial properties adjacent to the portion of Airport Blvd. to be widened in FY 2005.

Though an Airport Blvd. Ext. and a McCrimmon Parkway Ext. is included in the 2030 LRTP, CAMPO staff favors the McCrimmon Parkway project due to its continuity and the fact that a square loop interchange is feasible at its intersection with NC 54. An underutilized lumber yard is located in the row in the McCrimmon Parkway/NC 54 location as opposed to the newly constructed commercial uses (Car Quest, Exxon, Citgo, Best Supply, and Culligan Water) that will be disrupted if the Airport Boulevard Extension and planned square loop interchange is constructed.

Essentially our concerns are not with this particular project, but more with future projects and the possibility that the widening to take place next year will have to be altered significantly in the long term if Morrisville's plans are adhered to and an Extension of Airport Blvd. And accompanying interchange are built.

Attached is a map showing the projects mentioned. Let me know if further clarification is needed or if there is a need to have on hand a completed questionnaire. CAMPO's concern falls within the first question so I could easily place this explanation there and then email you back the completed form.

Jake Petrosky
Planning Technician
Capital Area MPO
919.807.8515
-----Original Message-----
From: Kory_Wilmot@URSCorp.com [mailto:Kory_Wilmot@URSCorp.com]

Sent: Friday, October 15, 2004 2:32 PM

To: Johnson, Ed

Cc: Petrosky, Jake

Subject: RE: Airport Boulevard ICE

I have attached a brief description that provides the purpose and definition of the Indirect and Cumulative Effects (ICE) Process and a description of the project and its purpose and need. Also, the Environmental Assessment has already been approved by the NC DOT for this project. And as far as a time line for the project goes, according to the NC DOT 2004-2008 TIP, the project (U-3344) is scheduled as follows: design is underway, acquisitions in FY 04, and construction in FY 05.

(See attached file: Airport Boulevard Background Information.doc)

Thanks,

Kory Wilmot

"Johnson, Ed" <Ed.Johnson@ci.raleigh.nc.us

To: <Kory_Wilmot@URSCorp.com>

cc: "Petrosky,Jake" <Jake.Petrosky@ci.raleigh.nc.us>

Subject: RE: Airport Boulevard ICE

10/15/2004 01:39 PM

By copy I'm asking Jake Petrosky to assist you. To assist us, please send all available current info on the proposed project (alternative cross-sections being evaluated, implementation schedule with interim milestones, estimated project costs, etc.).

Edison H. Johnson, Jr., PE
Director, N.C. Capital Area
Metropolitan Planning Organization
127 W. Hargett St. - Suite 406
Raleigh, NC 27601
Telephone: 919.807.8500
Facsimile: 919.807.8517
E-Mail: ed.johnson@ci.raleigh.nc.us
Website: http://www.raleigh-nc.org/campo/index.htm

-----Original Message-----

From: Kory_Wilmot@URSCorp.com [mailto:Kory_Wilmot@URSCorp.com]

Sent: Friday, October 15, 2004 1:32 PM

To: Johnson, Ed

Subject: Airport Boulevard ICE

Mr. Johnson,

I am working on an Indirect and Cumulative Effects (ICE) study on the widening of Airport Boulevard in Morrisville from McCrimmon Parkway to NC 54 for the NC DOT. As part of the process, we need the perspective of local planners on how the road project may impact the community.

Attached to this email you will find a questionnaire on the potential impacts. It would be a great help if you (or someone that you designate) could answer these questions for us. It is not a rush to get the questionnaire back, but it would be ideal if you could return it within the next two weeks. If you have any questions or would like additional information on the project, please don't hesitate to contact me. Thanks for your time and cooperation.

Sincerely,

Kory Wilmot
Urban Planner
URS Corporation
1600 Perimeter Park Drive
Morrisville, NC 27560
phone: (919) 461-1333
email: kory_wilmot@urscorp.com

(See attached file: Airport Boulevard Survey.doc) Airport_Blvd_ICE.pc

Correspondence with Morrisville Planning Department concerning Airport Boulevard ICE Questionnaire

To: pculpepper@ci.morrisville.nc.us
10/15/2004 01:29 PM
Subject: Airport Boulevard Widening ICE

Mr. Culpepper,

I am working on an Indirect and Cumulative Effects (ICE) study on the widening of Airport Boulevard from McCrimmon Parkway to NC 54 for the NC DOT. As part of the process, we need the perspective of local planners on how the road project may impact the community. Attached to this email you will find a questionnaire on the potential impacts. It would be a great help if you (or someone that you designate) could answer these questions for us. It is not a rush to get the questionnaire back, but it would be ideal if you could return it within the next two weeks.

If you have any questions or would like additional information on the project, please don't hesitate to contact me. Thanks for your time and cooperation.

Sincerely,

Kory Wilmot
Urban Planner

URS Corporation
1600 Perimeter Park Drive
Morrisville, NC 27560
phone: (919) 461-1333
email: kory_wilmot@urscorp.com

(See attached file: Airport Boulevard Survey.doc)

From: Kory_Wilmot@URSCorp.com [mailto:Kory_Wilmot@URSCorp.com]
Sent: Wednesday, November 10, 2004 10:49 AM
To: Philip E. Culpepper
Subject: Airport Boulevard Widening ICE

Mr. Culpepper,

I sent you a questionnaire concerning the Airport Boulevard Widening Indirect and Cumulative Effects Study back in mid October (See Email below). My project deadline is fast approaching. Can you take a look at this and have a response for me by the first of next week?

Thanks,

Kory Wilmot
Urban Planner

URS Corporation
1600 Perimeter Park Drive
Morrisville, NC 27560

From: Philip E. Culpepper
Sent: Wednesday, November 10, 2004 4:15 PM
To: 'Kory_Wilmot@URSCorp.com'
Subject: RE: Airport Boulevard Widening ICE

To: <Kory_Wilmot@URSCorp.com>

Subject: FW: Airport Boulevard Widening ICE
Try sending the short list. These question will have to be written better then the last ones or I will not take the time to respond.

From: Kory_Wilmot@URSCorp.com [mailto:Kory_Wilmot@URSCorp.com]
Sent: Friday, November 12, 2004 10:24 AM
To: Philip E. Culpepper
Subject: Re: Airport Boulevard Widening ICE

The survey was not something that URS developed. It comes directly from the NC DOT and their publication "Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina."

Attached you will find an abridged version of the survey that has been tailored to this project. I hope you will find it easier to complete.

Regards,

Kory Wilmot
Urban Planner

URS Corporation
1600 Perimeter Park Drive
Morrisville, NC 27560
phone: (919) 461-1333
email: kory_wilmot@urscorp.com

(See attached file: Airport Boulevard Survey Abridged.doc)

From: Philip E. Culpepper
Sent: Monday, November 15, 2004 4:15 PM
To: 'Kory_Wilmot@URSCorp.com'
Subject: RE: Airport Boulevard Widening ICE

Attached you will find a completed survey.

Philip Culpepper
Planning Director
Town of Morrisville
919-463-6196
pculpepper@ci.morrisville.nc.us

Airport Boulevard Survey Abridged.

RECORD OF CONVERSATION

1600 Perimeter Park Dr.
URS
Morrisville, NC 27560

(919) 461-1100
(919) 461-1415 (fax)

SPOKE WITH: *Name:* Mr. Phillip Culpepper *Phone Number:* (919) 463-6196	*Recorded By:* Kory Wilmot
Organization/Company: Town of Morrisville Planning Director	*Date:* 11.11.04 *Time:* 10:00 AM.
Client: NCDOT	*Phone Number:* *Extension:*

☐ *Incoming* ☒ *Outgoing*

Route To:	*For Information*	*For Action*
	file	
File number		

Project Name: Airport Boulevard ICE

Contract No.: 31823694

Reason for Call: Called to follow up on the Airport Boulevard ICE Survey

QUESTIONS ASKED:

A voicemail was left to inform Mr. Culpepper of the importance of the survey and of having Morrisville's positions and opinions documented. I informed him that I had gone through the survey and narrowed it down to only 4 vital questions. I also offered to conduct the survey over the phone or to meet with him in person in an effort to make the process less cumbersome.

Airport Boulevard Widening (Morrisville)
Abridged Indirect and Cumulative Effects Survey

PURPOSE

The purpose of this Survey is to gain insight from local and regional professionals into the study area's economic and development patterns in order to assess how future economic and physical development patterns will be affected by the Project. This Survey is being distributed as part of an Indirect and Cumulative Impacts Study being conducted by NCDOT, DWQ, and URS Corporation (Project Consultant).

Interviewee: Philip Culpepper

Title: Planning Director

Affiliation/Company: Town of Morrisville

Phone Number: 919-463-6196

PROJECT DESCRIPTION

The purpose of this survey is to assess the potential indirect and cumulative effects that may result from the incremental effects of the proposed widening of Airport Boulevard (SR 3015), from NC 54 to McCrimmon Parkway (TIP U-3344A), and other past, present, and future development activities in the same geographic region as the project.

QUESTIONS

1. Describe the development projects and patterns you expect to take place in the area surrounding the proposed project over the next 25 years. How does the probability of development change if the road widening project does not occur?

Projects along this area would likely be similar to those along the portion of Airport Blvd. That already improved to five lanes.

Development will likely occur faster because NCDOT has lowered the cost of developing land fronting on the road. We would require developers build the improvements that arte now being built by NCDOT.

2. How does the project fit into Morrisville's land use, zoning, and transportation plans? Are there any conflicts between the project and the existing plans?

This project is consistent with all of these plans. There is no conflict.

3. Do the current ordinances and planning documents sufficiently address future development, environmental, and transportation needs? Are there specific changes that are needed and/or likely to occur?

All ordinances are sufficient. No changes are needed.

4. Do you anticipate additional capital investments to support future development that would not be made without the proposed project? Please explain and identify the areas and type of infrastructure improvement.

See question #1 above.

5. What are some of the competitive strengths that the study area has over other regions in North Carolina? What are some of the weaknesses? (i.e., in terms of technology, the labor pool, industrial base, etc.).

Morrisville has interstate access and large areas for commercial, office and industrial development. We are central to the Triangle. Our major weakness is that most of the roads in town are NCDOT and are in great need of improvement. Other towns send their traffic impact to us and we are not in the position to make necessary upgrades.

THANK YOU

Appendix B: Checklists

B-1

ORGANIZATION AND TABULATION OF GOALS CHART

(Check where applicable)

	Notes
Social Health and Well-Being Goals	
✓ Achieve adequate, appropriate and accessible open space and recreation.	The Town of Morrisville offers park and recreation activities, which include organized sports, athletic facilities, community centers, and cultural programs. These programs and facilities promote and active and healthy communities. The Wake County Soil and Water Conservation District works to protect, restore, and improve the use of soil, water, and related resources.
✓ Comply with state and federal water and air quality laws.	
___ Preserve or create multi-cultural diversity.	
___ Preserve heritage.	
___ Provide choice of affordable residential locations	
___ Provide urban environment for those with special needs.	
✓ Promote land use patterns with sense of community.	
✓ Provide a range of services accessible to all.	
✓ Promote a healthy and safe environment.	
✓ Provide sound management of solid and hazardous waste.	
___ Other.	
Economic Opportunity Goals	The Morrisville Land Use Plan is set up to provide for orderly growth and development in the town through coordination of development with existing and planned infrastructure improvements.
✓ Support activities to meet changing economic conditions.	
___ Provide energy-efficient transportation.	
___ Provide developments with transit-supported capabilities.	Morrisville's location next to RTP and the RDU airport has made it an attractive place for development. This trend will continue and Morrisville has worked to facilitate future development.
✓ Target economic export activities.	
✓ Attract and maintain work force.	
✓ Promote infill of smaller, passed-over sites.	
___ Encourage redevelopment of older areas for new purposes.	The Airport Boulevard Widening project is included in the Town of Morrisville's Transportation Plan and in the CAMPO TIP Plan.
___ Other.	
Ecosystem Protection Goals	
✓ Protect ecosystems.	Neuse River Basin Plans: – Protect unimpaired waters yet allow of reasonable economic growth. – Restore full use to impaired waters. – Protect high value resource waters.
___ Minimize fragmentation.	
___ Promote native species.	
___ Protect rare and keystone species.	
✓ Protect sensitive environments.	
___ Maintain natural processes.	
___ Maintain natural structural diversity.	
___ Protect genetic diversity.	
✓ Restore modified ecosystems.	
___ Other.	

B-2
STUDY AREA DIRECTIONS AND GOALS CHECKLIST

1. Generalized Setting

Within Metropolitan Statistical Area (Identify MSA)	✓	Raleigh-Cary
Outside of MSA		
Both Inside and Outside MSA		Indicate Distance to Nearest Metropolitan Center

2. Characteristics of Transportation System (Note: These items are not intended to cover entire transportation need, but rather to use information from more detailed assessments to provide a preliminary indication of existing accessibility, service and modal interrelationship characteristics, i.e., factors relevant to subsequent indirect effects analysis).

- Identify missing links in transportation system
- Map and describe existing level of service on minor and principal arterials and their access characteristics.
- Indicate distance to nearest interstate highway if not in study area.
- Map and describe existing transit routes and demand.
- Map and describe major concentrations of existing and planned development.
- Describe modal interrelationships including competing and complementary characteristics.

3. Population	**Trend**	**Projection**
Declining		
Static (± 1%/10 years)		
Slow Growth		
Rapid Growth (>10%/10 years)	✓	✓

4. Planning Context	**Yes**	**No**	**If Yes, identify by title, agency and date**
Zoning	✓		Morrisville
State Master Plan		✓	
County / Regional Master Plan	✓		CAMPO
Municipal Master Plan	✓		Morisville
Water Quality Management Plan	✓		NCDENR, DWQ
Other Natural Resources Management Plan			

5. Describe known plans for major new or expanded activity centers including public facilities. Plans exist to extend McCrimmon Parkway. This project, coupled with the construction of I-540, will make the area more attractive for development. .

Plans are underway for the construction of a new hotel and convention center to be located along Airport Boulevard near I-40.

Is the activity center dependent on transportation system improvement? **Yes** ✓ **No** ____

6. Is the transportation need linked to economic growth and land development? **Yes** ✓ **No** ____

If yes, is the nature of the linkage to:

Serve the needs of planned growth	____	or
Channelize growth	✓	or
Stimulate growth	✓	or

7 Based on information obtained, are there any apparent conflicts between transportation and other needs that could result in controversy? (Describe)

Yes ____ Possible ____ No ✓

B-3
ECOSYSTEM CONDITIONS INVENTORY

	Setting	Describe/Characterize
✓	Suburban	See Figure 2, Study Area and Figure 8 Current Land Use
	Landscapes	
	Remnant Communities	
	Greenways	
	Remnant Populations	
	Wetlands and Riparian Zones	
	Drainage Patterns	
	Natural Vegetation Diversity	
✓	Rural	See Figure 2, Study Area and Figure 8 Current Land Use
	Watersheds	.
	Local Ecosystem Integrity	
	Riparian Corridors	
	Endemics and Migratory Species	
	Riparian and Forest Corridors	
	Hydrology	
	Landscape Pattern Diversity	
	Dispersal Routes	
	Wildland	
	Regional Ecosystems	
	Remote Habitat	
	Contiguous Habitat	
	Habitat Interior Species	
	Unique Environments	
	Structural Components of Interior Habitat	
	Sub-Population Movements	

B-4
SOCIOECONOMIC CONDITIONS INVENTORY

Characteristic	Description
Economic	See Section 3.2.2 Population, Development and Employment.
Residents' Occupational Mix	
Jobs in Community (Mix)	
Jobs/Housing Balance (Self-Containment)	
Income Distribution Mix	
Journey to Work (Length and Mode)	
Job Growth Rate	
Business Ownership and Services Characteristics	
Demographic	See Section 3.2.2 Population, Development and Employment. See Section 3.3.3 Socioeconomic Conditions
Population Growth Rate	
Population Age Mix	
Household Types	
Retired Population Percent	
Social	
Community Cohesion	
Crime Rates	
Clubs, Sports and Organizations Participation	
Education Levels Mix	
Sense of Control Over Change	
Balance of Old Timers and Newcomers	
Physical	See Section 3.2.3 Zoning Land Use and Transportation Planning. See Section 3.3.2 Ecosystem Conditions.
Housing Stock Mix and Values	
Open Space Percent	
Town Area and Form	
Separation from Other Activity Centers	
Residential Density	
Mix of Land Uses	
Town Edge Activity	
Historic Structures and Places	
Circulation and Traffic Characterizations	
Neighborhood Design Characteristics	
Infrastructure Character	
Commercial Building Scale	

Town Entrance Setting	
Scenic Character	
Trees and Vegetation Presence	
Noise Levels and Timing	
Lighting Influence	

B-5
NOTABLE FEATURES CHECKLIST
(Check where applicable)

	Specify
Ecosystem Features	
✓ Regional Habitats of Concern / Critical Areas	
____ Rare, Threatened or Endangered Species and Associated Habitat	
____ Species Requiring High Survival Rates	
____ Species Whose Intrinsic Rates of Increase Fluctuate Greatly	
____ Communities with Vulnerable Keystone Predators or Materialists	
____ Other _____	
Socioeconomic Features	
____ Substandard Amounts of Open Space and Recreation	
____ Non-Compliance with State and Federal Environmental Laws	
____ High Concentration of Uncontrolled Solid and Hazardous Waste Sites	
____ Inadequate Affordable Housing	
✓ Inadequate Access to Amenities	
____ Economically Distressed Area	
____ Lack of Institutional Land Use Controls	
____ High Proportion of Population Consisting of:	
____ _____ Minorities	
____ _____ Low-Income Residents	
____ _____ Elderly	
____ _____ Young	
____ _____ Disabled	
____ Low Proportion of Long-Term Residents	
✓ Locations of Poor Traffic Flow	See Section 3.2.5. Transportation System Characteristics and Trends
____ Other _____	

B-6
NOTABLE FEATURES ADDRESSED BY FEDERAL AND NORTH CAROLINA STATUTUES

(Check where applicable)

Resource Type or Area or Issue	Statute/Order	Sources of Information, Data, Map Locations, Etc.
Section 4(f) Resources ✓ Public Parks and Recreational Lands ___ Wildlife and Waterfowl Refuges ✓ Historic Sites ___ Historic or Archaeological Districts ___ Archaeological Sites ___ Historic Structures	National Historic Preservation Act of 1966 [16 USC § 461-470; 36 CFR Part 800]; Transportation Equity Act for the 21st Century (TEA-21, 1998) [23 USC; PL 105-178 and as amended 105—206]; DOT Act [23 USC § 138, 49 USC § 303©, 23 CFR 771.135]; Act for the Preservation of American Antiquities [16 USC § 431-433]; American Indian Religious Freedom Act [42 USC § 1996]; Native American Grave Protection and Repatriation Act [25 USC § 3001-3013]; Historic Bridges [23 USC § 144(0)]; Wilderness Act [16 USC § 1131-1136]; Land and Water Conservation Fund Act [16 USC § 460-4 to 460-11]; National Trails Systems Act (16 USC § 1241-1249)	• US Department of the Interior, Fish & Wildlife Service (USFWS); US Department of the Interior, Bureau of Indian Affairs; US Department of the Interior, National Park Service (NPS); National Archives and Records Administration (NARA); US Department of Agriculture, Forest Service (USFS; Bureau of Land Management (BLM • North Carolina Department of Cultural Resources, Division of Archives and History; North Carolina Department of Environment and Natural Resources (NCDENR), Division of Parks and Recreation • Local Parks and Recreation Officials • Local historic preservation and genealogical organizations
___ Coastal Zone ___ Coastal Wetlands ___ Navigable Waters	Coastal Zone Management Act of 1972 [16 USC 33 § 1451-1465]; Clean Water Act [33 USC 1344]; E.O. 11990 – Protection of Wetlands; Rivers and Harbor Act of 1899 [33 USC 1344]; North Carolina Coastal Area Management Act 1974 (CAMA) [7 NCGS 113A-100-134.3]; North Carolina Water Quality Certification Rules [15A NCAC 2H.0500]; Coastal Barriers Resources Act [16 USC § 3501-3510]; CAMA Rules EIS NCAC 7H.0208]	• NCDENR, Division of Coastal Management; NCDENR, Division of Water Quality • US Army Corps of Engineers (USACE) • US Department of Commerce, Marine Fisheries Service • NCDENR, Division of Marine Fisheries

Resource Type or Area or Issue	Statute/Order	Sources of Information, Data, Map Locations, Etc.
___ Waters of the United States ___ Jurisdictional Wetlands ___ Coastal Wetlands (See Coastal Zone) ___ Navigable Waters ✓ Wetland Mitigation	Clean Water Act [33 USC 1251-1376]; E.O 11990 – Protection of Wetlands; Rivers and Harbor Act of 1899 [33 USC 401 *et seq.*]; State Watershed Buffer Rules [15A NCAC 2B.0233, .0242, .0259 and .0260]; North Carolina Water Quality Certification Rules [15A NCAC 2H.0500]; Wetland Restoration Program Rules [15A NCAC 2R.100]	• USACE; US Coast Guard • NCDENR, Division of Water Quality • NCDENR, Division of Coastal Management • US Department of Commerce, Marine Fisheries Service • NCDENR, Division of Marine Fisheries
✓ Stream Buffers	State Watershed Buffer Rules [15A NCAC 2B .0233, .0242, .0259, and .0260]	• NCDENR, Division of Water Quality
✓ Sedimentation	Sedimentation Pollution Control Act [NCGS 113 A-50-66]	• NCDENR, Division of Water Quality
✓ Stormwater	NC Regulations 15A NCAC 2H.1000	• NCDENR, Division of Water Quality
___ Sole Source Aquifer	Safe Drinking Water Act [42 USC § 300F-300J-6]	• NCDENR, Division of Water Quality; NCDENR, Division of Environmental Health
✓ Floodplains	E.O. 11988, Floodplain Management (as amended by E.O. 12148); Flood Disaster Protection Act [42 USC § 4001-4128]; North Carolina Floodplain [NCGS § 143-215.51-215.61]	• Federal Emergency Management Agency (FEMA) • North Carolina Department of Transportation (NCDOT) • Counties and Municipalities
___ Threatened and Endangered Species ✓ Rare / Unique Habitat	Endangered Species Act of 1973 [16 USC § 1531 *et seq*]; Fish and Wildlife Coordination Act [16 USC 661 *et seq*]; Marine Mammal Protection Act of 1972 [16 USC § 1361 *et seq*]; North Carolina Endangered Species Act [NCGS 113-331 to 113-337]; North Carolina Plant Protection and Conservation Act of 1979 [NCGS 106-202.12 to 106-202.22]	• USFWS; US Department of Commerce, Marine Fisheries Service; NCDENR, Division of Marine Fisheries • NCDENR, Division of Parks and Recreation, Natural Heritage Program, Wildlife Resources Commission; North Carolina Department of Agriculture
___ Area of Know Contamination ___ Solid Waste	Comprehensive Environmental Response Compensation Liability Act (CERCLA) [42 USC § 9601-9675]; Resource Conservation and Recovery Act (RCRA) [42 USC 6901 *et seq* (40 CFR Parts 240-271)	• US Environmental Protection Agency (USEPA) • NCDENR, Division of Waste Management
___ Wild, Scenic or Recreational Waters	Wild and Scenic Rivers Act [16 USC § 1271-1287; Public Law 90-542]; Rivers and Harbor Act of 1899 [33 USC 403]	• US Department of the Interior, NPS; USACE • NCDENR, Division of Coastal Management
✓ Surface Water	Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina	• NCDENR, Division of Water Quality

Resource Type or Area or Issue	Statute/Order	Sources of Information, Data, Map Locations, Etc.
	[15A NCAC 2B.0200]	
✓ Ground Water	North Carolina Groundwater Classification and Standards [15A NCAC 2L.0100]	• NCDENR, Division of Water Quality
___ Prime or Unique Farmland	Farmland Protection Act [7 USC § 4201-p4209]	• US Department of Agriculture, Natural Resource Conservation Service
✓ Sensitive Receptors	Noise Control Act [23 USC § 109(i)]	• USEPA • NCDOT
✓ Non-Attainment or Maintenance Areas ___ Sensitive Receptors	Clean Air Act [42 USC § 7609 {CAA § 309} 40 CFR Part 93]; North Carolina Clean Air Rules [15A NCAC 2D .0100-.2000]	• USEPA • Federal Highway Administration (FHWA) Southern Resource Center • NCDOT; NCDENR, Division of Air Quality
✓ Communities and Residential or Commercial Property	Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 [42 USC § 4602 *et seq*]; North Carolina Relocation Assistance Act [NCGS 133-5-18]; E.O. 12898-Environmental Justice	• US Department of Commerce, Census Bureau • Local Governments • Local Citizens Groups (Church, School, Social, Unions, Chambers of Commerce, Realtors), Individual Citizens
___ Environmental Justice	Civil Rights Act [Title V1:42 USC § 2000D (60 FR 33896) *et seq*); E.O. 12898-Environmental Justice	• US Department of Commerce, Census Bureau • Local Governments • Local Citizens Groups (Church, School, Social, Unions, Chambers of Commerce, Realtors), Individual Citizens

B-7
OTHER ACTIVITIES (EXISTING AND PROPOSED) THAT MAY CUMULATIVELY AFFECT NOTABLE FEATURES

Description / Responsible Party	Location *(Describe or Map)*	Status *(Existing/Proposed)*	Type of Potential Conflict with Notable Features
Residential			
Industrial / Commercial			
Hotel/Convention Center	Airport Boulevard and I-40	Under Construction	Land use, traffic alterations
Industrial Development	McCrimmon Parkway and Airport Boulevard	Proposed/ongoing	Land use, traffic alterations, ecosystem
Government / Community Facility			
TTA Rail Station	Southeast of project, downtown Morrisville	Proposed	Land use, ecosystem, traffic alterations
Utilities			
Transportation			
I-40 Widening	North of Project Study Area	Completed	Access Alteration, Changes in Traffic
I-540 Extension	West of Project Study Area	Under Construction	Access Alteration, Changes in Traffic
NC 55 Widening	Widen to multi-lanes from US 64 to Cornwallis Rd	Planning Stages	Access Alteration, Changes in Traffic
Aviation Parkway Widening	Widen to 5 lanes from I-40 to NC 54	Planning Stages	Access Alterations, Changes in Traffic
Airport Boulevard Extension	Extend from NC 54 to Davis Drive	Early Planning Stages	Access Alterations, Changes in Traffic
McCrimmon Parkway	Extend from NC 54 to Airport Boulevard and connecting with Aviation	Planning Stages	Access Alterations, Changes in Traffic
Other			

B-8
PROJECT IMPACT-CAUSING ACTIVITIES CHECKLIST

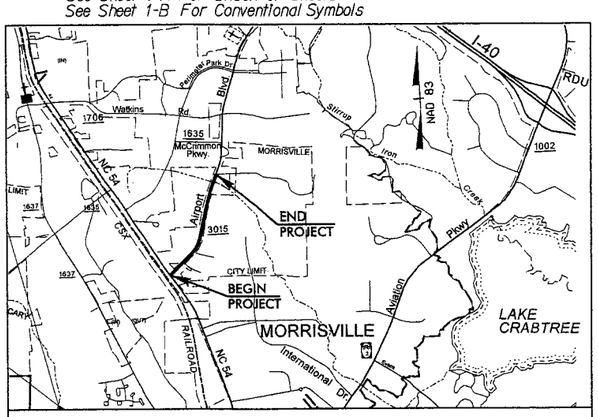
Modification of Regime	Yes	No	If Yes, Describe Generally (Source, Breadth, Duration, Location and Type)
Exotic Flora Introduction		✓	
Modification of Habitat	✓		Increase runoff, degradation of water quality from sedimentation.
Alteration of Ground Cover	✓		New construction, change in land use
Alteration of Groundwater Hydrology		✓	
Alteration of Drainage	✓		New construction, change in land use
River Control and Flow Modification		✓	
Channelization		✓	
Noise and Vibration	✓		Increased traffic flow, especially trucks
Land Transformation and Construction			
New or Expanded Transportation Facility	✓		Widening of existing Airport Boulevard
Service or Support Sites and Buildings		✓	
New or Expanded Service or Frontage Roads		✓	
Ancillary Transmission Lines, Pipelines, and Corridors		✓	
Barriers, Including Fencing		✓	
Channel Dredging and Straightening		✓	
Channel Revetments		✓	
Canals		✓	
Bulkheads or Seawalls		✓	
Cut and Fill	✓		Roadbed grading.
Resource Extraction			
Surface Excavation	✓		Cut/fill associated with road widening
Subsurface Excavation			
Dredging		✓	
Processing			
Product Storage		✓	
Land Alteration			
Erosion Control and Terracing	✓		Standard highway landscaping and construction methods.
Mine Sealing and Waste Control		✓	
Landscaping	✓		
Wetland or Open Water Fill and Drainage		✓	
Harbor Dredging		✓	
Resource Renewal			
Reforestation		✓	
Groundwater Recharge		✓	
Waste Recycling		✓	
Site Remediation		✓	
Changes in Traffic (including adjoining facilities)			
Railroad		✓	
Transit (Bus)		✓	
Transit (Fixed Guideway)		✓	
Automobile		✓	
Trucking		✓	
Aircraft		✓	
River and Canal Traffic		✓	
Pleasure Boating		✓	
Communication		✓	
Operational or Service Charge		✓	

Modification of Regime	Yes	No	If Yes, Describe Generally (Source, Breadth, Duration, Location and Type)
Waste Emplacement and Treatment			
Landfill		✓	
Emplacement of Spoil and Overburden		✓	
Underground Storage		✓	
Sanitary Waste Discharge		✓	
Septic Tanks		✓	
Stack and Exhaust Emission		✓	
Chemical Treatment			
Fertilization		✓	
Chemical Deicing		✓	
Chemical Soil Stabilization		✓	
Weed Control		✓	
Pest Control		✓	
Access Alteration			
New or Expanded Access to Activity Center	✓		Increased access to Fayetteville Airport
New or Expanded Access to Undeveloped Land	✓		Access to rural, undeveloped land.
Alter Travel Circulation Patters		✓	
Alter Travel Times Between Major Trip Productions and Attractions		✓	
Other			

TIP PROJECT: U-3344A

CONTRACT NO.: C201144

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3344A	1	

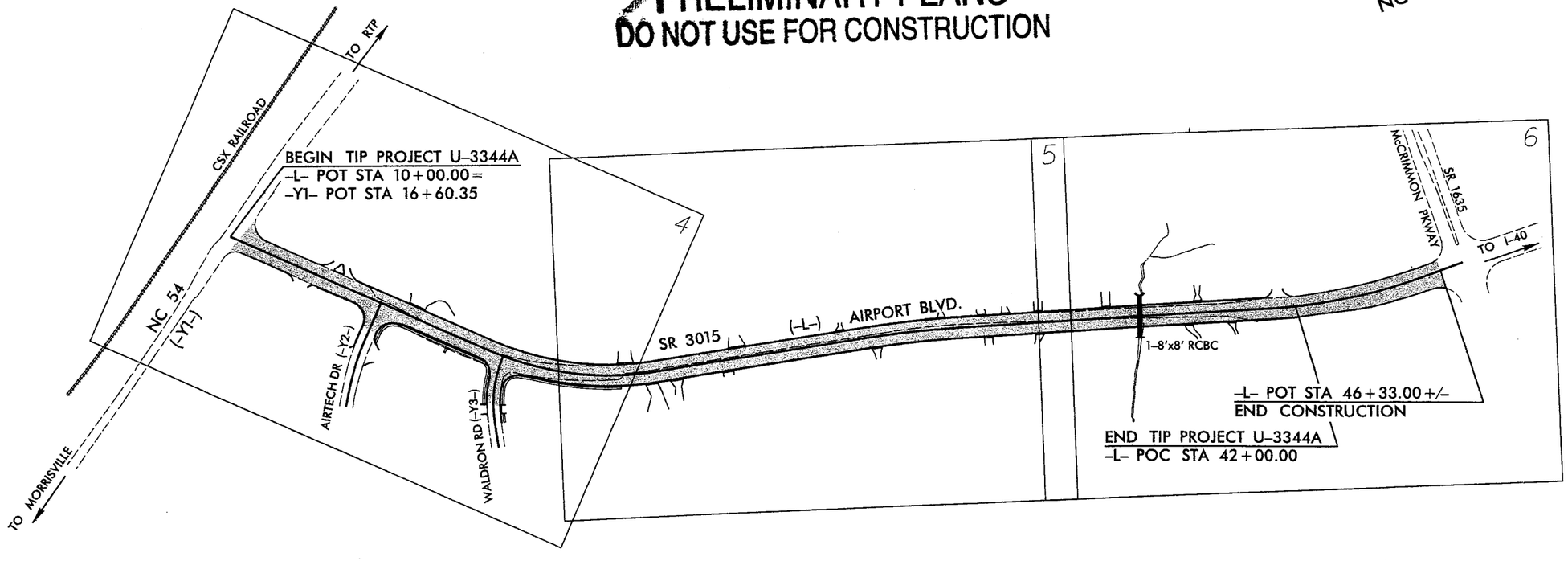
WBS NO.	F. A. PROJ. NO.	DESCRIPTION
34934.1.1		PE
34934.2.1		R/W, UTIL.
34934.3.3		CONST.

LOCATION: ***MORRISVILLE – SR 3015 (AIRPORT BLVD.) FROM NC 54 TO McCRIMMON PARKWAY***

TYPE OF WORK: ***WIDENING, GRADING, DRAINAGE, PAVING, SIGNALS, AND CULVERT***

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83
NC GRID



GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2005 = 15,500
ADT 2025 = 36,800
DHV = 11 %
D = 55 %
*T = 7 %
V = 50 MPH

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-3344A = 0.606 Mile
TOTAL LENGTH TIP PROJECT U-3344A = 0.606 Mile

NCDOT CONTACT: TERESA M. BRUTON, PE

Prepared In the Office of:
TY·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020
FOR THE NORTH CAROLINA DEPT. OF TRANSPORTATION

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: FEBRUARY 20, 2004

LETTING DATE: SEPTEMBER 20, 2005

CLAUDETTE M.K. ROQUE, PE
PROJECT ENGINEER

SUE R. FLOWERS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 23508 ENGINEER JEFFREY SUMMERLIN FLEMING
1/28/05
SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER
1/26/05
P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER *P.E.*

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	1-A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROGUE

1/24/05

Claudette M.K. Rogue

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1-A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1-B	CONVENTIONAL SYMBOLS
1-C	SURVEY CONTROL DATA
2	PAVEMENT SCHEDULE AND TYPICAL DETAILS
2-A THRU 2-C	TYPICAL SECTIONS
2-D THRU 2-E	TEMPORARY PAVEMENT
2-F	DETAIL IN LIEU OF STANDARD - DRIVEWAY-RADIUS TYPE
2-G THRU 2-H	DETAIL IN LIEU OF STANDARD - WHEELCHAIR RAMP
2-I	SPECIAL DETAIL FOR 2GI-A
3	SUMMARY OF QUANTITIES
3-A THRU 3-B	SUMMARY OF DRAINAGE QUANTITIES
3-C	EARTHWORK SUMMARY AND PAVEMENT REMOVAL SUMMARY
4 THRU 6	PLAN SHEETS
7 THRU 8	PROFILES
TCP-1 THRU TCP-18	TRAFFIC CONTROL PLANS
PM-1 THRU PM-5	PAVEMENT MARKING PLANS
EC-1 THRU EC-	EROSION CONTROL PLANS
SIGN-1 THRU SIGN-9	SIGNING PLANS
SIG-1 THRU SIG-2	SIGNAL PLANS
UC-1 THRU UC-5	UTILITY CONSTRUCTION PLANS
UO-1 THRU UO-3	UTILITY BY OTHERS PLANS
X-1 THRU X-18	CROSS-SECTIONS
X-1A	CROSS-SECTION SUMMARY SHEET
C-1 THRU C-5	CULVERT PLANS

GENERAL NOTES: 2002 SPECIFICATIONS
EFFECTIVE: 01-15-02
REVISED: 05-14-03

GRADING AND SURFACING OR RESURFACING AND WIDENING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. WHERE NO GRADE LINES ARE SHOWN, THE PROFILES SHOWN DENOTE THE TOP ELEVATION OF THE EXISTING PAVEMENT ALONG THE CENTER LINE OF SURVEY ON WHICH THE PROPOSED RESURFACING WILL BE PLACED. GRADE LINES MAY BE ADJUSTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II. (SPECIFY METHOD II OR III.)

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE AREAS IN THE PLANS DESIGNATED SAFETY CLEARING. THE LIMITS ARE AS SHOWN AND THE CLEARING AND GRUBBING IS CONSIDERED A PART OF THE LUMP SUM ITEM FOR "CLEARING AND GRUBBING".

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SIDE ROADS:

THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

UNDERDRAINS:

UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 AT LOCATIONS DIRECTED BY THE ENGINEER.

DRIVEWAYS:

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH DETAILS IN PLANS AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.

STREET RETURNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 848.04 USING THE RADII NOTED ON PLANS.

TEMPORARY SHORING:

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC NOT SHOWN ON THE PLANS WILL BE PAID FOR AT THE CONTRACT PRICE FOR "TEMPORARY SHORING" OR "TEMPORARY SHORING-BARRIER SUPPORTED" DEPENDING UPON THE LOCATION OF THE SHORING.

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE

TOWN OF MORRISVILLE, PROGRESS ENERGY, BELL SOUTH, PROGRESS TELECOM,

PUBLIC SERVICE NC, TIME WARNER, TOWN OF CARY

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS, EXCEPT AS SHOWN ON THE PLANS.

RIGHT-OF-WAY MARKERS:

ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY CONTRACT.

WHEELCHAIR RAMPS:

WHEELCHAIR RAMPS ARE SHOWN ON THE PLANS AT APPROXIMATE LOCATIONS. THE CONSTRUCTION OF ALL WHEELCHAIR RAMPS SHALL BE IN ACCORDANCE WITH DETAILS IN PLANS.

EFF. 01-15-02
REV.11-23-04

ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January 15, 2002 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
225.06	Method of Grading Sight Distance at Intersections
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation - Method 'A'
310.10	Driveway Pipe Construction
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
815.03	Pipe Underdrain and Blind Drain
838.01	Concrete Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.11	Brick Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.80	Precast Endwalls - 12" thru 72" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.01	Brick Catch Basin - 12" thru 54" Pipe
840.02	Concrete Catch Basin - 12" thru 54" Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.04	Concrete Catch Basin with Single and Multiple Pipes - 12" thru 48" Pipe
840.05	Brick Catch Basin with Single and Multiple Pipes - 12" thru 48" Pipe
840.14	Concrete Drop Inlet - 12" thru 30" Pipe
840.15	Brick Drop Inlet - 12" thru 30" Pipe
840.16	Drop Inlet Frame and Grates - for use with Std. Dwg 840.14 and 840.15
840.25	Anchorage for Frames - Brick or Concrete
840.29	Frames and Narrow Slot Flat Grates
840.31	Concrete Junction Box - 12" thru 66" Pipe
840.32	Brick Junction Box - 12" thru 66" Pipe
840.41	Spring Box - Concrete or Brick
840.45	Precast Drainage Structure
840.66	Drainage Structure Steps
840.72	Pipe Collar
846.01	Concrete Curb, Gutter and Curb & Gutter
848.01	Concrete Sidewalk
848.04	Street Turnout
850.01	Concrete Paved Ditches
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

ENAME: r:\U3344A\Roadway\Proj\U3344A_rdy_psh_01A.dgn
E: 01/26/2005

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	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
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
Riparian Buffer Zone — BZ
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
U/G Telephone Cable Hand Hold — HH
Cable TV Pedestal — C
U/G TV Cable Hand Hold — HH
U/G Power Cable Hand Hold — HH
Hydrant
Satellite Dish
Exist. Water Valve
Sewer Clean Out
Power Manhole
Telephone Booth — P
Cellular Telephone Tower
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
Storm Sewer Manhole — S
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
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
High Quality Wetland Boundary — HQ WLB
Medium Quality Wetland Boundaries — MQ WLB
Low Quality Wetland Boundaries — LQ 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

6/2/99

PROJECT REFERENCE NO.	SHEET NO.
34934.1.1	1 C
Location and Surveys	

SURVEY CONTROL SHEET U-3344A

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
101	BL-101	760367.3590	2049590.2230	345.57	OUTSIDE PROJECT LIMITS	
102	BL-102	760521.1020	2049796.6400	346.67	OUTSIDE PROJECT LIMITS	
103	BL-103	760633.4250	2049931.7830	346.68	10+35.29	48.91 RT
104	BL-104	760907.4060	2050214.5090	358.52	14+28.93	41.99 RT
105	BL-105	761218.8220	2050579.4030	351.09	19+01.63	68.45 RT
106	BL-106	761868.9760	2050782.9090	344.23	25+66.37	0.06 LT
107	BL-107	762404.5170	2050928.0050	349.59	31+21.47	3.91 RT
108	BL-108	762964.0250	2051128.6750	331.12	37+16.06	7.50 RT
109	BL-109	763526.6110	2051338.9880	342.92	43+13.59	28.68 RT

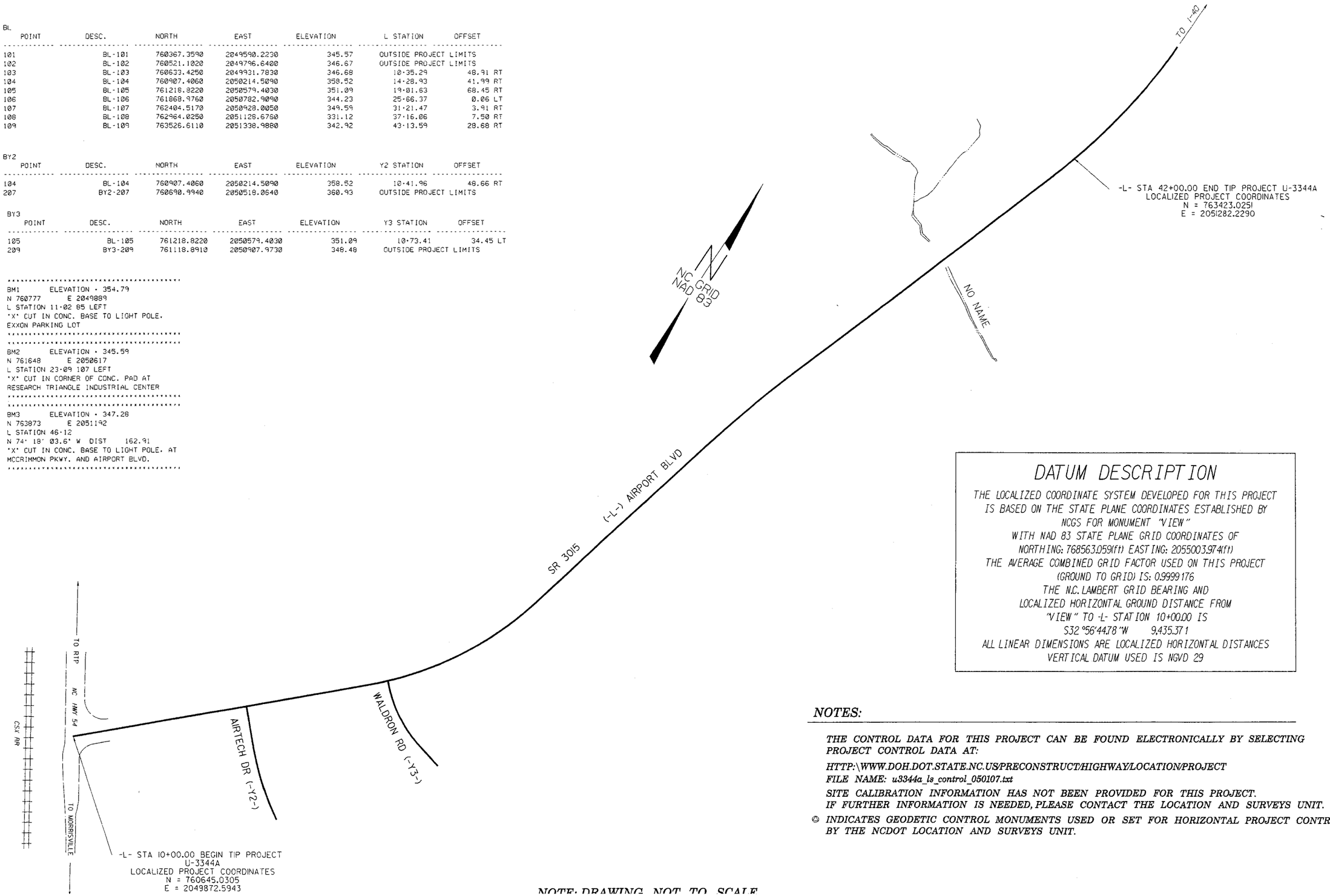
BY2

POINT	DESC.	NORTH	EAST	ELEVATION	Y2 STATION	OFFSET
104	BL-104	760907.4060	2050214.5090	358.52	10+41.96	48.66 RT
207	BY2-207	760690.9940	2050518.0640	360.93	OUTSIDE PROJECT LIMITS	

BY3

POINT	DESC.	NORTH	EAST	ELEVATION	Y3 STATION	OFFSET
105	BL-105	761218.8220	2050579.4030	351.09	10+73.41	34.45 LT
209	BY3-209	761118.8910	2050907.9730	348.48	OUTSIDE PROJECT LIMITS	

```
**************************************
BM1       ELEVATION = 354.79
N 760777      E 2049889
L STATION 11+02 85 LEFT
"X" CUT IN CONC. BASE TO LIGHT POLE.
EXXON PARKING LOT
**************************************
**************************************
BM2       ELEVATION = 345.59
N 761648      E 2050617
L STATION 23+09 107 LEFT
"X" CUT IN CORNER OF CONC. PAD AT
RESEARCH TRIANGLE INDUSTRIAL CENTER
**************************************
**************************************
BM3       ELEVATION = 347.28
N 763873      E 2051192
L STATION 46+12
N 74° 18' 03.6" W  DIST    162.91
"X" CUT IN CONC. BASE TO LIGHT POLE. AT
MCCRIMMON PKWY. AND AIRPORT BLVD.
**************************************
```



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "VIEW" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 768563.059(ft) EASTING: 2055003.974(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999176 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "VIEW" TO -L- STATION 10+00.00 IS S32°56'44.78"W 9,435.371 ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

NOTES:

THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:

HTTP:\WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT
FILE NAME: u3344a_ls_control_050107.txt

SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

△ ***INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.***

NOTE: DRAWING NOT TO SCALE

N:2005 13:48
cationSurveys\u3344a_ls_ic_050107.dgn
ay AT 05/24/16

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROQUE

Claudette M.K. Roque 11/28/15

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON

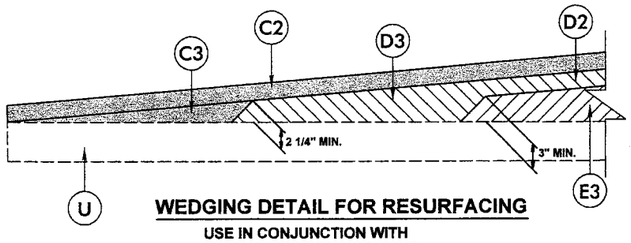
Clark S Morrison 11/28/15

TY·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

PAVEMENT SCHEDULE

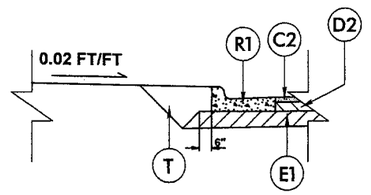
C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	R1	2'-6" CONCRETE CURB AND GUTTER.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	S	4" CONCRETE SIDEWALK.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.	T	EARTH MATERIAL.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
D2	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	V1	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 1½".
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.	V2	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 2½".
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	V3	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 4".
E2	PROP. APPROX. 5½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 627 LBS. PER SQ. YD.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL ON THIS SHEET).
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.		

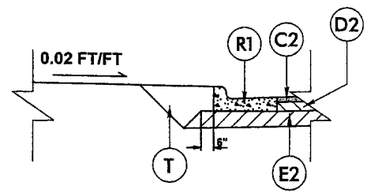
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



WEDGING DETAIL FOR RESURFACING

USE IN CONJUNCTION WITH TYPICAL SECTION NOS. 2 & 5

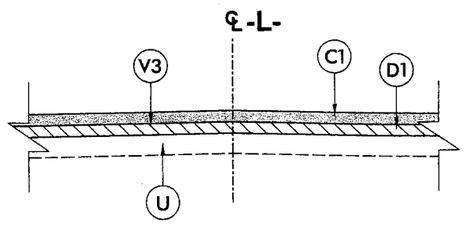


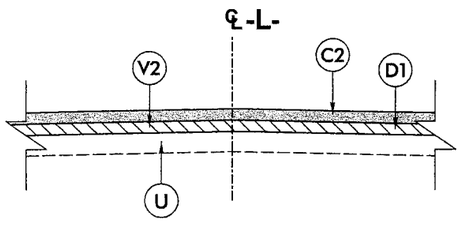


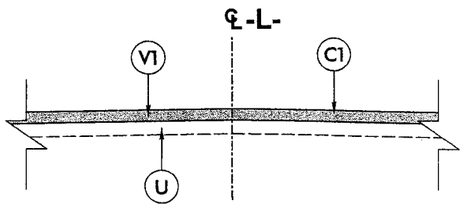
PAVEMENT EDGE CONSTRUCTION DETAILS

USE IN CONJUNCTION WITH TYPICAL SECTION NO. 5

USE IN CONJUNCTION WITH TYPICAL SECTION NOS. 2 & 3







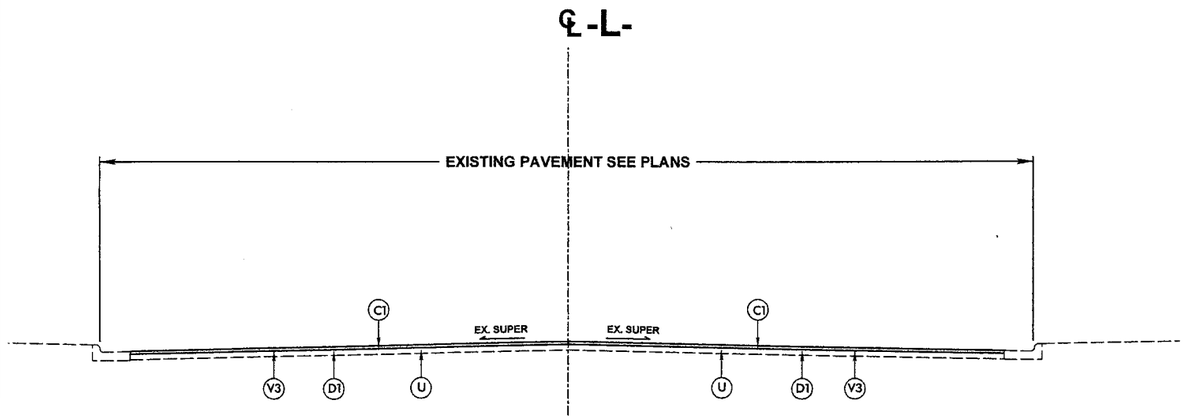
MILLING DETAILS

USE IN CONJUNCTION WITH TYPICAL SECTION NO. 1

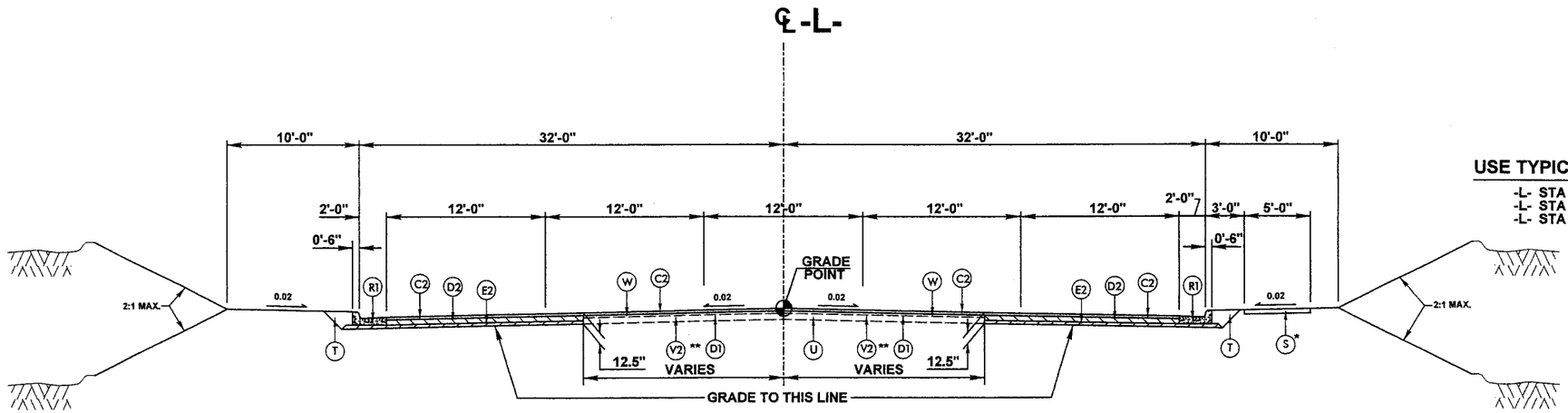
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 2

USE IN CONJUNCTION WITH TYPICAL SECTION NO. 4

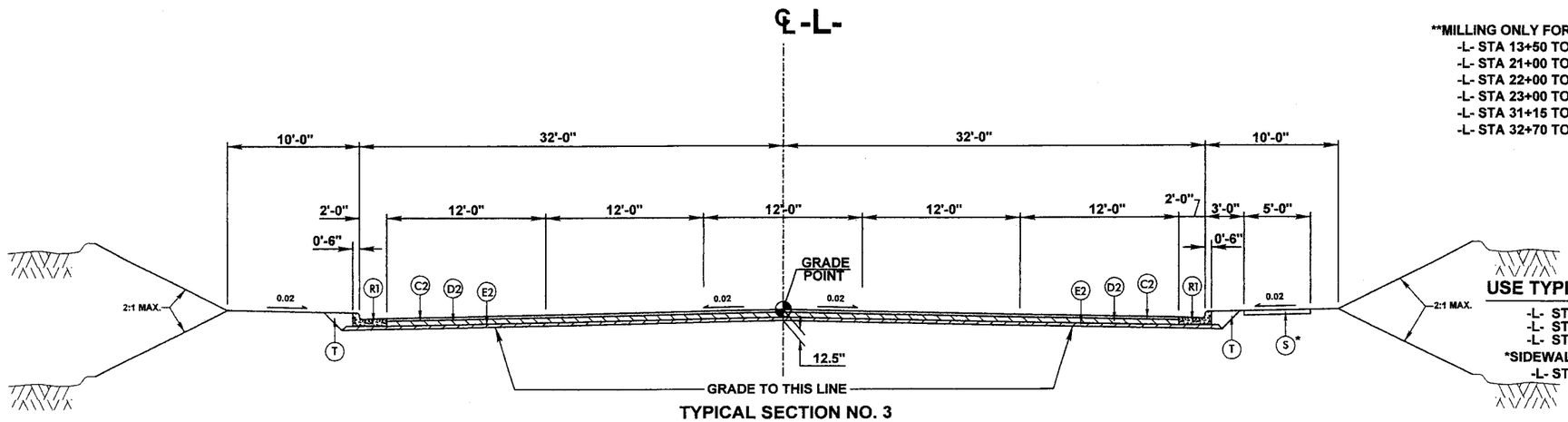
PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, I19.0B
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, I19.0B
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
E2	PROP. APPROX. 8½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
R1	2'-6" CONCRETE CURB AND GUTTER.
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 1½".
V2	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 2½".
V3	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 4".
W	VARIABLE DEPTH ASPHALT PAVEMENT
	NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 1



TYPICAL SECTION NO. 2



TYPICAL SECTION NO. 3

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2-A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. TOQUE 11/24/05

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON 11/24/05

TY·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

USE TYPICAL SECTION NO. 1 FOR:

-L- STA 10+36.70 TO STA 13+50
(MILLING AND RESURFACING ONLY)

USE TYPICAL SECTION NO. 2 FOR:

-L- STA 13+50 TO STA 15+00
-L- STA 21+00 TO STA 28+00
-L- STA 30+00 TO STA 33+50

*SIDEWALK TO BE REPLACED ONLY FOR:
-L- STA 21+00 TO STA 22+21

**MILLING ONLY FOR:
-L- STA 13+50 TO STA 15+00 4' OUTSIDE RT LANE
-L- STA 21+00 TO STA 21+35 12' RT LANE
-L- STA 22+00 TO STA 23+00 12' RT LANE
-L- STA 23+00 TO STA 28+00 24' RT/LT LANES
-L- STA 31+15 TO STA 32+70 4' OUTSIDE RT LANE
-L- STA 32+70 TO STA 33+50 24' RT/LT LANES

USE TYPICAL SECTION NO. 3 FOR:

-L- STA 15+00 TO STA 21+00
-L- STA 28+00 TO STA 30+00
-L- STA 33+50 TO STA 42+00

*SIDEWALK TO BE REPLACED ONLY FOR:
-L- STA 15+00 TO STA 21+00

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, I19.0B
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, I19.0B
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
E2	PROP. APPROX. 5½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
R1	2'-6" CONCRETE CURB AND GUTTER.
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 1½".
V2	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 2½".
V3	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 4".
W	VARIABLE DEPTH ASPHALT PAVEMENT
	NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2-B

ROADWAY DESIGN ENGINEER

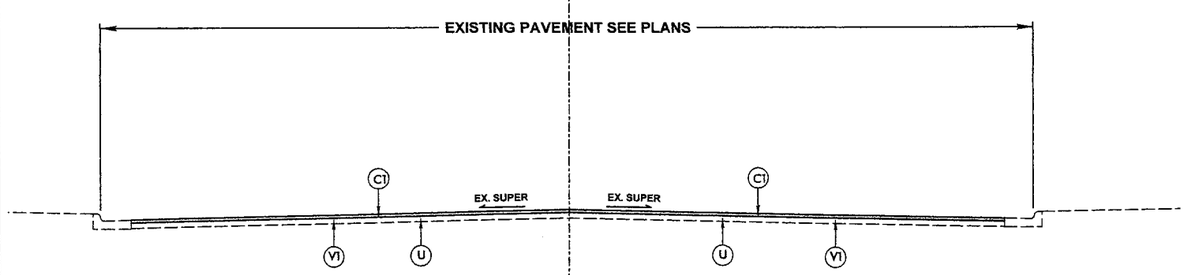
NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROGUE 11/24/08

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON 11/20/08

TY·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

℄-L-

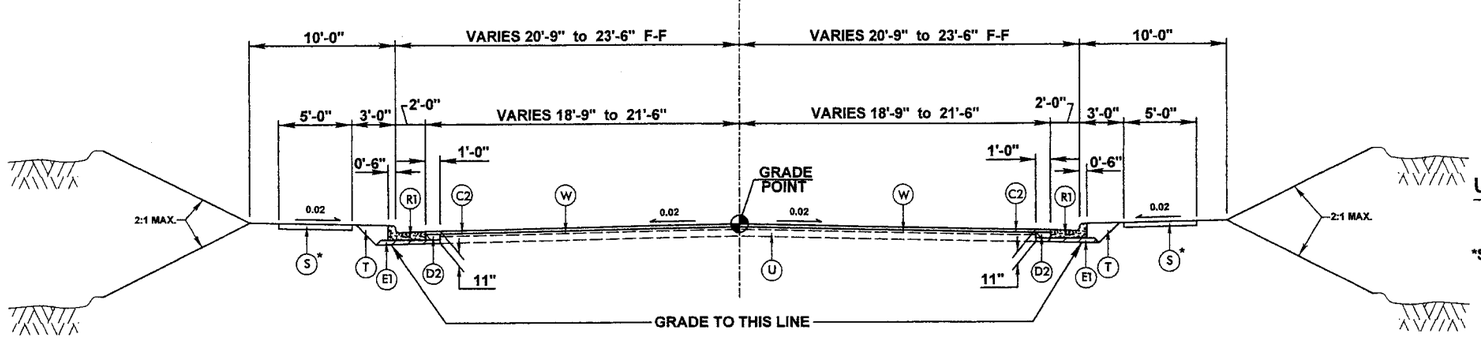


TYPICAL SECTION NO. 4

USE TYPICAL SECTION NO. 4 FOR:

-L- STA 42+00 TO STA 46+00+/-
(MILLING AND RESURFACING ONLY)

℄-Y2- & -Y3-



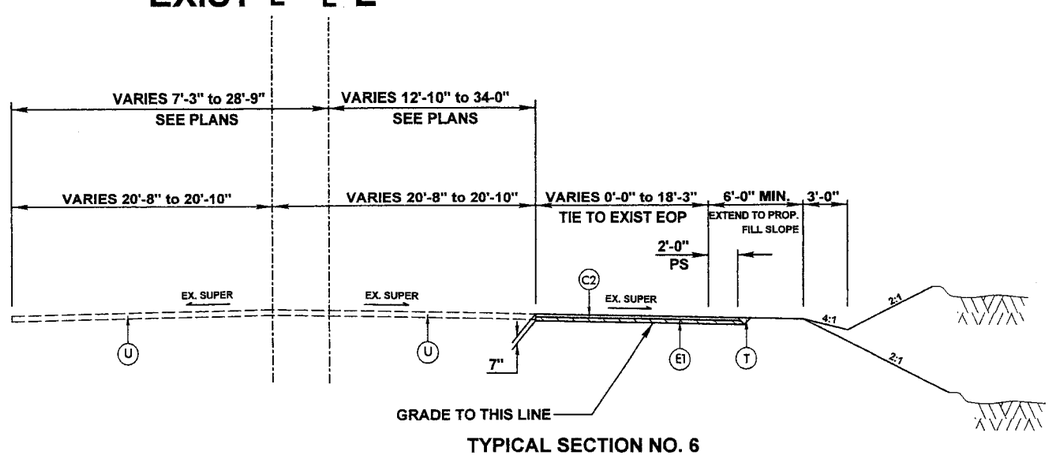
TYPICAL SECTION NO. 5

USE TYPICAL SECTION NO. 5 FOR:

-Y2- STA 10+86.20 TO STA 12+00
-Y3- STA 10+99.64 TO STA 12+00

***SIDEWALK TO BE REPLACED ONLY FOR:**
-Y2- STA 10+86.20 TO STA 11+17.07 LT
-Y3- STA 10+99.64 TO STA 12+00 LT
-Y3- STA 10+99.64 TO STA 11+44.26 RT

EXIST ℄ ℄-L-

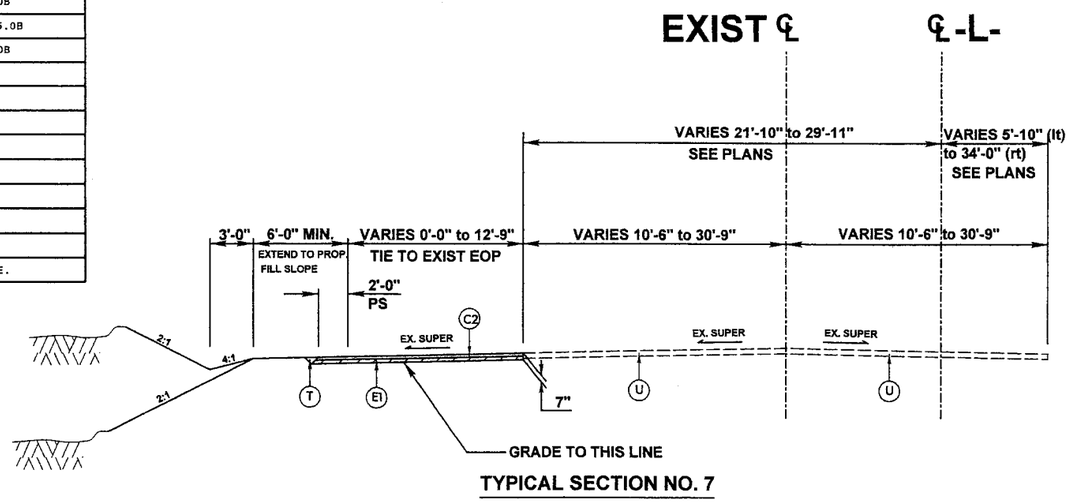


TYPICAL SECTION NO. 6

USE TYPICAL SECTION NO. 6 FOR:

-L- STA 19+00+/- TO STA 22+00+/-
TEMPORARY WIDENING
(SEE SHEET 2-D AND TRAFFIC CONTROL PLANS)

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B
D2	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, I19.0B
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, I19.0B
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
E2	PROP. APPROX. 5½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B
R1	2'-6" CONCRETE CURB AND GUTTER.
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 1½".
V2	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 2½".
V3	MILLING BITUMINOUS PAVEMENT TO A DEPTH OF 4".
W	VARIABLE DEPTH ASPHALT PAVEMENT
	NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



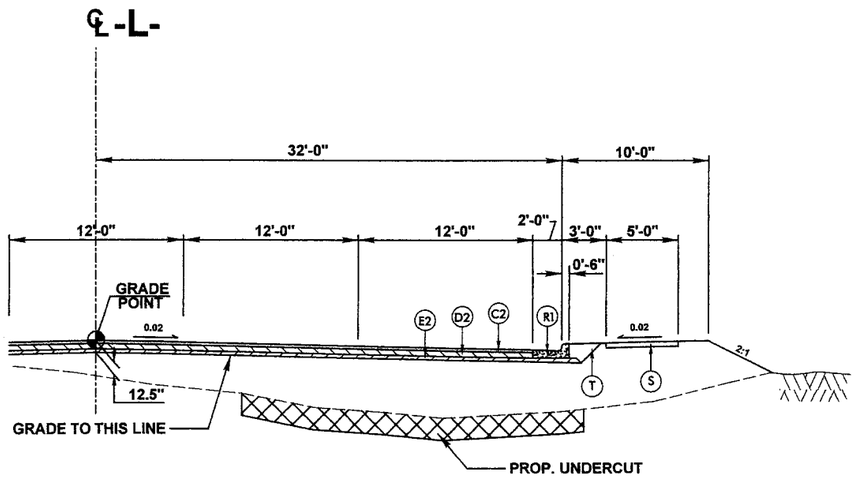
TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7 FOR:

-L- STA 33+94+/- TO STA 40+84+/-

TEMPORARY WIDENING

(SEE SHEET 2-E AND TRAFFIC CONTROL PLANS)



DETAIL OF UNDERCUTTING

USE IN CONJUNCTION WITH
TYPICAL SECTION NOS. 2 & 3

NOTE: UNDERCUT FROM APPROX. 10' RT OF ℄ -L- TO 1' BEYOND CURB AND GUTTER TO A MIN. DEPTH OF 4' BELOW EXISTING GROUND SURFACE. (SEE X-SECTS)

UNDERCUT EXCAVATION SHALL BE REQUIRED AT LOCATIONS NOTED ON PLANS OR AS DIRECTED BY THE ENGINEER.

USE UNDERCUT DETAIL FOR:

-L- STA 27+25 TO STA 29+25 (RT)

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2-C

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROQUE

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON

TYLIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2-D
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROQUE

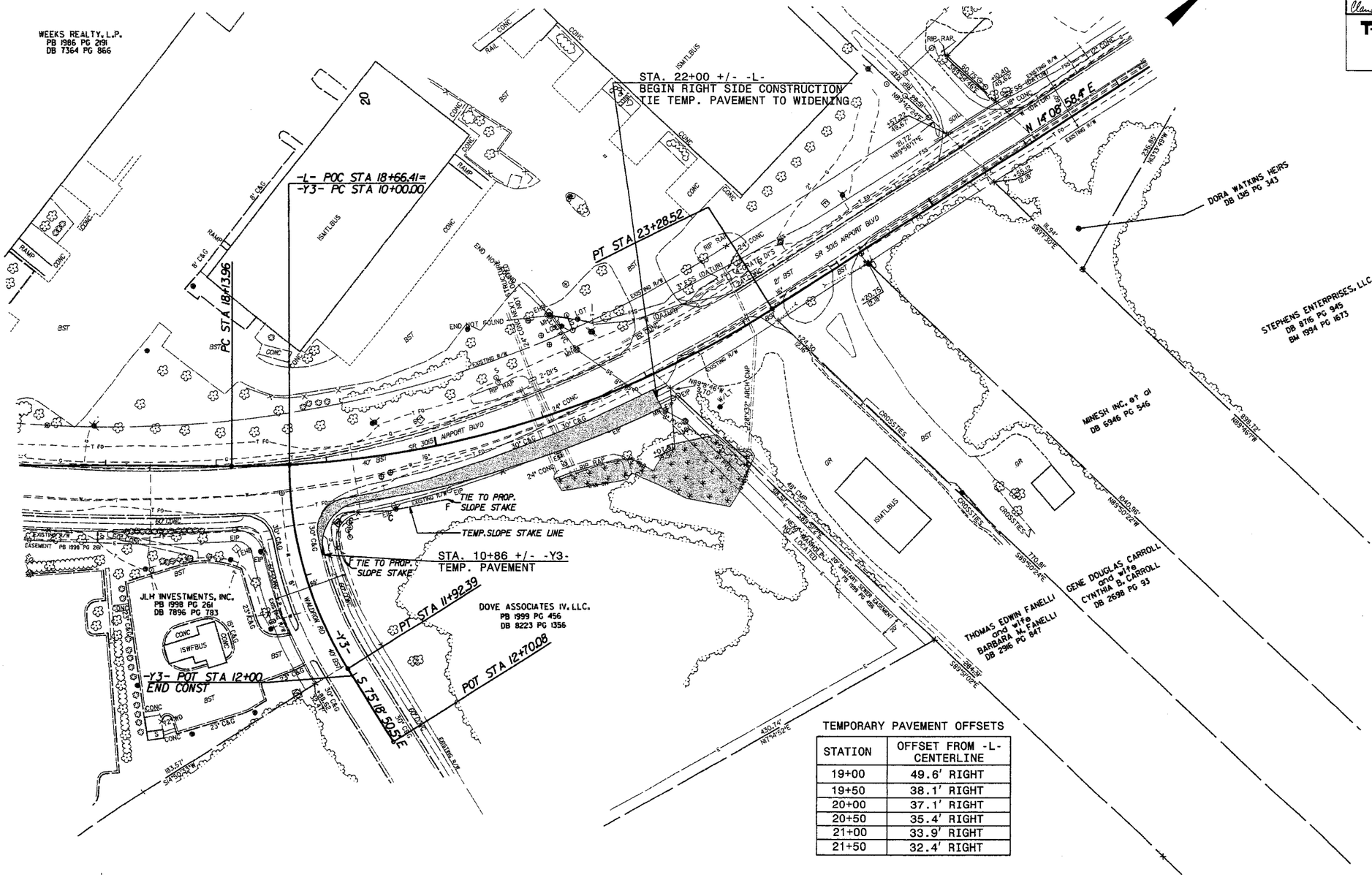
HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 25506 ENGINEER JENNY SUMMERLIN FLEMING

11/28/05

TYLIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

REVISIONS



STATION	OFFSET FROM -L- CENTERLINE
19+00	49.6' RIGHT
19+50	38.1' RIGHT
20+00	37.1' RIGHT
20+50	35.4' RIGHT
21+00	33.9' RIGHT
21+50	32.4' RIGHT

SEE TRAFFIC CONTROL PLANS FOR PHASING

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2-E
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROQUE

1/24/05

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 25506 ENGINEER JENNY SUMMERLIN FLEMING

1/20/05

TY·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

REVISIONS

NAD 83 NC GRID

RICHARD LARRY WATKINS
PB 1989 PG 1053
DB 4751 PG 482

G.J.C., A NORTH CAROLINA GENERAL PARTNERSHIP
PB 1986 PG 179
DB 3899 PG 253

EDWARD E. HOLLOWELL, TRUSTEE FOR DOVE INVESTMENT ASSOCIATES, III
PB 1980 PG 753
DB 5120 PG 130

GLORIA M. MOSS
PB 1980 PG 753
DB 8593 PG 698

WEEKS REALTY, L.P.
PB 1995 PG 159
PB 1993 PG 1425
DB 7282 PG 489

ROBERT L. FRITZ and wife JULIE T. FRITZ
DB 7663 PG 143

RUTH M. PERDUE
PB 1998 PG 280
WB 2000-E-749

RALPH WATKINS and wife MILDRED P. WATKINS
PB 1998 PG 210
DB 2822 PG 287

AIR PARK ASSOCIATES
DB 5438 PG 219

STA. 33+94 +/- -L-
TEMP. PAVEMENT
0' OFFSET

STA. 37+00 +/- -L-
TEMP. PAVEMENT
12.75' OFFSET

STA. 38+00 +/- -L-
TEMP. PAVEMENT
12.75' OFFSET

STA. 40+84 +/- -L-
TEMP. PAVEMENT
0' OFFSET

END STATE PROJECT U-3344A
-L- POC STA 42+00.00
END GRADE/BEGIN MILLING & RESURFACING

PC STA 41+19.14

TIE TO PROP. SLOPE STAKE

TEMP. SLOPE STAKE LINE

PT STA 32+54.38

-L- N 19° 37' 39.7" E

SEE TRAFFIC CONTROL PLANS FOR PHASING

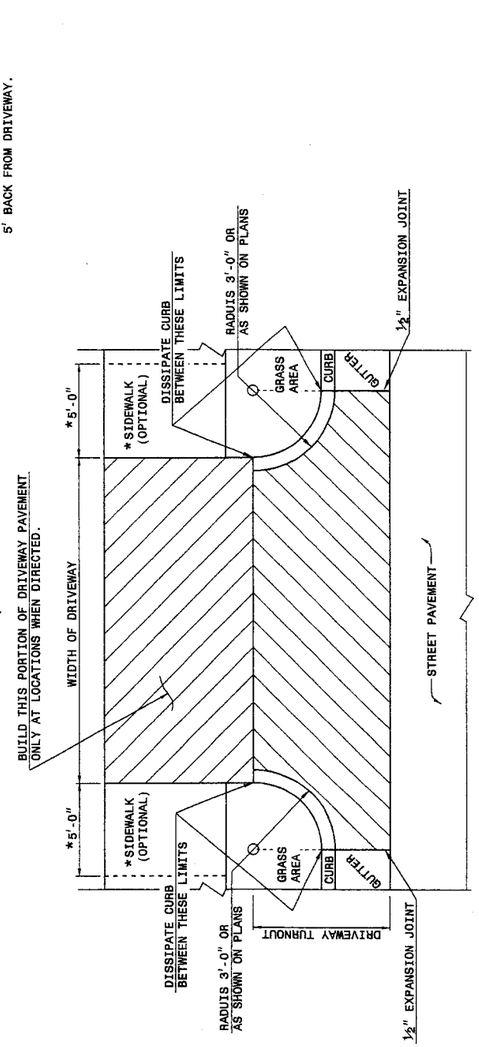
PROJECT REFERENCE NO.	SHEET NO.
U-3344A	2F

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

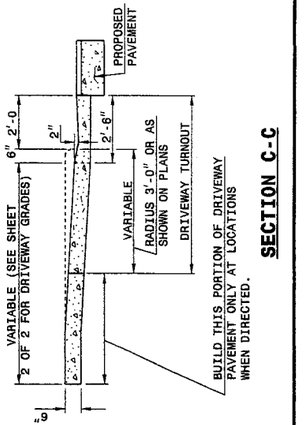
ENGLISH DETAIL DRAWING FOR
DRIVEWAY TURNOUT
RADIUS TYPE

SHEET 1 OF 2 **848D02**

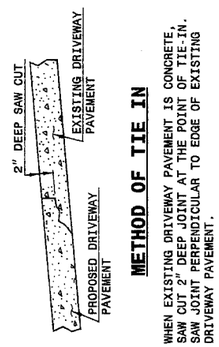
*SIDEWALK TAPERS DOWN 5' BACK FROM DRIVEWAY.



PLAN
DETAIL OF DRIVEWAY



SECTION C-C



METHOD OF TIE IN

WHEN EXISTING DRIVEWAY PAVEMENT IS CONCRETE, SAW CUT 2" DEEP JOINT AT THE POINT OF TIE-IN. SAW JOINT PERPENDICULAR TO EDGE OF EXISTING DRIVEWAY PAVEMENT.

STATE OF
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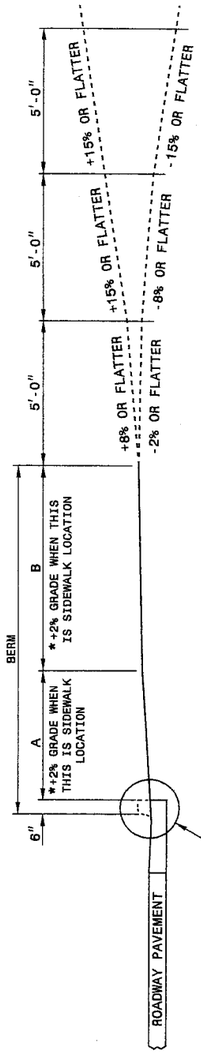
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
DRIVEWAY TURNOUT
DRIVEWAY GRADES

SHEET 2 OF 2 **848D02**

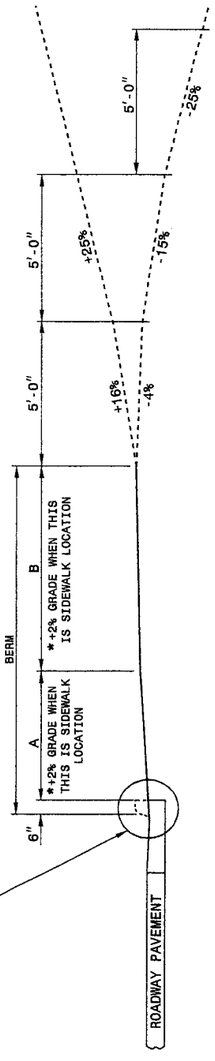
DESIRABLE DRIVEWAY GRADES

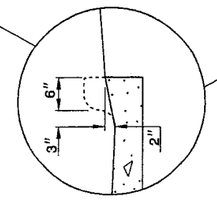


DESIRABLE OR MAXIMUM DRIVEWAY GRADES				
BERM WIDTH	A		B	
	DIST.	GRADE	DIST.	GRADE
8' OR LESS	5'-0"	+2%*	2'-6"	+5%
8' OR LESS	2'-0"	+6%	5'-6"	+2%*
10'	4'-0"	+4%	5'-6"	+2%*
12' & OVER	4'-6"	+4%	7'-0"	+2%*

*SIDEWALK LOCATION (DO NOT PLACE SIDEWALK ON BERMS LESS THAN 6' WIDE.)

MAXIMUM DRIVEWAY GRADES





STATE OF
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RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
DRIVEWAY TURNOUT
DRIVEWAY GRADES

SHEET 2 OF 2 **848D02**

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD. 848.02 DATE:
MODIFIED BY: E.E. WARD DATE: 03-27-03
CHECKED BY: DATE: 6/13/04

5/14/99

-OLT-2004 08dl
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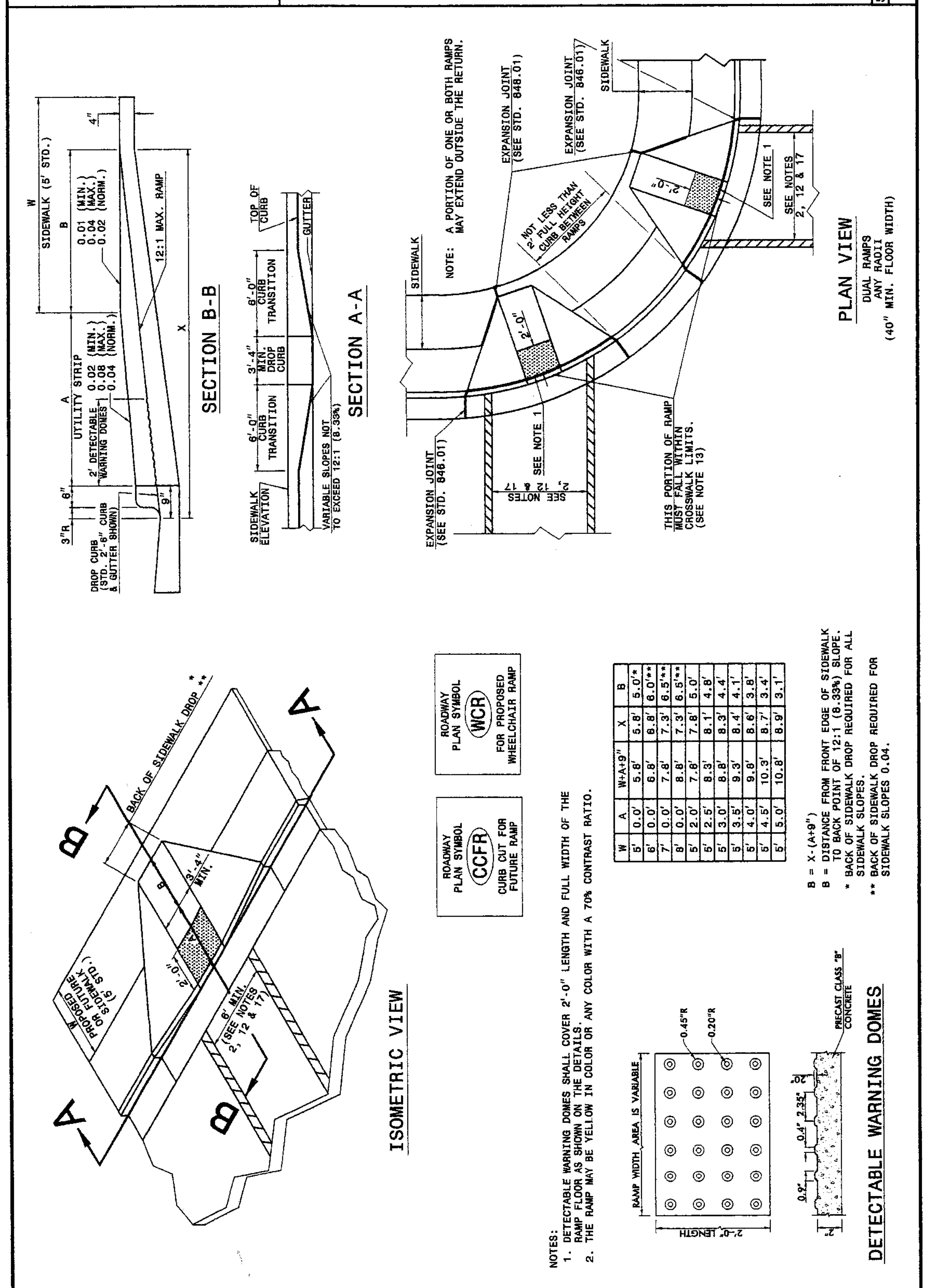
lowerJ AT DS212600

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ENGLISH DETAIL DRAWING FOR WHEELCHAIR RAMP CURB CUT
SHEET 1 OF 4 848D05



NOTES:
1. DETECTABLE WARNING DOMES SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. THE RAMP MAY BE YELLOW IN COLOR OR ANY COLOR WITH A 70% CONTRAST RATIO.

W	A	W+A+9"	X	B
5'	0.0'	5.8'	5.8'	5.0'*
6'	0.0'	6.8'	6.8'	6.0'**
7'	0.0'	7.8'	7.3'	6.5'**
8'	0.0'	8.8'	7.3'	6.5'**
5'	2.0'	7.8'	7.8'	5.0'
5'	2.5'	8.3'	8.1'	4.8'
5'	3.0'	8.8'	8.3'	4.4'
5'	3.5'	9.3'	8.4'	4.1'
5'	4.0'	9.8'	8.6'	3.8'
5'	4.5'	10.3'	8.7'	3.4'
5'	5.0'	10.8'	8.9'	3.1'

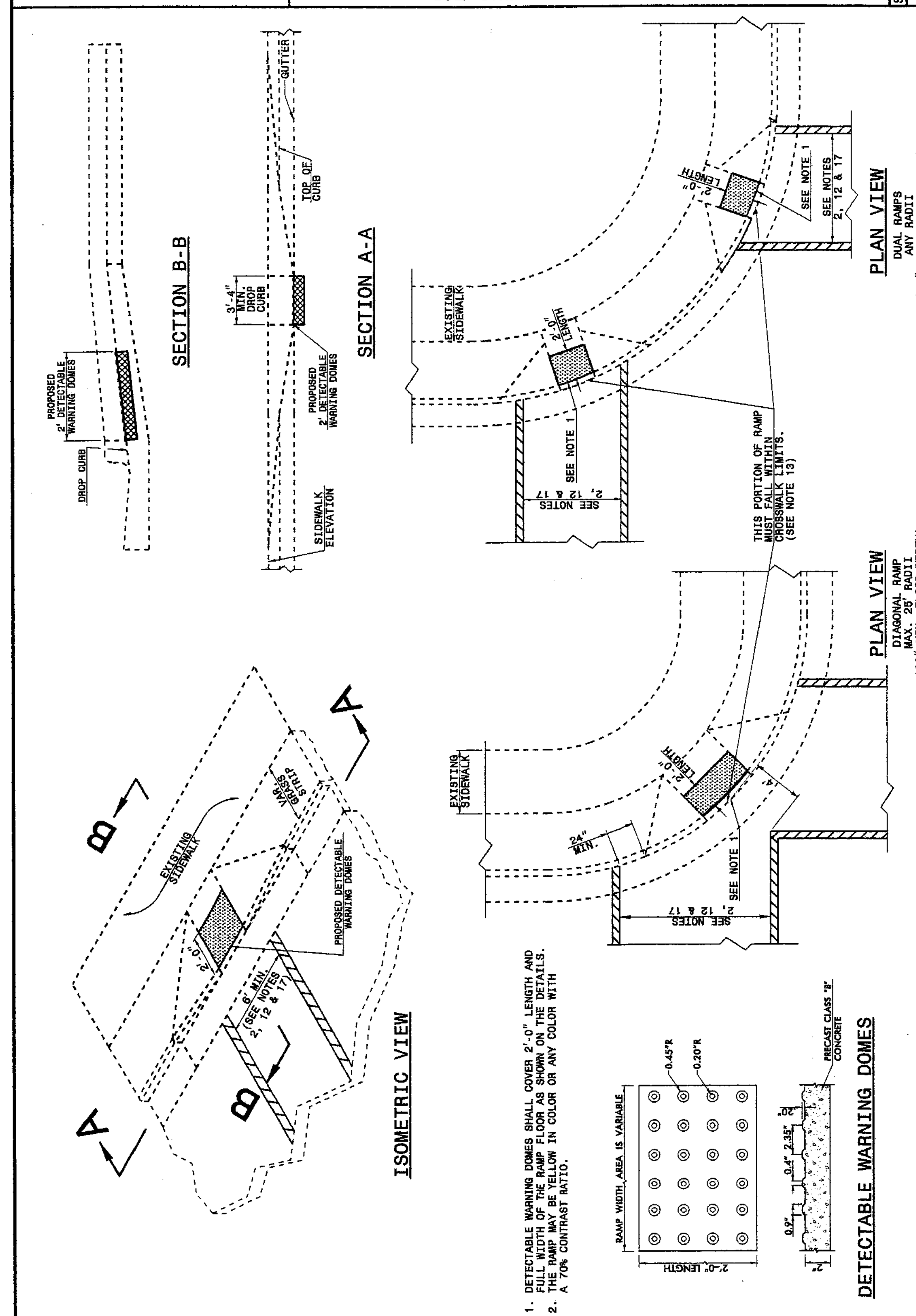
B = X-(A+9")
B = DISTANCE FROM FRONT EDGE OF SIDEWALK TO BACK POINT OF 12:1 (8.33%) SLOPE.
* BACK OF SIDEWALK DROP REQUIRED FOR ALL SIDEWALK SLOPES.
** BACK OF SIDEWALK DROP REQUIRED FOR SIDEWALK SLOPES 0.04.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
CURB CUT

SHEET 1 OF 4 **848D05**

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ENGLISH DETAIL DRAWING FOR RETROFITTING DETECTABLE WARNING DOMES ONTO EXISTING WHEELCHAIR RAMP CURB CUT
SHEET 2 OF 4 848D05



1. DETECTABLE WARNING DOMES SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. THE RAMP MAY BE YELLOW IN COLOR OR ANY COLOR WITH A 70% CONTRAST RATIO.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
RETROFITTING DETECTABLE WARNING DOMES ONTO EXISTING WHEELCHAIR RAMP
CURB CUT

SHEET 2 OF 4 **848D05**

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

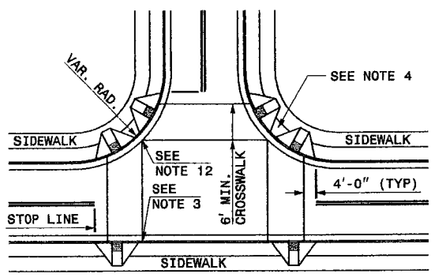
SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD.848.05 DATE:
MODIFIED BY: E.E. WARD DATE: 06-18-03
CHECKED BY: [signature] DATE: 6-03

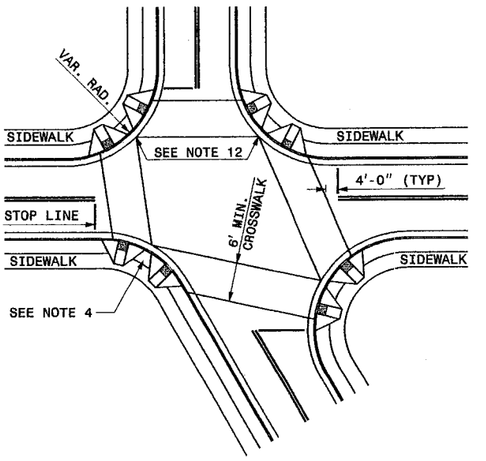
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
CURB CUT

SHEET 3 OF 4
848D05



DETAIL SHOWING TYPICAL LOCATION OF WHEELCHAIR RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES FOR TEE INTERSECTIONS



DETAIL SHOWING TYPICAL LOCATION OF WHEELCHAIR RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES

PROPOSED WHEELCHAIR RAMP
PROPOSED OR FUTURE SIDEWALK

ALLOWABLE LOCATIONS

DUAL RAMP RADII.....ANY

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
CURB CUT

SHEET 3 OF 4
848D05

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
CURB CUT

NOTES:

1. CONSTRUCT THE WALKING SURFACE WITH SLIP RESISTANTANCE AND A 70% CONTRASTING COLOR TO THE SIDEWALK.
2. CROSSWALK WIDTHS AND CONFIGURATION VARY BUT MUST CONFORM TO TRAFFIC DESIGN STANDARDS.
3. NORTH CAROLINA GENERAL STATUTE 136-44.14 REQUIRES THAT ALL STREET CURBS BEING CONSTRUCTED OR RECONSTRUCTED FOR MAINTENANCE PROCEDURES, TRAFFIC OPERATIONS, REPAIRS, CORRECTION OF UTILTIES OR ALTERED FOR ANY REASON AFTER SEPTEMBER 1, 1973 SHALL PROVIDE WHEELCHAIR RAMPS FOR THE PHYSICALLY DISABLED AT ALL INTERSECTIONS WHERE BOTH CURB AND GUTTER AND SIDEWALKS ARE PROVIDED AND AT OTHER POINTS OF PEDESTRIAN FLOW.

   IN ADDITION, SECTION 228 OF THE 1973 FEDERAL AID HIGHWAY SAFETY ACT REQUIRES PROVISION OF CURB RAMPS ON ANY CURB CONSTRUCTION AFTER JULY 1,1976 WHETHER A SIDEWALK IS PROPOSED INITIALLY OR IS PLANNED FOR A FUTURE DATE.

   THE AMERICANS WITH DISABILITIES ACT (ADA) OF 1990 EXTENDS TO INDIVIDUALS WITH DISABILITIES. COMPREHENSIVE CIVIL RIGHTS PROTECTIONS SIMILIAR TO THOSE PROVIDED TO PERSONS ON THE BASIS OF RACE, SEX, NATIONAL ORIGIN AND RELIGION UNDER THE CIVIL RIGHTS ACT OF 1964. THESE CURB RAMPS HAVE BEEN DESIGNED TO COMPLY WITH THE CURRENT ADA STANDARDS.

4. PROVIDE WHEELCHAIR RAMPS AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. LOCATE WHEELCHAIR RAMPS AS DIRECTED BY THE ENGINEER WHERE EXISTING LIGHT POLES, FIRE HYDRANTS, DROP INLETS, ETC. AFFECT PLACEMENT. WHERE TWO RAMPS ARE INSTALLED PLACE NOT LESS THAN 2 FEET OF FULL HEIGHT CURB BETWEEN THE RAMPS. PLACE DUAL RAMPS AS NEAR PERPENDICULAR TO THE TRAVEL LANE BEING CROSSED AS POSSIBLE.
5. PAY FOR ALL VARIABLE DEPTH CONCRETE USED FOR CONSTRUCTION OF WHEELCHAIR RAMPS AS CONCRETE WHEELCHAIR RAMPS. (SQ. YDS.)
6. PAY FOR ALL DEPRESSED CURBS AT WHEELCHAIR RAMPS AS THE TYPE CURB AND GUTTER USED ADJACENT TO DEPRESSED CURB. (LN. FT.)
7. SUCH PRICES AND PAYMENTS IS CONSIDERED FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPMENT, TOOLS AND INCIDENTALS NECESSARY TO SATISFACTORILY COMPLETE THE WORK.
8. DO NOT EXCEED 0.08 (12:1) SLOPE ON THE WHEELCHAIR RAMP IN RELATIONSHIP TO THE GRADE OF THE STREET.
9. CONSTRUCT WHEELCHAIR RAMPS 40" (3'-4") OR GREATER FOR DUAL RAMPS.
10. USE CLASS "B" CONCRETE WITH A SIDEWALK FINISH IN ORDER TO OBTAIN A ROUGH NON-SKID TYPE SURFACE.
11. PLACE A ½" EXPANSION JOINT WHERE THE CONCRETE WHEELCHAIR RAMP JOINS THE CURB AND AS SHOWN ON STD. DWG. 848.01.
12. PLACE THE INSIDE PEDESTRIAN CROSSWALK LINES NO CLOSER IN THE INTERSECTION BY BISECTING THE INTERSECTION RADII, WITH ALLOWANCE OF A 4' CLEAR ZONE IN THE VEHICULAR TRAVELWAY WHEN ONE RAMP IS INSTALLED. (SEE NOTE 17)
13. COORDINATE THE CURB CUT AND THE PEDESTRIAN CROSSWALK LINES SO THE FLOOR OF THE WHEELCHAIR RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES. PLACE DIAGONAL RAMPS WITH FLARED SIDES SO 24" OF FULL HEIGHT CURB FALLS WITHIN THE CROSSWALK MARKINGS ON EACH SIDE OF THE FLARES.
14. CONSTRUCT THE PEDESTRIAN CROSSWALK A MINIMUM OF 6 FEET. A CROSSWALK WIDTH OF 10 FEET OR GREATER IS DESIRABLE.
15. USE STOP LINES, NORMALLY PERPENDICULAR TO THE LANE LINES, WHERE IT IS IMPORTANT TO INDICATE THE POINT BEHIND WHICH VEHICLES ARE REQUIRED TO STOP IN COMPLIANCE WITH A TRAFFIC SIGNAL, STOP SIGN OR OTHER LEGAL REQUIREMENT. AN UNUSUAL APPROACH SKEW MAY REQUIRE THE PLACEMENT OF THE STOP LINE TO BE PARALLEL TO THE INTERSECTING ROADWAY.
16. TERMINATE PARKING A MINIMUM OF 20 FEET BACK OF PEDESTRIAN CROSSWALK.
17. PLACE ALL PAVEMENT MARKINGS IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION AND THE NORTH CAROLINA SUPPLEMENT TO THE MUTCD.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
CURB CUT

SHEET 4 OF 4
848D05

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
CURB CUT

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

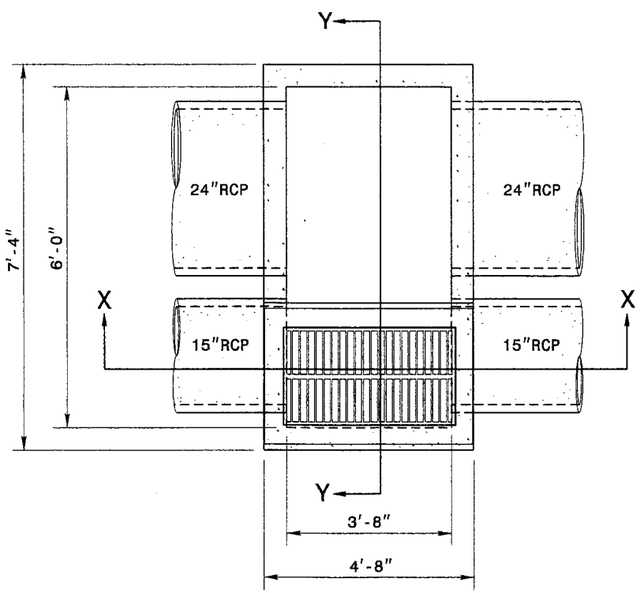
SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD. 848.05 DATE:
MODIFIED BY: E.E. WARD DATE: 06-18-03
CHECKED BY: DATE: 2-04

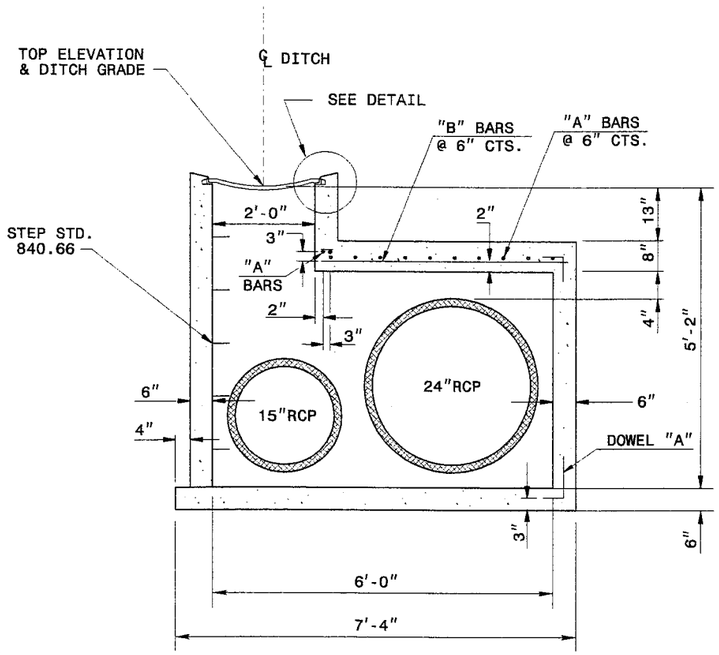
PROJECT REFERENCE NO. 7-3344A
SHEET NO. 2-H

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
4-3344A	2-I



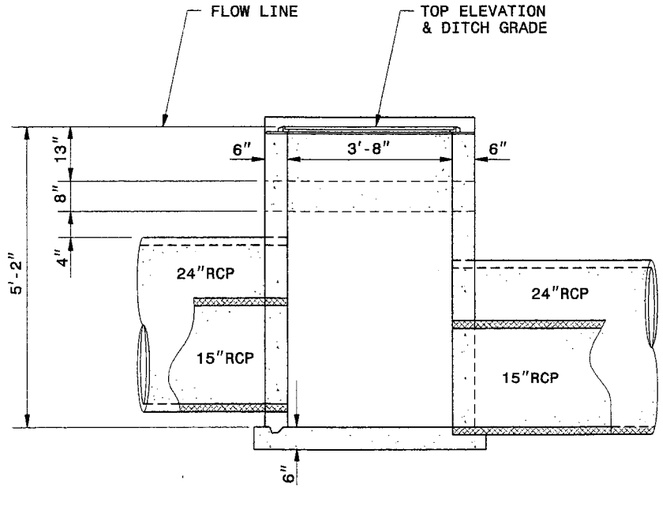
PLAN



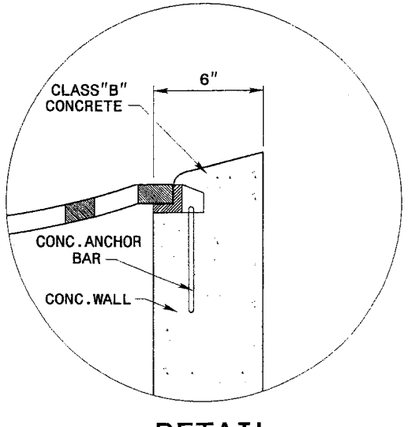
SECTION Y-Y

BILL OF MATERIALS				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	12	#4	4'-6"	37
B	10	#4	4'-10"	33
DOWEL	20	#4	1'-9"	24
TOTAL REINF. STEEL (LBS.)				94
TOTAL CONC. (CU. YDS.)				2.7

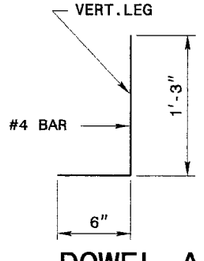
* 0.036 CY DEDUCTION FOR 15" RCP
* 0.085 CY DEDUCTION FOR 24" RCP
* 0.30 CU. YDS PER FOOT OF RISER HEIGHT
* NO DEDUCTIONS HAVE BEEN MADE FOR PIPES OR GRATE THROAT



SECTION X-X



DETAIL



DOWEL-A

GENERAL NOTES:

USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL DROP INLETS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.

OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.

USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.

IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.

WHEN PAYMENT FOR THE DROP INLET IS MADE ON A PER EACH BASIS, THE CONCRETE APRON WILL BE CONSIDERED PART OF THE DROP INLET.

CONSTRUCT WITH PIPE CROWNS MATCHING.

USE STANDARD FRAMES AND GRATES 840.22 (SHOWN), 840.24(SHOWN), 840.20, 840.29, AND 840.33.

SEE STANDARD DRAWING 840.25 FOR ATTACHMENT OF FRAMES AND GRATES NOT SHOWN.

CHAMFER ALL EXPOSED CORNERS 1".

DRAWING NOT TO SCALE.

MAX. DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 12 FEET.

USE FOR STRUCTURE NO. 21A

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

2 GRATE INLET TYPE "A"

ORIGINAL BY: _____ DATE: _____
MODIFIED BY: rnbritt DATE: 03-06-04
CHECKED BY: _____ DATE: _____

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	3

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF QUANTITIES

COMPUTED BY: SRF DATE: 12/16/2004
CHECKED BY: CMKR and JSF DATE: 12/21/2004

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
U-3344A	3-A

T·Y·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 48" & UNDER)

STATION	LOCATION (LT, RT, OR CL)	STRUCTURE NO.		TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE)								BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE)								15" SIDE DRAIN PIPE	10" PVC PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01, STD. 838.11 or STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS		QUANTITIES FOR DRAINAGE STRUCTURES *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B')			C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE			D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATE STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.20	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	J.B. STD. 840.31 OR 840.32	SPRING BOX STD. 840.41	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	2GI-A SPECIAL DETAIL (SEE SHEET 2-I)	PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON (SEE DETAIL ON PLAN SHEET 6)	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD. 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN. FT.	REMARKS
SIZE		FROM	TO					12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"	30"	36"	42"	48"				R.C.P.	C.S.P.	PER EACH (0' THRU 5.0')	*LIN. FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE		E	F	G																				
THICKNESS OR GAUGE																	.064	.064	.064	.064	.079	.079	.109	.109																																		
12+91	RT	1		351.2	350.9																								1			1			1																				
12+91	RT	1	2		351.3	353.7			112																																																REM. 108' OF EXIST.
14+06	RT	2		359	353.7																								1	0.27		1			1																					EXTRA DEPTH
14+06	RT	2	3		353.7	353.9			8																																													0.399			REM. 8' OF EXIST.
10+80 Y2	LT	4		358.3	354.9																								1			1	1																					
15+20	LT	5		359.1	356.1																								1			1			1																				
15+20	LT	5	6		356.1	356.6			16																																																
15+20	LT	6		358.8	356.6																								1							1	1																		
15+20	LT	5	8		356.1	346.1			280																																														84	
18+02	LT	8		351.6	346.1																								1	0.45		1			1																					EXTRA DEPTH
18+02	LT	8	9		346.1	346.3			28																																																
17+82	LT	9		348.5	346.3																								1							1	1																		
15+84	RT	7		358.1	355.1																								1			1		1																						
15+84	RT	7	10		355.1	350.9			216																																																
18+02	RT	10		353.9	350.9																								1			1			1																				
18+02	RT	10	11		350.9	349.8			16																																																
18+05	RT	11		352	349.8																								1							1	1																		
10+75 Y3	RT	11	12		349.8	349.5			52																																																
10+75 Y3	RT	12		352.9	349.5																								1			1		1																						
10+75 Y3	RT	12	13		349.5	349.3			44																																																
11+00 Y3	LT	13		352.5	349																								1			1		1																						
11+00 Y3	LT	13	14		349.3	349.4			32																																																
11+40 Y3	LT	14		352.4	349.4																								1			1		1																						
11+00 Y3	LT	13	15		349	348.5				28																																															
18+02	LT	8	16		346.1	343.8				116																																															
19+28	LT	16		347	343.8																								1			1			1																				
19+28	LT	16	17		346.3	344.5																				48																																		
18+80	LT	17		348.3	346.3																								1																	1										
19+28	LT	16	18		343.8	338.7				148																																															
20+86	LT	18		343.9	338.7																								1	0.23		1			1																					EXTRA DEPTH
20+97	RT	19			338.2						8																																													0.553			
20+99	LT	20	21A		339	339.1	X		16																																												0.399			REMOVE 2GI
20+03	LT	21	21A		339	339.1	X				16																																										0.553			REMOVE 2GI
20+03	LT	21A		342	339.1																																					1						1						SPECIAL DETAIL
22+00	LT	22		343	340																								1			1			1																				
22+00	LT	22	23		340	339.6	X		80																																														110	
22+85	LT	23		342.6	339.6																								1			1			1																				
22+85	LT	23	24		339.6	335.7	X		16																																																
23+05	LT	24		342.7	335.7																								1	2.47		1	1																						EXTRA DEPTH
23+05	LT	24	25		335.7	336	X							28														4.5																															REMOVE 4GI, REM 20' OF EXIST.
23+05	LT	24	26		335.7	334.7									64																																										46	
22+80	RT	26		346.6	334.7																								1	5	1.9	1	1																						EXTRA DEPTH
22+80	RT	26	27		334.7	333.5									76																																										104	REMOVE 26"X32" ARCH CMP
22+80	RT	26	28		338.1	338.4	X				148																																												58	
24+28	RT	28		345.8	338.4																								1	2.95		1			1																					EXTRA DEPTH
24+28	RT	28	29		341.2	341.3				16																																															
24+28	RT	28	30		338.4	338.9	X				136																																												22	
25+65	RT	30		346.5	338.9																								1	2.69		1			1																					EXTRA DEPTH
25+65	RT	30	31		338.9	339	X				48																																													
25+97	LT	32		345.7	342.1																								1			1		1																						
25+97	LT	32	33		342.1	342.2	X			16																																														
25+94	LT	33		344.8	342.2																								1							1	1																		
25+94	LT	33	34		342.2	342.4	X		56																																														72	
25+35	LT	34		344.6	342.4																								1							1	1																		
25+97	LT	32	35		342.1	341.4				120																																														20	
27+20	LT	35		347.2	341.4																								1	0.79		1		1																							EXTRA DEPTH
27+20	LT	35	36		341.4	340.9				164																																														20	
28+87	LT	36		350.2	340.4																								1	4.84		1		1																							EXTRA DEPTH
28+87	LT	36	37		340.7	346.8			16																																																
28+87	LT	37		349	346.8																								1							1	1																		
28+87	LT	36	38		340.4	340.2	X				60																																													
28+87	RT	38		349.4	340.2																								1	4.2		1			1																					EXTRA DEPTH
28+87	RT	38	39		340.2	340	X				36																																													
31+84	RT	40		347.9	344.9																								1			1		1																						
31+84	RT	40	41		344.9	342.7			96																																																
32+85	RT	41		345.7	342.7																								1			1		1																						
32+85	RT	41	47		342.7	338.3			144																																																
34+32	RT	47		341.3	338.3																								1			1		1																						
33+38	LT	42		344.8	341.8																								1			1			1																				
33+38	LT	42	43		341.8	342	X		16																																																
33+43	LT	43		344.3	342																								1							1	1																		
33+43	LT	43	44		342	343			72																																														30	
32+67	LT	44		345.3	343																								1							1	1																		
32+67	LT	44	45		343	347.3			88																																																
31+75	LT	45		349.5	347.3																								1							1	1																		20	
33+38	LT	42	46		341.8	338.3			88																																														30	
34+32	LT	46		341.3	338.3																								1			1			1																				
34+32	LT	46	47		338.3	347.3			60																																																
SHEET TOTAL								1552	608	452			168												48		4.5		37	23.89	1.9	27	3	10	14	9	9							1		1				1			1.904		616	

ABBREVIATIONS	
C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
D.I.	DROP INLET
M.D.I.	MEDIAN DROP INLET
M.D.I.(N.S.)	MEDIAN DROP INLET (NARROW SLOT)
J.B.	JUNCTION BOX
M.H.	MANHOLE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX

COMPUTED BY: SRF DATE: 12/16/2004
CHECKED BY: CMKR and JSF DATE: 12/21/2004

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
U-3344A	3-B

T.Y.LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 48" & UNDER)

STATION	LOCATION (LT, RT, OR CL)	STRUCTURE NO.		TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE)								BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE)													15" SIDE DRAIN PIPE	10" PVC PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01, STD. 838.11 or STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS		QUANTITIES FOR DRAINAGE STRUCTURES *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B')			C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE			D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATE STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.20	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	J.B. STD. 840.31 OR 840.32	SPRING BOX STD. 840.41	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54		2GI-A SPECIAL DETAIL (SEE SHEET 2-I)		PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON (SEE DETAIL ON PLAN SHEET 6)															CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD. 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN. FT.	REMARKS
SIZE		FROM	TO					12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"		30"		36"		42"		48"					R.C.P.	C.S.P.	PER EACH (0' THRU 5.0')	*LIN. FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE		E	F	G																																			
THICKNESS OR GAUGE																.064	.064	.064	.064		.079		.079		.109		.109																																																		
34+32	RT	47	48		338	339.8				8																																																																			
34+32	RT	47	50		338	331.39				264																																																																	28	
37+00	RT	50		334.64	331.39																													1			1		1																																							
37+00	RT	50	52		331.39	330.87				56																																																																		74	REMOVE 66" CMP
37+60	RT	52		334.12	330.87																													1	1.06		1	1																																							EXTRA DEPTH
37+60	RT	52	54		330.87	328.39				52																																																																	
38+17	RT	54		333.95	327.89																													1			1			1																																						EXTRA DEPTH
38+17	RT	54	55		327.9	324				32																																																1																			PREFORMED SCOUR HOLE
36+31	LT	49		335.71	332.71																													1			1			1																																							
36+31	LT	49	51		332.71	331.12			124																																																																			
37+60	LT	51		334.12	331.12																													1			1	1																																							
37+60	LT	51	56		331.12	330.95			52																																																																		
38+17	LT	56		333.95	330.95																													1			1		1																																							
38+17	LT	56	57		330.95	328.55			64																																																																			
38+35	RT	57		334.68																														1			1			1																																							
38+35	RT	57	58		330	325			56																																																	X																			CONC. PAVED DITCH LEVEL SPREADER
37+60	RT	53	59		318.5	328.41	X			164																																																																	30	
39+10	RT	59		335.2																														1																1																											
39+10	RT	59	60		328.41	328.5				20																																																																		
39+10	RT	59	63		331.93	333.93				116																																																																	20	
40+30	RT	63		337.2																														1																1																											
40+30	RT	63	64		333.93	334				12																																																																		
38+17	LT	56	61		330.95	331.64			112																																																																			REM. 20' OF EXIST.
39+35	LT	61		334.64	331.64																													1			1		1																																								
39+15	LT	62			330.83	330																							24																																																		
SHEET TOTAL									408	724																			24					10	1.06		8	2	3	3										2								1																		152	
GRAND TOTAL									1960	1332	452			168															24	48		4.5		47	27.42		35	5	13	17	9	9							1	2	1					1		1																1.904		768	
SAY																																			28																																										2			

ABBREVIATIONS

C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
D.I.	DROP INLET
M.D.I.	MEDIAN DROP INLET
M.D.I.(N.S.)	MEDIAN DROP INLET (NARROW SLOT)
J.B.	JUNCTION BOX
M.H.	MANHOLE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX

COMPUTED BY: cadd, SRF, CMKR DATE: 12/21/2004

CHECKED BY: SRF, CMKR DATE: 12/21/2004

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
U-3344A	3-C

T.Y.LIN INTERNATIONAL

3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

SUMMARY OF PAVEMENT REMOVAL

IN SQUARE YARDS

LINE	STATION TO STATION	LOCATION	ASPHALT REMOVAL	ASPHALT BREAK-UP	CONCRETE REMOVAL	CONCRETE BREAK-UP
L	15+00 to 17+00	RT	578			
L	19+50 to 21+00	RT	595			
L	28+00 to 30+00	LT	533			
L	33+50 to 36+50	LT	1060			
L	40+00 to 42+00		1111			
L	34+00 to 36+50 (temp pav't)	LT	186			
L	40+25 to 40+75 (temp pav't)	LT	14			
	CONTINGENCY		400			
L	15+50 to 20+00	RT		1650		
L	36+50 to 40+50			1258		
L	36+50 to 40+00 (temp pav't)	LT		451		
Y3	10+30 to 10+75			442		
		TOTAL	4477	3801		
		SAY	4550	3850		

Note: Approximate quantities only. Unclassified excavation,
fine grading, clearing and grubbing,
breaking of existing pavement, and removal of existing pavement
will be paid for at the contract lump sum price for "Grading".

SUMMARY OF EARTHWORK

IN CUBIC YARDS

LINE	STATION TO STATION		UNCLASS. EXCAVATION	UNDERCUT	EMBANKMENT +%	BORROW	WASTE
L-LT	21+50.00	27+50.00	91		517	426	0
L-LT	33+94.00	40+84.00	179		674	495	0
L-RT	19+00.00	42+00.00	2663	723	10643	7980	723
Y3-LT	10+30.00	10+86.00	32		0		32
	TOTAL	PHASE 1	2985	723	11834	8901	755
L-LT	13+50.00	21+50.00	63		2472	2409	0
L-LT	27+50.00	42+00.00	256		3725	3469	0
	TOTAL	PHASE 2	319		6197	5878	0
L-RT	13+50.00	22+00.00	69		1952	1883	0
Y2	10+50.00	12+00.00	13		97	84	0
Y3	10+50.00	12+00.00	13		301	288	0
	TOTAL	PHASE 3	95		2350	2255	0
PROJECT TOTAL			3379	723	20381	17034	755
LOSS DUE TO CLEARING AND GRUBBING			-700			700	
USE WASTE TO REPLACE BORROW						-32	-32
ADDITIONAL UNDERCUT				1000	1200	1200	1000
EST. 5% TO REPLACE TOPSOIL ON BORROW PITS						945	
GRAND TOTAL			2679	1723	21581	19847	1723
SAY			2700	1750		19900	

DRAINAGE DITCH EXCAVATION 1500 CY

GUARDRAIL SUMMARY

LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOULDER WIDTH	FLARE LENGTH		W		ANCHORS									IMPACT ATTENUATOR TYPE 350			SINGLE FACED CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE & STOCKPILE EXISTING GUARDRAIL	
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GRAU 350	M-350	XIII	CAT-1	VI MOD	BIC	AT-1	EA	G	NG				REMARKS

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAKPT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL
G = GATING IMPACT ATTENUATOR TYPE 350

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROUSE

Claudette M.K. Rouse 1/24/05

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 25506 ENGINEER JENNY SUMMERLIN FLEMING

Jenny S. Fleming 1/28/05

TY·LIN INTERNATIONAL

3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

REVISIONS

DIRECTIONAL		DHV	
65%	-Y1-	10%	-Y1-
55%	-L-	11%	-L-

14800 / 30200

NC 54

4400 / 12900 -L- AIRPORT BLVD 15300 / 36500 15500 / 36800

9600 / 21900 1000 / 1400 2200 / 3100 1000 / 1400 1200 / 1700

-Y1-

-Y2- AIRTECH DR 3300 / 4500

-Y3- WALDRON RD 3200 / 3300

20000 / 39200

TRAFFIC DIAGRAM

2005 ADT
2025 ADT

BY1-203 5+00.00 POT

BY-202 5+00.00 POT

-L-
PI Sta 20+78.49
Δ = 32° 45' 29.4" (LT)
D = 6° 21' 58.3"
L = 514.56'
T = 264.53'
R = 900.00'
e = .06
Runoff = 252
DS = 50 mph

-Y2-
PI Sta 11+93.97
Δ = 12° 46' 28.3" (LT)
D = 7° 32' 20.1"
L = 169.45'
T = 85.08'
R = 760.00'
DS = 30 mph

-Y3-
PI Sta 10+98.77
Δ = 31° 57' 04.5" (LT)
D = 16° 36' 26.9"
L = 192.39'
T = 98.77'
R = 345.00'
DS = 30 mph

NAD 83 NC GRID

BEGIN STATE PROJECT U-3344A
-L- POT STA 10+00.00=
-Y1- POT STA 16+60.35

-L- POT STA 14+77.58=
-Y2- POT STA 10+00.00

-L- POC STA 18+66.41=
-Y3- PC STA 10+00.00

-L- POT STA 13+50

-L- POT STA 19+01.63
5+00.00 POT
-Y3- POT STA 18+06.52 PINC

-L- POT STA 18+13.96

-L- POT STA 13+92.87

-L- POT STA 14+28.57

-L- POT STA 10+35.29 PINC
(48.91 RT.)
BY1-204 11+27.93 PINC
BL-103 9+33.11 PINC

BY2-206 5+00.00 POT
13+26.81 PINC
BL-104

BY3-208 5+00.00 POT
BL-105

BY-201 11+03.63 PINC
BL-102 7+57.38 PINC

BY2-207 8+72.80 POT

BY3-209 8+43.43 POT

POT STA 12+70.08

POT STA 11+92.39

POT STA 12+78.34

POT STA 13+18.34

-Y1- S 32° 17' 49.2" E

-L- N 46° 54' 27.8" E

-Y2- S 43° 05' 18.3" E

-Y3- S 75° 18' 50.5" E

S 51° 53' 46.5" E

PEARL ROAD PROPERTIES
PB 1989 PG 916
DB 8533 PG 118

WEEKS REALTY, L.P.
PB 1986 PG 2191
DB 7364 PG 866

LEE-MOORE OIL COMPANY
PB 1998 PG 437
DB 8191 PG 174

CDC PROPERTIES INC., ETAL
PB 1991 PG 1016
DB 7593 PG 232

GPI PROPERTIES 1995, LLC.
PB 1991 PG 1016
DB 6937 PG 1

N. GARY BOYETTE
PB 1991 PG 1016 DB 5006 PG 805

PANSILEE BRANNAN ET AL
PB 1986 PG 1695
DB 3565 PG 519

DOVE ASSOCIATES I, LLC.
PB 1999 PG 456
DB 8223 PG 1359

DOVE ASSOCIATES IV, LLC.
PB 1999 PG 456
DB 8223 PG 1356

JLH INVESTMENTS, INC.
PB 1998 PG 261
DB 7896 PG 783

PC STA 11+08.90

END MILLING & RESURFACING/BEG GRADE

BEGIN MILLING & RESURFACING
-L- POT STA 10+36.70

-Y2- POC STA 12+00
END CONST

-Y3- POT STA 12+00
END CONST

MATCH LINE STA 21+50 (SEE SHT. 5)

PROPOSED SLOPE STAKE LINE (TYP.)

TIE TO EXIST C & G 12+92.72

TIE TO EXIST C & G 11+33.16

TIE TO EXIST C & G AND SIDEWALK 11+17.07

TIE TO EXIST C & G 13+92.87 GENERATOR

TIE TO EXIST C & G AND SIDEWALK

REMOVE SIDEWALK AND C & G
TIE TO EXIST C & G AND SIDEWALK

REMOVE 2SI COLLAR & EXTEND 24"

REMOVE 2SI COLLAR & EXTEND 15"

RELOCATE SERVICE AND TIE TO SPRING BRK

RETAIN

CLASS B RIP RAP SEE NOTE

LATERAL BASE DITCH SEE DETAIL A

LATERAL BASE DITCH SEE DETAIL B

DETAIL B
LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 3:1, D, B, b, F/F, 3:1 Fill Slope

Filter Fabric

Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
B = 3.0 Ft.
b = 5-15 Ft.

Type of Liner = CLASS 'B' RIP RAP

20+50 TO 21+00 -L- RT
EST. 30 TONS CLASS 'B' RIP RAP
EST. 83 SY FILTER FABRIC
EST. 50 CY DDE

DETAIL A
LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 3:1, D, B, b, F/F, 3:1 Fill Slope

Min. D = 1.5 Ft.
B = 3 Ft.
b = 5 Ft.

11+00 -Y3- LT TO 20+50 -L- RT
EST. 131 CY DDE

DRAINAGE NOTE I:
11+00 -Y3- LT
EST. 3 TONS CLASS 'B' RIP RAP
EST. 10 SY FILTER FABRIC

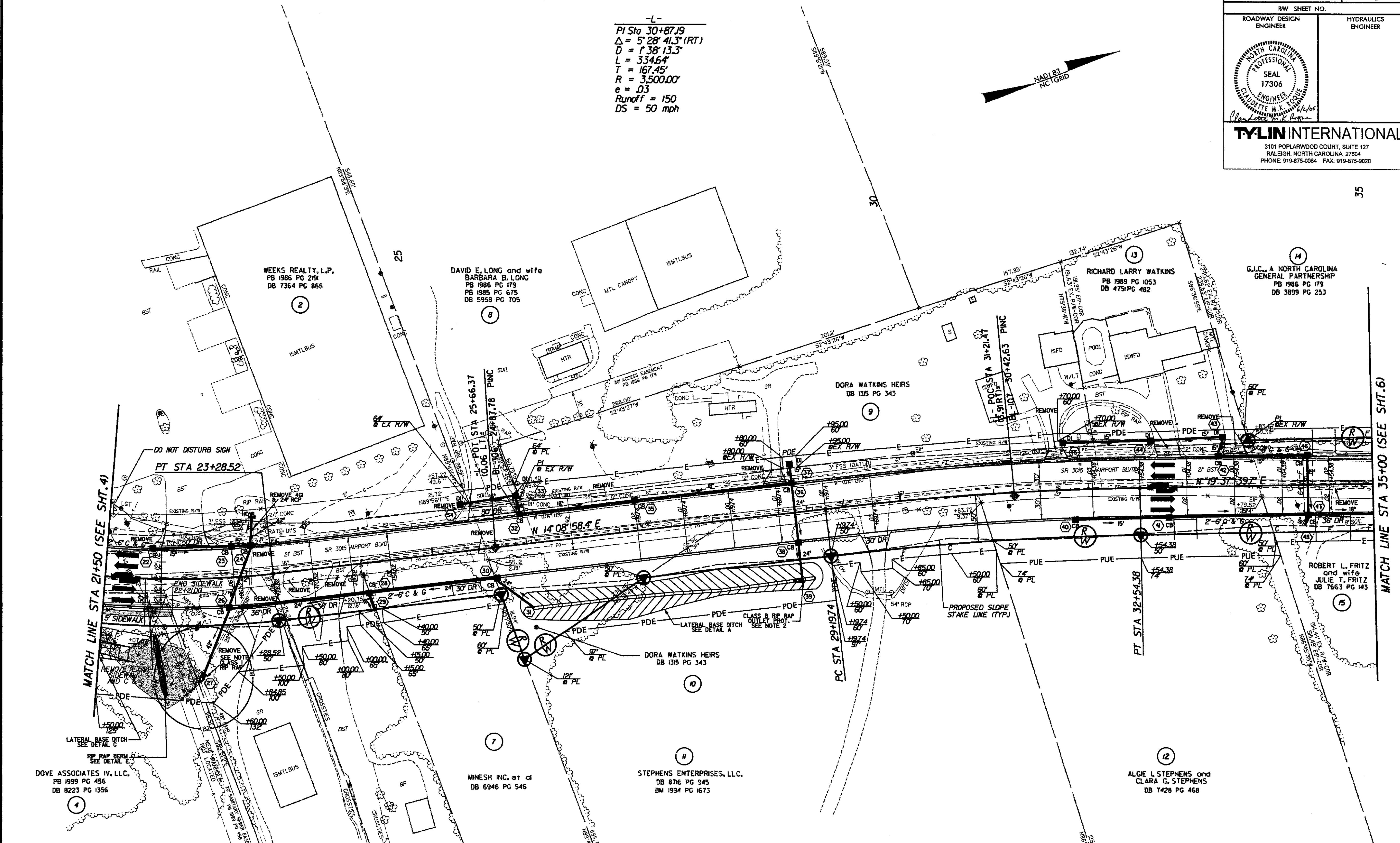
SEE SHEET 7 FOR -L- PROFILE
SEE SHEET 8 FOR -Y2-, -Y3- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROQUE 6/1/05

T·Y·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

-L-
PI Sta 30+87.19
Δ = 5° 28' 41.3" (RT)
D = 1° 38' 13.3"
L = 334.64'
T = 167.45'
R = 3,500.00'
e = .03
Runoff = 150
DS = 50 mph



NAD 83 NC GRID
WEEKS REALTY, L.P.
PB 1986 PG 2191
DB 7364 PG 866
DAVID E. LONG and wife BARBARA B. LONG
PB 1986 PG 179
PB 1985 PG 675
DB 5958 PG 705
RICHARD LARRY WATKINS
PB 1989 PG 1053
DB 4751 PG 482
G.J.C., A NORTH CAROLINA GENERAL PARTNERSHIP
PB 1986 PG 179
DB 3899 PG 253
DORA WATKINS HEIRS
DB 1315 PG 343
ROBERT L. FRITZ and wife JULIE T. FRITZ
DB 7663 PG 143
DOVE ASSOCIATES IV, LLC.
PB 1999 PG 456
DB 8223 PG 1356
MINESH INC. et al
DB 6946 PG 546
STEPHENS ENTERPRISES, LLC.
DB 8716 PG 945
BM 1994 PG 1673
ALGIE L. STEPHENS and CLARA G. STEPHENS
DB 7428 PG 468
THOMAS EDWIN FANELLI and wife BARBARA M. FANELLI
DB 2916 PG 847
GENE DOUGLAS CARROLL and wife CYNTHIA B. CARROLL
DB 2698 PG 93
MATCH LINE STA 21+50 (SEE SHT. 4)
MATCH LINE STA 35+00 (SEE SHT. 6)
PT STA 23+28.52
PC STA 29+19.74
PT STA 32+54.38
DO NOT DISTURB SIGN
SR 3015 AIRPORT BLVD
W 14° 08' 58.4" E
N 19° 37' 39.7" E
LATERAL BASE DITCH SEE DETAIL A
CLASS B RIP RAP OUTLET PROT. SEE NOTE 2
PROPOSED SLOPE STAKE LINE (TYP)
LATERAL BASE DITCH SEE DETAIL C
RIP RAP BERM SEE DETAIL E
REMOVE EXIST SIDEWALK AND C & G

DETAIL E
RIP RAP BERM
(Not to Scale)
TOP ELEV. = 338 ft.
Natural Ground
CLASS 'B' RIP RAP W/ FILTER FABRIC
B = 2.0 Ft.
22+05 -L- RT
EST. 25 TONS CLASS 'B' RIP RAP
EST. 50 SY FILTER FABRIC

DETAIL C
STANDARD BASE DITCH
(Not to Scale)
Natural Ground
Min. D = 1.0 Ft.
B = 5.0-15.0 Ft.
21+00 TO 21+82 -L- RT
EST. 57 CY DDE

DETAIL A
LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Fill Slope
Min. D = 1.5 Ft.
B = 3 Ft.
b = 5 Ft.
26+00 TO 29+00 -L- RT
EST. 954 CY DDE

DRAINAGE NOTE 1:
22+50 -L- RT
EST. 20 TONS CLASS 'I' RIP RAP
EST. 39 SY FILTER FABRIC

DRAINAGE NOTE 2:
28+87 -L- RT
EST. 5 TONS CLASS 'B' RIP RAP
EST. 14 SY FILTER FABRIC

REVISIONS

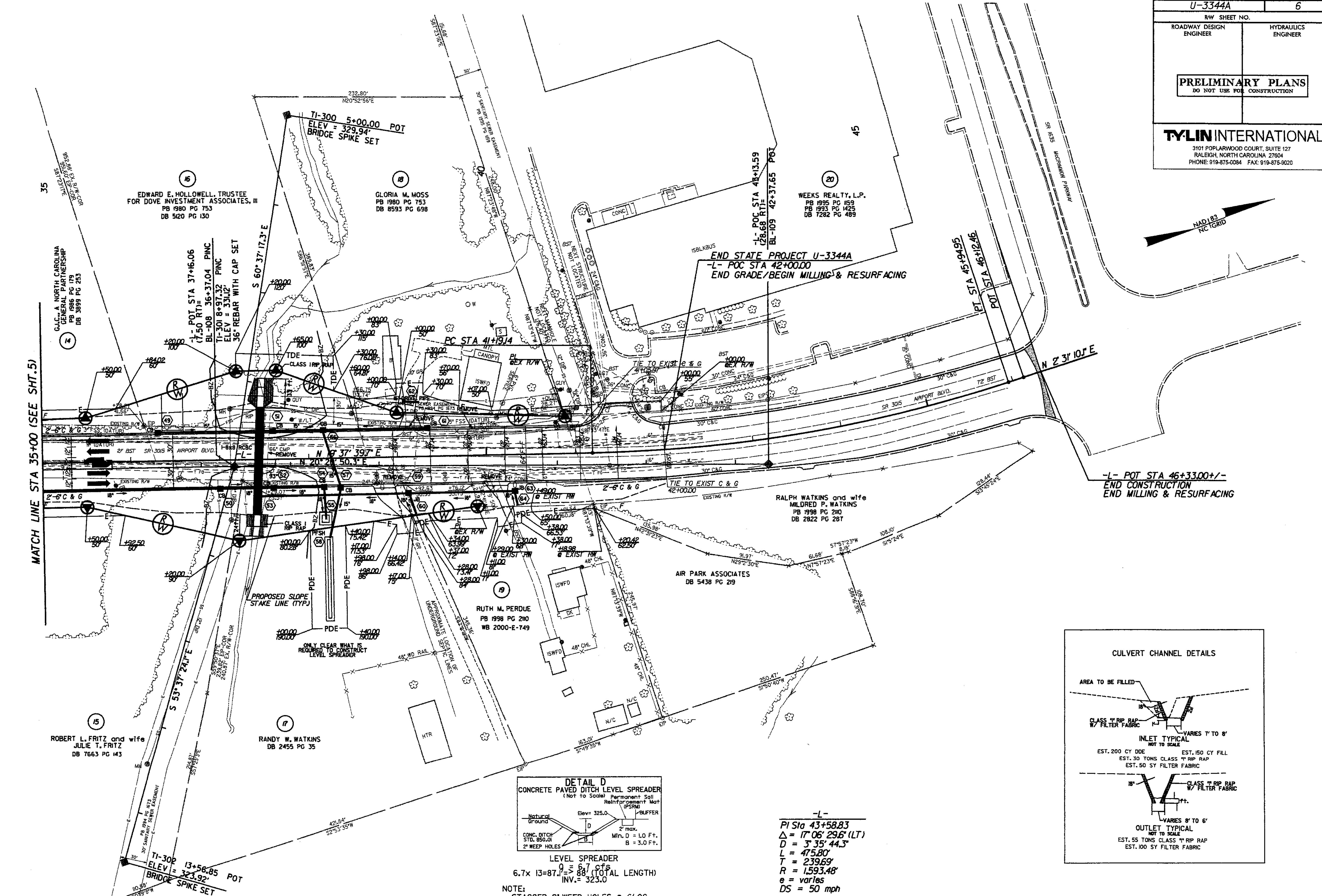
PROJECT REFERENCE NO.	SHEET NO.
U-3344A	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TYLIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

REVISIONS

R/W REV - 2/16/05
REVISED PDE ON PARCEL 17


MATCH LINE STA 35+00 (SEE SHT. 5)
TI-300 5+00.00 POT
ELEV = 329.94'
BRIDGE SPIKE SET
EDWARD E. HOLLOWELL, TRUSTEE
FOR DOVE INVESTMENT ASSOCIATES, III
PB 1980 PG 753
DB 5120 PG 130
GLORIA M. MOSS
PB 1980 PG 753
DB 8593 PG 698
WEEKS REALTY, L.P.
PB 1995 PG 1159
PB 1993 PG 1425
DB 7282 PG 489
G.J.C., A NORTH CAROLINA GENERAL PARTNERSHIP
PB 1986 PG 1179
DB 3899 PG 253
-L- POT STA 37+16.06 (7.50 RT)=
BL-108 36+37.04 PINC
TI-301 8+97.32 PINC
ELEV = 331.12'
36" REBAR WITH CAP SET
S 60° 37' 17.3" E
PC STA 41+19.14
-L- POC STA 41+13.59 (28.68 RT)=
BL-109 42+37.65 POT
END STATE PROJECT U-3344A
-L- POC STA 42+00.00
END GRADE/BEGIN MILLING & RESURFACING
PT STA 45+94.95
POT STA 46+12.46
N 2° 31' 10.5" E
NAD 83 NC GRID
SR 1635 MCCRIMMON PARKWAY
SR 3015 AIRPORT BLVD.
N 18° 37' 39.7" E
N 20° 28' 50.3" E
TIE TO EXIST C & G
42+00.00
-L- POT STA 46+33.00+/-
END CONSTRUCTION
END MILLING & RESURFACING
RALPH WATKINS and wife
MILDRED P. WATKINS
PB 1998 PG 2110
DB 2822 PG 287
AIR PARK ASSOCIATES
DB 5438 PG 219
RUTH M. PERDUE
PB 1998 PG 2110
WB 2000-E-749
PROPOSED SLOPE STAKE LINE (TYP)
ONLY CLEAR WHAT IS REQUIRED TO CONSTRUCT LEVEL SPREADER
APPROXIMATE LOCATION OF UNDERGROUND SEPTIC LINES
ROBERT L. FRITZ and wife
JULIE T. FRITZ
DB 7663 PG 143
RANDY W. WATKINS
DB 2455 PG 35
S 53° 37' 24.1" E
TI-302 13+56.85 POT
ELEV = 323.92'
BRIDGE SPIKE SET
DETAIL D
CONCRETE PAVED DITCH LEVEL SPREADER
(Not to Scale)
Permanent Soil Reinforcement Mat (PSRM)
BUFFER
Natural Ground
Elev= 325.0
CONC. DITCH STD. 850.01
2" WEEP HOLES
2" max.
Min. D = 1.0 Ft.
B = 3.0 Ft.
CULVERT CHANNEL DETAILS
AREA TO BE FILLED
CLASS "I" RIP RAP W/ FILTER FABRIC
VARIES 7' TO 8'
INLET TYPICAL
NOT TO SCALE
EST. 200 CY DDE
EST. 150 CY FILL
EST. 30 TONS CLASS "I" RIP RAP
EST. 50 SY FILTER FABRIC
VARIES 8' TO 6'
OUTLET TYPICAL
NOT TO SCALE
EST. 55 TONS CLASS "I" RIP RAP
EST. 100 SY FILTER FABRIC

LEVEL SPREADER
Q = 6.7 cfs
6.7x 13=87.1 => 88' (TOTAL LENGTH)
INV.= 323.0

NOTE:
STAGGER 2" WEEP HOLES @ 6' OC
EST. 20 SY PSRM
EST. 25 CY DDE

-L-
PI Sta 43+58.83
Δ = 17° 06' 29.6" (LT)
D = 3° 35' 44.3"
L = 475.80'
T = 239.69'
R = 1,593.48'
e = varies
DS = 50 mph

SEE SHEET C-1 thru C-5 FOR CULVERT PLANS
NOTE: ALL DRIVEWAYS ARE 24' UNLESS OTHERWISE NOTED
SEE SHEET 8 FOR -L- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER LAFAYETTE M. A. ROQUE 12/4/05

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 25506 ENGINEER JENNY SUMMERLIN FLEMING 12/2/05

TY·LIN INTERNATIONAL
3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

BM 1: "X" CUT IN CONC BASE TO LIGHT POLE
IN EXXON PARKING LOT
85.1633 FEET LEFT OF -L- STA 11+02.14
(45 FEET LEFT OF BY1 STA 9+85 NEAREST FT)
(132.8782 FEET LEFT OF BL STA 10+02.30)
EL = 354.79'

-L-

BEGIN MILLING & RESURFACING -L- STA 10+36.70

MILL & RESURFACE ONLY

END MILLING & RESURFACING
BEGIN GRADE -L- STA 13+50
EL = 359.44
(INCLUDES 2.5" RESURF)

-L- PC STA 14+00
EL = 359.70'

-L- STA 14+77.58 =
-Y2- STA 10+00

PI = 15+50.00
EL = 360.49'
VC = 300'
K = 84
DS = 50 mph

+0.5250%

-3.0421%

-L- PT STA 17+00
EL = 356.93'

PROP. GRADE LINE

-L- STA 18+66.41 =
-Y3- STA 10+00

-L- PC STA 19+00
EL = 349.64

PI = 20+25.00
EL = 346.04'
VC = 250
K = 102
DS = 50 mph

-L- PT STA 21+50
EL = 345.31'

-3.0421%

-3.87%

-0.5840%

-7.00%

0.0%

EXIST. GROUND LINE

PROP. LAT. DITCH

-Y3- STA 10+67 LT =
-L- STA 19+50 RT
EL = 345.37'

PI = 20+50
EL = 341.50

PI = 21+00
EL = 338.00

338.00'

SEE SHEET 4 FOR -L- PLAN VIEW

BM 2: "X" CUT IN CORNER OF CONC PAD
AT RESEARCH TRIANGLE INDUSTRIAL CENTER
106.7387 FEET LEFT OF -L- STA 23+09.26
(92 FEET LEFT OF BL STA 22+27 NEAREST FT)
EL = 345.59'

-L-

-L- PT STA 21+50
EL = 345.31'

-L- PC STA 21+90
EL = 345.08'

PI = 24+00.00
EL = 343.85'
VC = 420
K = 227
DS = 75 mph

-L- PT STA 26+10
EL = 346.51'

PROP. GRADE LINE

-L- PC STA 28+25
EL = 349.24'

PI = 31+00.00
EL = 352.72'
VC = 550
K = 122
DS = 55 mph

-L- PT STA 33+75
EL = 343.83'

-L- PC STA 35+00
EL = 339.79'

-0.5840%

+1.2671%

+1.2671%

-3.2314%

UNDERCUT

+0.3333%

EXIST. GROUND LINE

338.00' 0.0%

PROP. LAT. DITCH

42" RCP

END DITCH GRADE
-L- STA 21+82 RT
EL = 338.00'

BEG DITCH GRADE
-L- STA 26+00 RT
EL = 339.00'

END DITCH GRADE
-L- STA 29+00 RT
EL = 340.00'

PIPE HYDRAULIC DATA

DRAINAGE STRUCT. NO.24 to NO.26

DRAINAGE AREA	= 16.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 65	CFS
DESIGN HW ELEVATION	= 340.9	FT
100 YEAR DISCHARGE	= 75	CFS
100 YEAR HW ELEVATION	= 341.4	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 128+	CFS
OVERTOPPING ELEVATION	= 347.9	FT

SEE SHEET 5 FOR -L- PLAN VIEW

PROJECT REFERENCE NO.	SHEET NO.
U-3344A	8
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 17306 ENGINEER CLAUDETTE M.K. ROUSE

12/6/05

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 25506 ENGINEER KENT SUMMERLIN FLEMING

1/28/05

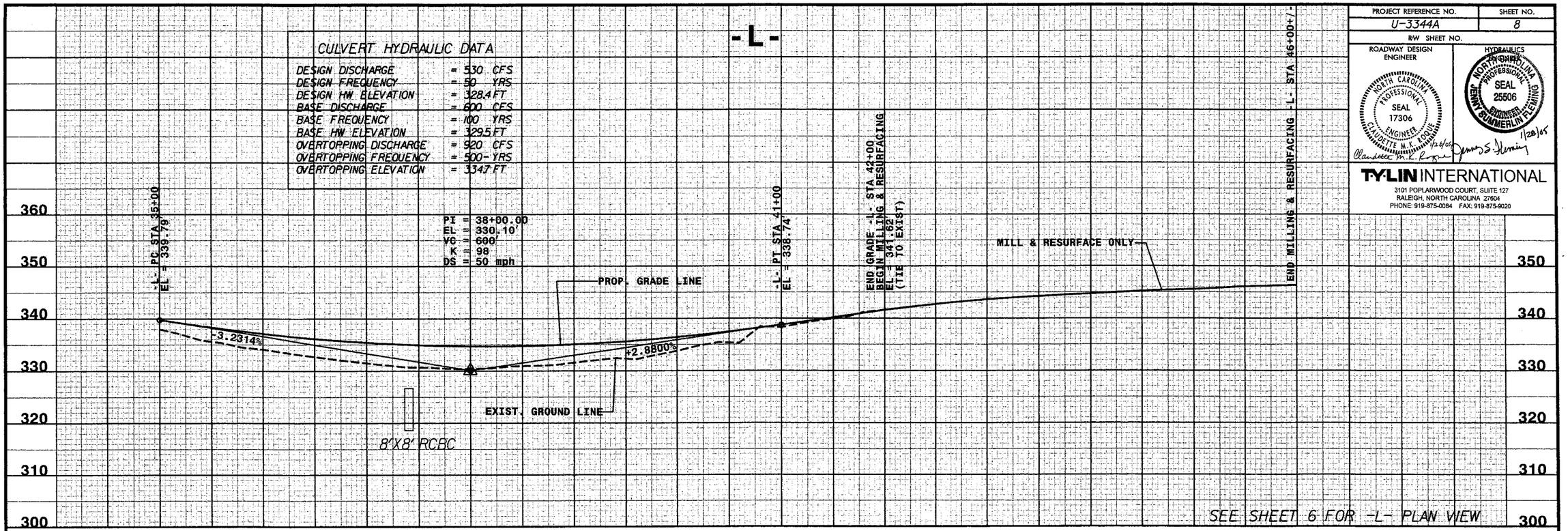
TY LIN INTERNATIONAL

3101 POPLARWOOD COURT, SUITE 127
RALEIGH, NORTH CAROLINA 27604
PHONE: 919-875-0084 FAX: 919-875-9020

-L-

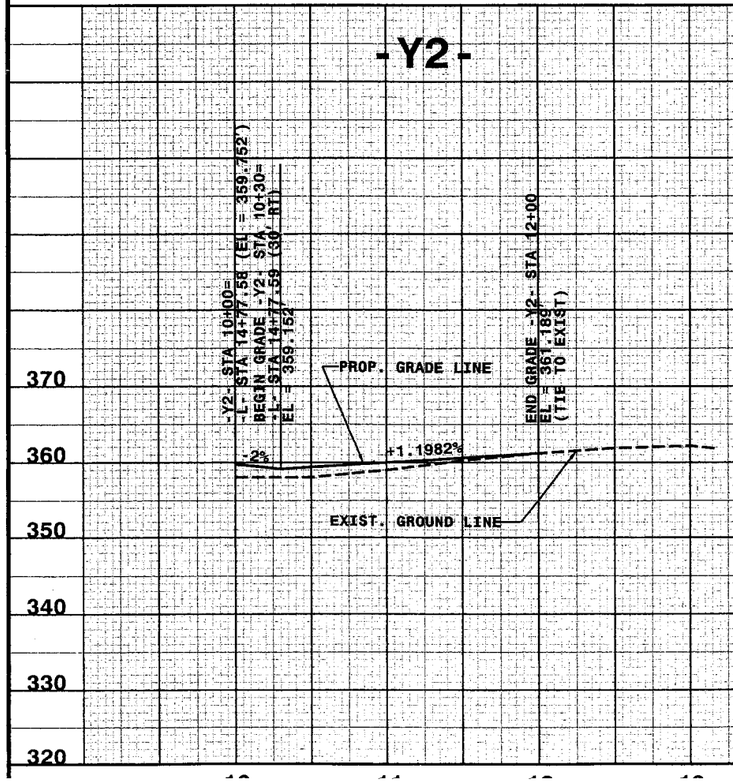
CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 530 CFS
DESIGN FREQUENCY	= 50 YRS
DESIGN HW ELEVATION	= 328.4 FT
BASE DISCHARGE	= 600 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 329.5 FT
OVERTOPPING DISCHARGE	= 920 CFS
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING ELEVATION	= 334.7 FT

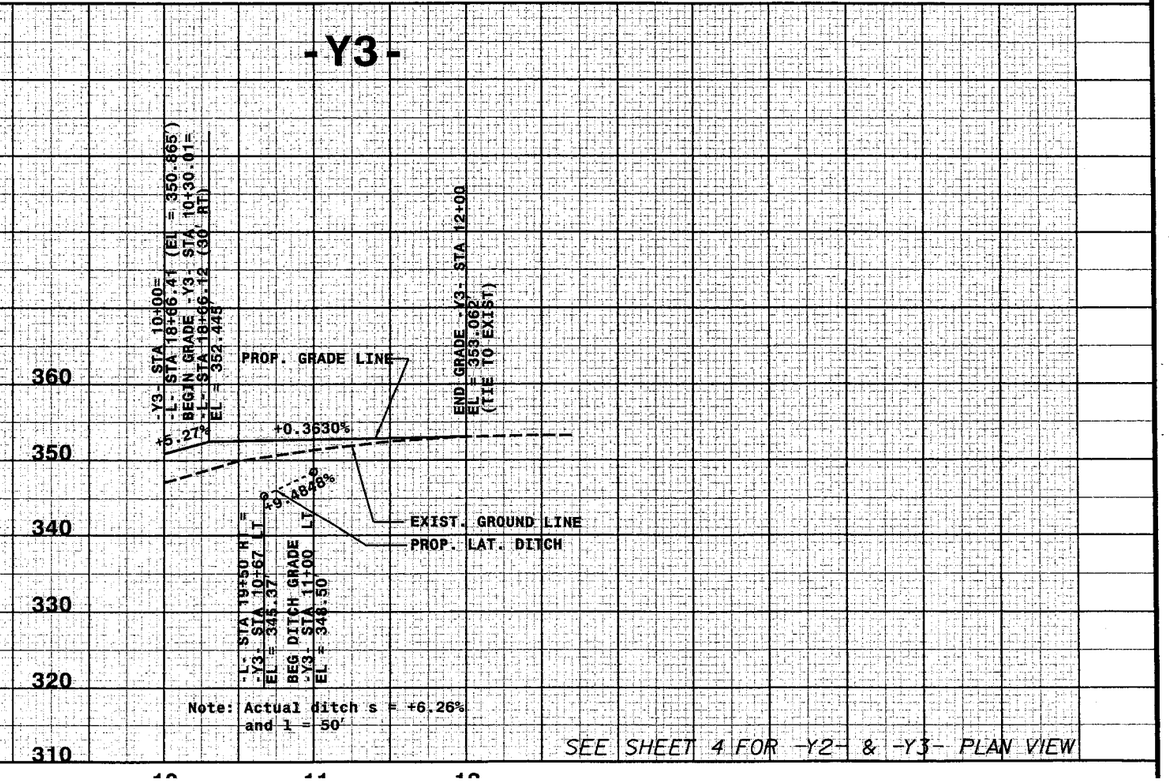


SEE SHEET 6 FOR -L- PLAN VIEW

-Y2-



-Y3-



SEE SHEET 4 FOR -Y2- & -Y3- PLAN VIEW

R:\U3344A\Roadway\Xsc\earthwork\ew_llt_2150_2750_phase1.log

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-1A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NOTE: EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT

CROSS-SECTION SUMMARY

	Station L-LT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 1	21+50.00	0	0
	22+00.00	1	35
	22+50.00	6	44
	23+00.00	8	57
	23+50.00	6	55
	24+00.00	8	44
	24+50.00	6	43
	25+00.00	7	37
	25+50.00	16	19
	26+00.00	15	17
	26+50.00	7	24
	27+00.00	6	26
	27+50.00	5	30

	Station L-LT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 1	33+94.00	0	0
	34+00.00	0	1
	34+50.00	3	10
	35+00.00	6	17
	35+50.00	8	34
	36+00.00	9	52
	36+50.00	9	100
	37+00.00	8	126
	37+50.00	11	79
	38+00.00	12	61
	38+50.00	9	59
	39+00.00	13	22
	39+50.00	23	1
	40+00.00	31	0
	40+50.00	29	0
	40+84.00	8	0

	Station L-RT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 1	19+00.00	0	0
	19+50.00	21	0
	20+00.00	23	1
	20+50.00	24	16
	21+00.00	26	43
	21+50.00	29	87
	22+00.00	34	175
	22+50.00	19	198
	23+00.00	2	380
	23+50.00	0	509
	24+00.00	0	403
	24+50.00	0	251
	25+00.00	2	86
	25+50.00	32	33
	26+00.00	35	24
	26+50.00	5	55
	27+00.00	0	112
	27+50.00	0	268

	Station L-RT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 1	28+00.00	0	377
	28+50.00	0	392
	29+00.00	0	420
	29+50.00	0	304
	30+00.00	5	124
	30+50.00	99	32
	31+00.00	261	0
	31+50.00	375	0
	32+00.00	403	0
	32+50.00	338	0
	33+00.00	258	2
	33+50.00	197	6
	34+00.00	153	11
	34+50.00	80	17
	35+00.00	25	17
	35+50.00	20	36
	36+00.00	5	196
	36+50.00	0	398
	37+00.00	0	491
	37+50.00	0	754
	38+00.00	0	788
	38+50.00	0	518
	39+00.00	0	372
	39+50.00	0	291
	40+00.00	0	262
	40+50.00	0	206
	41+00.00	49	119
	41+50.00	96	63
	42+00.00	47	32

	Station Y3-LT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 1	10+30.00	0	0
	10+50.00	14	0
	10+86.00	18	0

	Station L-LT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 2	13+50.00	0	0
	14+00.00	2	8
	14+50.00	19	9
	15+00.00	20	31
	15+50.00	5	73
	16+00.00	3	98
	16+50.00	1	137
	17+00.00	0	208
	17+50.00	0	284
	18+00.00	0	277
	18+50.00	0	211
	19+00.00	0	176
	19+50.00	0	171

	Station L-LT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 2	20+00.00	0	150
	20+50.00	0	107
	21+00.00	6	74
	21+50.00	7	46

	Station L-LT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 2	27+50.00	0	0
	28+00.00	4	43
	28+50.00	3	65
	29+00.00	0	83
	29+50.00	0	92
	30+00.00	1	79
	30+50.00	1	47
	31+00.00	8	27
	31+50.00	21	22
	32+00.00	19	26
	32+50.00	6	40
	33+00.00	1	46
	33+50.00	13	44
	34+00.00	24	42
	34+50.00	28	41
	35+00.00	21	42
	35+50.00	6	49
	36+00.00	0	74
	36+50.00	0	144
	37+00.00	0	196
	37+50.00	0	279
	38+00.00	0	326
	38+50.00	0	286
	39+00.00	0	336
	39+50.00	0	316
	40+00.00	0	198
	40+50.00	0	105
	41+00.00	19	38
	41+50.00	50	13
	42+00.00	31	5

	Station L-RT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 2	13+50.00	0	0
	14+00.00	5	4
	14+50.00	5	4
	15+00.00	3	4
	15+50.00	4	37
	16+00.00	1	95
	16+50.00	0	137
	17+00.00	0	162
	17+50.00	0	184
	18+00.00	0	189
	18+50.00	0	173

	Station L-RT	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 3	19+00.00	0	150
	19+50.00	0	139
	20+00.00	0	113
	20+50.00	1	66
	21+00.00	17	34
	21+50.00	16	16
	22+00.00	17	120

	Station Y2	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 3	10+50.00	0	0
	11+00.00	7	66
	11+50.00	6	15

	Station Y3	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
PHASE 3	10+50.00	0	0
	11+00.00	1	222
	11+50.00	7	28
	12+00.00	5	1

Approximate quantities only. Unclassified excavation,
fine grading, clearing and grubbing,
breaking of existing pavement and removal of existing pavement
will be paid for at the lump sum price for "Grading".

0 5 10

AIRPORT BLVD -L-

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-1

355

357.65
13+00.00

355

355

355.20
12+50.00

355

355

350

352.34
12+00.00

355

350

355

350

349.81
11+50.00

350

350

345

344.82
11+00.00

345

345

346.66
10+50.00

345

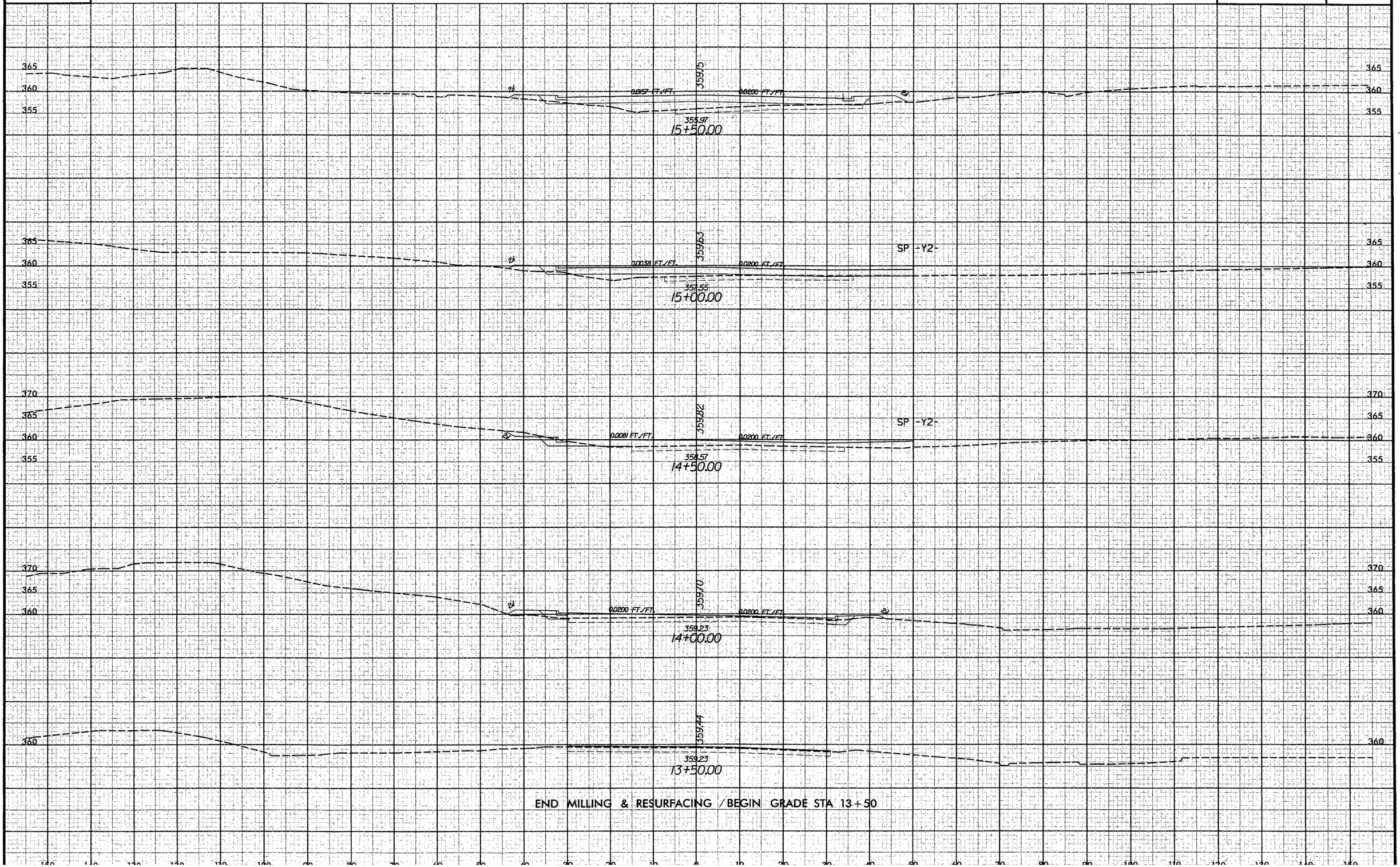
BEGIN MILLING & RESURFACING STA 10+36.70

BEGIN PROJECT STA 10+00

0 5 10

AIRPORT BLVD -L-

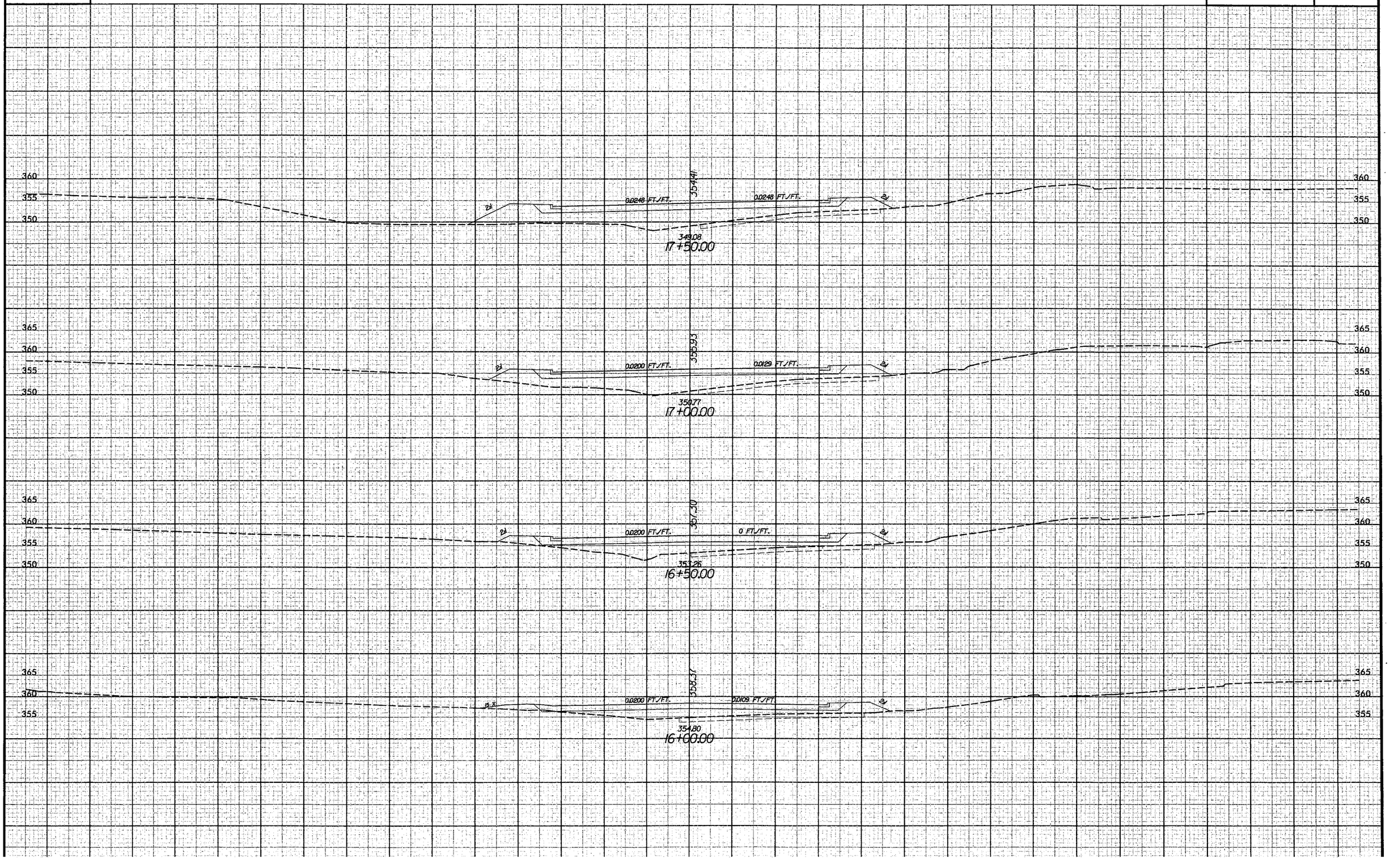
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-2



0 5 10

AIRPORT BLVD -L-

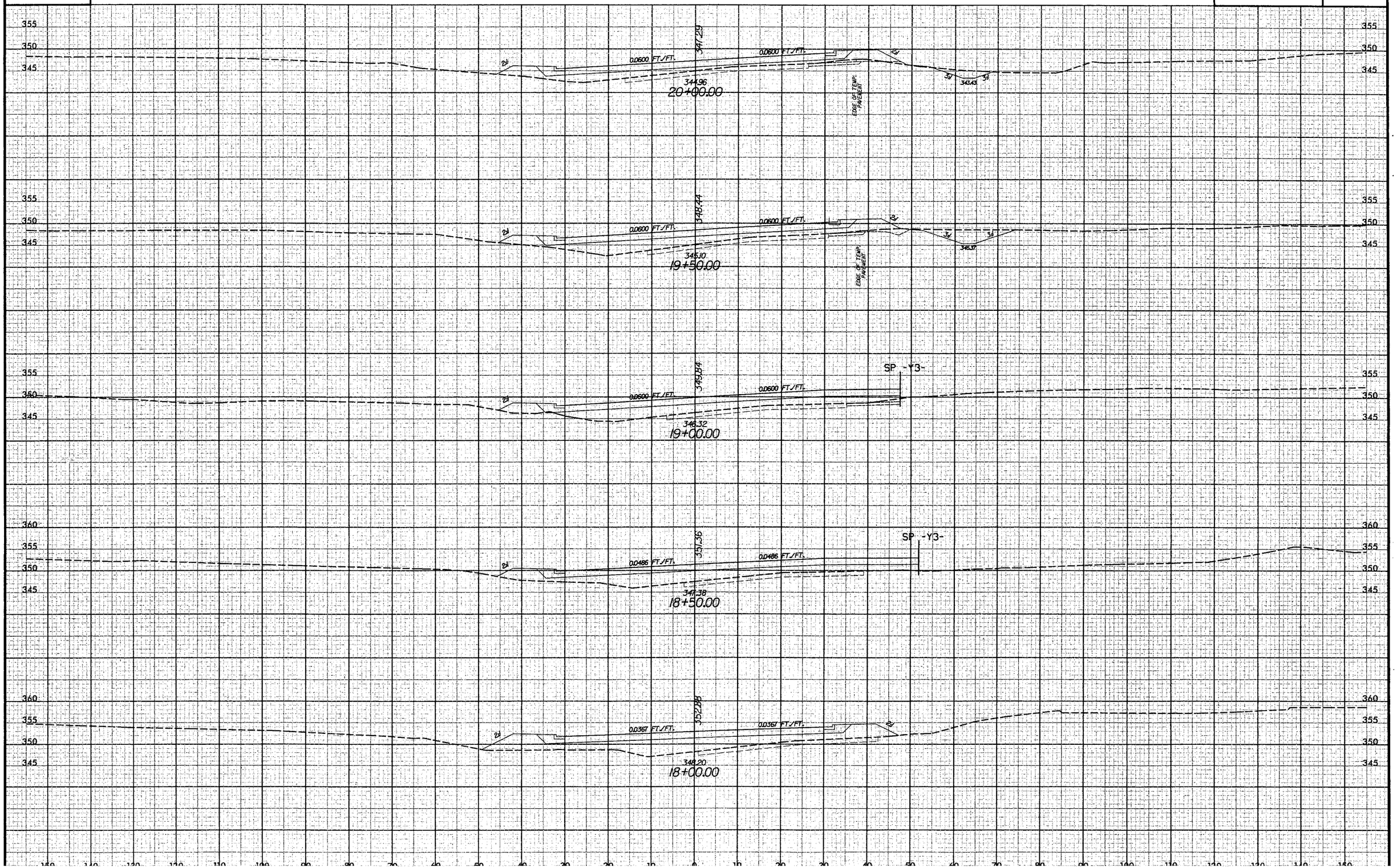
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-3



0 5 10

AIRPORT BLVD -L-

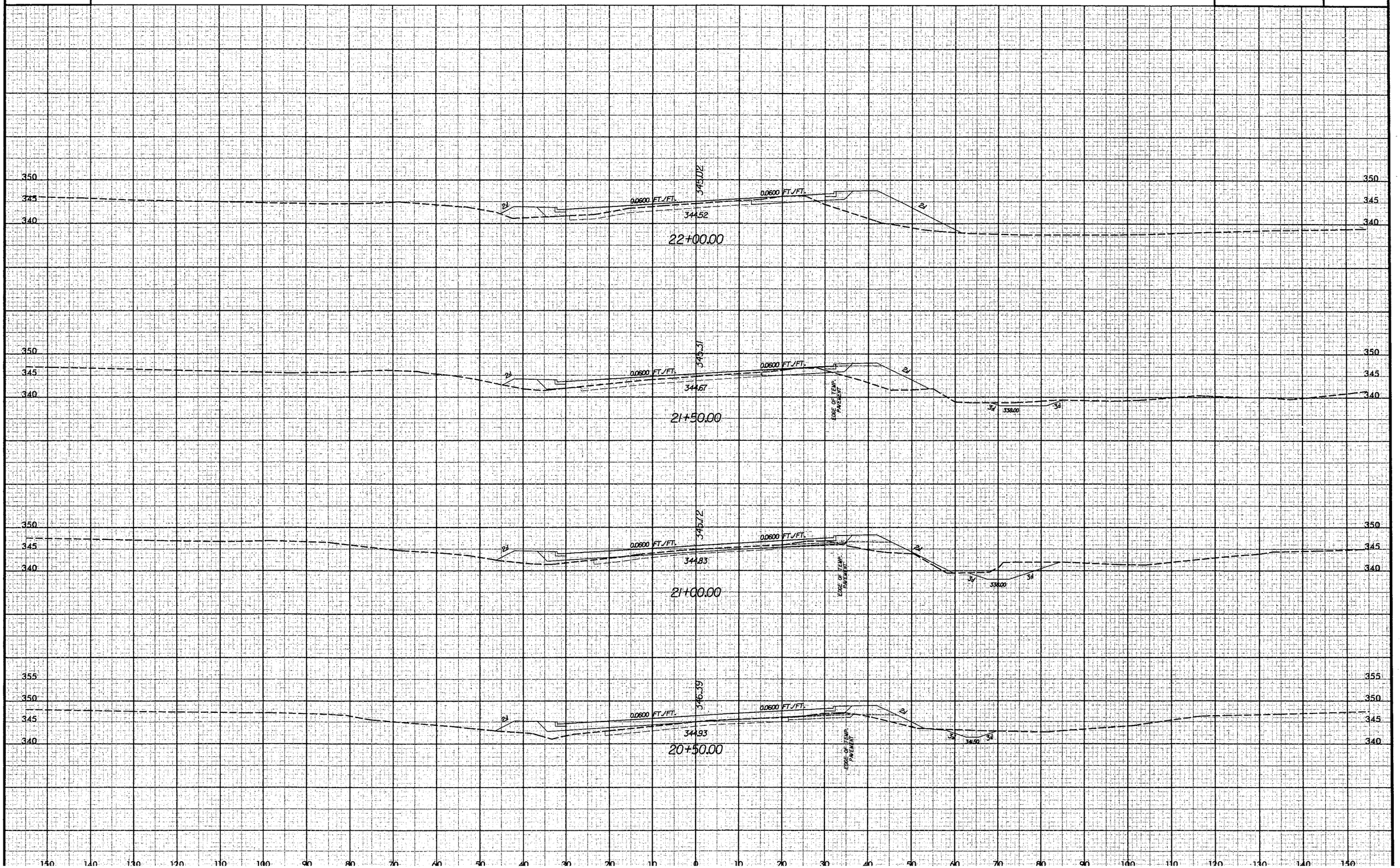
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-4



0 5 10

AIRPORT BLVD -L-

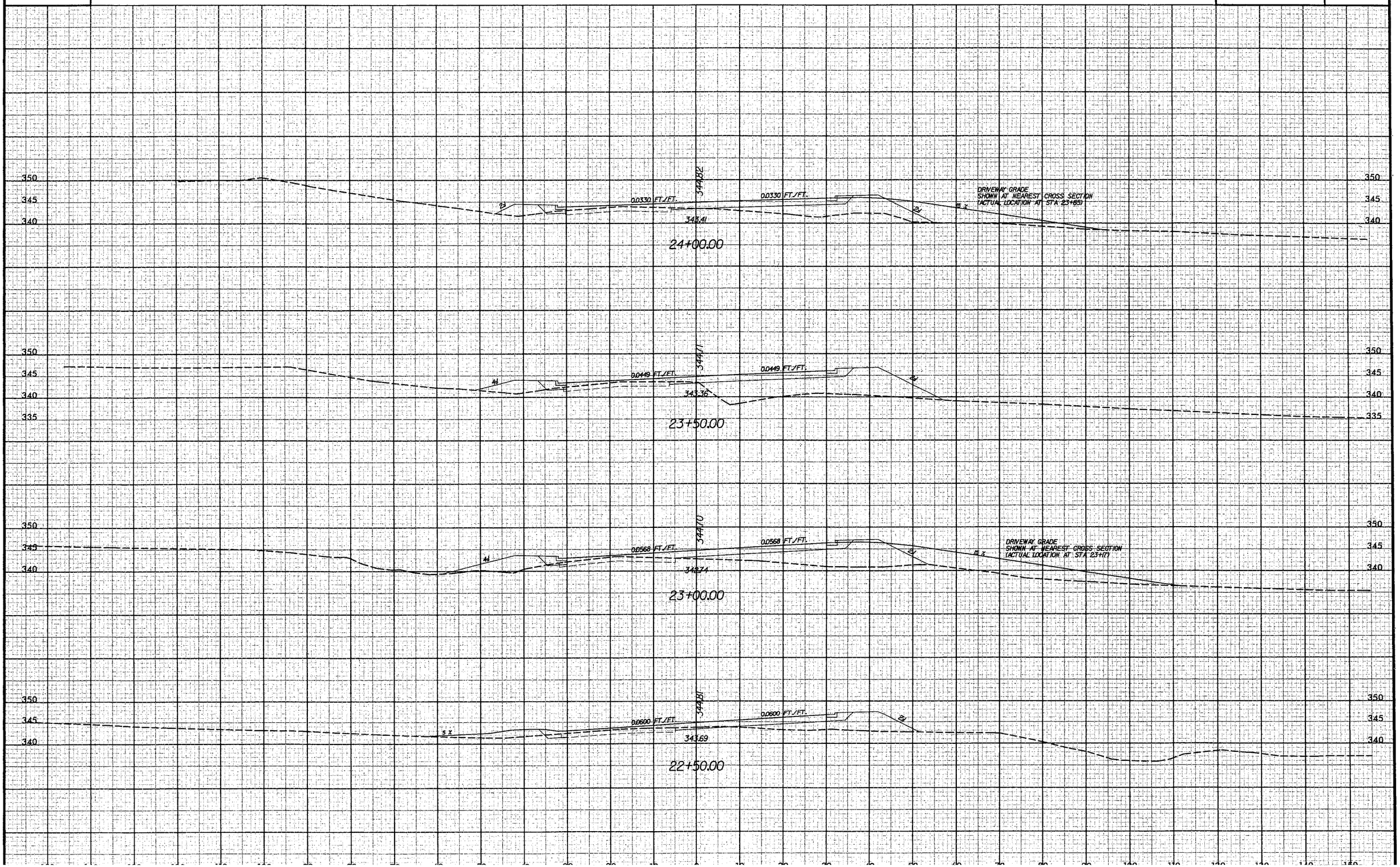
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-5



0 5 10

AIRPORT BLVD -L-

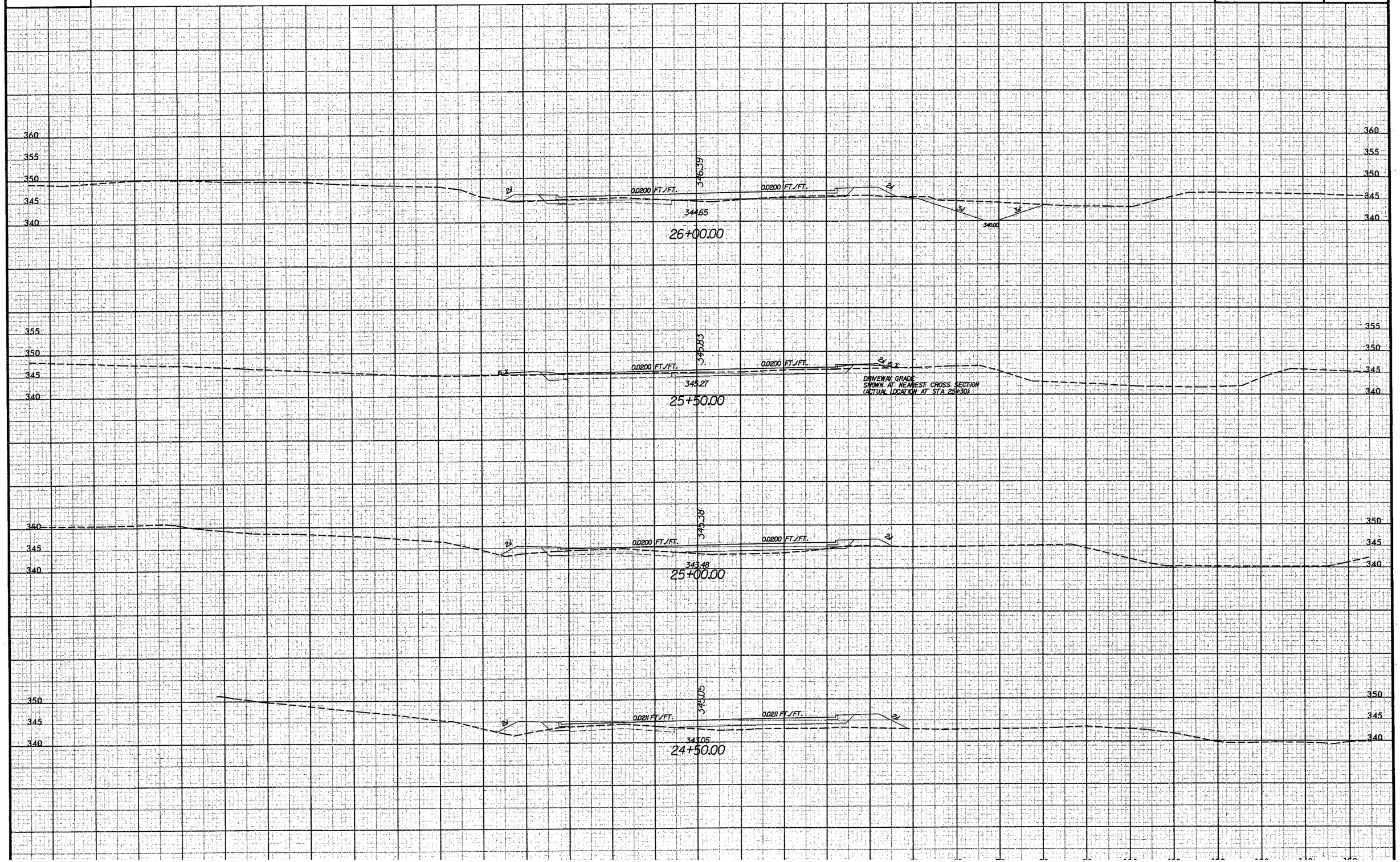
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-6



0 5 10

AIRPORT BLVD -L-

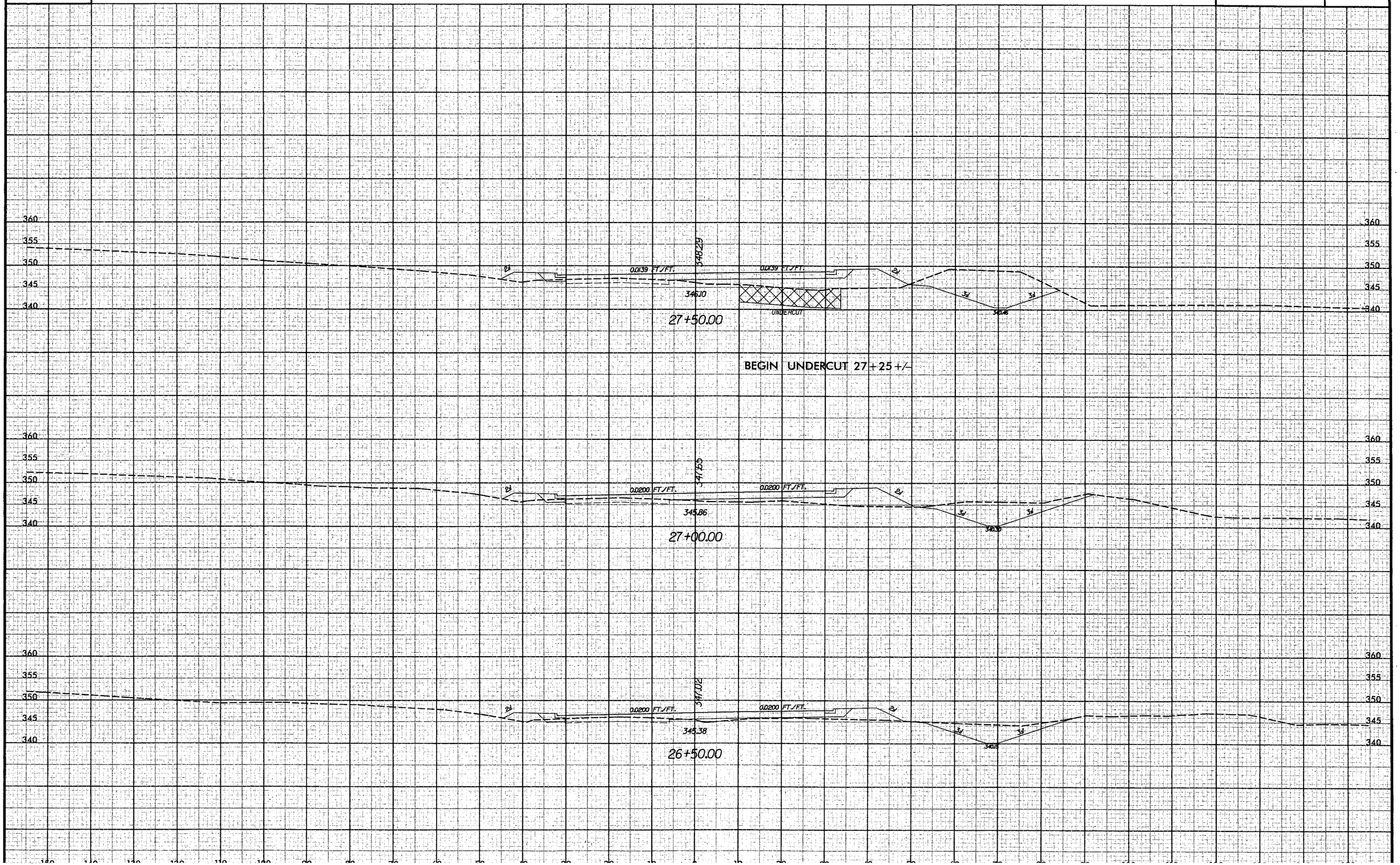
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-7



0 5 10

AIRPORT BLVD -L-

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-8



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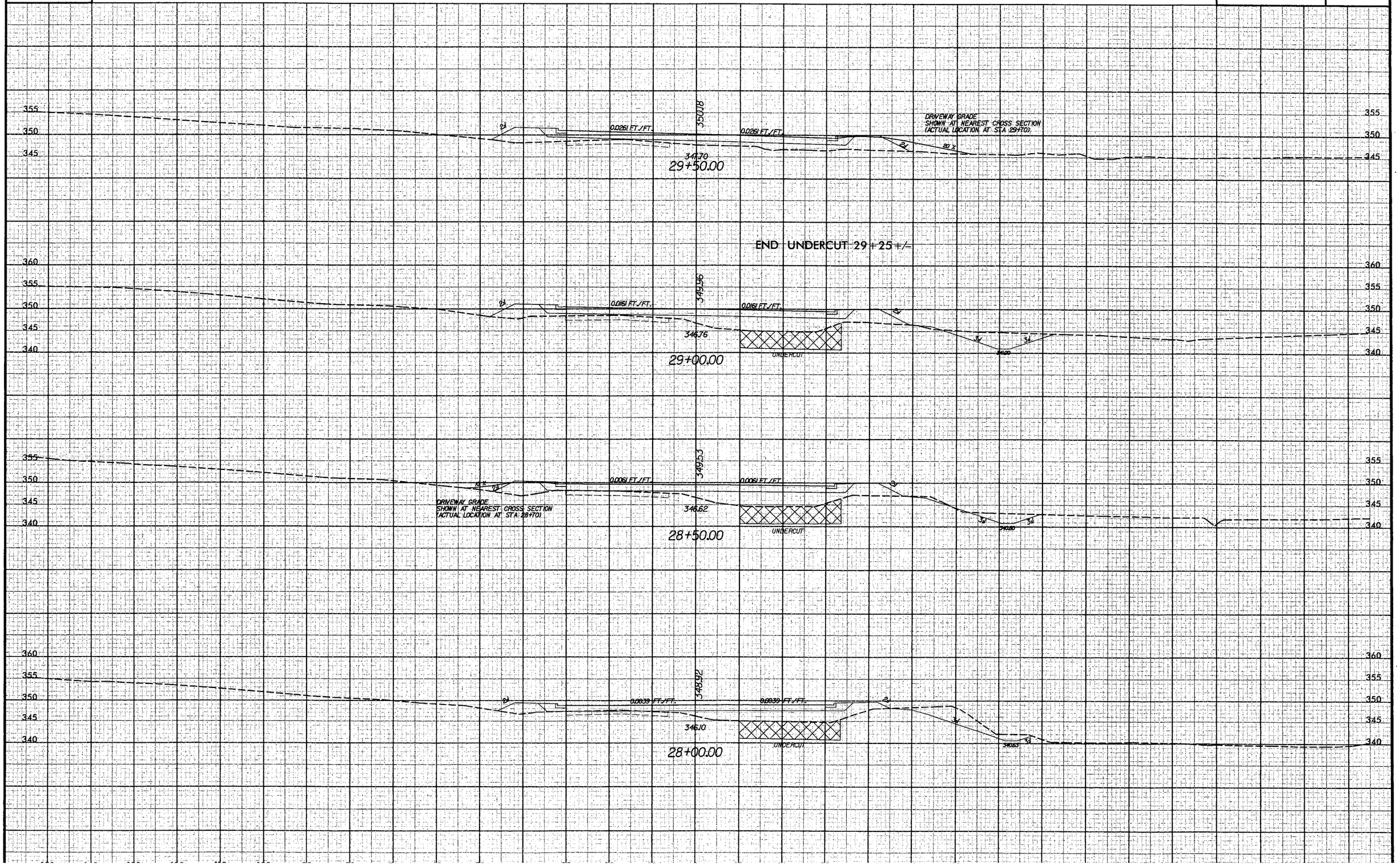
AIRPORT BLVD -L-

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-9



0 5 10

AIRPORT BLVD -L-

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-10

355
350
345

348.24
347.60
32+00.00
0.0300 FT./FT.
0.0300 FT./FT.
2:1
2:1

349.03
348.87
31+50.00
DRIVEWAY GRADE
SHOWN AT NEAREST CROSS SECTION
(ACTUAL LOCATION AT STA 31+70)

349.63
349.17
31+00.00

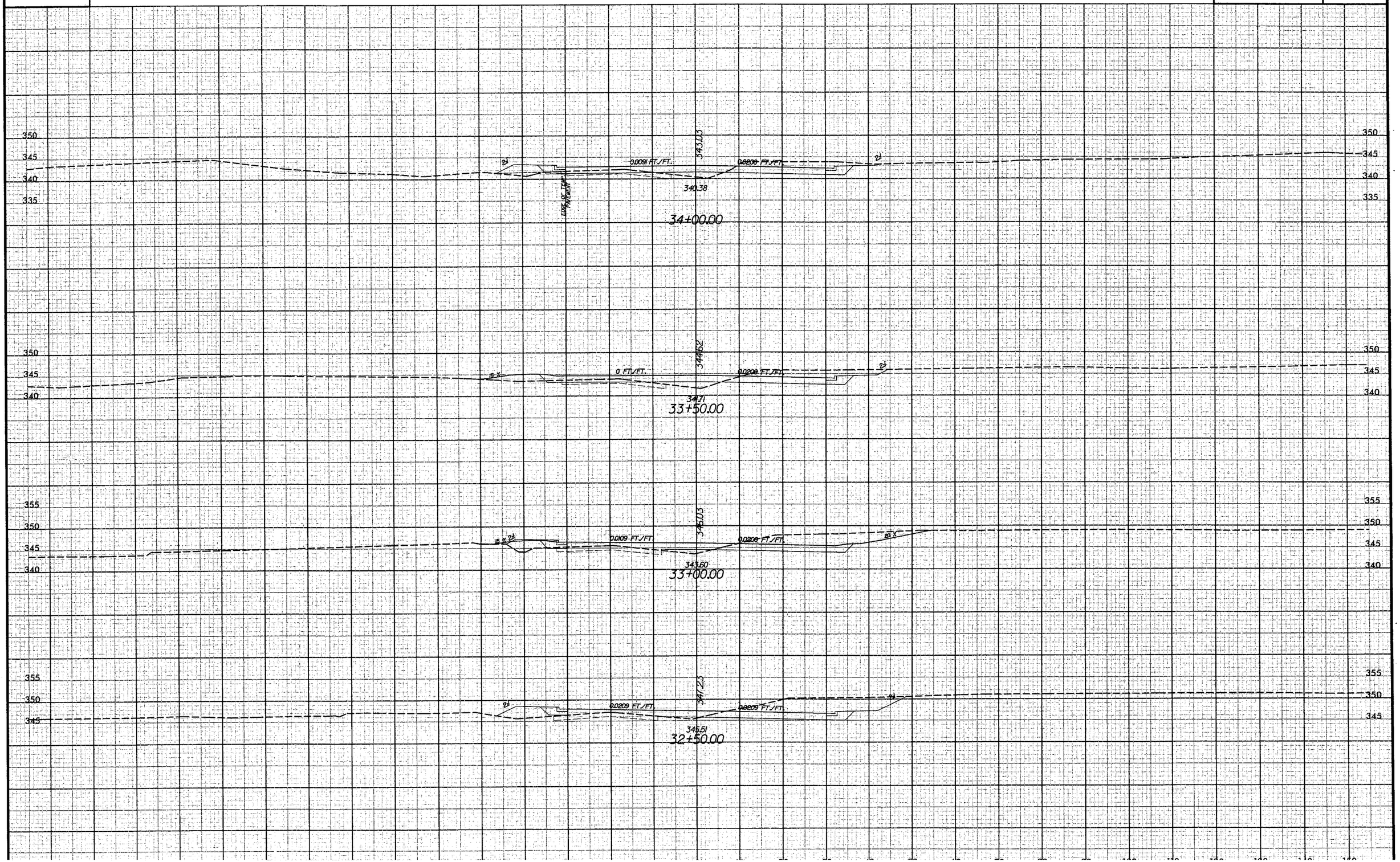
350.02
349.66
30+50.00

350.20
348.00
30+00.00

0 5 10

AIRPORT BLVD -L-

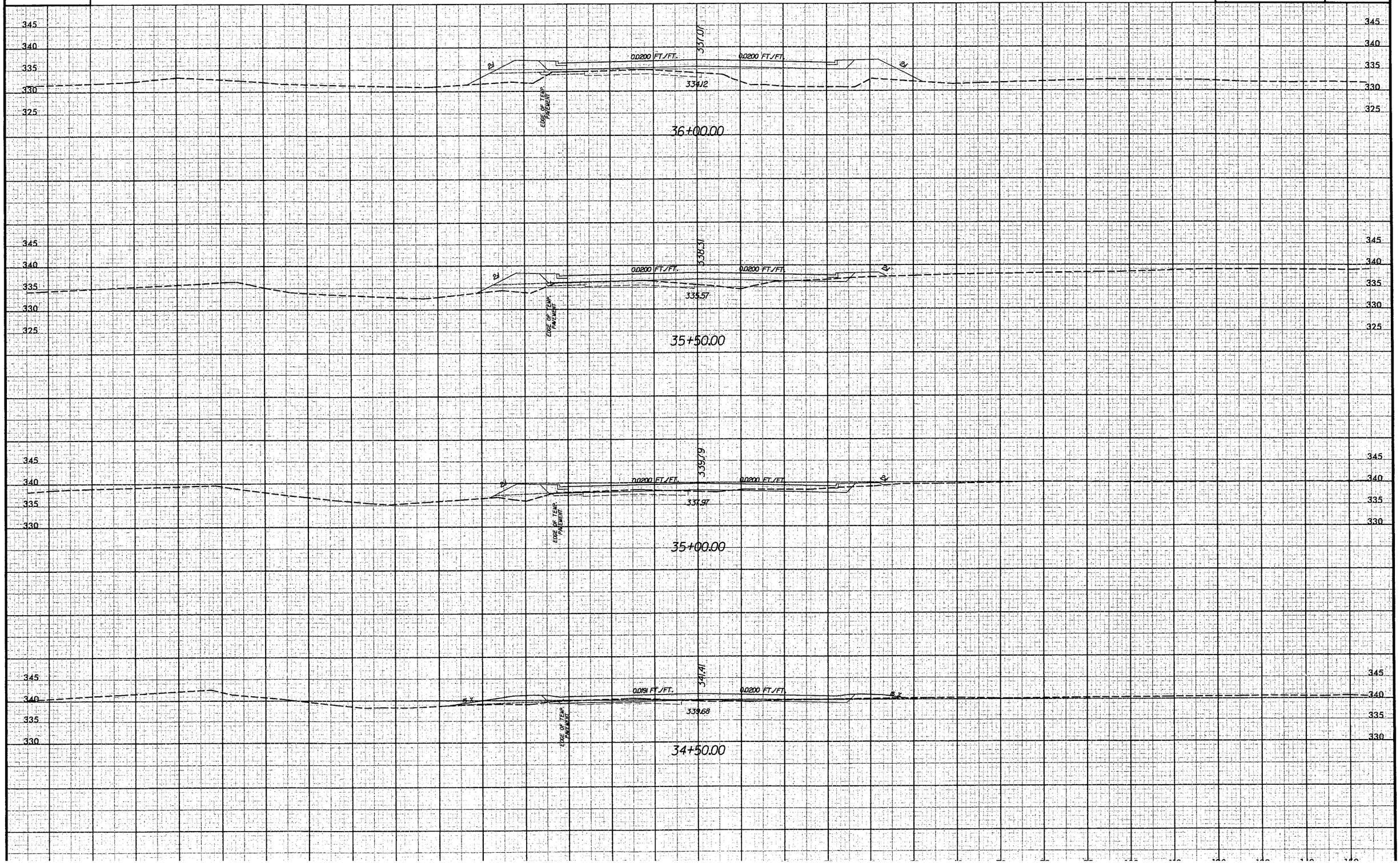
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-11



0 5 10

AIRPORT BLVD -L-

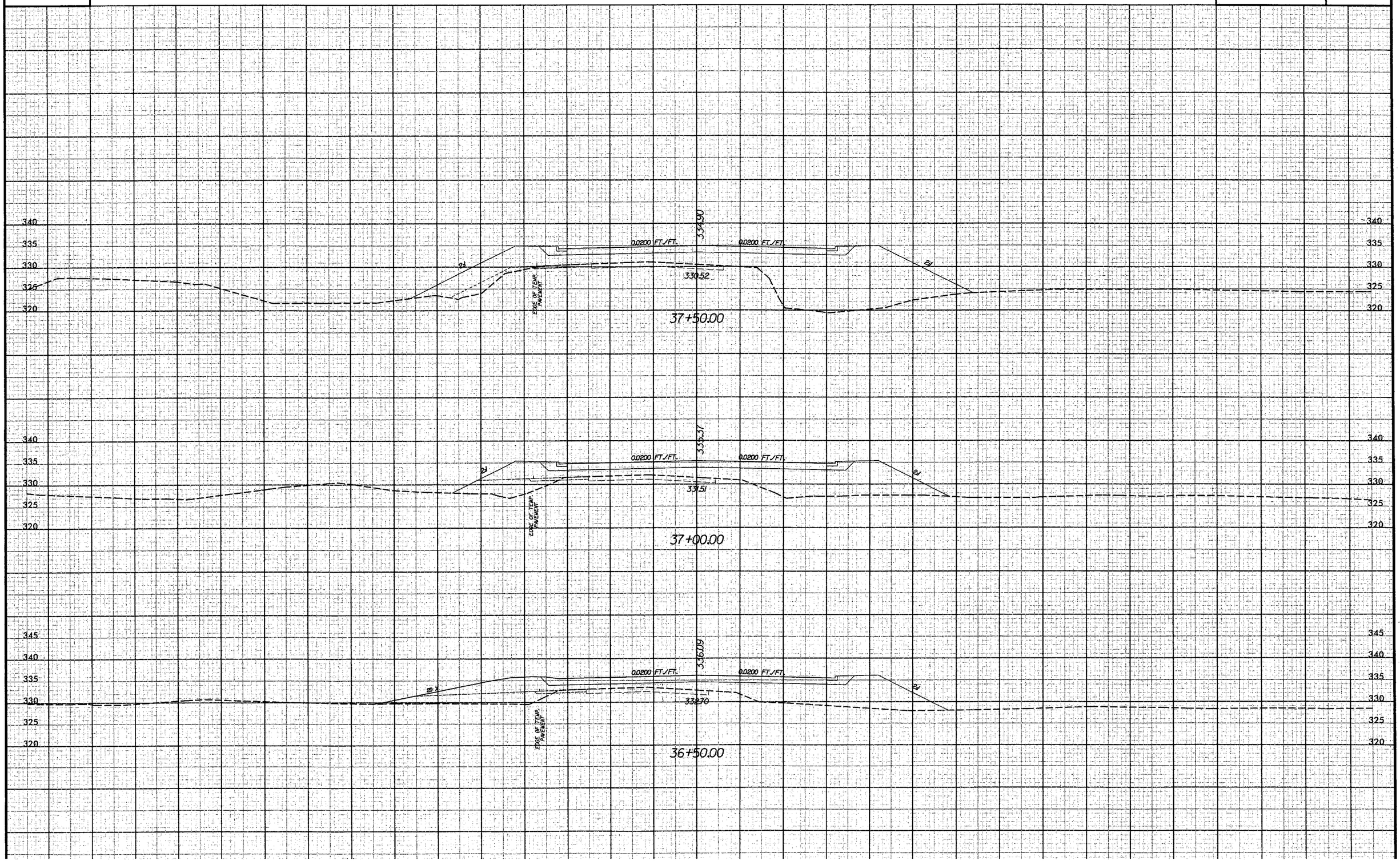
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-12



0 5 10

AIRPORT BLVD -L-

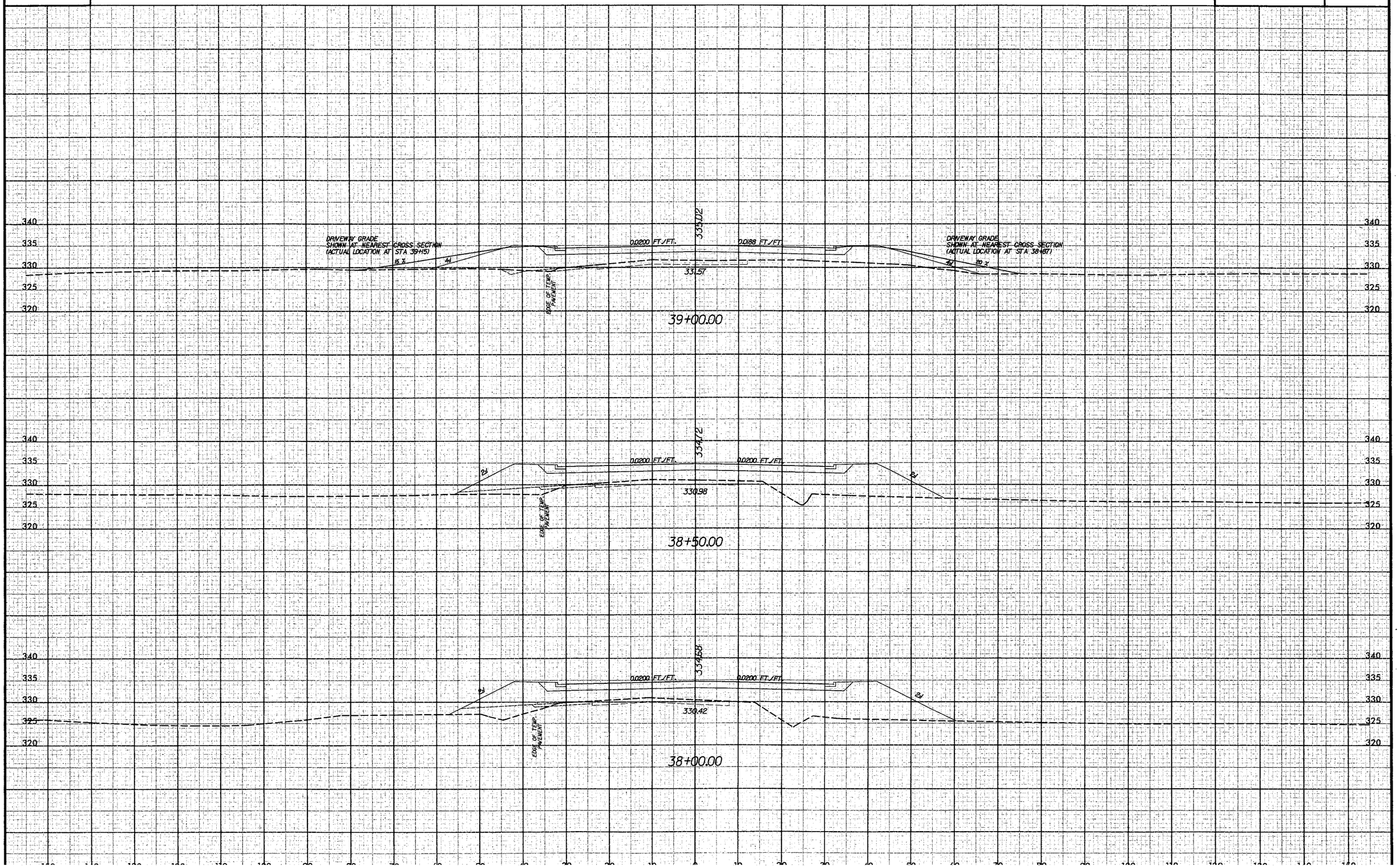
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-13



0 5 10

AIRPORT BLVD -L-

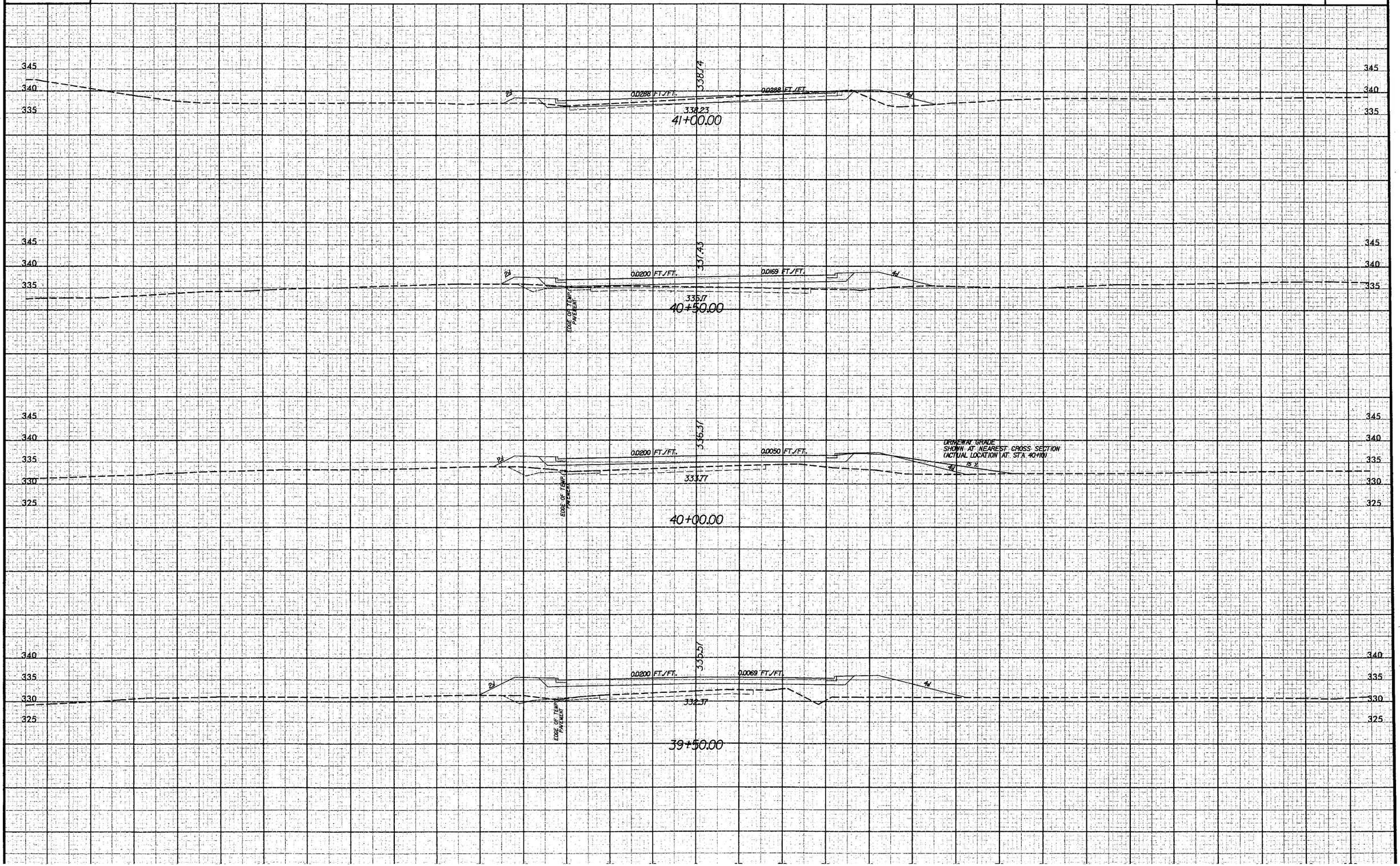
PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-14



0 5 10

AIRPORT BLVD -L-

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-15



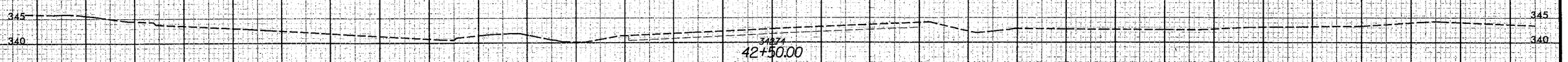
0 5 10

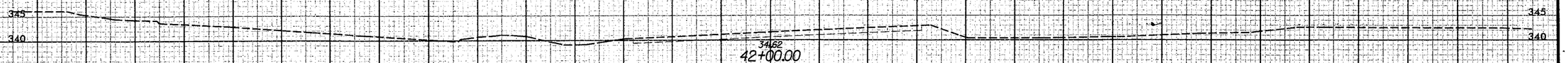
AIRPORT BLVD -L-

PROJ. REFERENCE NO.	SHEET NO.
U-3344A	X-16

END CONSTRUCTION STA 46+00+/-

END MILLING & RESURFACING STA 46+00+/-





END GRADE / BEGIN MILLING & RESURFACING STA 42+00

END PROJECT STA 42+00