STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
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October 24, 2005

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

ATTN: Mr. Eric Alsmeyer
NCDOT Coordinator

Dear Mr. Alsmeyer:

Subject: **Application for Section 404 Individual Permit and 401 Water Quality Certification** for Widening of Davis Drive (SR 1613/SR 1999) from Morrisville-Carpenter Road in Wake County to NC 54 in Durham County, State Project No. 9.8051713, TIP No. U-4026, $475.00 Debit Work Order 9.8051713, WBS Element 35018.1.1

The North Carolina Department of Transportation (NCDOT) proposes to widen Davis Drive (SR 1613/SR 1999) to a multi-lane facility from Morrisville-Carpenter Road (SR 3014) in Wake County to north of NC 54 in Durham County. The project length is 5.6 miles. These improvements are proposed to increase the capacity and safety of this facility. The project lies in the Piedmont Physiographic Province in the Cape Fear River Basin (Hydrologic Catalog Unit 03030002, Subbasin 03-06-05) and the Neuse River Basin (Hydrologic Catalog Unit 03020201, Subbasin 03-04-02). The application package consists of this cover letter, an ENG Form 4345, permit drawings, half size plan sheets, interagency meeting minutes, a stormwater management plan, North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP) confirmation letter, United States Army Corps of Engineers (USACE) verification letter, and the Indirect and Cumulative Effects (ICE) document.

Purpose and Need: The purpose of this project is to increase the traffic carrying capacity, manage traffic congestion, and provide improved access to adjacent properties on the section of Davis Drive between Morrisville-Carpenter Road and NC 54 so the route may better serve its functions as a major thoroughfare and a major collector to the Research Triangle Park and surrounding area. The project corridor is located in both Wake and Durham Counties, and passes through the western section of the Town of Morrisville, the northwest section of the Town of Cary, and the southern portion of the Research Triangle Park. In addition, Davis Drive is

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bounded by major highway facilities including Interstate 40 to the north, NC 55 to the west, NC 54 to the east, and Morrisville-Carpenter Road to the south.

The area is experiencing rapid growth in residential and commercial development including the Research Triangle Park, a major research-development park. In addition, major residential developments consisting of Breckenridge and Alta Seasons occur near the Davis Drive/Parkside Valley Drive/Summer Sky Drive intersection. The proposed widening improvements are needed to meet the increasing traffic demand, provide improved access to adjacent properties, and to improve safety.

Summary of Impacts: No jurisdictional impacts will occur within Section A of the U-4026 project. All jurisdictional impacts under the Clean Water Act occur within Section B of the U-4026 project footprint. All of these impacts occur within the Cape Fear River Basin and include the following.

- 0.22 acre of permanent impacts to riverine wetlands (fill, excavation, and mechanized clearing)
- 0.06 acre of permanent impacts to isolated wetlands (fill and mechanized clearing)
- 2125 linear feet of stream impacts
- No temporary wetland impacts
- 0.08 acre of permanent impacts to ponds (fill)
- 0.12 acre of temporary fill in surface waters

Summary of Mitigation: The project has been designed to avoid and minimize impacts to jurisdictional areas throughout the NEPA and design processes. Detailed descriptions of these actions are presented later in this cover letter. Compensatory mitigation for pond impacts and temporary surface water impacts will not be required for this project as determined by United States Army Corps of Engineers (USACE) representative Eric Alsmeyer June 26, 2001. Compensatory mitigation for the remaining impacts includes the following.

- 0.22 acre of riverine wetland impacts will be mitigated through the use of the EEP (see attached EEP confirmation letter).
- 0.06 acre of isolated wetland impacts will not require compensatory mitigation due to less than 0.1 acre of total isolated wetland impacts.
- 261 linear feet of on-site stream will be relocated on-site using natural channel design techniques.
- 1008 linear feet of perennial stream impacts will be mitigated through the use of the EEP (see attached EEP confirmation letter).
- Compensatory mitigation for 98 linear feet of perennial stream impacts has already been provided as part of the permitting for Site 4 of R-2000 Section AB.
- 758 linear feet of intermittent stream impacts will not require compensatory mitigation due to the quality of the resources as determined by USACE representative Eric Alsmeyer June 26, 2001.

PROJECT SCHEDULE

The project is divided into two sections as indicated in the following table. No jurisdictional impacts will occur within U-4026 Section A; therefore, no permit drawings were produced.

Table 1. Construction Limits and Schedule

Sections	Project Limits	Let Date
U-4026A	north of Morrisville-Carpenter Road to north of Koppers Road/McCrimmons Parkway	July 18, 2006
U-4026B	north of Koppers/McCrimmons Parkway to north of NC 54	July 18, 2006

NEPA DOCUMENT STATUS

The Categorical Exclusion (CE) for this project was approved on March 27, 2002. After the document was approved it was circulated to federal, state, and local agencies. Additional copies will be provided upon request.

INDEPENDENT UTILITY

The 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 including the following.

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.

The proposed project is needed to increase the capacity of Davis Drive. The southern terminus will tie into Morrisville-Carpenter Road and the northern terminus will tie into NC 54. The locations of the proposed project's termini have been coordinated with other programmed TIP projects in the area. The locations of the termini do not preclude the development and assessment of multiple alternates for other programmed TIP projects in the area. In this regard, the proposed project demonstrates logical termini and independent utility.

This project can stand alone as a functioning project and is designed to be compatible with other TIP projects in the area. The environmental impacts of the other projects will be fully evaluated in separate environmental documents. NCDOT has determined this project meets the criteria set forth in 23 CFR 771.111(f).

RESOURCE STATUS

Delineations: Delineations of jurisdictional areas were performed by EcoScience Corporation biologists in May 2001 and September 2004. Guidance provided in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) was used for determining wetland boundaries. Wetland boundaries and stream delineations were verified and a determination of mitigation requirements was made on June 26, 2001 (for May 2001 delineations) and February 8, 2005 (for September 2004 delineations) by Eric Alsmeyer of the USACE (see attached USACE verification letter and pages 40 to 46 of the CE document). Jurisdictional area delineations and mitigation status of jurisdictional areas were verified on

October 2, 2001 by North Carolina Division of Water Quality (NCDWQ) representative John Hennessey (for May 2001 delineations).

As previously mentioned, jurisdictional impacts for U-4026 Section B include 0.22 acre of permanent impacts to riverine wetlands, 0.06 acre of permanent impacts to isolated wetlands, 2125 linear feet of permanent stream impacts, no temporary wetland impacts, 0.08 acre of permanent impacts to ponds, and 0.12 acre of temporary impacts to surface waters. Detailed descriptions of impacted areas can be found in the CE on pages 40 to 46. The following tables and text summarize this information.

Table 2. Wetland and Stream Impacts for U-4026 Section B

Site	Permanent Riverine Wetland Impacts (acres)*	Permanent Isolated Wetland Impacts (acres)	Stream Impacts (linear feet)	Stream Impacts Requiring Mitigation (linear feet)	Natural Channel Design (linear feet)
1	0	0	216	0	0
2	0	0	106	0	0
3	0	0	186	186**	0
4	0	0	215	215	0
5	0	0	0	0	0
6	0.035	0	423	0	0
7	0	0	307	307	0
8	0	0	21	21	0
9	0	0	394	394	261
10	0	0	244	244	0
11	0.014	0	0	0	0
12	0.013	0	0	0	0
13	0.021	0	0	0	0
14	0.011	0	0	0	0
15	0	0.013	0	0	0
16	0	0.043	0	0	0
17	0	0	0	0	0
18	0.034	0	13	0	0
19	0.090	0	0	0	0
Total	**0.22**	**0.06**	**2125**	**1367**	**261**

* -- Includes fill, excavation, and mechanized clearing.

** -- 98 linear feet of stream has been mitigated for during the permitting of Site 4 of R-2000 Section AB.

Wetland Impacts: All impacts to riverine wetlands occur within the U-4026 Section B project area in the Cape Fear River Basin. Impacts to isolated wetlands occur at two sites within the U-4026 Section B project area in the Cape Fear River Basin. Table 3 summarizes information for each of the wetland impact sites associated with U-4026 Section B. A description of each site is as follows.

Site 6 (CE Site 11): The riverine wetland at Site 6 consists of 0.023 acre of fill and 0.012 acre of mechanized clearing (Sheet 26 of 65 of the permit drawings). The wetland supports an emergent marsh which occurs near a man-made pond. The wetland is currently receiving hydrology from a pipe extending beneath Davis Drive. This pipe will be removed and off-site drainage is to be

conveyed in a piped culvert system north of Development Drive and outlet into uplands as discussed in the June 19, 2003 Interagency Hydraulic Design Review Meeting. Dominant plants associated with the emergent marsh include black willow (*Salix nigra*), tag alder (*Alnus serrulata*), buttonbush (*Cephalanthus occidentalis*), rushes (*Juncus* spp.), sedges (*Carex* spp.), wool-grass (*Scirpus robustus*), climbing hempweed (*Mikania scandens*), and American lotus (*Nelumbo lutea*).

Site 11: The riverine wetland at Site 11 consists of 0.014 acre of fill (Sheet 52 of 65 of the permit drawings). This wetland exists as a roadside depression adjacent to McCrimmons Parkway that is subject to regular vegetative maintenance. Wetland vegetation includes soft rush (*Juncus effusus*) and sedges.

Sites 12 and 13: The riverine wetlands at Sites 12 and 13 consist of 0.012 acre of fill and 0.001 acre of mechanized clearing, and 0.020 acre of fill and 0.001 acre of mechanized clearing, respectively (Sheet 52 of 65 of the permit drawings). These wetlands are linear depressions adjacent to McCrimmons Parkway that are subject to regular vegetative maintenance. Wetland vegetation includes soft rush, sedges, Japanese stilt grass (*Microstegium vimineum*), and polygonum (*Polygonum* sp.).

Site 14: The riverine wetland at Site 14 consists of 0.009 acre of fill and 0.002 acre of mechanized clearing (Sheet 52 of 65 of the permit drawings). This wetland is a roadside depression adjacent to McCrimmons Parkway that is subject to regular vegetative maintenance. Wetland vegetation includes soft rush and sedges.

Sites 15 and 16: The isolated wetlands at Sites 15 and 16 consist of 0.013 acre of fill, and 0.036 acre of fill and 0.007 acre of mechanized clearing, respectively (Sheets 54 and 56 of 65 of the permit drawings). These wetlands are roadside depressions adjacent to Hopson Road that are subject to regular vegetative maintenance. Wetland vegetation species include soft rush and sedges.

Site 18: The riverine wetland at Site 18 consists of 0.027 acre of fill and 0.007 acre of mechanized clearing (Sheet 58 of 65 of the permit drawings). This wetland supports a bottomland hardwood forest and serves as the headwaters to an intermittent stream. Dominant vegetation associated with this wetland includes green ash (*Fraxinus pennsylvanica*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), and Japanese stilt grass.

Site 19: The riverine wetland at Site 19 consists of 0.013 acre of fill and 0.077 acre of excavation and mechanized clearing (Sheet 62A of 65 of the permit drawings). This wetland exists as a forested roadside depression that serves as the headwaters to an intermittent stream. Dominant vegetatin associated with this wetland includes black willow, sweetgum, winged elm (*Ulmus alata*), Japanese silt grass, poison ivy (*Toxicodendron radicans*), and Japanese honeysuckle (*Lonicera japonica*).

Table 3. Wetland Information for U-4026 Section B

Site	Cowardin Classification*	DEM Rating	Schafale and Weakley (1990) Classification	Impact Type **	Permanent Riverine Impacts (acres)	Permanent Isolated Impacts (acres)
6	PEM1/2K	71	Emergent Marsh	F, M	0.035	0
11	PEM1E	16	maintained roadside depression	F	0.014	0
12	PEM1E	16	maintained roadside depression	F, M	0.013	0
13	PEM1E	16	maintained roadside depression	F, M	0.021	0
14	PEM1E	16	maintained roadside depression	F, M	0.011	0
15	PEM1E	16	maintained roadside depression	F	0	0.013
16	PEM1E	16	maintained roadside depression	F, M	0	0.043
18	PFO1B	19	Bottomland Hardwoods Forest	F, M	0.034	0
19	PF01A/J	27	forested roadside depression	F, E, M	0.090	
Total	--	--	--	--	**0.22**	**0.06**

*--P = palustrine; EM = emergent; (EM)1 = persistent; 2 = non-persistent; FO = forested; (FO)1 = broad-leaved deciduous; K = artificially flooded; E = seasonally flooded or saturated; B = saturated
**--F = fill; E = excavation; M = mechanized clearing (method III)

Stream Impacts: All impacts to jurisdictional streams occur on Kit Creek, tributaries to Kit Creek, and tributaries to Burdens Creek within the Cape Fear River Basin. Stream crossings associated with the existing facility consist of concrete culverts of various sizes, which are nearly perpendicular to the roadway. Table 4 summarizes the information for each of the stream impact sites associated with U-4026 Section B.

Unnamed Tributary to Burdens Creek Proposed for Natural Channel Design (Site 9): The proposed widening of Davis Drive will result in the impact (fill) of a portion of stream east and west of the existing facility (Sheet 40 of 65 of the permit drawings). Approximately 261 linear feet of this impacted channel east of Davis Drive is targeted for on-site relocation and restoration. The stream design/classification for this stream reach is based on fluvial geomorphic principles and techniques. Existing stream conditions include a substrate composed primarily of gravel, a width-depth ratio of 8.27, an entrenchment ratio of 1.07, an average slope of 0.0174, a sinuosity of 1.17, and a classification of G4. The restored channel has been designed for stable pattern,

Table 4. Jurisdictional Stream Information for U-4026 Section B

Site	CE Site No.	Station No.	Structure	Stream	Status	NCDWQ Index No./ Classification	Channel Width (feet)	Channel Depth (feet)	Impact (linear feet)	Mitigation Required (linear feet)/Ratio
1	3B	93+29 – L-	54" RCP/48" suppl pipe	UT to Kit Creek	Inter-mittent	16-41-1-17-2(0.3) C NSW	3	3	216	0
2	3C	104+58 – L-	(2) 48" pipes	UT to Kit Creek	Inter-mittent	16-41-1-17-2(0.3) C NSW	5	2	106	0
3	4	134+23 – L-	66" RCP/72" suppl pipe	UT to Kit Creek	Perennial	16-41-1-17-2(0.3) C NSW	4	2	186***	176/2:1
4	9	178+23 – L-	54" RCP/66" suppl pipe	UT to Kit Creek	Perennial	16-41-1-17-2(0.7) WS-IV; NSW	9	3	215	430/2:1
6	12	205+00 to 215+00 – L-	Embank-ment/ Lateral	UT to Kit Creek	Inter-mittent	16-41-1-17-2(0.7) WS-IV; NSW	2	1	423	0
7	13	229+99.7 –L-	66" RCP/72" suppl pipe	UT to Kit Creek	Perennial	16-41-1-17-2(0.7) WS-IV; NSW	7	4	307	614/2:1
8	14	241+00 – L-	54" RCP	UT to Kit Creek	Perennial	16-41-1-17-2(0.7) WS-IV; NSW	3	1	21	21/1:1*
9	15	286+57.6 –L-	66" RCP/48" suppl pipe	UT to Burdens Creek	Perennial	16-41-1-17-1(0.3) C NSW	5	4	394	266/2:1 261/1:1**
10	16	293+82.1 –L-	8' x 6'/ 60" suppl pipe	UT to Burdens Creek	Perennial	16-41-1-17-1(0.3) C NSW	12	5	244	488/2:1
18	--	25+00-Y13-	30" RCP w/ EW/ Embank-ment/Trail	UT to Burdens Creek	Inter-mittent	16-41-1-17-1(0.3) C NSW	1	1	13	0
Total									**2125**	**2256**

*Mitigation ratio for this site of 1:1 as determined by USACE representative Eric Alsmeyer June 26, 2001.

** 261 linear feet of perennial stream impacts will be compensated for by on-site natural channel design at a mitigation ratio of 1:1.

*** -- 98 linear feet of stream has been mitigated for during the permitting of Site 4 of R-2000 Section AB.

dimension, and profile. Based upon the existing valley type, the desired flood prone width, and reference reach data, the proposed channel design has a classification of C4, a mean bankfull depth of 0.9 feet, and an excavated floodplain width of 33 to 55 feet. Native trees and shrubs will be planted on channel banks above bankfull. In addition, cross-vane structures will be utilized to control near-bank shear stress in meanders along the proposed roadway. A cross-vane is proposed to control the channel gradient upstream, while the culvert crossing under Davis Drive will control the gradient downstream. More detailed descriptions and plans for existing and proposed conditions can be found on Sheets 44 to 47 of 65 of the permit drawings.

Water Quality Information: Unnamed tributaries to Kit Creek within Sites 1, 2, and 3 have been assigned a NCDWQ Index No. of 16-41-1-17-2(0.3) and a best usage classification of C, NSW. Unnamed tributaries to Kit Creek within Sites 4, 5, 6, 7, and 8 have been assigned a NCDWQ Index No. of 16-41-1-17-2(0.7) and a best usage classification of WS-IV, NSW. Unnamed tributaries to Burdens Creek within Sites 9, 10, and 18 have been assigned a NCDWQ Index No. of 16-41-1-17-1(0.3) and a best usage classification of C, NSW.

No waters designated as Water Supply I (WS-I), Water Supply II (WS-II), High Quality Waters (HQW), Outstanding Resource Waters (ORW), or watershed Critical Areas (CA) occur within the project corridor. In addition, Kit Creek, Burdens Creek, and tributaries to Kit Creek and Burdens Creek are not listed in the North Carolina 2002 or draft 2004 Section 303(d) lists.

Pond and Temporary Surface Water Impacts: Permanent impacts to man-made ponds total 0.08 acre and temporary impacts to surface waters total 0.12 acre. Compensatory mitigation for pond impacts will not be required as determined by USACE representative Eric Alsmeyer on June 26, 2001. Once construction is complete, surface waters temporarily impacted by construction activities will be returned to pre-construction conditions.

Temporary Lowering of Reservoir: The water level of the reservoir at Davis Drive (Site 5) will be lowered temporarily in order to extend the existing box culvert in dry conditions. The reservoir will be partially lowered for approximately two to six months. Once construction is complete, the reservoir will be allowed to return to the original surface water capacity.

Explanations for Impact Increases from CE Projections: Stream channel impacts for Site 9 (CE Site 15) increased from the amount projected in the 2002 CE document due to additional impacts resulting from natural channel design on the perennial stream system (Sheet 40 of 65 of the permit drawings, Station 286+57.6). Therefore, the existing channel will be filled and relocated using natural channel design techniques. Additional stream channel impacts from the 2002 CE document projections have increased due to the following.

1. Channel/bank work and roadway ditches tying into channel work outside of the fill limits account for some of the additional impacts. These changes have been proposed since the 2002 CE document and, therefore, were not taken into account at that time.
2. New standard practice to extend stream impacts to the right-of-way or permanent drainage easement rather than the fill limits as in the 2002 CE document.

PROTECTED SPECIES

Plants and animals with a Federal classification of Endangered (E) or Threatened (T) 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 U.S. Fish and Wildlife Service (USFWS) lists three federally protected species for Durham County and four federally protected species for Wake County (Table 5).

Table 5. Federally Protected Species for Durham and Wake Counties

Scientific Name	Common Name	Status	County Listed	Biological Conclusion
Haliaeetus leucocephalus	Bald eagle	Threatened (proposed for delisting)	Durham & Wake	No Effect
Picoides borealis	Red-cockaded woodpecker	Endangered	Wake	No Effect
Rhus michauxii	Michaux's sumac	Endangered	Durham & Wake	No Effect
Echinacea laevigata	Smooth coneflower	Endangered	Durham	No Effect
Alasmidonta heterodon	Dwarf wedgemussel	Endangered	Wake	No Effect

Endangered -- a species that is in danger of extinction throughout all or a significant portion of its range.
Threatened -- a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

As reported in the CE, a Biological Conclusion of "No Effect" was rendered for bald eagle, dwarf wedgemussel, and red-cockaded woodpecker due to the lack of habitat within the project corridor. Potential suitable habitat for Michaux's sumac and smooth coneflower exists within the corridor; therefore, plant-by-plant surveys were conducted within the project corridor on May 25 and 29, 2001 by EcoScience biologists. No specimens of either plant species were found during the surveys; therefore a biological conclusion of "No Effect" was determined for Michaux's sumac and smooth coneflower. Additional surveys for Michaux's sumac and smooth coneflower were again conducted on October 6, 2005 and no specimens were found.

CULTURAL RESOURCES

Architectural/Historic: The proposed project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 4(f) of the Department of Transportation Act of 1966, as amended. Staff of the State Historic Preservation Office (SHPO) conducted a review of the project area and stated that no properties of architectural or historic significance would be affected by the proposed project in a letter dated May 1, 2001 (Appendix B of the CE).

Archaeology: SHPO reviewed the proposed project and stated that no properties of archaeological significance would be affected by the proposed project in a letter dated May 1, 2001 (Appendix B of the CE).

UTILITY IMPACTS

According to the NCDOT, all potential utility impacts have been addressed and no utility relocations will result in additional impacts to jurisdictional areas.

ICE STUDY

ICE STUDY

An Indirect and Cumulative Effects (ICE) Assessment for Transportation Improvement Program (TIP) project U-4026 in Wake and Durham Counties, North Carolina was completed in November 2003 by HNTB North Carolina, PC and was submitted to the agencies (see attached ICE document). The ICE Assessment includes project documentation, background information, and a definition of the study area(s). It also includes the identification of regional influences, growth and development trends, current transportation plans, land use plans, environmental regulations, and an inventory of notable features. The assessment also consists of the identification of activities that cause effects, any potential indirect and cumulative effects, analysis of these indirect and cumulative effects, and finally an evaluation of the results.

According to the ICE Assessment, TIP U-4026 may induce development between intersections of the project corridor and in other sections of the Impact Area. However, local planners agree that growth will occur regardless of TIP U-4026 construction. The Town of Cary, Town of Morrisville, the Research Triangle Park, Wake County, and City/County of Durham have created local plans and environmental restrictions to manage anticipated growth and development pressures within local communities and the TIP U-4026 Impact Area. All local planners agree that TIP U-4026 will accelerate planned development within the Impact Area; however, if the local plans and environmental regulations are adhered to and practiced, then the influence of TIP U-4026 will be negligible.

FEMA COMPLIANCE

According to the NCDOT hydraulics engineers, no Federal Emergency Management Agency involvement is required for this project.

WILD AND SCENIC RIVERS

The project will not impact any Designated Wild and Scenic Rivers or any rivers included in the list of study rivers (Public Law 90-542, as amended).

ESSENTIAL FISH HABITAT

The project will not impact any Essential Fish Habitat (EFH) afforded protection under the Magnuson-Stevens Act of 1996 (16 U.S.C. 1801 et seq.).

MITIGATION OPTIONS

The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the waters of the United States. Mitigation of wetland and surface water impacts has been defined by the CEQ to include avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20). Executive Order 11990 (Protection of Wetlands) and Department of Transportation Order 5660.1A (Preservation of the Nations Wetlands), emphasize protection of the functions and values provided by wetlands. These directives require that new construction in wetlands be avoided as much as possible and that all practicable measures are taken to minimize or mitigate impacts to wetlands.

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

AVOIDANCE: All wetland areas not affected by the project will be protected from unnecessary encroachment.

1. No staging of construction equipment or storage of construction supplies will be allowed in wetlands or near surface waters.
2. Careful containment of toxic or hazardous materials near creeks and tributaries, and employment of strict erosion and sediment control procedures will be practiced to avoid additional impacts to jurisdictional areas.
3. Aquatic Life Movement: The project was designed to avoid disturbance to aquatic life movements.
4. The NCDOT coordinated with the USACE, USFWS, NCDWQ, and the N.C. Wildlife Resources Commission (NCWRC) on stream restorations, relocations, and minimization. As a result of this coordination, the NCDOT has committed to
    a. Not clearing the area adjacent to the stream at Site 3 and indicating it as an environmentally sensitive area on the final design plans;
    b. Reconfiguring the intermittent stream at Site 12 and planting the streambanks with appropriate species where impacted by road widening; and
    c. Investigating the possibility of moving the stream out of the fill slope at Site 15 for minimization and restoration of the stream outside of the fill are for mitigation.

MINIMIZATION: Minimization includes the examination of appropriate and practicable steps to reduce adverse impacts. Minimization techniques implemented include the following.

1. Protection of Surface Waters BMP: In order to minimize potential impacts to water resources in the project area NCDOT BMPs for the Protection of Surface Waters will be strictly enforced during the construction phase of the project.
2. Ditching: It is the policy of NCDOT to eliminate lateral ditching in wetlands as much as possible, thus preserving the hydrology of adjacent wetlands.
3. Stream/Wetland Crossings: Fill slopes, canopy removal in or near floodplain systems, and median widths will be reduced at stream/wetland crossings to reduce jurisdictional area loss.
4. "In-Stream" Construction: "In-stream" construction will be minimized.
5. Stormwater Management: As required by NCDWQ, a stormwater management plan will be implemented for this project. The plan is enclosed with the application package.
6. Structural BMPs: Structural BMPs to be utilized for this project include grassed swales, preformed scour holes, rip-rap outlet protection and energy dissipaters, natural channel design for stream relocation, and submergence of box and pipe culverts below stream beds.
7. Drainage Outlets: Discharge from highway drainage systems has been outlet, where practical, into lateral ditches or preformed scour holes to promote filtration of discharge prior to entering a stream system.

8. Side Slopes: Side slopes in jurisdictional areas are no steeper than 2:1. The proposed grass ditches and channel banks will have side slopes no steeper than 3:1. The use of rip-rap has been limited to pipe outlets, channel banks, and steep ditches to reduce soil erosion.
9. Site 9, Inlet: The inlet of the supplemental pipe at approximately Station 286+57 is elevated to match bankfull (Sheet 40 of 65 of the permit drawings).

COMPENSATION: The primary emphasis of compensatory mitigation is to re-establish a condition similar to what would have existed if the project was 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 wetland functions and values lost as a result of construction of the project. These methods consist of creation of new wetlands from uplands, borrow pits, and other non-wetland areas; restoration of wetlands; and enhancement of existing wetlands. Where such options may not be available, or when existing wetlands and wetland-surface water complexes are considered to be important resources worthy of preservation, consideration is given to preservation as at least one component of a compensatory mitigation proposal.

Necessary compensatory mitigation to offset unavoidable impacts to waters jurisdictional under the Clean Water Act will be provided by EEP. The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. NCDOT has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. Unavoidable impacts consist of 0.22 acre of riverine wetland impacts, 0.06 acre of isolated wetland impacts, and 2125 linear feet of stream impacts. Compensatory mitigation for this project consists of the following.

Wetland Mitigation: Wetland impacts total 0.22 acre of impact to riverine wetlands and 0.06 acre of impacts to isolated wetlands. The following combination of compensatory mitigation is proposed.

1. Compensatory mitigation will be mitigated through the use of EEP for 0.22 acre of riverine wetland impacts [mitigation ratio of 2:1 (0.44 acre of mitigation required)].
2. Compensatory mitigation for 0.06 acre of isolated wetland impacts will not require compensatory mitigation due to less than 0.1 acre total of isolated wetland impacts.

Stream Mitigation: Stream impacts total 2125 linear feet of impacts to perennial and intermittent streams. The following combination of on-site stream relocation and compensatory mitigation is proposed.

1. Natural channel design and relocation of 261 linear feet of stream impacted within Site 9 of U-4026 Section B at a mitigation ratio of 1:1.
2. Compensatory mitigation will be mitigated through the use of EEP for 1008 linear feet of perennial stream impacts [mitigation ratio of 2:1 for 987 linear feet of impacts (1974 linear feet of mitigation required) and mitigation ratio of 1:1 for 21 linear feet of impacts (21 linear feet of mitigation required) as determined by USACE representative Eric Alsmeyer on June 26, 2001].

3. A total of 98 linear feet of compensatory mitigation for perennial stream impacts within Site 3 of U-4026 Section B has already been provided for during the permitting for Site 4 of R-2000 Section AB
4. Additionally, 758 linear feet of intermittent stream impacts will not require compensatory mitigation due to the quality of the resources as determined by USACE representative Eric Alsmeyer on June 26, 2001.

REGULATORY APPROVALS

Application is hereby made for a Department of the Army Individual 404 Permit and a 401 Water Quality Certification from the NCDWQ as required for the activities described above. In compliance with Section 143-215.3D(e) of the NCAC, we will provide $475.00 to act as payment for processing the Section 401 Water Quality Certification application previously noted in this application (see Subject line). Seven copies of this application are provided to NCDWQ, for their review.

If you have any questions or need additional information please call Mr. Brett Feulner at (919) 715-1488.

Sincerely,

Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

w/attachment
Mr. John Hennessy, NCDWQ (7 Copies)
Ms. Becky Fox, USEPA – Whittier, NC
Mr. Clarence W. Coleman, P.E., FHWA
Dr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Chris Murray, DEO
Mr. Travis Wilson (Div. 5)
Mr. Ronald Mikulak, USEPA – Atlanta, GA
Mr. Gary Jordan (Div. 5) USFWS
Mr. Mark Staley, Roadside Environmental
Mr. Jon Nance, P.E. Division Engineer

w/o attachment
Mr. Jay Bennett, P.E., Roadway Design
Mr. Scott McLendon, USACE, Wilmington
Mr. Brian Yamamoto, NCDOT-PDEA
Mr. Majed Alghandour, P. E., Programming and TIP
Mr. Carl Goode, PE, Human Environment
Mr. Art McMillan, P.E., Highway Design
Ms. Beth Harmon, EEP
Mr. Todd Jones, NCDOT External Audit Branch

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325)	OMB APPROVAL NO. 071-0003 Expires December 31, 2004

The public reporting burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies. Submission of requested information is voluntary, however, if information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4.DATE APPLICATION COMPLETED

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANTS NAME Gregory J. Thorpe, Ph.D., Environmental Management Director Project Development and Environmental Analysis North Carolina Department of Transportation	8. AUTHORIZED AGENTS NAME AND TITLE (an agent is not required) Not applicable
6.APPLICANTS ADDRESS 1598 Mail Service Center Raleigh, North Carolina 27699-1548	9. AGENTS ADDRESS
7. APPLICANTS PHONE NOS. WITH AREA CODE a. Residence b. Business (919) 715-1488	10. AGENTS PHONE NOS. WITH AREA CODE a. Residence b. Business

11. STATEMENT OF AUTHORIZATION

I hereby authorize, ---------- to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT=S SIGNATURE DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE(*see instructions*)
Widening of Davis Drive (SR 1613/SR 1999) from Morrisville-Carpenter Road of NC 54. The project length is approximately 5.7 miles. These improvements are proposed to increase the capacity and safety of this facility. State Project No. 9.8051713, TIP No. U-4026.

13. NAME OF WATERBODY, IF KNOWN (*if applicable*) Tributaries to Kit Creek and tributaries to Burdens Creek	14. PROJECT STREET ADDRESS (*if applicable*) NA
LOCATION OF PROJECT **Wake/Durham** COUNTIES **NC** STATE	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)
See the March 2002 Categorical Exclusion (CE).

17. DIRECTIONS TO THE SITE
See the attached permit drawings and half size plan sheets.

18. Nature of Activity (*Description of project, include all features*)
Transportation Improvement Program (TIP) project U-4026
Widening of Davis Drive (SR 1613/SR 1999) from Morrisville-Carpenter Road to NC 54. The project length is approximately 5.7 miles. These improvements are proposed to increase the capacity and safety of this facility.

19. Project Purpose (*Describe the reason or purpose of the project, see instructions*)
The purpose of this project is to increase the carrying capacity, manage traffic congestion, and provide better access to adjacent properties on Davis Drive between Morrisville-Carpenter Road and NC 54 so that the route may better serve its functions as a major thoroughfare and a major collector to the RTP and surrounding area. The purpose and need are briefly explained in the permit application cover letter and are explained in detail in the March 2002 CE.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
Proposed widening of Davis Drive (SR 1613/SR 1999) from north Morrisville Carpenter Road to north of NC 54.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards
See the attached permit drawings.

22. Surface Area in Acres of Wetlands or Other Waters Filled (*see instructions*)
See sheet 62 of 63 (impact summary table) of the attached permit drawings.

23. Is Any Portion of the Work Already Complete? YES___ NO _X_ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).
See sheets 63B and 63C of 63 of the attached permit drawings.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

Agency	**Type approval***	**Identification number**	**Date applied**	**Date approved**	**Date Denied**

Not Applicable

*Would include but is not restricted to zoning, building, and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information is this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT — DATE: 10/25/05 — SIGNATURE OF AGENT — DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manor within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statements of entry, shall be fines not more than $10,000 or imprisoned not more than five years or both.

Ecosystem Enhancement PROGRAM

October 3, 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, North Carolina 27699-1548

Dear Dr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

U-4026, Widening of SR 1613/SR 1999 (Davis Drive), Durham and Wake Counties

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the compensatory riverine wetland and stream mitigation for the subject project. Based on the information supplied by you in a letter dated September 19, 2005 (received September 26, 2005), the impacts are located in CU 03030002 of the Cape Fear River Basin in the Central Piedmont (CP) Eco-Region, and are as follows:

Riverine Wetland:	0.22 acre
Stream:	1,008 feet

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 compensatory riverine wetland and stream 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-4026

Subject: Draft Minutes of the Interagency Hydraulic Design Review Meeting on June 19, 2003, for U-4026, Wake/Durham County.

Team Members:		Participants:
Eric Alsmeyer – USACE	PRESENT	Tom Herring – Ko & Associates
John Hennessy – NCDWQ	PRESENT	Herb Turner – Ko & Associates
Travis Wilson – NCWRC	PRESENT	Brett Feulner – NCDOT ONE
Gary Jordan – USFWS	ABSENT	Anne Gamber – NCDOT Hydraulics
Chris Militscher – EPA	ABSENT	
Scott Blevins – NCDOT Design Services	PRESENT	
Jennifer Harris – NCDOT PDEA	PRESENT	

The meeting began at 3:00pm. Herb Turner handed out a chart listing the stream crossings and wetlands within the project limits and the associated status, stream geometry and description of impact. Herb described the project and mentioned that the project is located in both the Neuse and Cape Fear River Basins. The project was reviewed site by site. The issues to be resolved are as follows:

1. Site 1, Sheet 4: None – Project does not impact wetlands. Per John Hennessy, this site has been determined to be **not** subject to the Neuse River Riparian Buffer Rule.
2. Site 2 Sheet 6 Neuse River Basin: The wetlands area is a partially breached pond. Herb noted that the NCDOT Geotechnical Unit expressed concern that the remaining pond causes an increase in the water table that would be hazardous to the embankment of the proposed road and requested to draw down the pond. Both Eric Alsmeyer and John Hennessy agreed that it would be allowable and the wetlands impacts would have to be included in the permit.
3. Site 3A Sheets 11 and 12 Cape Fear River Basin: The stream banks were determined an Environmentally Sensitive Area by David Cox. The commitments were to note "Environmentally Sensitive Area" on the plan sheets and not to clear to banks. Travis Wilson will investigate to determine the purpose and quantification of this commitment. . After consulting David Cox following the meeting, it was decided that this area designated was incorrect. Therefore, Travis indicated that he had no concerns with the outlets noted in the Hydraulic Design that were listed in the ESA
4. Site 3B Sheet 11 Cape Fear River Basin: None - A supplemental pipe is required to convey the additional discharge due to upstream development. Its inlet is set approx. 1-ft above the extension of the existing inlet. Riprap energy dissipator for supplemental pipe has been relocated outside stream.
5. Site 3B Sheet 11 Cape Fear River Basin: The stream outlets into the Environmentally Sensitive Area. A supplemental pipe is required to convey the additional discharge due to upstream development. To reduce velocities entering the stream in the Environmentally Sensitive Area, the proposed channel is to be widened. This may cause a conflict with the commitment to the Environmentally Sensitive Area. Travis Wilson will investigate. ACTION TAKEN: As per Travis Wilson: *The ESA should be located from approximately station 122 to station 136 on the North/Northeast side of the project. Therefore I have no concerns with the outlets noted in the Hydraulic Design that were listed in the ESA, and do not have any concerns within the correct ESA.* No action required.
6. Site 4 Sheet 14 Cape Fear River Basin: The culvert is to follow the existing culvert alignment. Travis Wilson requested that the culvert be buried 1' and no rip rap to be placed in bed, but noted that in keeping with the existing alignment it may be infeasible due to the rock line.
7. Site 5, Sheets 13 and 14: None – Project does not impact wetlands.
8. Sites 6, 7 and 8 Sheets 14and 15 Cape Fear River Basin: These are to be permitted through project R2000AB.
9. Site 9 Sheet 17 Cape Fear River Basin: The outlet of the culvert requires the stream to turn a right angle. The stream is constricted and already disturbed due to the greenway path. The design attempted to avoid impacts to the stream. The design calls for a retaining wall to be constructed to direct the flow. Eric Alsmeyer and John Hennessy had concern that this would result in scour that would undermine the culvert and the retaining wall. It was agreed to install a junction box and turn the pipe extension. Eric Alsmeyer would not require mitigation for the junction box and pipe extension and John Hennessy agreed not to require mitigation if the impact was less than 150'.

10. Site 10, Sheet 19 Cape Fear River Basin: None.
11. Site 11 Sheet 20 Cape Fear River Basin: The system is to be revised so that the offsite drainage is conveyed in a system north of Development Drive and outletted in uplands.
12. Sites 12 –14, Sheets 20- 23 Cape Fear River Basin: None.
13. Site 15, Sheet 26 Cape Fear River Basin: Per field review meeting, natural stream design is being investigated for the relocation of approximately 180 LF at the culvert inlet.
14. Site 16, Sheet 27 Cape Fear River Basin: None.

The meeting was adjourned at 4:45pm.

Subject: Draft Minutes of the Interagency Permit Drawings Review Meeting on October 23, 2003, for U-4026, Wake/Durham County.

Team Members:		Participants:
Eric Alsmeyer – USACE	PRESENT	Kevin Williams – Ko & Associates
John Hennessy – NCDWQ	PRESENT	Herb Turner – Ko & Associates
Travis Wilson – NCWRC	ABSENT	Marshall Clawson – NCDOT Hydraulics
Gary Jordan – USFWS	ABSENT	Anne Gamber – NCDOT Hydraulics
Chris Militscher – EPA	PRESENT	Jerry Beard – NCDOT Hydraulics
Brett Feulner – NCDOT PDEA	PRESENT	

The meeting began at 1:35pm. Section A had no impacts and will have no permit drawings. The section B was reviewed site by site. The issues to be resolved are as follows:

1. Site 1, Plan Sheet 6: No comments.
2. Site 2 Plan Sheet 9: No comments.
3. Site 3 Plan Sheet 12: The *Henderson Bench* will be considered to avoid distorting width of stream at pipes inlet.
4. Site 4 Plan Sheet 14: No comments
5. Site 5 Plan Sheet 15: The entire finger of wetlands will be taken.
6. Site 6 Plan Sheet 16: Shift energy dissipater into stream to revise pipe angle entering it.
7. Site 7 Plan, Sheet 17: No comments.
8. Sites 8 Plan Sheet 18: No comments.
9. Site 9 Plan Sheet 21: The natural channel design may require structures for grade control and bank protection, such as rock vanes and root wads.
10. Site 9, Sheet 22: Inlet of supplemental pipe is elevated to match bankful elevation.

The meeting was adjourned at 2:30pm.

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID. 200120448 County: Wake/Durham U.S.G.S. Quad: Cary/Southeast Durham

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Agent: NCDOT - Division of Highways
Address: Attn: Gregory J. Thorpe, Ph.D., Dir., PDEA
1548 Mail Service Center
Raleigh, NC 27699
Telephone No.: (919) 715-1488

Property description:
Size (acres) n/a Nearest Town Morrisville/Durham
Nearest Waterway Kit Creek/Burdens Creek River Basin Cape Fear/Neuse
USGS HUC 03030002 Coordinates N 35.852 W 78.865
Location description Right-of-way corridor for Davis Drive Widening (TIP U-4026) as shown on the drawings submitted by EcoScience on July 11, 2001 and September 20, 2004.

Indicate Which of the Following Apply:

_ Based on preliminary information, there may be wetlands on the above described property. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X There are waters of the U.S. including wetlands on the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ We strongly suggest you have the wetlands on your project area delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.

X The waters of the U.S. including wetland on your project area have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

_ The wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ There are no waters of the U.S., to include wetlands, present on the above described project area which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Wilmington, NC, at (910) 395-3900 to determine their requirements.

Action ID. 200120448

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact Eric Alsmeyer at (919) 876-8441, ext. 23.

Basis For Determination: The study area contains stream channels of unnamed tributaries of Kit Creek and Burdens Creek, tributaries of the Cape Fear River, with indicators of ordinary high water marks, and wetlands adjacent to the tributaries.

Remarks: Wetlands 2 and 3, as shown on the submittal from EcoScience dated September 20, 2004, are depressions with no direct surface water connection to any water of the US; therefore they are not regulated under Section 404 of the Clean Water Act.

Corps Regulatory Official: Eric Alsmeyer

Date 02/08/2005 Expiration Date 02/08/2010

Copy furnished (By fax): NCDOT, ONE (B. Feulner)
EcoScience Corp. (H. Saunders)

STORMWATER MANAGEMENT PLAN

State Project 35018.1.1 **(U-4026B)**
Federal Project
Wake – Durham Counties (Division 5)

Prepared by: Ko & Associates, PC WHH 3-30-2004

Date: March 30, 2004

Desc: Davis Drive (SR 1613/1999) from North of Koppers Rd. / McCrimmons Pkwy (SR 1635) to North of NC 54

Roadway Description

The proposed project consists of widening Davis Drive (SR 1613), an existing two-lane facility, to a multi-lane roadway. From the beginning of the project North of Koppers Rd. / McCrimmons Pkwy (SR 1635) to near the intersection at George Watts Hill Road, there is a proposed four-lane shoulder section with a 16 foot raised median and grassed ditches. Next, a four-lane shoulder section with a 46 foot depressed grass median and ditches extends to south of Hopson Road where it ties into an existing piece of five lane curb and gutter. Thirdly, the five-lane curb and gutter section will be modified to north of Hopson Road for grade and intersection improvements. Finally, the roadway section will transition to a four-lane curb and gutter section with bike lanes and a 16 foot raised grass median that continues to the project terminus north of the intersection with NC 54. The project area is urban in nature and continued development is expected. Much of the proposed widening is located in the Research Triangle Park.

Project Involvement

The project is located within unincorporated areas of Wake and Durham Counties and within the municipal city limits of Cary and Morrisville. However, this project is a state project and is not subject to the county / municipal stormwater regulations. The entire project is located in the Cape Fear River Basin in which buffer rules currently have not been adopted.

Best Management Practices

Structural Best Management Practices (BMPs) utilized on this project include grass swales, preformed scour holes, riprap outlet protection and energy dissipaters, natural channel design for stream relocation, and submergence of box and pipe culverts below stream beds. Discharge from highway drainage systems has been outleted, where practical, into lateral ditches or preformed scour holes to promote filtration of discharge prior to entering the stream. The proposed grassed ditches and channel banks will have side slopes no steeper than 3:1. The use of riprap has been limited to pipe outlets, channel banks, and steep ditches to reduce soil erosion.

The widening of Davis Drive from an existing two lane facility to a proposed divided four lane roadway, in Durham County, will require that a portion of an Unnamed Tributary to Hollow Creek be relocated. The relocation of the existing channel is unavoidable along this reach from Right of Project Station 283+81 –L- to Right of Station 285+80 –L-, approximately 261 feet in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

In cut locations from the beginning of the project North of Koppers Rd. / McCrimmons Pkwy (SR 1635) to south of Hopson Road, a typical grassed ditch is used with 6:1 front slopes and 4:1 or flatter back slopes. The grassed shoulders (2-ft) and ditches provide treatment for the runoff from the pavement. In the existing five-lane curb and gutter section, south of Hopson Road, the roadway drainage ties to existing systems. There are no BMP structures that can be practically implemented within this section. In the four-lane curb and gutter section from north of Hopson Road to the project terminus north of NC 54, roadway drainage has been discharged prior to the receiving streams in lateral ditches or preformed scour holes, where practical.

QUALITATIVE INDIRECT AND CUMULATIVE EFFECTS ASSESSMENT

Davis Drive

TIP U-4026AB

Wake/Durham County, North Carolina

Prepared for

North Carolina Department of Transportation

Office of Human Environment

Prepared by:

HNTB North Carolina, PC

343 East Six Forks Road

Suite 200

Raleigh, North Carolina 27609

November 20, 2003

HNTB

TABLE OF CONTENTS

North Carolina Department of Transportation
Office of Human Environment

Qualitative Indirect and Cumulative Effects Assessment
TIP U-4026AB, Davis Drive (SR 1613/SR 1999), Wake and Durham Counties

I. EXECUTIVE SUMMARY

The North Carolina Department of Transportation (NCDOT) has proposed widening Davis Drive (SR 1613/SR 1999) from Morrisville-Carpenter Road in Wake County to NC 54 in Durham County. The total length of the widening improvement is 5.6 miles and will cross through portions of the Town of Morrisville, Town of Cary, the Research Triangle Park (RTP), City of Durham, and unincorporated areas of Wake and Durham County (refer to Figure I). According to NCDOT, TIP U-4026 is divided into two sections, A and B. Section A (1.2 miles in length) will run from Morrisville-Carpenter Road to the Koppers Road/McCrimmon Parkway intersection and construction is scheduled for April of 2004. Section B (4.4 miles in length) will run north from the Koppers Road/McCrimmon Parkway intersection to NC 54 and construction is scheduled for June of 2004. The project design is for partial-control access with a combination of east-side, west-side, and symmetrical widening.

This report is intended to provide a preliminary analysis of the potential for indirect and cumulative effects associated with TIP U-4026AB, and to provide information to the North Carolina Department of Environment and Natural Resources (DENR), Division of Water Quality (DWQ). The information requested relates to downstream water quality impacts that may occur as a result of indirect and cumulative effects of the proposed TIP project and Section 401 Water Quality certification.

Identification of Study Area Direction and Goals

- Between 1990 and 2000, the demographic area had a higher population growth rate (122.2%) than Durham County (22.8%), Wake County (48.3%), and North Carolina (21.4%).
- Between 1990 and 2002, the employment growth rates of both Durham (33.1%) and Wake (54.2%) counties outpaced the state (21.7%).
- Since 2000, the unemployment rate has jumped from 2.5% to 5.6% in Durham County and 1.7% to 5.2% in Wake County. Also, companies in the Research Triangle Park (RTP) have cut 5,500 jobs since 2001.
- Based on site visit observations, there are large tracts of vacant and developable land within the TIP U-4026AB Impact Area. However, according to local planners, the economic growth in the region has slowed recently and has affected the commercial, office, and industrial development market.

- Numerous vacant or underdeveloped parcels within the TIP U-4026AB Impact Area are already in the process of being developed, including: a plaza anchored by a Winn-Dixie grocery store, a plaza anchored by a Harris Teeter grocery store, and the Triangle Metro Center mixed use development.
- Cary, Durham, and Morrisville planners anticipate rapid growth in the project Impact Area; however, several small area plans and regulations are in place to protect environmental and community interests.
- TIP U-4026AB is consistent with all regional transportation plans; however, it is not consistent will all local transportation plans. Durham's 1993 Triangle Township Plan does not include TIP U-4026AB and the Morrisville Transportation Plan and Cary's Northwest Area Plan contain small discrepancies for the project.
- Wake County restrictions within RTP include a maximum 30% impervious surface coverage and a maximum density of 0.125 acres per lot. Durham County restrictions within RTP include a maximum 15% building footprint (excludes parking and access areas) and 145-foot maximum height.
- The western portion of the TIP U-4026AB Impact Area falls under the Jordan Lake Water Supply Watershed Protected Area (Class IV), which restricts residential development to one dwelling unit per half acre (24% coverage on each lot).
- Neuse River Basin streamside buffer requirements are in place for the eastern portion of the TIP U-4026AB Impact Area. The streamside buffer consists of 50 total feet, with the first 30 feet to remain undisturbed while the remaining 20 feet is to be vegetated. The municipalities of Durham and Morrisville are in conformance with the Neuse River Basin streamside buffers, while the town of Cary has expanded the streamside buffer regulations to 100 feet.
- The establishment of Cape Fear River Basin 50-foot protective streamside buffers has been put on hold. However, it should be noted that the local government entities in the vicinity of TIP U-4026AB conform to internal buffer regulations regardless of which river basin development occurs in.

Inventory of Notable Features

- According to NCDOT Statewide Planning GIS layers, one Historic Study List District, Carpenter Historic District, is located within the TIP U-4026AB Impact Area.
- According to the 2002 Categorical Exclusion (CE) and the North Carolina Natural Heritage Program, the TIP U-4026AB Impact Area may include thirty-seven (37) state or federally protected species and twelve (12) natural communities.

Identification of Activities that Cause Effects

- According to the CE, TIP U-4026AB will not have an effect on any of the listed species or communities. However, the TIP U-4026AB Impact Area is geographically larger than the CE project corridor, and thus there may be an impact to some extent due to induced development of the project.
- According to the CE, no business or residences are anticipated to be relocated along the TIP U-4026AB project corridor, and 0.02 acres of wetlands and 429 feet of mitigatable streams will be impacted by the project.

- The CE does not provide a section on Indirect and Cumulative Impacts, but does analyze local land use plans for consistency. The CE finds that TIP U-4026AB is consistent with all local land use plans and will not divide or disrupt the communities along the project.

Potential Indirect and Cumulative Effects

- Based on the site visit, discussions with local planners, and the CE, traffic volumes on intersecting roadways are relatively high; therefore, the construction of TIP U-4026AB could stimulate some pressure on the vacant land in the immediate vicinity of the project corridor.
- Complementary function development pressure could increase once other intersecting TIP and local projects, such as TIP R-2000, McCrimmon Parkway, Kit Creek Parkway, Triangle Parkway, and Airport Boulevard Extension are constructed or improved.
- Planners and developers have been aware of TIP U-4026AB, and some, like the developers of Harris Teeter and Winn-Dixie, may have strategically located at intersections along the corridor.

Analysis of Indirect and Cumulative Effects

- The construction of TIP U-4026AB would create some regional travel time savings, especially during peak traffic hours.
- TIP U-4026AB may raise some property values along the project corridor, but should not have a dramatic effect area-wide due to already high property values.
- Based on population growth rates, availability of water and sewer, the relatively high pro-growth public policy, and the numerous TIP and local road projects proposed, it is foreseeable that this land will build out and population growth in the area will be high.

Evaluation of Analysis Results

- TIP U-4026AB may influence growth. However, local planners are all in agreement that the land in the area will build-out with or without TIP U-4026AB, and that the project may only increase the rate of development.
- If influenced or accelerated growth occurs, or has already been planned, it will vary depending on location within the Impact Area. Local planners anticipate growth along the corridor, and specifically at the major intersections where transportation improvements are planned.
- The Davis Drive intersections with Morrisville-Carpenter Road, McCrimmon Parkway, and Hopson Road all have mixed use or commercial developments planned.
- If growth occurs between intersections along the TIP U-4026AB project corridor, it is likely to take place along the southern portion between Morrisville-Carpenter Road and McCrimmon Parkway (TIP U-4026AB Section A).
- The improved access that TIP U-4026AB provides to the southern portion of RTP is a factor that will raise the development market. However, growth in the technology sector of the Raleigh-Durham-Chapel Hill MSA has slowed, and portions of RTP and the Impact Area are currently, and may remain, vacant.

- While approximately 1100 acres of vacant land exists in RTP, there are restrictions on the type of development (research oriented component) that can occur. This will restrict the location and intensity of development within the TIP U-4026AB Impact Area and make it unlikely for rampant speculative strip-type development.
- The cumulative impact of TIP U-4026AB increases when considered along with other proposed TIP Projects and local road improvements.

II. PROJECT DOCUMENTATION AND BACKGROUND

Project Description

The North Carolina Department of Transportation (NCDOT) has proposed widening Davis Drive (SR 1613/SR 1999) from Morrisville-Carpenter Road in Wake County to NC 54 in Durham County. The total distance of the widening improvements is 5.6 miles and will cross through portions of the Town of Morrisville, Town of Cary, the Research Triangle Park (RTP), City of Durham, and unincorporated areas of Wake and Durham County (refer to Figure I). According to NCDOT, TIP U-4026 is divided into two sections, A and B. Section A (1.2 miles in length) will run from Morrisville-Carpenter Road to the Koppers Road/McCrimmon Parkway intersection and construction is scheduled for April of 2004. Section B (4.4 miles in length) will run north from the Koppers Road/McCrimmon Parkway intersection to NC 54 and construction is scheduled for June of 2004. The project design is for partial-control access with a combination of east-side, west-side, and symmetrical widening. The following describes the proposed improvements to TIP U- 4026 A and B in more detail:

- **Morrisville-Carpenter Road to George Watts Hill Drive (all of Section A, portions of Section B)** – The cross section will consist of a four-lane divided shoulder facility with a 16-foot median.
- **George Watts Hill Drive to just south of Hopson Road (Section B)** –The cross section will consist of a four-lane divided shoulder facility with a 46-foot median.
- **Just south of Hopson Road to just north of Hopson Road (Section B)** – The cross section will remain unchanged from what is already existing, a five-lane undivided facility with curb and gutter.
- **Just north of Hopson Road to NC 54 (Section B)** – The cross section will consist of a four-lane divided curb and gutter facility with a 16-foot median.

According to NCDOT, the purpose of TIP U-4026AB is to increase traffic carrying capacity, manage traffic congestion, and provide improved access to properties along the project corridor. Davis Drive is classified as a major thoroughfare on both the Capital Area Metropolitan Planning Organization (CAMPO) and the Durham-Chapel Hill-Carrboro (DCHC) Urban Area Thoroughfare Plans as a major thoroughfare, and as a major collector on the Statewide Functional Classification System. The increased capacity and traffic congestion management that TIP U-4026AB provides will help Davis Drive to better serve its function to RTP and the surrounding area.

The area in the vicinity of TIP U-4026AB is undergoing rapid change, and as a result, numerous NCDOT and local transportation improvement projects are slated to take place in the near future (refer to Figure I for area NCDOT TIP projects). A specific listing of these projects will occur in the "Current Transportation Plans" section of this document.

III. DEFINITION OF STUDY AREA BOUNDARIES

Identification of the Potential Growth Impact Area and Impact Area

North Carolina DOT's and North Carolina DENR's *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina* indicate that the development effects of an improved facility are most often found up to two to five miles away from the project. Based on this guidance, an initial review of project area conditions, and professional judgment, it was determined that the potential for growth impact as a result of this project would mostly be within a three-mile radius of the project. This three-mile radius, referred to as the Potential Growth Impact Area (PGIA), will determine the data collection and analysis area, but will not necessarily be the extent to which growth impacts are expected to occur.

TIP U-4026AB is located on the border of Wake and Durham Counties in the Piedmont Region of North Carolina. As mentioned above, the PGIA was established as a three-mile radius around TIP U-4026AB (see Figure II). The three mile radius of the Potential Growth Impact Area includes portions of numerous jurisdictions and key features located in the Raleigh-Durham-Chapel Hill Metropolitan Statistical Area (MSA) including;

- Counties – *Wake, Durham, and Chatham*
- Municipalities – *City of Raleigh, City of Durham, Town of Cary, and Town of Morrisville*
- Key Features – *Research Triangle Park, Raleigh-Durham International Airport, Jordan Lake State Recreation Area*

The Impact Area is defined as the area which is most likely to experience land use changes as a result of the construction of a transportation improvement project. For TIP U-4026AB, the Impact Area was created by identifying developable and un-developable property, determining the areas where travel time savings are most likely to occur, and identifying areas where other NCDOT and local transportation improvements will spur change. A large portion of the land in the TIP U-4026AB project area, especially the southern section, is developable. Local planners envision that TIP U-4026AB will improve the north/south commuting patterns present in the area, but other east/west state and local transportation projects will have the potential to spur more development. As a result, the Impact Area for TIP U-4026AB includes the immediate area surrounding the project and the developable land between TIP U-4026AB and other transportation improvement projects or built-up areas (see Figure II).

Identification of Demographic Area

Data from the 1990 and 2000 Census was obtained to illustrate population growth within the demographic area and local affected municipalities. The demographic area consists of Census Tracts in both Durham and Wake Counties (see Figure III). Census Tracts for Durham County include:

- 20.13 (Block Groups 1-3); and
- 20.14 (Block Groups 2-3).

Census Tracts for Wake County include:

- 534.03 (Block Group 2);
- 535.12 (Block Groups 1-3);
- 535.13 (Block Group 1);
- 535.14 (Block Groups 1-2);
- 535.15 (Block Group 1);
- 536.00 (Block Groups 1-3); and
- 537.09 (Block Group 1).

The Census Bureau and the North Carolina Office of State Budget and Management also provided data and population projections for Durham County, Wake County, and North Carolina.

The demographic area was created to illustrate the general population trends of those residents that may be most directly impacted by TIP U-4026AB. The majority of the Census Tracts and Block Groups listed above are located within the Potential Growth Impact Area, and the entire Impact Area is within the demographic area. As a note, some Census Tracts and Block Groups are located outside the Potential Growth Impact Area due to Census Tract and Block geographic changes between 1990 and 2000. To assure data consistency in 1990 and 2000 comparisons, the demographic area was expanded to include common Census boundaries.

IV. IDENTIFICATION OF STUDY AREA DIRECTION AND GOALS

Growth and Development Trends

The Raleigh-Durham-Chapel Hill MSA of North Carolina has witnessed substantial growth in the past 20-plus years. Development in the region has been widely scattered and has generally taken place along major roads and in small, existing towns. The southeastern area of Durham County and the western portion of Wake County, including the TIP U-4026AB Impact Area, are at the geographic center of this growth. This particular area has been the scene of major growth, with the Town of Cary and Town of Morrisville growing at triple digit rates in the past ten years. The area also includes RTP. RTP is a 7,000 acre research and development business park formed in 1959 which houses approximately 43,000 employees and hosts some of the area's largest employers

including IBM, Ericsson, and Cisco Systems. According to RTP personnel, projected growth in the park is steady, with a target development rate of 50 acres per year. However, there have been fluctuations in the park's growth rate over the past 44 years. For example, RTP grew rapidly in the 1990's, but growth has slowed recently due to the area's sluggish economy. Vacant land currently exists in RTP, with the majority of this land located in the southern (Wake County) portion of the park.

Similar to other parts of the growing Raleigh-Durham-Chapel Hill MSA, land use in Cary, Morrisville, RTP, Durham, and Wake and Durham Counties within the TIP U-4026AB Impact Area can best be described as "transitional" (refer to Figure IV). Based on site observations and existing land use data, large office complexes, medium to high density residential developments, and small, single lot, stick-built homes are present in the area. According to local planners, growth is occurring throughout the area in pockets and is mainly in the form of commercial, office, and medium to high density residential uses. In general, commercial and office development within the Impact Area increases to the north (within RTP) and locations closest to Interstate 40 access roadways. There is an abundance of vacant and developable land throughout the southern portion of the Impact Area, with most being occupied by small, stick built homes with large acreage lots or offered for sale by large commercial brokers. Residential property values are high, up to $65,000 an acre, according to Town of Morrisville planners.

Two large residential developments exist along the corridor just north of the McCrimmon Parkway intersection, Breckenridge and Alta Seasons. Breckenridge is a large subdivision on the west side of Davis Drive which features apartments, townhouses, and single family homes while Alta Seasons is a large apartment complex on the east side of Davis Drive with a second entrance on McCrimmon Parkway. Two large grocery store anchored future developments were observed during the site visit and discussed with local planners. A commercial development anchored by Winn-Dixie is being planned for the southeastern quadrant of the Morrisville-Carpenter Road/Davis Drive intersection and a development anchored by Harris Teeter is being planned for the northwest quadrant of the McCrimmon Parkway/Davis Drive intersection.

Demographic and Employment Trends

As shown in Tables I and II, the demographic area, municipalities, and counties in the TIP U-4026AB area have experienced substantial growth in the past 10 years. In fact, according to Census data, the entire Raleigh-Durham-Chapel Hill MSA ranked 12th in the nation for fastest growing regions. Wake County, and the Town of Cary and Morrisville located within it, grew at a faster rate than Durham County and the City of Durham. However, both counties, the demographic area, and all the listed municipalities outpaced the state in growth.

Table I. Population, 1990-2000

	Demographic Area	Town of Cary	City of Durham	Town of Morrisville
Population:				
1990	17,088	43,858	136,611	1,022
2000	37,977	94,536	187,035	5,208
percentage growth 1990-2000	*122.2%*	*115.6%*	*36.9%*	*409.6%*

Source: US Census Bureau

The North Carolina Office of State Budget and Management predict that the North Carolina, Wake County, and Durham County growth rates will slow through 2020. While Wake County is predicted to continue outpacing the state's growth rates, Durham County's growth rate is expected to slip below that of North Carolina. In looking at the overall slowing of growth rates in Table II, it is reasonable to assume that the demographic area will grow at rates less than those seen in the past ten years. However, large portions of the demographic area are undeveloped, and it is feasible that these properties could be built out within the next ten years, thus maintaining the high growth rate.

Table II. Population Estimates and Projections, 1980-2020

	Durham County	Wake County	North Carolina
Population:			
1980	152,235	301,429	5,880,095
1990	181,835	423,380	6,628,637
percentage growth 1980-1990	*19.4%*	*40.5%*	*12.7%*
2000	223,314	627,846	8,049,313
percentage growth 1990-2000	*22.8%*	*48.3%*	*21.4%*
Population Projections:			
2010	257,367	851,771	9,491,372
percentage growth 2000-2010	*15.2%*	*35.7%*	*17.9%*
2020	292,639	1,088,545	10,966,139
percentage growth 2010-2020	*13.7%*	*27.8%*	*15.5%*

Sources: US Census Bureau and NC Office of State Budget & Management

Tables III and IV show the employment by sector for various industries in Durham and Wake County. Both counties experienced healthy gains in their overall employment between the years 1990 and 2002, with Durham County employment growing by 40,846

(33.1%) overall and Wake County growing by 132,995 (54.2%) overall. Growth in most sectors was present in both counties, with the health care and social assistance sector at 19,722 leading the way for Wake County in and the educational services sector at 8,535 leading the employment gains for Durham County. Also, the professional and technical services sector for both counties grew substantially (16,556 for Wake and 6,693 for Durham). Other growth sectors included retail trade (15,336) and information (10,709) for Wake County and administrative and waste services (4,985) and manufacturing (4,840) for Durham County. The largest loss for Wake County was in the transportation and warehousing sector at 1,512 employees, while the only loss in Durham County was in the management of companies and enterprises sector at 1,265 employees.

Although growth has been seen in most sectors of Wake and Durham County employment between 1990 and 2002, the unemployment rate has jumped dramatically from 2000 levels, which can be viewed as an indication of a sluggish economy. According to the North Carolina Employment Security Commission, in June, 2000 the unemployment rates were 2.5% and 1.7% respectively for Durham and Wake Counties. By June, 2003 those numbers had jumped to 5.6% in Durham County and 5.2% in Wake County. Also, according to RTP personnel, 5,500 jobs have been lost since 2001 in companies operating within RTP.

Table III. Employment by Sector
Wake County, 1990-2002

Sector	Employment		Change 1990-2002	
	1990	2002	Difference	Percentage
Agriculture, Forestry, Fishing & Hunting	492	1,282	790	160.6%
Mining	600	943	343	57.2%
Utilities	*N/A	*N/A	N/A	N/A
Construction	15,708	27,605	11,897	75.7%
Manufacturing	24,704	24,020	-684	-2.8%
Wholesale Trade	13,769	18,571	4,802	34.9%
Retail Trade	29,758	45,094	15,336	51.5%
Transportation and Warehousing	12,228	10,716	-1,512	-12.4%
Information	6,725	17,434	10,709	159.2%
Finance and Insurance	11,336	15,311	3,975	35.1%
Real Estate and Rental and Leasing	4,081	6,790	2,709	66.4%
Professional and Technical Services	13,941	30,497	16,556	118.8%
Management of Companies and Enterprises	2,127	7,154	5,027	236.3%
Administrative and Waste Services	16,885	27,317	10,432	61.8%
Educational Services	20,875	30,397	9,522	45.6%
Health Care and Social Assistance	14,952	34,674	19,722	131.9%
Arts, Entertainment, and Recreation	3,117	6,453	3,336	107.0%
Accommodation and Food Services	18,904	29,121	10,217	54.0%
Other Services, Ex. Public Administration	11,025	12,214	1,189	10.8%
Public Administration	24,047	32,676	8,629	35.9%
Unclassified	N/A	*N/A	N/A	N/A
Total	**245,274**	**378,269**	**132,995**	**54.2%**

Source: NC Employment Security Commission
* The NCESC does provide 2002 Employment for "Utilities" and "Unclassified"; however, this information was excluded from the table for comparison purposes.

Table IV. Employment by Sector
Durham County, 1990-2002

Sector	Employment		Change 1990-2002	
	1990	2002	Difference	Percentage
Agriculture, Forestry, Fishing & Hunting	36	88	52	144.4%
Mining	N/A	N/A	N/A	N/A
Utilities	* N/A	*N/A	N/A	N/A
Construction	5,116	5,260	144	2.8%
Manufacturing	27,327	32,167	4,840	17.7%
Wholesale Trade	2,282	5,398	3,116	136.5%
Retail Trade	11,476	13,613	2,137	18.6%
Transportation and Warehousing	1,984	2,409	425	21.4%
Information	2,964	4,153	1,189	40.1%
Finance and Insurance	2,644	3,962	1,318	49.8%
Real Estate and Rental and Leasing	1,200	1,737	537	44.8%
Professional and Technical Services	8,568	15,261	6,693	78.1%
Management of Companies and Enterprises	4,244	2,979	-1,265	-29.8%
Administrative and Waste Services	5,991	10,976	4,985	83.2%
Educational Services	6,152	14,687	8,535	138.7%
Health Care and Social Assistance	25,214	28,138	2,924	11.6%
Arts, Entertainment, and Recreation	1,194	1,464	270	22.6%
Accommodation and Food Services	8,146	10,135	1,989	24.4%
Other Services, Ex. Public Administration	2,925	4,616	1,691	57.8%
Public Administration	5,900	7,166	1,266	21.5%
Unclassified	*N/A	*N/A	N/A	N/A
Total	**123,363**	**164,209**	**40,846**	**33.1%**

Source: NC Employment Security Commission
* The NCESC does provide 2002 Employment for "Utilities" and "Unclassified"; however, this information was excluded from the table for comparison purposes.

As compared to the State of North Carolina, both Wake and Durham County experienced higher employment growth rates between 1990 and 2002. As shown in Table V, North Carolina experienced 668,671 (21.7%) overall growth in employment, but unlike Wake and Durham Counties, suffered large losses in the manufacturing sector (-176,271 or 21.5%). The sectors with the highest increase in number of persons employed for the State were in health care (178,394), followed by the administrative and waste services (98,774) and educational services (83,882). Wake and Durham County continue to

maintain a relatively stable manufacturing climate, while other areas of the state have seen substantial job losses in this sector. Also, Wake and Durham County continue to add jobs in the health care, professional, administrative, and information sectors, which help diversify the regional economy.

Table V. Employment by Sector
North Carolina, 1990-2002

Sector	Employment		Change 1990-2002	
	1990	2002	Difference	Percentage
Agriculture, Forestry, Fishing & Hunting	21,827	31,376	9,549	43.7%
Mining	3,993	4,203	210	5.3%
Utilities	27,287	15,447	-11,840	-43.4%
Construction	166,733	219,036	52,303	31.4%
Manufacturing	820,249	643,978	-176,271	-21.5%
Wholesale Trade	139,697	162,233	22,536	16.1%
Retail Trade	381,041	442,878	61,837	16.2%
Transportation and Warehousing	102,720	133,052	30,332	29.5%
Information	58,588	80,341	21,753	37.1%
Finance and Insurance	103,041	137,756	34,715	33.7%
Real Estate and Rental and Leasing	32,493	47,234	14,741	45.4%
Professional and Technical Services	91,327	148,043	56,716	62.1%
Management of Companies and Enterprises	35,104	63,565	28,461	81.1%
Administrative and Waste Services	110,979	209,753	98,774	89.0%
Educational Services	233,161	317,043	83,882	36.0%
Health Care and Social Assistance	261,592	439,986	178,394	68.2%
Arts, Entertainment, and Recreation	31,090	50,554	19,464	62.6%
Accommodation and Food Services	206,014	288,201	82,187	39.9%
Other Services, Ex. Public Administration	80,279	98,844	18,565	23.1%
Public Administration	171,716	214,079	42,363	24.7%
Unclassified	N/A	N/A	N/A	N/A
Total	**3,078,931**	**3,747,602**	**668,671**	**21.7%**

Source: NC Employment Security Commission
* The NCESC does provide 2002 Employment for "Unclassified"; however, this information was excluded from the table for comparison purposes.

Current Transportation Plans and Proposed Projects

There are numerous road and rail improvement projects and proposals within the TIP U-4026AB project corridor and Impact Area. TIP U-4026AB is consistent with all regional transportation plans; however, it is not consistent will all local transportation plans. The following breakdown provides a summary of relevant statewide and local transportation projects and plans, and the TIP U-4026AB status within these plans. For purposes of alleviating redundancy, projects are only referenced once.

Proposed Road Improvement Projects

North Carolina Transportation Improvement Program

TIP U-4026AB is part of the NCDOT's 2004-2010 Transportation Improvement Program. Other TIP Projects in the TIP U-4026AB project area include (see Figure I):

- **TIP R-2635 (Western Wake Expressway, Wake County).** This project is a 10.1 mile freeway on new location from US 1 to NC 55 at the Northern Wake Expressway. Construction is slated for Fiscal Year 2008.
- **TIP R-2000 (Northern Wake Expressway).** This project is an approximately 30 mile freeway from US 64 near Knightdale to NC 55 west of Morrisville. Three proposed interchanges are located within the TIP U-4026AB Impact Area: at NC 54, the proposed Triangle Parkway, and NC 55. Construction is complete for some sections and is slated for Fiscal Year 2004 in the TIP U-4026AB project area.
- **TIP R-2904 (SR 1973 Page Road, Durham County).** This project will widen 1.1 miles of NC 54 to multi-lanes from SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard) and 0.6 miles of SR 1973 (Page Road) from NC 54 to I-40. Construction is slated for Fiscal Year 2008.
- **TIP R-2906 (NC 55, Wake and Durham Counties).** This project will widen 13 miles of NC 55 to multi-lanes from US 64 in Wake County to SR 1121 (Cornwallis Road) in Durham County. Construction is slated for Fiscal Year 2004.
- **TIP I-2204 (Interstate 40, Wake and Durham Counties).** This project consists of widening 9.4 miles of I-40 to eight lanes from NC 147 (Exit 279) in Research Triangle Park to Bradshaw Freeway at Wade Avenue (Exit 289). This project is currently under construction.
- **TIP U-3344 (SR 3015 Airport Boulevard, Wake County).** This project will widen 1.9 miles of SR 3015 (Airport Boulevard) to multi-lanes from NC 54 to I-40. Construction is slated for Fiscal Year 2005.
- **TIP U-3343 (SR 1002 Aviation Parkway, Wake County).** This project will widen the 2.6 miles of SR 1002 (Aviation Parkway), from NC 54 to I-40, to a multi-lane roadway. This project is currently unfunded and a construction date has yet to be set.

Durham-Chapel Hill-Carrboro Urban Area Thoroughfare Plan (1991) and Durham-Chapel Hill-Carrboro 2025 Long-Range Transportation Plan (Draft)
Davis Drive (TIP U-4026AB) is included in these plans and listed as a major thoroughfare.

City/County of Durham Triangle Township Plan (1993)
Davis Drive (TIP U-4026AB) is not included in this plan. Other projects referenced in this plan within the TIP U-4026AB project area include:

- **Alston Avenue** – Proposed extension of a minor arterial from Hopson Road to SR 1635 (McCrimmon Parkway) for 4.26 miles to a 2 lane facility.
- **Durham Freeway (NC 147)** – Proposed extension from Interstate 40 to Wake County Line for a 6 lane freeway. Funding proposed to be federal/state.
- **Hopson-Scott King Road Connector** – Proposed new 2 lane road with 4 lane right of way facility between Hopson and Scott King Road.

CAMPO – Wake County Thoroughfare Plan (1997) and CAMPO and Wake County 2025 Long Range Transportation Plan
Davis Drive (TIP U-4026AB) is included in this plan and listed as a major thoroughfare.

Town of Morrisville Transportation Plan (2002)
Davis Drive (TIP U-4026AB) is included in this plan. The proposed Davis Drive improvements differ slightly than NCDOT's. Morrisville's plan proposes an 18-foot wide median while NCODT's design features a 16-foot wide median. Other projects referenced in this plan within the TIP U-4026AB project area include:

- **Barbee Road** – Proposed extension would connect Church Street and the Triangle Parkway.
- **Airport Boulevard Extension** – Proposed new 4 lane, median divided extension from Morrisville-Carpenter Road to NC 54.
- **Triangle Parkway** – Proposed new 4 lane, median divided north/south interstate thoroughfare which will provide relief for parallel routes NC 54 and Davis Drive. This project is part of the Northern Wake Expressway.
- **Durham Freeway (NC 147)** – Proposed extension from Interstate 540 to Durham County Line for a 6 lane freeway.
- **Morrisville-Carpenter Road** - Proposed widening of a minor thoroughfare to a 4 lane, median divided road from the town limits to NC 54.
- **McCrimmon Parkway** – Proposed widening and extension of a minor thoroughfare to a 4 lane, median divided road.

Town of Cary - Northwest Cary Area Plan (2002)
Davis Drive (TIP U-4026AB) is included in this plan. The proposed Davis Drive improvements differ from NCDOT's. Cary's plan proposes six lanes while NCODT's design features four lanes. Other projects referenced in this plan within the TIP U-4026AB project area include:

- **Louis Stevens Drive** – Proposed new route with three to four lanes and a landscaped median running from Kit Creek Parkway through Morrisville

Parkway. According to the Town of Cary, construction is proposed to begin June 2003.

- **Kit Creek Parkway/Wake Road/Grandale Road** – Proposed widening to four lanes, with median, of a minor facility from Durham County Line to Davis Drive.
- **Amberly Parkway/McCrimmon Parkway Extension** – Proposed extension of a minor facility from Green Level to Durham Road, to a 4 lane, landscaped median facility.
- **Cary Glen Boulevard** – Proposed four lane with median route running from Green Level – Durham Road to McCrimmon Parkway.
- **Airport Boulevard/Sowter Drive Extension** – Proposed extension of Airport Boulevard. West of Davis Drive, this project is proposed as a three lane road. From Davis Drive to NC 54 it is proposed as a four lane road with a landscaped median.
- **Morrisville-Carpenter Road/Carpenter Fire Station/Yates Store Road** – Proposed widening to four lanes with a landscaped median.

Proposed Transit Projects

Triangle Transit Authority (TTA)

The Triangle Transit Authority is developing a regional rail transit system to be constructed in the next ten years. The first phase of this project will connect Durham, RTP, Cary, Raleigh, and North Raleigh. TTA's rail transit corridor extends through the TIP U-4026AB Impact Area, utilizing the existing Norfolk Southern rail corridor (see Figure I). A proposed station, South RTP, will be located just outside the Impact Area near the NC 54 and South Miami Boulevard. The South RTP Transit Station will be located within the proposed Triangle Metro Center, which will contain high density mixed used development, a proposed bus transfer facility, and the TTA administrative offices.

Town of Cary - Northwest Cary Area Plan (2002)

In its *Northwest Cary Area Plan*, The Town of Cary has outlined future transit and rail goals and proposals which include:

- Reserving a transit corridor that will link the planned mixed use areas in northwest Cary with the TTA Regional Rail System.
- Utilizing the existing CSX rail corridor east of NC 55 as a transit corridor.
- Construct a transit station along the CSX rail corridor between NC 55 and the proposed Louis Stephens Drive south of the Northern Wake Expressway/NC 55 interchange.

Local Land Use Plans and Regulations

City/County of Durham – Triangle Township Plan (1993)

The *Triangle Township Plan* comprises the comprehensive planning vision for southern Durham County, and is one of fifteen small areas that comprise Durham's planning jurisdiction. The boundaries for the *Triangle Township Plan* are Chatham County to the south, Wake County to the east, Orange County and Farrington Road to the west, and the

northern boundaries of RTP, Interstate 40, and the Durham City limits to the north. The approach of the *Triangle Township Plan* is to manage growth, encouraging economic development and community reinvestment, while preserving the area's environmental resources.

The *Triangle Township Plan* forecasts rapid growth in the southern area of Durham County, with much of it in non-residential form occurring east of RTP. Land use planning goals and policies were outlined in the plan and include:

- Developing a pattern of land use for the Triangle Township which provides appropriate areas for new development and supports the efficient delivery of community services, while respecting neighborhood integrity and protecting environmentally sensitive areas.
- Transitional areas containing office and medium density residential development should be located between lower density residential development and high intensity uses.
- Commercial and other non-residential uses should be developed in clusters located at major thoroughfare intersections. This will reduce strip development and alleviate the impacts of associated traffic, especially on residential neighborhoods and local area thoroughfares.
- Development along creeks and streams should be closely monitored, and include enforcement of restrictions created to restrict development in floodplains and stream buffers.

As outlined in the *Triangle Township Plan*, the majority of the proposed land use within the TIP U-4026AB Impact Area is projected for industrial and mixed use (see Figure V). There is also a cluster of proposed commercial development at the southern end of the Davis Drive – Hopson Road intersection. As seen on Figure V, two large areas of proposed mixed use development are present within the Impact Area. The first is on the far west side of the Impact Area, located along the NC 55 and CSX rail corridor. The second is centered on the northeast and northwest quadrants of the Davis Drive – Hopson Road intersection, and extends east along Hopson Road. This second area is slated as the Triangle Metro Center, a mixed development of office, commercial, and residences uses situated adjacent to the proposed RTP South Station of TTA's rail transit corridor. The Triangle Metro Center will be discussed in more detail in later sections of this document.

The *Triangle Township Plan* is currently ten years old, and Durham planners have noted that some proposed land uses denoted in the plan may not develop according to the plan. This is because the market for industrial land uses has diminished, and the demand on this land is now more focused on mixed uses. The current zoning, shown on Figure VI still displays a large representation of industrial uses, but according to Durham planners, re-zoning is occurring in these areas.

Town of Cary – Northwest Cary Area Plan (2002)

The *Northwest Cary Area Plan (NWCAP)* functions as the master plan for over 8,100 acres in the northwest portion of Cary's planning area. The *NWCAP* is comprehensive in

nature and establishes long range visions for future land uses, transportation, parks, open space, public schools, and the environment in the area. This plan also acts as an amendment to the Town of Cary Land Use Plan, Comprehensive Transportation Plan, and Parks and Greenways Master Plan. The boundaries for the *NWCAP* are roughly Wake and Chatham Counties, areas located west of NC 55 (within 3 miles of RTP), and Cary's Planning Jurisdiction east of NC 55 and north of Morrisville-Carpenter Road.

The purpose of the *NWCAP* is to provide a guidance and framework for the anticipated growth and development pressures that the northwest area of Cary will experience in the coming years. The land use approach of the *NWCAP* is organized around the stream corridors, using open space designations around them to act as functional urban amenity, separate and define land uses and development, and protect water quality. The anticipated growth and development of the plan area is considerable, and if full build-out was to occur within the timeframe of this plan (20-30 years), the area would include:

- 8,900 – 18,600 dwellings
- 20,700 – 43,100 people
- 11.5 - 15.4 million square feet of nonresidential floor space

As noted previously, the Town of Cary will utilize existing streams as the focal point of their land use recommendations for the *NWCAP*. According to the *NWCAP*, Kit Creek, Nancy Branch, Morris Branch, and Panther Creek will have their required 100 foot streamside buffer extended to 200 feet. The area within the buffers will be used as green space, pedestrian trails, and land use breaks. Development will face towards the stream buffers and thus will provide a measure of safety, as well as, a visually stimulating environment. As seen in Figure V, the projected land use for the *NWCAP* is a combination of uses, including mixed, office and institutional, and varying densities of residential separated by the streamside buffer open spaces. Recommended residential dwelling units per acre vary from 1-2 DU/Acre (Low Density), 3-8 DU/Acre (Medium Density), and 8-16 DU/Acre for (High Density). Cluster development is viewed as a viable option in the *NWCAP* area. There are also five concentrated mixed-use areas that form "activity centers" in the plan area. One of these mixed-use areas, a Regional Activity Center centered on the proposed TIP R-2000 (Northern Wake Expressway)/NC 55 Interchange, is located within the TIP U-4026AB Impact Area. Another large mixed use area, which isn't one of the aforementioned "activity centers", is centered at the Carpenter Historic District around the intersection of Morrisville-Carpenter Road and NC 55 in the southwestern corner of the Impact Area.

One of the goals of the *NWCAP* is to protect the water quality in the plan area while taking advantage of the existing and foreseen development potential. Town of Cary staff has taken a novel approach to the situation by completing a water quality assessment, analyzing three different land use scenarios. The scenarios were:

- Existing land use
- Future development under the prior (1996) land use plan
- Future development under the Northwest Cary Area Plan

Table VI. Watershed Protected Overlay District Buffers for Wake County

Location of Buffer	Minimum Buffer Width (ft)	Minimum Setback from Buffer (ft)	Minimum Drainage Area (Acres)
Around Water Supply Impoundment	100	20	N/A
Along Perennial Stream	100	N/A	N/A
Around Non-Water Supply Impoundment; Along Non-Perennial Stream	50	20	25 or more acres (Non-Perennial Streams)
Around Water Supply Impoundment; Along Watercourse	30	20	Greater than or equal to 5 acres but less than 25 acres

Environmental Regulations

The TIP U-4026AB Impact Area is at the center of a wide array of environmental features including numerous streams, floodplains, aircraft noise contours, and a Water Supply Watershed (see Figure VII).

State and Federal Regulations

The following Federal and other State regulations are in effect for the TIP U-4026AB Impact Area.

Federal Phase II National Pollutant Discharge Elimination System (NPDES) Rules

- Regulate discharges of stormwater to surface waters and requires control of suspended solids, fecal coliform, and nutrients.
- Develop a nutrient management plan.
- Control runoff and removal of 85% of Total Suspended Solids (TSS) from urban runoff

North Carolina Division of Land Resources - Sediment and Erosion Control Act

- This act requires that any person planning to disturb more than one acre of land must submit a Sedimentation and Erosion Control Plan to the Division of Land Resources. Local governments may review and enforce the program within their jurisdiction, but the program has to be as strict as the Division of Land Resources program.

Basins and Water Supply Watershed Regulations

The TIP U-4026AB Impact Area is intersected by two major river basins, The Cape Fear and the Neuse, and contains a portion of the Jordan Lake Water Supply Watershed Protected Area (Class IV- Nutrient Sensitive Water). The North Carolina Division of Water Quality (DWQ), working under the direction of the United States Environmental Protection Agency (EPA), has been delegated the responsibility of protecting the state's surface and ground water resources, and have created a series of environmental regulations. These environmental regulations exist for each river basin, and separate regulations exist for the Water Supply Watershed. The following is a summary of the regulations:

Harris Teeter grocery store planned. The third cluster is along McCrimmon Parkway at the future Triangle Parkway intersection.

The Town *of Morrisville Land Use* was adopted in November of 1998 and is currently being implemented. As seen in Figure VI, current zoning in the area is beginning to reflect the development goals of the plan.

Town of Morrisville –Shiloh- North Morrisville Small Area Plan (2003)
The *Shiloh-North Morrisville Small Area Plan* (SAP) serves as a small comprehensive planning document in the Town of Morrisville. The boundary of the *SAP* is roughly defined as the Morrisville Jurisdictional Area north of Aviation Parkway. The land use section of the plan outlays the following general goals:

- Keep extensive commercial development east of NC 54 (Chapel Hill Road).
- Honor the heritage of the area by protecting existing homes and businesses.
- Plan for parks and greenways.
- Design transportation and land uses for circulation.

A small section of the *SAP* planning area is located in the TIP U-4026AB Impact Area. This area is located to the west of NC 54 in the vicinity of Kit Creek Road. As seen in Figure V, proposed land use in this area consists of low density residential in keeping with the goal of protecting the heritage of the area.

Research Triangle Park Covenants
Research Triangle Park is located in both Wake and Durham Counties, and regulations and zoning controls are placed on RTP by each county. According to RTP personnel, development in RTP can best be described as "steady", with full build-out occurring in 20 years if a preset 50 acre/year sales goal is accomplished. The smallest lot size that can be sold and developed within RTP is 8 acres, and currently there are 357 acres of available land in Durham and 754 acres of available land in Wake County. All firms located in RTP are required to have a "research" component in their work.

Durham County development restrictions within RTP include a maximum 15% building footprint (excludes parking and access areas) and 145-foot maximum height.

Wake County development restrictions within RTP include a maximum 30% impervious surface coverage and a maximum density of 0.125 acres per lot. Also, Wake County has zoned a portion of RTP west of TIP U-4026AB as a Watershed Protected Area Overlay (see Figure VI). According to the Wake County zoning descriptions, this Overlay District limits impervious surface coverage from new development to the same 30% of a site's area (whether or not it includes curb and gutter systems). Impervious surface from existing development already on-site does not count into the aforementioned 30% limit. Furthermore, all development in the overlay zone must provide and maintain 30 to 100-foot naturally vegetated buffers along water bodies and drainage-ways, and buildings must be set back 20 feet from these buffers. Table VI below outlines the Watershed Protected Overlay District streamside buffer requirements in detail.

General conclusions and implementation suggestions of the water quality analysis include:

- The *NWCAP* will result in more favorable water quality than the 1996 land use plan.
- Overall imperviousness within the area will increase from 14% current to 29% at full build-out of the plan.
- Regional approaches to Best Management Practices (BMPs) could further reduce Total Nitrogen (TN) loading.
- On-site ponds and stream buffers throughout the plan area can reduce sediment and phosphorous pollutant loading at or below current conditions.
- A watershed plan for the area developed and approved by the North Carolina Division of Water Quality (DWQ) is recommended.

The *NWCAP* was adopted in September, 2002 and is currently being implemented. As seen in Figure VI, current zoning in the area is beginning to reflect the goals of the plan. Large tracts of Planned Employment Center is already zoned; however, large tracts of the area are still zoned General Residential.

Town of Morrisville —Land Use Plan (1999)

The *Town of Morrisville Land Use Plan* functions as the master development guide for the town's future. The plan establishes balanced goals and objectives that will dictate community land use with overall community benefit. Select specific goals of the *Town of Morrisville Land Use Plan* are:

- Encourage new development to locate where public services exist or can be extended at a minimum public cost to achieve a compact and cohesive development pattern to maximize efficient use of limited resources.
- Reducing potential conflicts between land uses and high decibel airport noise.
- Maintaining a relatively large non-residential/residential tax base balance.
- Planning for a balance of single-family, condominium/townhouse, and apartment development that meets the needs of a variety of citizens.
- Identifying and encouraging conveniently-located commercial/office development to provide shopping and service opportunities for town citizens and daytime employees.
- Identifying and reserving sensitive environmental areas for public recreational use and enjoyment while protecting these areas from inappropriate development.
- Coordinating growth and public facility/services planning with other local governments and entities.

According to the *Town of Morrisville Land Use Plan*, the majority of the proposed land use within the TIP U-4026AB Impact Area is slated for mixed use, office and industrial, or medium density residences. There are three major clusters of proposed mixed use development within the TIP U-4026AB Impact Area. The first is at the intersection of Morrisville-Carpenter Road and Davis Drive, with the southeastern quadrant of the intersection already planned for a development anchored by a Winn-Dixie grocery store. The second cluster is centered on the intersection of McCrimmon Parkway and Davis Drive. The northwest quadrant of this intersection has a development anchored by a

Harris Teeter grocery store planned. The third cluster is along McCrimmon Parkway at the future Triangle Parkway intersection.

The Town *of Morrisville Land Use* was adopted in November of 1998 and is currently being implemented. As seen in Figure VI, current zoning in the area is beginning to reflect the development goals of the plan.

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- Develop a nutrient management plan.
- Control runoff and removal of 85% of Total Suspended Solids (TSS) from urban runoff

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Neuse River Basin

- Establishment of 50 foot protective streamside buffers on all new development. Under this rule the first 30 feet is to remain undisturbed while the remaining 20 feet is to be vegetated.
- Establishment of a stormwater rule for reducing nitrogen and applying it to the largest and fastest growing local governments in the basin including: Cary, Durham, and Wake County. The affected local governments must work with DWQ and establish stormwater plans which include: development review/approval, public education, illegal discharges, and retrofitting locations.
- Establishment of a rule that restricts all new development (after July 2001) to a maximum of 15% impervious surface. A stormwater management plan is required for any development with an impervious surface of more than 15%.

Cape Fear River Basin

- Establishment of 50-foot protective streamside buffers. This regulation has been put on hold. However, it should be noted that the local government entities in the vicinity of TIP U-4026AB conform to internal buffer regulations (listed in Table VII below) regardless of which river basin development occurs in.

Jordan Lake Water Supply Watershed Protected Area (Class IV – NSW)

- Development within the protected area is restricted to one dwelling unit per half acre (24% coverage on each lot) or 15,000 square feet without curb and gutter, but with public water or sewer (36% coverage on each lot).
- Nutrient Sensitive Water Controls to limit nitrogen which includes development of nutrient management strategies that focus on point/non-point pollution sources. These strategies may include protection of riparian buffers, control of peak flow/runoff from development sites, and limits on nitrogen loads from new development.

County and Local Municipality Regulations

The counties' local municipalities within the TIP U-4026AB Impact Area have conformed to, and in some cases, expanded on the regulations listed above. Table VII, listed below, provides a summary of local government water quality rules and regulations.

Table VII

Jurisdiction	Width of Stream Buffer (ft)	Minimum Draining Area (Acres)	Buffers shown on all plans	Buffer used for Passive Recreation Activities	City/Town Stormwater Plan	Follow River Basin Regulations	NPDES Phase II Conformity
Town of Cary	100	N/A	Yes	Yes	Yes	Yes	Yes
Durham (City and County)	50	25	Yes	Yes	Yes	Yes	Yes
Town of Morrisville	50	N/A	N/A	N/A	Yes	Yes	N/A
Wake County*	50	N/A	N/A	N/A	N/A	Yes	N/A

* Wake County has separate buffer restrictions for areas within Water Supply Watersheds (see Table VI).

303(d) Waters
The 303(d) list is a product of the Clean Water Act, which requires states to identify those waters that do not meet water quality standards or which have impaired uses. If control strategies for point and non-point source pollution exist for impaired waters, they may be excluded from the 303(d) list. According to NCDOT Statewide Planning GIS layers, the TIP U-4026AB Impact Area does not include any 303(d) waters. However, two 303(d) list waters are present within the larger Potential Growth Impact Area, Northeast Creek to the northwest and Crabtree Creek to the southeast (refer to Figure VII).

Raleigh-Durham International Airport (RDU) Noise Contours
The TIP U-4026AB Impact Area contains portions of the RDU Aircraft Noise Contours measured in 1996 (see Figure VII). The RDU noise office has discouraged new residential development uses in the non-airport areas closest to the runways (over 70dB). However, residential uses are still allowed in the 60dB-65dB noise level with a stipulation that there must be a 35dB noise level reduction (through added insulation, modified windows, etc) in all habitable rooms. The Town of Morrisville experiences the greatest impact from the noise contours and the subsequent restriction that they place on development.

V. INVENTORY OF NOTABLE FEATURES

Inventory of Notable Features

This section is based on review of the Categorical Exclusion (March 2002), Geographic Information System (GIS) data, and a database search of the TIP U-4026AB project area.

State and Federally-Protected Species

Common Name	Scientific Name	State Status (unless specified)	USGS Quad Map
Plant Species:			
Douglass's Bittercress	*Cardamine douglassii*	Significantly Rare	SW Durham, SE Durham
Bush's Sedge	*Carex bushii*	Significantly Rare	SW Durham
Big Shellbark Hickory	*Carya laciniosa*	Significantly Rare	SW Durham
Eastern Isopyrum	*Enemion biternatum*	Significantly Rare	SW Durham
Crested Coralroot	*Hexalectris spicata*	Significantly Rare	SW Durham
Lewis's Heartleaf *	*Hexastylis lewisii*	Significantly Rare	SW Durham, Green Level, Cary
Earle's Blazing Star	*Liatris squarrulosa*	Significantly Rare	SW Durham
Wiry Panic Grass	*Panicum flexile*	Significantly Rare	SW Durham
Indian Physic	*Porteranthus stipulatus*	Significantly Rare	SW Durham, Green Level, Cary

Dissected Toothwort	*Cardamine dissecta*	Significantly Rare	SE Durham
Heller's Rabbit Tobacco	*Gnaphalium helleri var helleri*	Significantly Rare	SE Durham
Veined Skullcap	*Scutellaria nervosa*	Significantly Rare	Green Level
American Bluehearts	*Buchnera americana*	Significantly Rare	Cary
Carolina Thistle	*Cirsium carolinianum*	Significantly Rare	Cary
Michaux's Sumac *	*Rhus michauxii*	Endangered	N/A
Smooth Coneflower *	*Echinaceae laevigata*	Endangered	N/A
Sweet Pinesap *	*Monotropsis odorata*	Special Concern	N/A
Carolina Least Trillium *	*Trillium pusillum*	Endangered	N/A
Tall Larkspur *	*Delphinium exaltatum*	Endangered – Special Concern	N/A
Butternut *	*Juglans cinerea*	Watch List	N/A
A Liverwort *	*Plagiochila columbiana*	Watch List	N/A
Amphibian:			
Four-toed Salamander	*Hemidactylium scutatum*	Special Concern	SE Durham, Cary
Bird:			
Bald Eagle *	*Haliaeetus leucocephalus*	Threatened	Green Level
Bachman's Sparrow *	*Aimophila aestivalis*	Special Concern	Cary
Red-cockaded Woodpecker *	*Picoides borealis*	Endangered	N/A
Fish:			
Carolina Darter-eastern Piedmont Population *	*Etheostoma collis pop 2*	Special Concern	SE Durham
Pinewoods Shiner *	*Lythrurus matutinus*	Significantly Rare	N/A
Mammal:			
Southeastern Myotis *	*Myotis austroriparius*	Special Concern	N/A
Mollusk:			
Dwarf Wedgemussel *	*Alasmidonta heterodon*	Endangered	N/A
Atlantic Pigtoe *	*Fusconaia masoni*	Threatened (Proposed Endangered)	N/A
Yellow Lance *	*Elliptio lanceolata*	Threatened	N/A
Green Floater *	*Lasmigona subviridus*	Endangered	N/A

Yellow Lampmussel *	*Lampsilis cariosa*	Threatened (Proposed Endangered)	N/A
Panhandle Pebblesnail *	*Somotogyrus virginicus*	Significantly Rare	N/A
Reptile:			
Southern Hognose Snake *	*Heterodon simus*	Special Concern	N/A
Insect:			
Diana Fritillary Butterfly *	*Speyeria Diana* *	Significantly Rare	N/A
Septima's Clubtail Dragonfly *	*Gomphus septima*	Significantly Rare	N/A

* Listed in the 2002 Categorical Exclusion
Source: North Carolina National Heritage Program, Durham and Wake Counties (October 2003) http://ils.unc.edu/parkproject/nhp

Natural Communities

Name	USGS Quad Map
Floodplain Pool	Southwest Durham, Green Level
Low Elevation Seep	Southwest Durham
Mesic Mixed Hardwood Forest (Piedmont Subtype)	Southwest Durham, Green Level
Piedmont/Mountain Bottomland Forest	Southwest Durham, Green Level
Piedmont/Mountain Levee Forest	Southwest Durham
Piedmont/Mountain Semipermanent Impoundment	Southwest Durham
Piedmont/Mountain Swamp Forest	Southwest Durham, Green Level
Basic Oak – Hickory Forest	Green Level
Dry-Mesic Oak – Hickory Forest	Green Level
Piedmont/Low Mountain Alluvial Forest	Green Level
Piedmont Monadnock Forest	Cary
Piedmont/Coastal Plain Heath Bluff	Cary

Source: North Carolina National Heritage Program, Durham and Wake Counties (October 2003) http://ils.unc.edu/parkproject/nhp

Architectural Features and Historic Sites
TIP Project Corridor

Name	Address	Status
Carpenter Historic District	Junction of Indian Wells Rd., Morrisville-Carpenter Rd. and Carpenter-Upchurch Rd.	Historic Study List District

Source: North Carolina Department of Transportation – Statewide Planning GIS layers (August 2003)

Impact Area Solid Waste Facilities

Permit	Name	Type	Location	Contact
N/A	N/A	N/A	N/A	N/A

Source: North Carolina Department of Environment and Natural Resources, zip codes: 27560 and 27709 (October 2003)
http://www.wastenotnc.org

Impact Area Superfund Sites

Name	Location
N/A	N/A

Source: North Carolina Department of Transportation – Statewide Planning GIS layers (August 2003)

VI. IDENTIFICATION OF ACTIVITIES THAT CAUSE EFFECTS

Previous Conclusions

Categorical Exclusion (CE)
The CE, dated March 2002, documents impacts for TIP U-4026AB. Five alternatives were considered in the CE, consisting of four widening design alternatives and a "no-build" option. The four widening design alternatives were: symmetrical widening, east-side widening, west-side widening, and a combination of east-side, west-side, and symmetrical widening. The "preferred alternative" selected was a combination of east-side, west-side, and symmetrical widening in order to minimize impacts on human and natural environment and to take advantage sections already improved as development has occurred.

Findings in the CE for TIP U-4026AB include:

- No businesses or residences are anticipated to be relocated.
- 0.02 acres of wetlands and 429 feet of mitigatable streams will be impacted by the project.
- No substantial impact on air, water quality, or ambient noise levels is expected.
- The project will have no effect on historic properties listed or eligible in the National Register of Historic Places.
- The project will have no effect on federally listed threatened or endangered species.

The CE does not provide a section on Indirect and Cumulative Impacts, but does analyze local land use plans for consistency. The CE finds that TIP U-4026AB is consistent with all local land use plans and will not divide or disrupt the communities along the project.

VII. POTENTIAL INDIRECT AND CUMULATIVE EFFECTS

The Louis Berger Group, in *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina,* outlined a set of factors that can be used to evaluate indirect and cumulative impacts, and to determine if further analysis is necessary. Following is an assessment of these factors as they apply to TIP U-4026AB.

- **Conflict with Local Plan:**
  TIP U-4026AB is included in the majority of regional and local plans within the area, with Durham's *Triangle Township Plan* as the only plan not including the project. Discrepancies exist within the local Morrisville and Cary plans as well. The Morrisville Transportation Plan lists TIP U-4026AB with an 18-foot median while NCDOT's design features a 16-foot median. The Town of Cary *NWCAP* shows TIP U-4026AB as a six-lane roadway, while NCDOT's preferred alternative calls for four lanes. Discrepancies within plans may be attributed to the timing of plans. The *Triangle Township Plan* was adopted in 1993 and the Cary *NWCAP* proposes growth and transportation projects out to the year 2025.

- **Explicit Economic Development Purpose:**
  As noted in the Project Description, the purpose of TIP U-4026AB is to increase traffic carrying capacity, manage traffic congestion, and provide improved access to properties along the project corridor. There is no explicit economic development purpose.

- **Planned to Serve Specific Development:**
  Although TIP U-4026AB will improve access to existing and future properties along the project corridor, TIP U-4026AB will not be constructed to serve a *specific* development.

- **Likely to Stimulate Land Development Having Complementary Functions:**
  This involves an evaluation of a set of factors commonly used to determine induced growth including:
  - Distance to a major urban center.
  - Traffic volumes on intersecting roadways.
  - Presence of frontage roads.
  - Availability of water/sewer.

  The TIP U-4026AB Impact Area is within 15 miles of downtown Durham and Raleigh, two of the major cities in the state. Based on the site visit, discussions with local planners, and the CE, traffic volumes on intersecting roadways are relatively high. Traffic volumes are especially high during peak hours, and the construction of TIP U-4026AB could stimulate some additional pressure on the vacant land in the immediate vicinity of the project corridor. According to local planners, water and sewer services are available throughout the Impact Area. Complementary function development pressure may increase once other intersecting TIP and local projects, such as TIP R-2000, McCrimmon Parkway, Kit Creek Parkway, Triangle Parkway,

and Airport Boulevard Extension are constructed or improved. However, local planners anticipate that growth will occur in this area regardless of multiple transportation improvement projects, and TIP U-4026AB will only accelerate the rate of the anticipated growth.

- **Likely to Influence Intraregional Land Development Location Decisions:** Typically, if conditions are favorable for development and/or a region is currently undergoing urbanization, an improvement in the transportation infrastructure is likely to influence "where" development will occur and not necessarily "if" it will occur. According to local planners, the market for development is relatively high, but outside the immediate project corridor area other TIP and local projects and regional growth pressures may be more responsible for this than TIP U-4026AB. However, planners and developers have been aware of TIP U-4026AB, and some, like the developers of Harris Teeter and Winn-Dixie, may have strategically located at intersections along the corridor.

- **Notable Feature(s) Present in the Impact Area:** Notable features typically relate to the natural environment, historic or cultural properties, wildlife habitat, etc. According to the CE, GIS information, and data searches, the TIP U-4026AB Impact Area may include thirty-seven (37) state or federally protected species and twelve (12) natural communities. According to the CE, TIP U-4026AB will not have an effect on any of the listed species or communities. The TIP U-4026AB Impact Area is geographically larger than the CE project corridor, and thus the potential for impacts to notable features may exist. However, as mentioned previously, local planners anticipate that growth will occur in this area regardless of TIP U-4026AB, thus it is not envisioned that this project will have a specific impact on notable features.

  There is also one Historic Study List property, the Carpenter Historic District, centered on the intersection of NC 55 and Morrisville-Carpenter Road. The Town of Cary has labeled this area a mixed use development in the *NWCAP* and has set a goal of preserving the character of the Carpenter Historic District.

VIII. ANALYSIS OF INDIRECT AND CUMULATIVE EFFECTS

The following set of indicators displayed in Table VIII help to evaluate the magnitude of land use and growth impacts induced by highway projects, and help to determine if quantitative analysis is warranted. These factors include change in accessibility, change in property values, forecasted growth, land supply vs. demand, water and sewer availability, market for development and public policy.

Table VIII. Magnitude Of Land Use Changes

Rating	Change in Accessibility	Change in Property Values	Forecasted Growth	Land Supply vs. Land Demand	Water/ Sewer Availability	Market For Development	Public Policy
Strong	Travel Time Savings > 10 min.	> 50% Increase	> 3% Annual Pop. Growth	< 10-Year Supply of Land	Current Services Exist	Extremely High Potential	Pro-Growth
^			X		X		
"	X					X	X
"		X		X			
"							
"							
Weak	Travel Time Savings < 10 min.	No Change	< 1% Annual Pop. Growth	> 20-Year Supply of Land	No Plans For Future Service	Extremely Low Potential	Anti-Growth

The construction of TIP U-4026AB would create some regional travel time savings, especially during peak traffic hours. According to local planners, Davis Drive, and other north-south routes in the area, handle the majority of peak hour commuter traffic while the east-west routes carry the bulk of the resident traffic. According to the CE, the TIP U-4026AB project corridor is expected to operate at a level of service E or F during peak times in 2005; therefore, widening and improving the road should facilitate travel time savings. However, local planners envision that TIP U-4026AB will accelerate some planned commercial development along the corridor, which in turn, could translate into Davis Drive carrying more resident traffic in the near future.

Property values in the area are already high due to the advantageous geographic location of the TIP U-4026AB Impact Area. The Impact Area's proximity to RTP, RDU Airport, and Interstate 40 make it a lucrative area for developers. The widening of TIP U-4026AB may raise some property values along the project corridor, but should not have a dramatic effect area-wide.

Forecasted annual growth within the impact area should reach the 3% level. This area has been the scene of substantial growth in the past ten years and growth for Wake County is anticipated to be 35.7% in the next ten years. The proposed land use in the Impact Area includes many Mixed Use and Medium and High Density uses. Water and sewer services exist or are planned for the majority of the area. Based on the aforementioned factors, the relatively high pro-growth public policy, and the numerous TIP and local road projects proposed, it is foreseeable that this land will build out and population growth in the area will be high.

The market for development is relatively high. Many lots in the area are owned by large commercial brokers. The improved access that TIP U-4026AB provides to the southern portion of RTP is a factor that will raise the development market. However, growth in the technology sector of the Raleigh-Durham-Chapel Hill MSA has slowed, and portions of RTP and the Impact Area are currently, and may remain, vacant. The economic health

of the region, and not the improvements of TIP U-4026AB, may act as more of a factor in the area market for development.

IX. EVALUATION OF ANALYSIS RESULTS

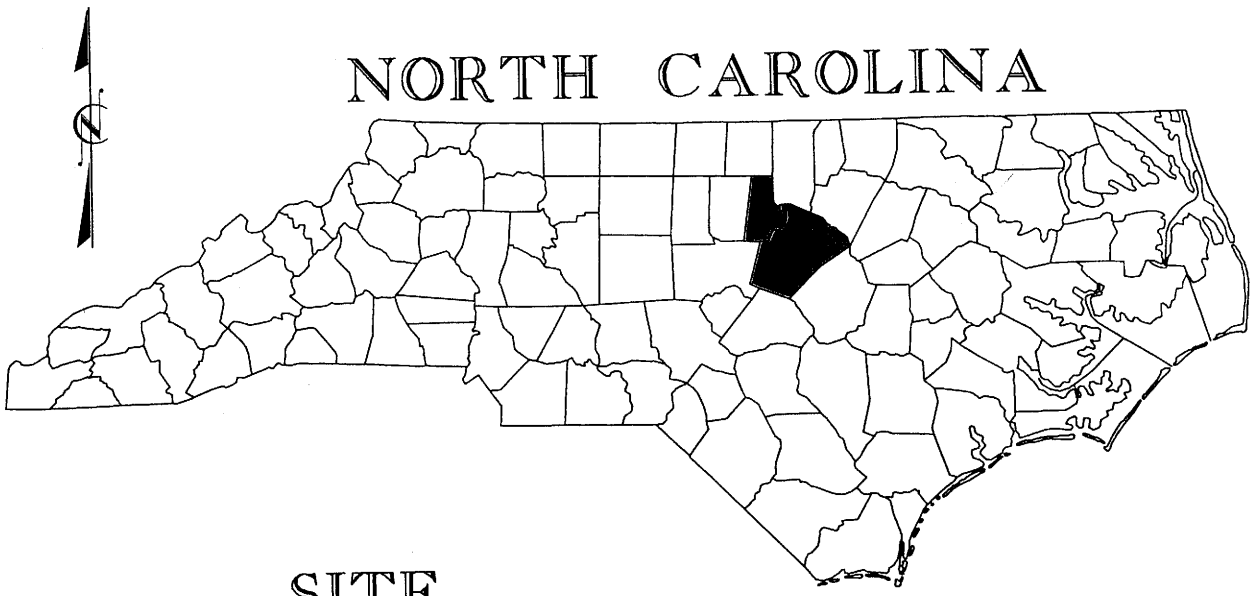
TIP U-4026AB will likely, and already has to a degree, induce some growth. However, local planners are all in agreement that the land in the area will build-out with or without TIP U-4026AB, and that the project may only increase the rate of development. Improvements and construction of major and arterial roads, as well as the geographically advantageous location within the Raleigh-Durham-Chapel Hill MSA are spurring tremendous growth pressures on land in the project area. The Town of Cary, Town of Morrisville, City/County of Durham, and RTP have anticipated these land development pressures, and in the past 15 years have set up local land use plans and environmental restrictions which will allow development while protecting natural resources. The Town of Cary, and their *NWCAP*, has specifically addressed the induced growth influence that TIP U-4026AB and other transportation improvements will create and has gone to the level of running a water quality model to insure that their growth will not affect water quality.

If induced or accelerated growth occurs, or has already been planned, it will vary depending on location within the Impact Area. Local planners have anticipated and planned for growth along the corridor, and specifically at the major intersections of TIP U-4026AB. The scheduled construction of TIP U-4026A compared to U-4026B is only two months apart; therefore, accelerated growth pressures should be experienced throughout the entire corridor within the same timeframe.

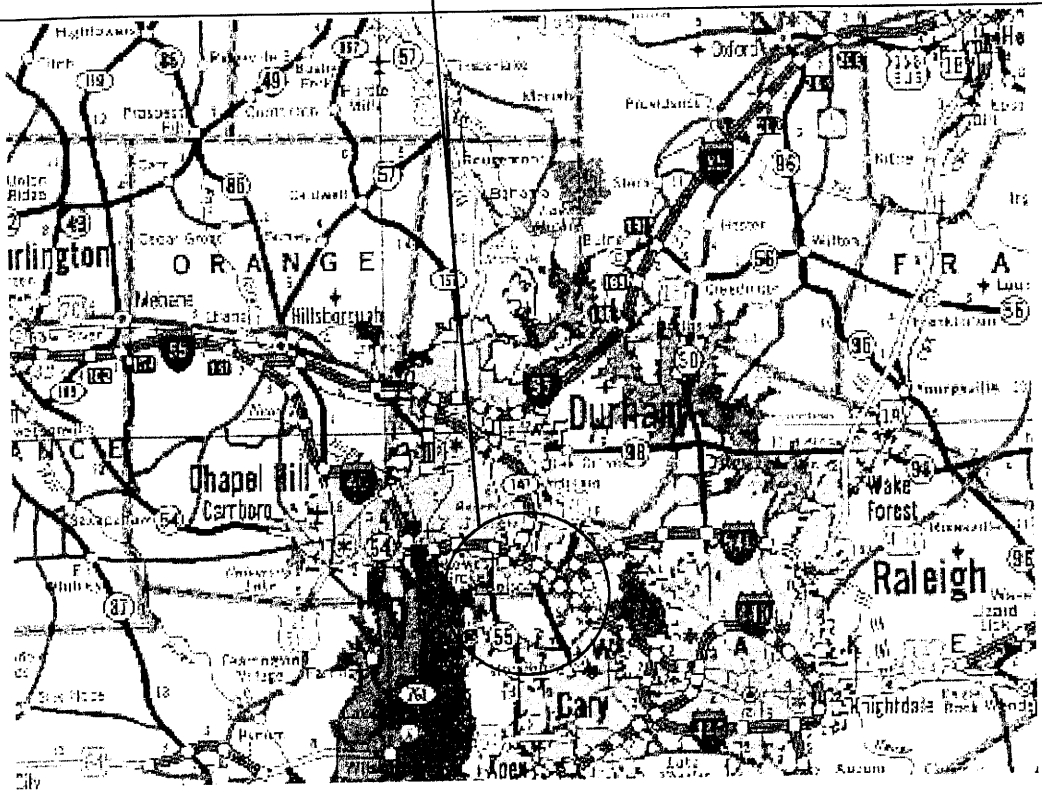
Development at Intersections

Davis Drive and Morrisville-Carpenter Road
The Davis Drive/Morrisville Carpenter intersection has a planned commercial plaza anchored by Winn-Dixie on the southeast quadrant. According to Morrisville planners, the Certificate of Occupancy (CO) will not be granted until the TIP U-4026AB improvements are complete for this intersection. The other quadrants of the intersection are slated for mixed use development and accelerated growth pressures on these parcels should increase when Morrisville-Carpenter Road is improved to four lanes.

In summary, the Town of Cary, Town of Morrisville, RTP, Wake County, and City/County of Durham have created local plans and environmental restrictions to manage the anticipated growth and development pressures within their communities and the TIP U-4026AB Impact Area. All of the local planners are in agreement that TIP U-4026AB will accelerate some planned development within the Impact Area. However, if the local plans and environmental regulations are adhered to and practiced, then the influence of TIP U-4026AB will be negligible.



SITE



VICINITY MAP

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

NOT TO SCALE

DATE: 02-04-05

SHEET 1 OF 65

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WETLAND LEGEND

WLB — WETLAND BOUNDARY

WETLAND

DENOTES FILL IN WETLAND

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN SURFACE WATER (POND)

DENOTES TEMPORARY FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

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

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

NOT TO SCALE

DATE: 02-04-05

SHEET 2 OF 65

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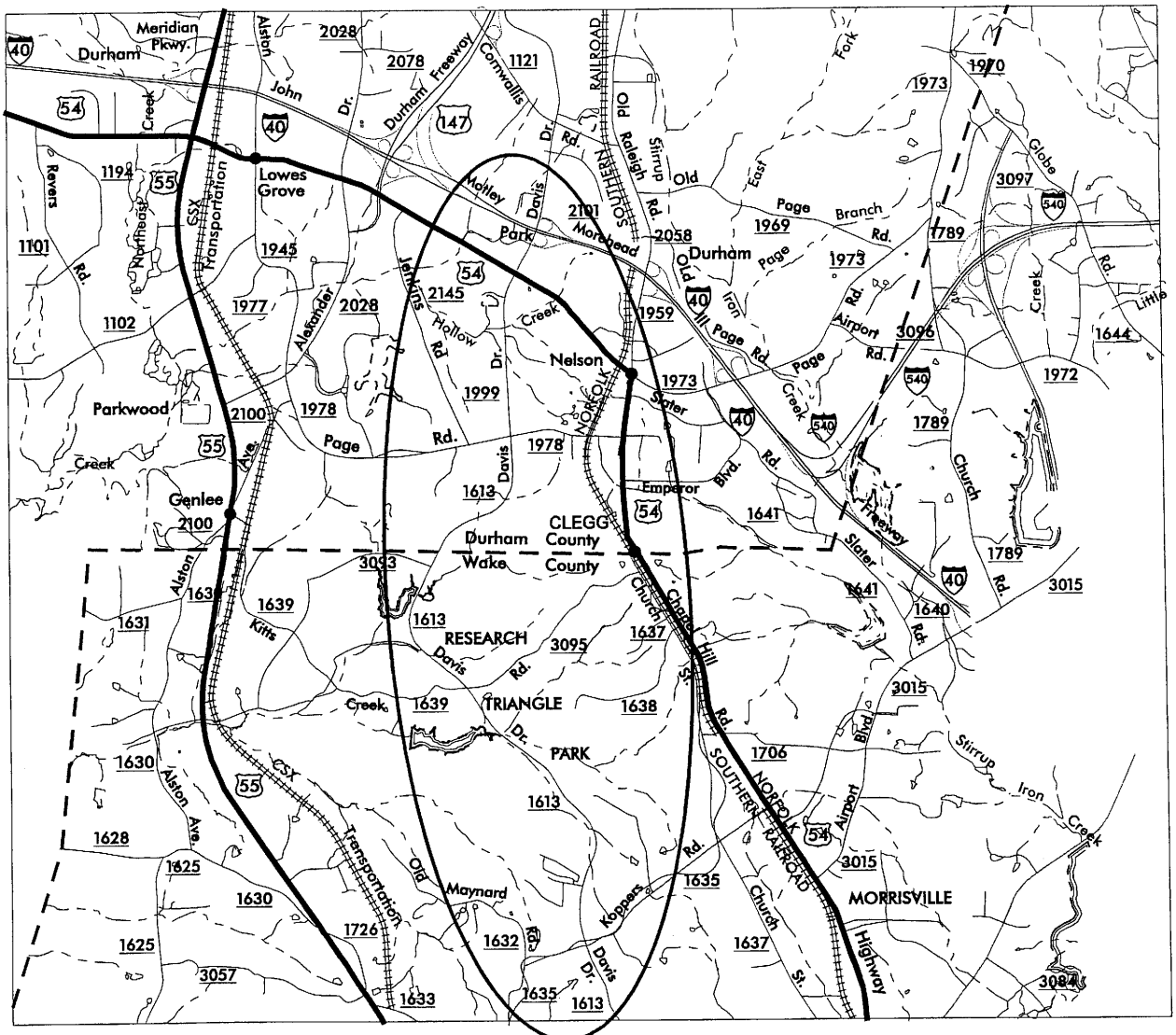
SITE MAP



NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

NOT TO SCALE

DATE: 02-04-05

SHEET 3 OF 65

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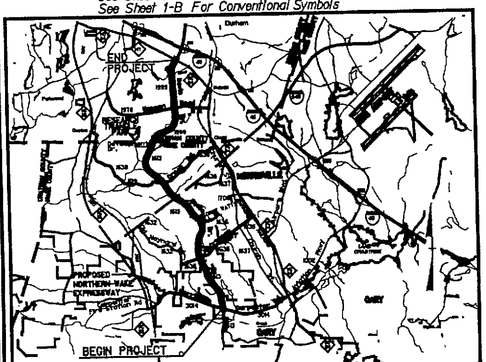
See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4026	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35018.1.1		P.E.	
35018.2.1		R/W	
35018.3.1		CONST	

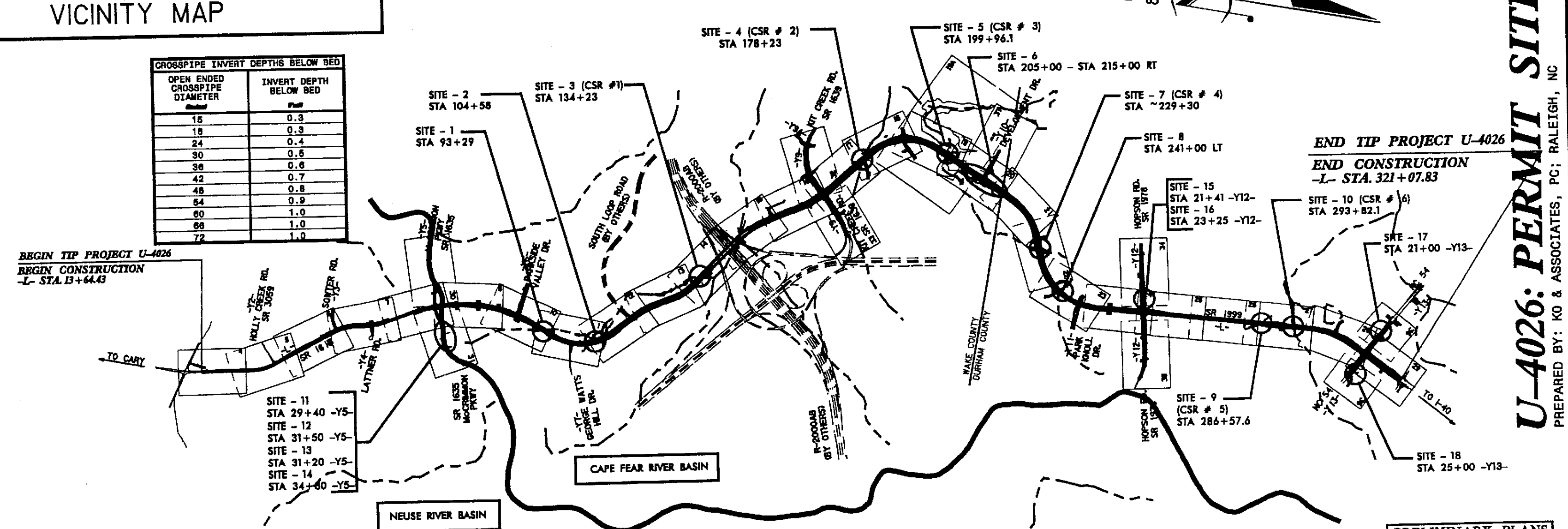
WAKE-DURHAM COUNTIES

***LOCATION:* DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER ROAD (SR 3014) TO NORTH OF NC 54**

***TYPE OF WORK:* GRADING, DRAINAGE, PAVING, CULVERTS AND SIGNALS.**

U-4026: PERMIT SITE MAP

CROSSPIPE INVERT DEPTHS BELOW BED	
OPEN ENDED CROSSPIPE DIAMETER	INVERT DEPTH BELOW BED
15	0.3
18	0.3
24	0.4
30	0.5
36	0.6
42	0.7
48	0.8
54	0.9
60	1.0
66	1.0
72	1.0



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

U-4026: PERMIT SITE MAP

PREPARED BY: KO & ASSOCIATES, PC; RALEIGH, NC

NCDOT CONTACT: TERESA BRUTON, P.E.
PROJECT SERVICES - ENGINEERING COORDINATION

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT (2004) = 24155
ADT (2024) = 45055
DHV = 12 %
D = 65 %
T = 4 % *
V = 55 MPH (SHLD)
= 50 MPH (C&G)
* TTST 1 % DUAL 3 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-4026 = 5.587 MI.
TOTAL LENGTH OF TIP PROJECT U-4026 = 5.587 MI.

Prepared in the Office of:
KO & ASSOCIATES, P.C.
1011 Schaub Dr. Suite 202, Raleigh, NC 27606 919-851-6066
for
North Carolina Department of Transportation

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
U-4026A - APRIL 29, 2003
U-4026B - JUNE 30, 2003

LETTING DATE:

Warren F. Lamb, P.E.
PROJECT ENGINEER

Stephen R. Whitley, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

CONTRACT: C200840 TIP PROJECT: U-4026

9/09/99

2/3/2005
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4 of 65

7/2/99

REVISIONS
7/18/03 REVISED CE & ADDED PDE TO PARCEL 18
10/04/04 REVISED NAME AND PARCEL NO. ON PARCEL 18

PROJECT REFERENCE NO.	SHEET NO.
U-4026	10
U-4026A R/W SHEET NO.	10
U-4026B R/W SHEET NO.	5

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NAD 83 | NC GRID

TOWN OF CARY TO HANDLE CLAIMS ON PARCEL NO. 18 THIS SHEET

18A PARK SOUTH VILLAGES, LLC

3' LAT. BASE DITCH EST. 175 CY DDE SEE DITCH DETAIL E

CLASS "B" RIP RAP EST. 5 TONS EST. 14 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

ENDWALL

PROP. 6' MONO CONC. ISLAND

DO NOT DISTURB SIGN

DO NOT DISTURB SIGN & FENCE

3 L.L.P.

PULTE HOME CORPORATION

4 THE MANORS AT BRECKENRIDGE ASSOCIATION

-L- STA. 88+48.95
BEGIN 200' TAPER
RT TURN LANE, SB
LT TURN LANE, SB

-L- STA. 90+48.95
END 200' TAPER
RT TURN LANE, SB
LT TURN LANE, SB

PUBLIC SERVICE COMPANY

MORRISVILLE CITY LIMIT
RTP LIMIT

6A RESEARCH TRIANGLE FOUNDATION

4A THE MANORS AT BRECKENRIDGE ASSOCIATION

LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 78.2 TONS
EST. 220 SY FF
EST. 55 CY DDE
SEE DITCH DETAIL G

SLOPE STAKE LINE

-MATCHLINE- STA. 82+00.00 SEE SHEET NO. 9

-MATCHLINE- STA. 94+00.00 SEE SHEET NO. 11

-L- STA. 83+75.00
END 200' TAPER
LT TURN LANE, SB

-L- STA. 83+48.58
END 200' TAPER
RT. TURN LANE, NB

-L- STA. 83+48.58
BEGIN 200' TAPER
RT. TURN LANE, NB

-L- STA. 88+40.00
BEGIN 210' TAPER
BUS LANE, NB

-L- STA. 90+50.00
END 210' TAPER
BUS LANE, NB

EXIST. EARTH BERM TO BE REMOVED

TOWN OF MORRISVILLE

1 RTP/PARKSIDE, L.L.C.

2 DIOSYNTH RTP, INC.

PERMIT SITE 1
PLAN VIEW

SITE 1
STA. 93+29

48" WELDED STEEL PIPE 0.625 THK (TRENCHLESS INSTALLATION)

2' HEAD BASE DITCH @ 20 LF
EST. 3 CY DDE
SEE DITCH DETAIL A

2' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 192 TONS
EST. 520 SY FF
EST. 850 CY DDE
SEE DITCH DETAIL F

CHANNEL CHANGE W/ CLASS "B" RIP RAP - BANKS ONLY
EST. 55 TONS
EST. 142 SY FF
EST. 125 CY DDE
SEE DITCH DETAIL M

TOE PROTECTION W/ CLASS "B" RIPRAP
EST. 17.4 TONS
EST. 52 SY FF
SEE DITCH DETAIL N

CLASS "B" RIP RAP
EST. 1 TONS
EST. 4 SY FF

TIE EXISTING TO CHANNEL

5 of 65

LEGEND
- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS

SCALE: 1" = 100'

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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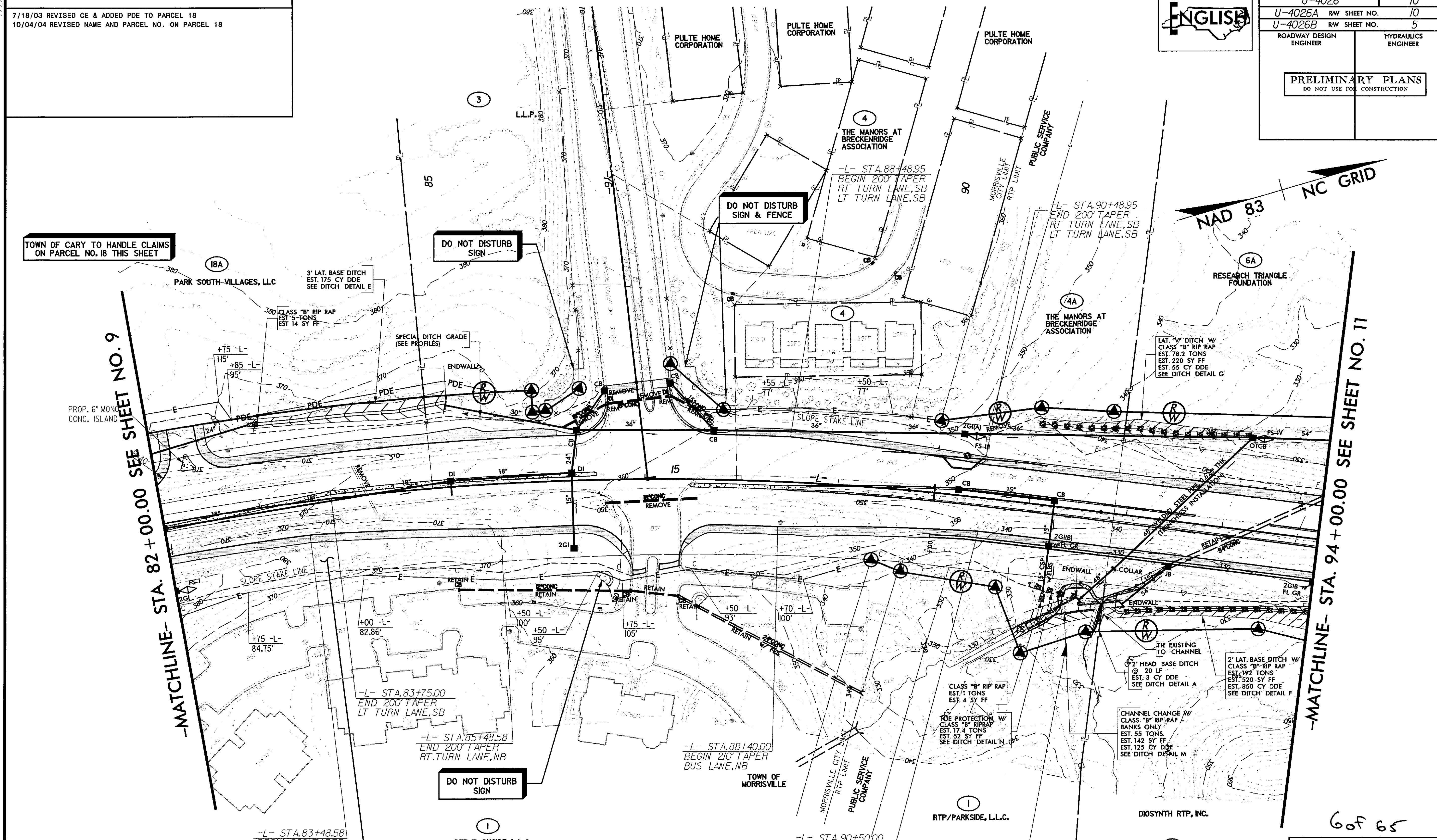
KO & Associates, P.C.

REVISIONS
7/18/03 REVISED CE & ADDED PDE TO PARCEL 18
10/04/04 REVISED NAME AND PARCEL NO. ON PARCEL 18

PROJECT REFERENCE NO.	SHEET NO.
U-4026	10
U-4026A RW SHEET NO.	10
U-4026B RW SHEET NO.	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



ENGLISH
PULTE HOME CORPORATION
PULTE HOME CORPORATION
PULTE HOME CORPORATION
L.L.P.
THE MANORS AT BRECKENRIDGE ASSOCIATION
-L- STA.88+48.95
BEGIN 200' TAPER
RT TURN LANE,SB
LT TURN LANE,SB
DO NOT DISTURB SIGN & FENCE
MORRISVILLE CITY LIMIT
RTP LIMIT
PUBLIC SERVICE COMPANY
-L- STA.90+48.95
END 200' TAPER
RT TURN LANE,SB
LT TURN LANE,SB
NAD 83
NC GRID
TOWN OF CARY TO HANDLE CLAIMS ON PARCEL NO. 18 THIS SHEET
DO NOT DISTURB SIGN
PARK SOUTH VILLAGES, LLC
3' LAT. BASE DITCH
EST. 175 CY DDE
SEE DITCH DETAIL E
CLASS "B" RIP RAP
EST 5 TONS
EST 14 SY FF
SPECIAL DITCH GRADE (SEE PROFILES)
ENDWALL
RESEARCH TRIANGLE FOUNDATION
THE MANORS AT BRECKENRIDGE ASSOCIATION
LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 78.2 TONS
EST. 220 SY FF
EST. 55 CY DDE
SEE DITCH DETAIL G
-MATCHLINE- STA. 82+00.00 SEE SHEET NO. 9
-MATCHLINE- STA. 94+00.00 SEE SHEET NO. 11
PROP. 6' MONO CONC. ISLAND
SLOPE STAKE LINE
REMOVE
-L-
36"
15
2GI
CB
DI
OTCB
48" WELDED STEEL PIPE
ENDWALL
COLLAR
JB
2GI(B)
TIE EXISTING TO CHANNEL
2' HEAD BASE DITCH @ 20 LF
EST. 3 CY DDE
SEE DITCH DETAIL A
2' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 192 TONS
EST. 520 SY FF
EST. 850 CY DDE
SEE DITCH DETAIL F
CLASS "B" RIP RAP
EST. 1 TONS
EST. 4 SY FF
TOE PROTECTION W/ CLASS "B" RIPRAP
EST. 17.4 TONS
EST. 52 SY FF
SEE DITCH DETAIL N
CHANNEL CHANGE W/ CLASS "B" RIP RAP - BANKS ONLY
EST. 55 TONS
EST. 142 SY FF
EST. 125 CY DDE
SEE DITCH DETAIL M
-L- STA.83+75.00
END 200' TAPER
LT TURN LANE,SB
-L- STA.85+48.58
END 200' TAPER
RT.TURN LANE,NB
-L- STA.88+40.00
BEGIN 210' TAPER
BUS LANE,NB
TOWN OF MORRISVILLE
DO NOT DISTURB SIGN
-L- STA.83+48.58
BEGIN 200' TAPER
RT.TURN LANE,NB
RTP/PARKSIDE, L.L.C.
RTP/PARKSIDE, L.L.C.
DIOSYNTH RTP, INC.
-L- STA.90+50.00
END 210' TAPER
BUS LANE,NB
EXIST. EARTH BERM TO BE REMOVED
SITE I
STA. 93+29

PERMIT SITE I

PLAN VIEW

6 of 65

LEGEND

TS — DENOTES TEMPORARY SURFACE WATER LOSS

S — DENOTES SURFACE WATER LOSS

SCALE: 1" = 100'

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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Ko & Associates, P.C.

7/2/99

REVISIONS
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6A & 6B
3/25/04 NAME CHANGE PARCEL NO. 2
6/24/04 REVISED R/W & CE PARCEL NO. 2 & REVISED CE ON PARCEL NO. 6B
7/9/04 REVISED PARCEL NO. AND OWNER PARCEL 6B
9/9/04 REVISED PARCEL NO. 2A TO PARCEL NO. 2
2/16/05 REVISED ACCESS TO LEFT OVER CONDITION AT-Y7-
2/16/05 REVISED R/W AND TCE ON PARCEL NO. 2

PROJECT REFERENCE NO.	SHEET NO.
U-4026	11
U-4026B R/W SHEET NO.	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 1 50
SCALE: 1" = 100'

NAD 83 | NC GRID

DESIGNATED ENVIROMENTALLY SENSITIVE AREA. NO CLEARING ADJACENT TO STREAM.

-MATCHLINE- STA. 94+00.00 SEE SHEET NO. 10

-MATCHLINE- STA. 106+00.00 SEE SHEET NO. 12

SITE 1
CON'T

RIP RAP ENERGY DISSIPATOR BASIN #1 W/CLASS I RIP RAP SEE DITCH DETAIL FF

4' BASE TAIL DITCH EST. 20 CY DDE SEE DITCH DETAIL A

ROCK CROSS VANE SEE DITCH DETAIL EE

6A RESEARCH TRIANGLE FOUNDATION

-L- STA.101+70.00 BEGIN 750' TAPER NB & SB LANES
BEGIN 200' TAPER SB LANES

-L- STA.103+70.00 END 200' TAPER SB LANES

CHANNEL IMPROVEMENT 25 LF W/CLASS "I" RIP RAP EST. 9 TONS EST. 13 SY FF EST. 13 CY DDE SEE DITCH DETAIL J

CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF

2' LAT. BASE DITCH W/ CLASS "B" RIP RAP FOR QUANTITIES SEE SHEET 5 SEE DITCH DETAIL F

BERM DITCH W/ CLASS "B" RIP RAP EST. 69 TONS EST. 194 SY FF SEE DITCH DETAIL L

STD BERM DITCH SEE DITCH DETAIL K

-L- STA.97+00.00 BEGIN 200' TAPER RT TURN LANE

-L- STA.99+00.00 END 200' TAPER RT TURN LANE

SPECIAL DITCH GRADE (SEE PROFILES)

CLASS "I" RIP RAP 10 LF (EACH BANK) EST. 20 TONS EST. 38 SY FF

ROCK INLET SILL W/BOULDERS EST. 7 TONS EST. 14 SY FF SEE DETAIL SHEET 2-DD

LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 83 TONS EST. 233 SY FF EST. 196 CY DDE SEE DITCH DETAIL G

LAT. "V" DITCH EST. 92 CY DDE SEE DITCH DETAIL H

25LF OF CHANNEL TRANSITION EST 30 CY DDE SEE DITCH DETAIL A

SITE 2
STA. 104+58

DIOSYNTH RTP, INC.

DIOSYNTH RTP, INC.

PERMIT SITE 1
PLAN VIEW

PERMIT SITE 2
PLAN VIEW

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LEGEND
- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-K
FOR ROCK INLET SILL DETAIL, SEE SHEET 2-DD
FOR -L- PROFILE, SEE SHEET 41
FOR -Y7- PROFILE, SEE SHEET 53

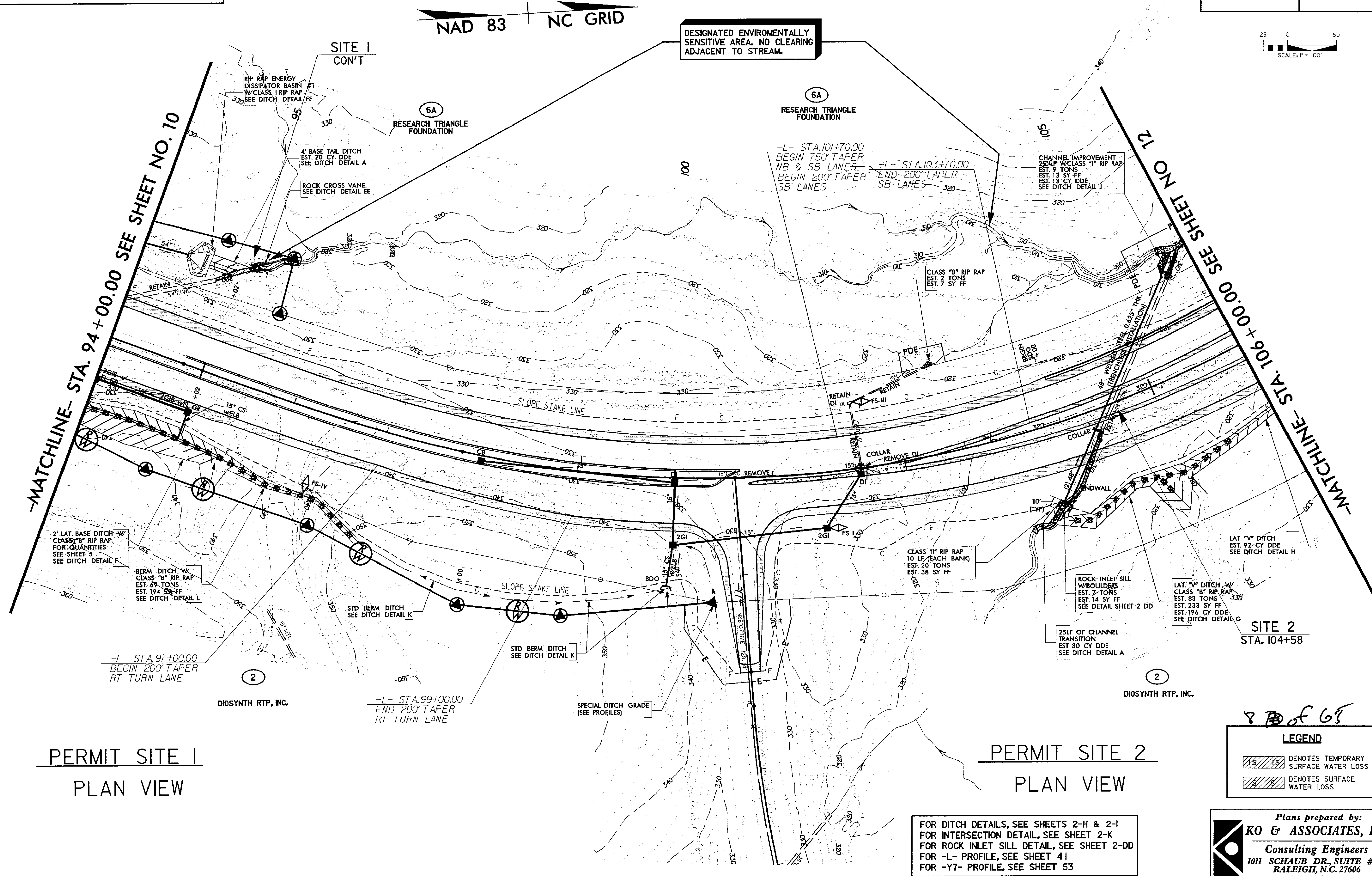
Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

PROJECT REFERENCE NO.	SHEET NO.
U-4026	11
U-4026B RW SHEET NO.	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

REVISIONS
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6A & 6B
3/25/04 NAME CHANGE PARCEL NO. 2
6/24/04 REVISED R/W & CE PARCEL NO. 2 & REVISED CE ON PARCEL NO. 6B
7/9/04 REVISED PARCEL NO. AND OWNER PARCEL 6B
9/9/04 REVISED PARCEL NO. 2A TO PARCEL NO. 2
2/16/05 REVISED ACCESS TO LEFT OVER CONDITION AT-Y7-
2/16/05 REVISED R/W AND TCE ON PARCEL NO. 2



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LEGEND

- TS — DENOTES TEMPORARY SURFACE WATER LOSS
- S — DENOTES SURFACE WATER LOSS

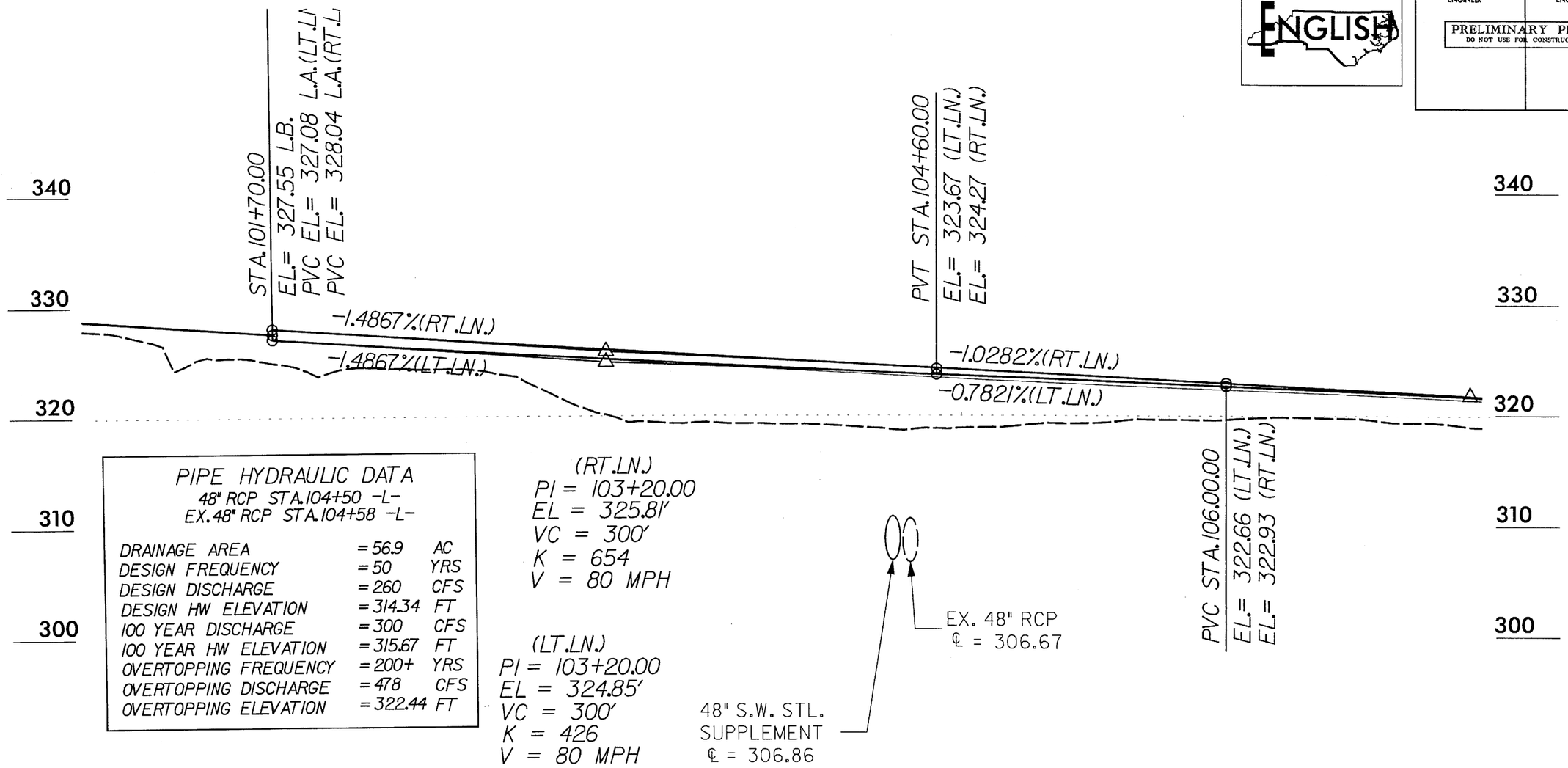
FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-K
FOR ROCK INLET SILL DETAIL, SEE SHEET 2-DD
FOR -L- PROFILE, SEE SHEET 41
FOR -Y7- PROFILE, SEE SHEET 53

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

PROJECT REFERENCE NO.	SHEET NO.
U-4026	11-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



PIPE HYDRAULIC DATA
48" RCP STA.104+50 -L-
EX.48" RCP STA.104+58 -L-

DRAINAGE AREA	= 56.9	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 260	CFS
DESIGN HW ELEVATION	= 314.34	FT
100 YEAR DISCHARGE	= 300	CFS
100 YEAR HW ELEVATION	= 315.67	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 478	CFS
OVERTOPPING ELEVATION	= 322.44	FT

PROFILE ALONG ROADWAY
SITE 2

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 9 OF 66

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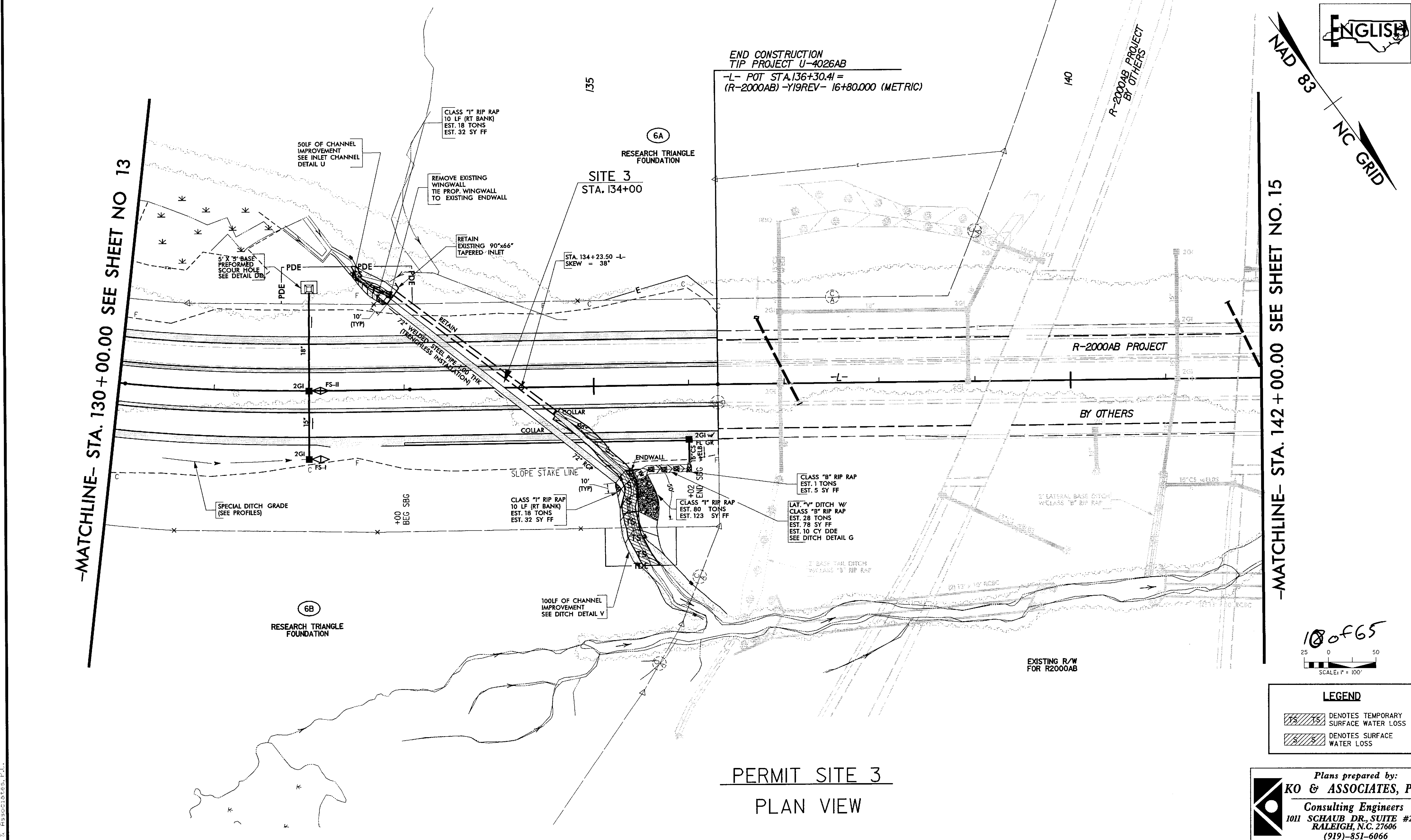
PROJECT REFERENCE NO.	SHEET NO.
U-4026	14
U-4026B R/W SHEET NO.	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



-MATCHLINE- STA. 130+00.00 SEE SHEET NO 13
-MATCHLINE- STA. 142+00.00 SEE SHEET NO. 15
ENGLISH
NAD 83 / NC GRID
END CONSTRUCTION
TIP PROJECT U-4026AB
-L- POT STA.136+30.41 =
(R-2000AB) -Y19REV- 16+80.000 (METRIC)
R-2000AB PROJECT BY OTHERS
SITE 3
STA. 134+00
6A
RESEARCH TRIANGLE FOUNDATION
6B
RESEARCH TRIANGLE FOUNDATION
CLASS "I" RIP RAP
10 LF (RT BANK)
EST. 18 TONS
EST. 32 SY FF
50LF OF CHANNEL IMPROVEMENT
SEE INLET CHANNEL DETAIL U
REMOVE EXISTING WINGWALL
TIE PROP. WINGWALL TO EXISTING ENDWALL
RETAIN EXISTING 90"x66" TAPERED INLET
STA. 134+23.50 -L-
SKEW = 38°
5' X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD
PDE
72" WELDED STEEL PIPE 1.00 THK (TRENCHLESS INSTALLATION)
RETAIN
R-2000AB PROJECT
-L-
BY OTHERS
COLLAR
2GI
FS-II
FS-I
SLOPE STAKE LINE
ENDWALL
2GI W/ FL GR
SPECIAL DITCH GRADE (SEE PROFILES)
+00 BEG SBG
CLASS "I" RIP RAP
10 LF (RT BANK)
EST. 18 TONS
EST. 32 SY FF
CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF
CLASS "I" RIP RAP
EST. 80 TONS
EST. 123 SY FF
LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 28 TONS
EST. 78 SY FF
EST. 10 CY DDE
SEE DITCH DETAIL G
100LF OF CHANNEL IMPROVEMENT
SEE DITCH DETAIL V
EXISTING R/W FOR R2000AB
10 of 65
SCALE: 1" = 100'

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS

PERMIT SITE 3

PLAN VIEW

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	14
U-4026B RW SHEET NO.	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NAD 83 / NC GRID

-MATCHLINE- STA. 130+00.00 SEE SHEET NO 13

-MATCHLINE- STA. 142+00.00 SEE SHEET NO. 15

END CONSTRUCTION
TIP PROJECT U-4026AB
-L- POT STA.136+30.41 =
(R-2000AB) -Y19REV- 16+80.000 (METRIC)

SITE 3
STA. 134+00

6A
RESEARCH TRIANGLE FOUNDATION

6B
RESEARCH TRIANGLE FOUNDATION

50LF OF CHANNEL IMPROVEMENT SEE INLET CHANNEL DETAIL U

CLASS "I" RIP RAP
10 LF (RT BANK)
EST. 18 TONS
EST. 32/SY FF

REMOVE EXISTING WINGWALL TIE PROP. WINGWALL TO EXISTING ENDWALL

RETAIN EXISTING 90"x66" TAPERED INLET

STA. 134+23.50 -L-
SKEW = 38°

5' X 3' BASE PREFORMED SCOUR HOLE SEE DETAIL DD

72" WELDED STEEL PIPE (TRENCHLESS INSTALLATION)

RETAIN

COLLAR

ENDWALL

SLOPE STAKE LINE

SPECIAL DITCH GRADE (SEE PROFILES)

+00 BEG SBG

CLASS "I" RIP RAP
10 LF (RT BANK)
EST. 18 TONS
EST. 32 SY FF

CLASS "I" RIP RAP
EST. 80 TONS
EST. 123 SY FF

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 28 TONS
EST. 78 SY FF
EST. 10 CY DDE
SEE DITCH DETAIL G

100LF OF CHANNEL IMPROVEMENT SEE DITCH DETAIL V

R-2000AB PROJECT BY OTHERS

R-2000AB PROJECT

BY OTHERS

EXISTING R/W FOR R2000AB

11 of 65

SCALE: 1" = 100'

PERMIT SITE 3
PLAN VIEW

LEGEND

- TS / TS — DENOTES TEMPORARY SURFACE WATER LOSS
- S / S — DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

PROJECT REFERENCE NO.	SHEET NO.
U-4026	14-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

PI = 131+00.00
EL = 302.00'
VC = 100'
K = 3123
V = 75 MPH

PI = 133+05.00
EL = 299.98'
VC = 250'
K = 1948
V = 80 MPH

PVT STA. 130+20.00
EL.= 302.81

PVC STA. 130+50.00
EL.= 302.51

PVC STA. 131+80.00
EL.= 301.21

PVT STA. 131+50.00
EL.= 301.51

PVT STA. 134+30.00
EL.= 298.91

-1.0174%

-0.9854%

-0.8570%

PROPOSED GRADE

EXISTING GROUND

72"
INV = 281.1

EX. 66" RCP W/
90" x 66"
TAPERED INLET
INV = 283.5

STRUCTURE HYDRAULIC DATA		
1@ 72" SPIRAL STEEL PIPE & 1-EX.66" RCP W/ TAPERED INLET		
DESIGN DISCHARGE	= 825	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 295.4	FT
BASE DISCHARGE	= 900	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 296.6	FT
OVERTOPPING DISCHARGE	= 900	CFS
OVERTOPPING FREQUENCY	= +100	YRS
OVERTOPPING ELEVATION	= 296.6	FT

310
300
290
280
270

131 132 133 134 135

PROFILE ALONG ROADWAY
SITE 3

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 12 OF 65

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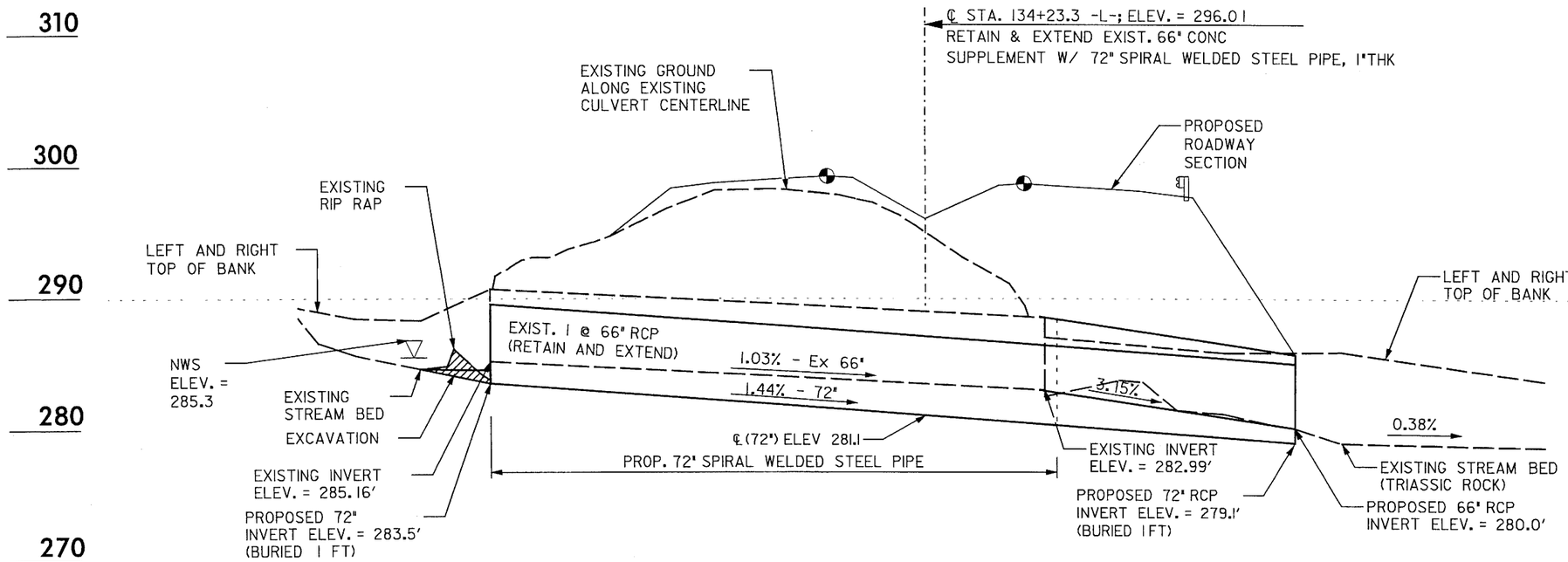
PROJECT REFERENCE NO.	SHEET NO.
U-4026	14-PAS
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG STRUCTURE
SITE 3

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 13 OF 65

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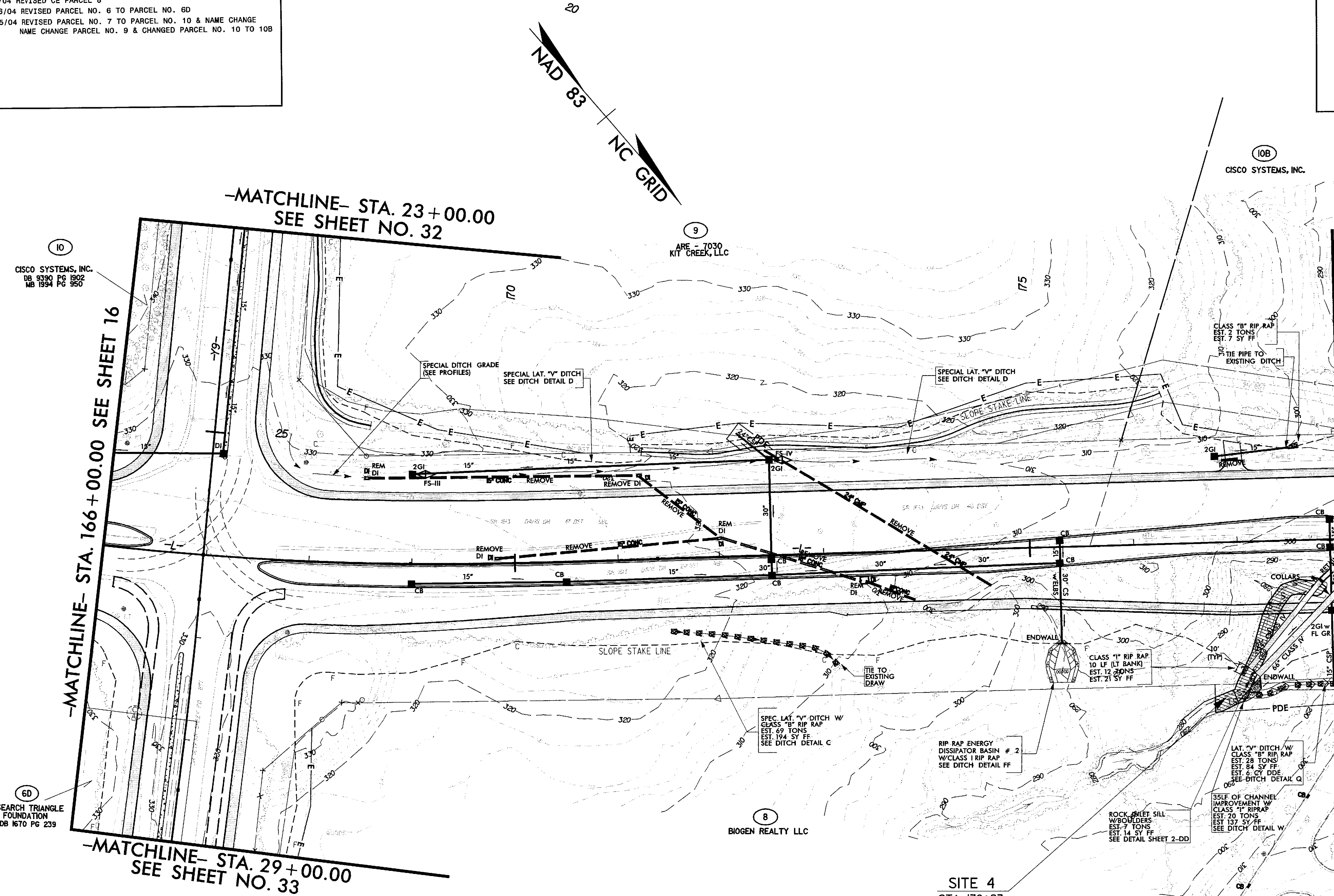
REVISIONS
2/4/04 REVISED CE PARCEL 8
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6D
3/25/04 REVISED PARCEL NO. 7 TO PARCEL NO. 10 & NAME CHANGE NAME CHANGE PARCEL NO. 9 & CHANGED PARCEL NO. 10 TO 10B

PROJECT REFERENCE NO.	SHEET NO.
U-4026	17
U-4026B R/W SHEET NO.	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



NAD 83
NC GRID
-MATCHLINE- STA. 23+00.00 SEE SHEET NO. 32
-MATCHLINE- STA. 166+00.00 SEE SHEET 16
-MATCHLINE- STA. 178+00.00 SEE SHEET NO. 18
-MATCHLINE- STA. 29+00.00 SEE SHEET NO. 33
10
CISCO SYSTEMS, INC.
DB 9390 PG 1902
MB 1994 PG 950
9
ARE - 7030 KIT CREEK, LLC
10B
CISCO SYSTEMS, INC.
6D
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239
8
BIOGEN REALTY LLC
SPECIAL DITCH GRADE (SEE PROFILES)
SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D
SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D
CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF
TIE PIPE TO EXISTING DITCH
SLOPE STAKE LINE
REMOVE
TIE TO EXISTING DRAW
SPEC. LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 69 TONS EST. 194 SY FF SEE DITCH DETAIL C
RIP RAP ENERGY DISSIPATOR BASIN # 2 W/CLASS I RIP RAP SEE DITCH DETAIL FF
CLASS "I" RIP RAP 10 LF (LT BANK) EST. 12 TONS EST. 21 SY FF
ENDWALL
COLLARS
PDE
LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 28 TONS EST. 84 SY FF EST. 6 CY DDE SEE DITCH DETAIL Q
35LF OF CHANNEL IMPROVEMENT W/ CLASS "I" RIPRAP EST. 20 TONS EST 137 SY FF SEE DITCH DETAIL W
ROCK INLET SILL W/BOULDERS EST. 7 TONS EST. 14 SY FF SEE DETAIL SHEET 2-DD
SITE 4
STA. 178+23

14 of 65

SCALE: 1" = 100'

PERMIT SITE 4

PLAN VIEW

LEGEND

TS	DENOTES TEMPORARY SURFACE WATER LOSS
S	DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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Ko & Associates, P.C.

REVISIONS
2/4/04 REVISED CE PARCEL 8 3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6D 3/25/04 REVISED PARCEL NO. 7 TO PARCEL NO. 10 & NAME CHANGE NAME CHANGE PARCEL NO. 9 & CHANGED PARCEL NO. 10 TO 10B

PROJECT REFERENCE NO.	SHEET NO.
U-4026	17
U-4026B R/W SHEET NO.	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NAD 83 NC GRID

-MATCHLINE- STA. 23+00.00
SEE SHEET NO. 32

-MATCHLINE- STA. 166+00.00 SEE SHEET 16

-MATCHLINE- STA. 178+00.00 SEE SHEET NO. 18

-MATCHLINE- STA. 29+00.00
SEE SHEET NO. 33

10
CISCO SYSTEMS, INC.
DB 9390 PG 1902
MB 1994 PG 950

9
ARE - 7030
KIT CREEK, LLC

10B
CISCO SYSTEMS, INC.

6D
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

8
BIOGEN REALTY LLC

SPECIAL DITCH GRADE (SEE PROFILES)

SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D

SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

TIE PIPE TO EXISTING DITCH

SLOPE STAKE LINE

SLOPE STAKE LINE

TIE TO EXISTING DRAW

SPEC. LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 69 TONS
EST. 194 SY FF
SEE DITCH DETAIL C

RIP RAP ENERGY DISSIPATOR BASIN # 2 W/CLASS I RIP RAP
SEE DITCH DETAIL FF

CLASS "I" RIP RAP
10 LF (LT BANK)
EST. 12 TONS
EST. 21 SY FF

ROCK INLET SILL W/BOULDERS
EST. 7 TONS
EST. 14 SY FF
SEE DETAIL SHEET 2-DD

LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 28 TONS
EST. 84 SY FF
EST. 6 CY DDE
SEE DITCH DETAIL Q

35LF OF CHANNEL IMPROVEMENT W/ CLASS "I" RIPRAP
EST. 20 TONS
EST 137 SY FF
SEE DITCH DETAIL W

SITE 4
STA. 178+23

PERMIT SITE 4
PLAN VIEW

15 of 65

SCALE: 1" = 100'

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

REVISIONS
9/24/03 CHANGED R/W TO PDE ON PARCEL 11
2/4/04 PROPERTY NAME CHANGE PARCELS 8
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6E
3/25/04 REVISED PARCEL NO. 10 TO PARCEL NO. 10B

PROJECT REFERENCE NO.	SHEET NO.
U-4026	18
U-4026B R/W SHEET NO.	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

6E
RESEARCH TRIANGLE FOUNDATION

10B
CISCO SYSTEMS, INC.

11
DELTA PRODUCTS CORP.

8
BIOGEN REALTY LLC
DB 9230 PG 0450
DB 8249 PG 0340
BM 1999 PG 0265
BM 1994 PG 1560

SITE 4 CON'T

SPECIAL CONCRETE OUTLET STRUCTURE w/5 FT WEIR SEE STRUCTURE PLANS FOR DETAILS

CLASS "B" RIP RAP
EST. 11 TONS
EST. 28 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

DO NOT DISTURB SIGN

-MATCHLINE- STA. 178+00.00 SEE SHEET NO. 17

-MATCHLINE- STA. 190+00.00 SEE SHEET NO. 19

SLOPE STAKE LINE

STD.BERM DITCH SEE DITCH DETAIL K

SPEC. FALSE CUT SEE DITCH DETAIL I

BERM "V" DITCH W/ CLASS "B" RIP RAP
EST. 52 TONS
EST. 157 SY FF
SEE DITCH DETAIL L

BERM "V" DITCH W/ CLASS "B" RIP RAP
EST. 52 TONS
EST. 157 SY FF
SEE DITCH DETAIL L (SEE PROFILE)

TIE TO EXISTING SWALE

TIE TO EXISTING DITCH

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

2' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 108 TONS
EST. 304 SY FF
EST. 275 CY DDE
SEE DITCH DETAIL F

DELTA
190
390

21950 / 40950	-L- DAVIS DRIVE	22245 / 41345
95 / 195		95 / 195
190 / 390		485 / 785
675 / 1175		

WALLY GILBERT DRIVE

2004 ADT
2024 ADT

PROJECTED TRAFFIC VOLUMES

16 of 66

SCALE: 1" = 100'

LEGEND

- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS

PERMIT SITE 4
PLAN VIEW

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

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ko & Associates, P.C.

REVISIONS
9/24/03 CHANGED R/W TO PDE ON PARCEL 11
2/4/04 PROPERTY NAME CHANGE PARCELS 8
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6E
3/25/04 REVISED PARCEL NO. 10 TO PARCEL NO. 10B

PROJECT REFERENCE NO.	SHEET NO.
U-4026	18
U-4026B R/W SHEET NO.	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

6E RESEARCH TRIANGLE FOUNDATION

10B CISCO SYSTEMS, INC.

11 DELTA PRODUCTS CORP.

SITE 4 CON'T

SPECIAL CONCRETE OUTLET STRUCTURE w/5 FT WEIR SEE STRUCTURE PLANS FOR DETAILS

CLASS "B" RIP RAP EST. 11 TONS EST. 28 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

DO NOT DISTURB SIGN

-MATCHLINE- STA. 178+00.00 SEE SHEET NO. 17

-MATCHLINE- STA. 190+00.00 SEE SHEET NO. 19

SLOPE STAKE LINE

STD.BERM DITCH SEE DITCH DETAIL K

SPEC. FALSE CUT SEE DITCH DETAIL I

TIE TO EXISTING SWALE

TIE TO EXISTING DITCH

CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF

2' LAT. BASE DITCH W/ CLASS "B" RIP RAP EST. 108 TONS EST. 304 SY FF EST. 275 CY DDE SEE DITCH DETAIL F

BERM "V" DITCH W/ CLASS "B" RIP RAP EST. 52 TONS EST. 157 SY FF SEE DITCH DETAIL L

BERM "V" DITCH W/ CLASS "B" RIP RAP EST. 52 TONS EST. 157 SY FF SEE DITCH DETAIL L (SEE PROFILE)

8 BIOGEN REALTY LLC
DB 9230 PG 0450
DB 8249 PG 0240
BM 1999 PG 0265
BM 1994 PG 1560

DELTA

21950	190/390	22245
40950	DAVIS DRIVE	41345

95/195 95/195 190/390 485/785 675/1175

2004 ADT
2024 ADT

WALLY GILBERT DRIVE

PROJECTED TRAFFIC VOLUMES

PERMIT SITE 4
PLAN VIEW

17 of 65

SCALE: 1" = 100'

LEGEND

- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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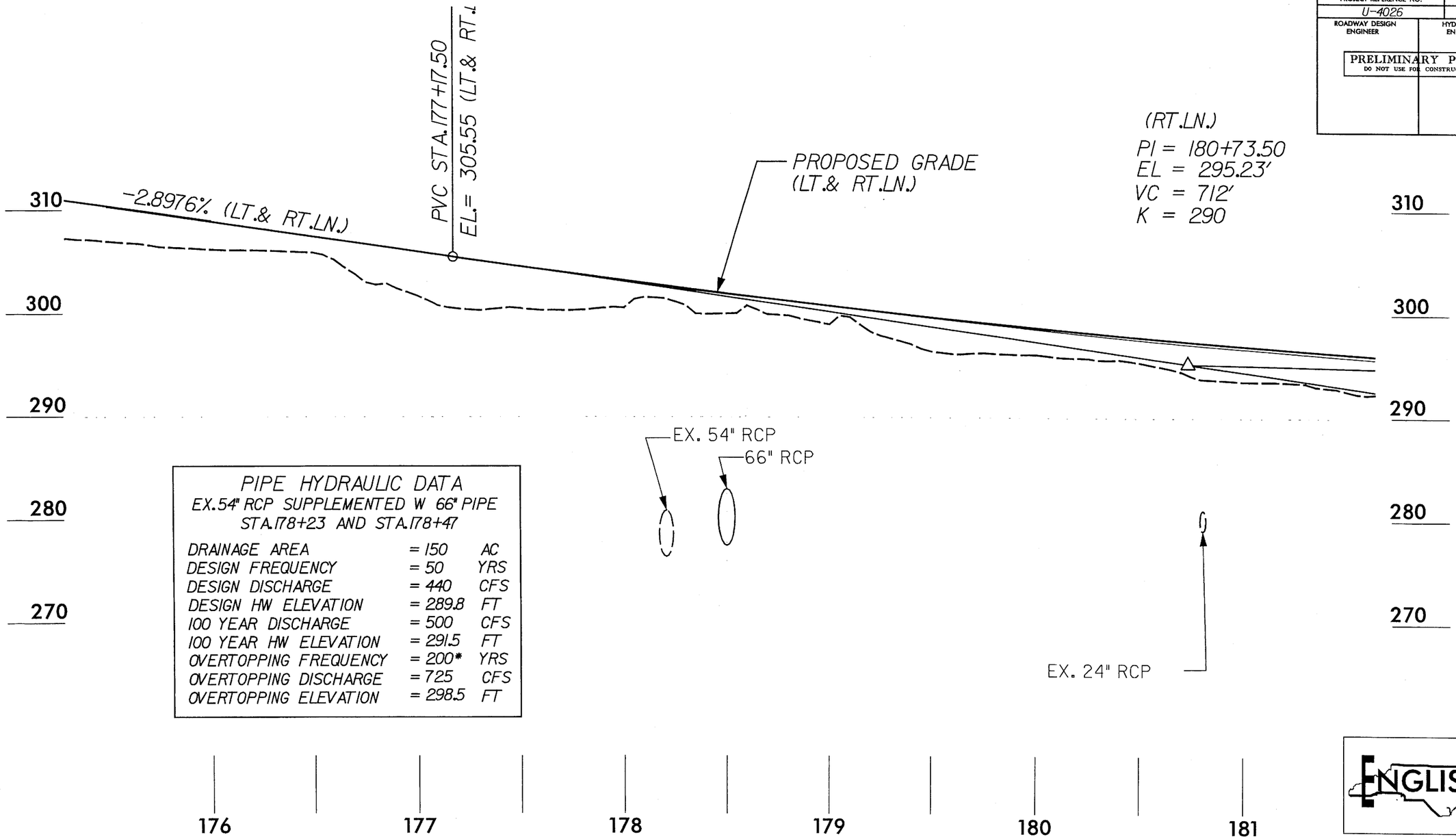
KO & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	17&18-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

EX.54" RCP SUPPLEMENTED W 66" PIPE
STA.178+23 AND STA.178+47

DRAINAGE AREA	= 150	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 440	CFS
DESIGN HW ELEVATION	= 289.8	FT
100 YEAR DISCHARGE	= 500	CFS
100 YEAR HW ELEVATION	= 291.5	FT
OVERTOPPING FREQUENCY	= 200*	YRS
OVERTOPPING DISCHARGE	= 725	CFS
OVERTOPPING ELEVATION	= 298.5	FT

PROFILE ALONG ROADWAY
SITE 4

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 18 OF 65

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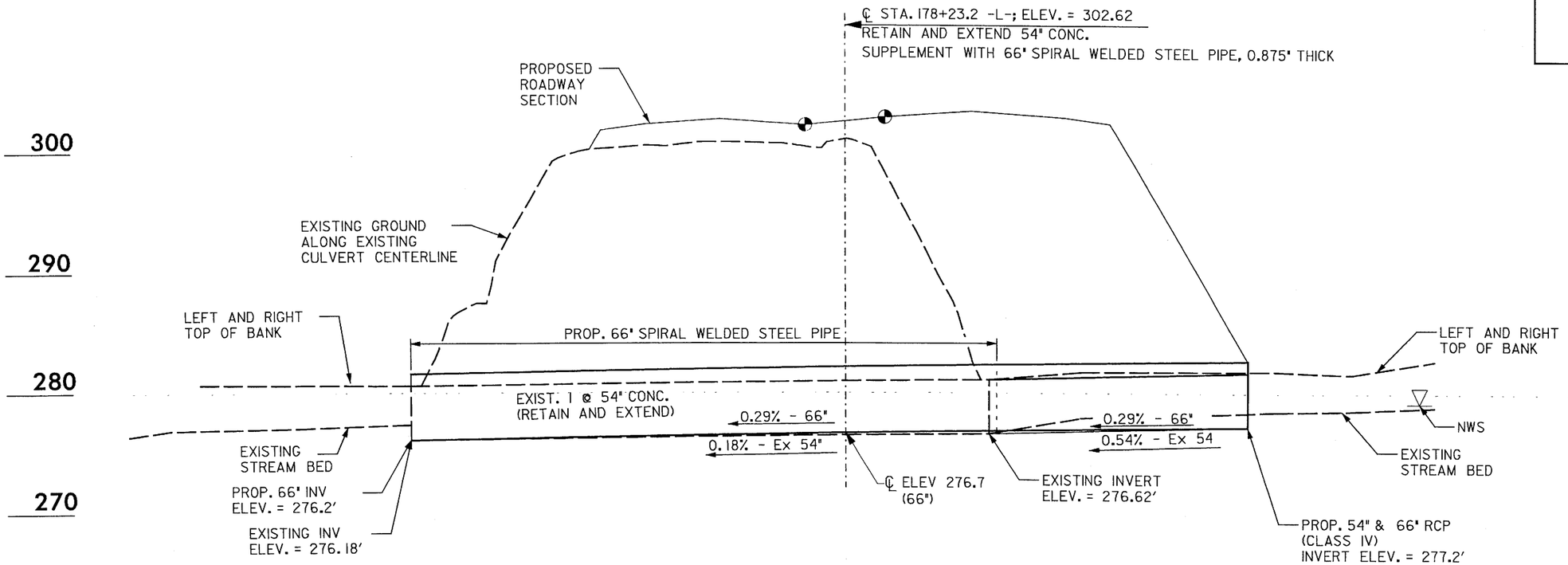
PROJECT REFERENCE NO.	SHEET NO.
U-4026	17&18-PAS
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG STRUCTURE
SITE 4

ENGLISH

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 19 OF 65

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7/2/99

REVISIONS
2/4/04 PROPERTY NAME CHANGE PARCEL 8
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6F & 6G

PROJECT REFERENCE NO.	SHEET NO.
U-4026	19
U-4026B R/W SHEET NO.	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

FOR TDE AROUND POND
SEE PLAN SHEET 19A

RESEARCH TRIANGLE FOUNDATION

6F RESEARCH TRIANGLE FOUNDATION

II DELTA PRODUCTS CORP.

POND

W.S. 275.86

NAD 83 NC GRID

SITE 5
STA. 199+96.1

6F RESEARCH TRIANGLE FOUNDATION

6F RESEARCH TRIANGLE FOUNDATION

-MATCHLINE- STA. 190+00.00 SEE SHEET NO. 18

-MATCHLINE- STA. 202+00.00 SEE SHEET NO. 20

SPECIAL DITCH GRADE (SEE PROFILES)

RETAIN FS-III

RETAIN

REMOVE DI

REMOVE 28LF EX 18" CONC

2GI FS-II

2GI FS-I

18" CS W/ELB

BDO

SPECIAL DITCH GRADE (SEE PROFILES)

SPECIAL DITCH GRADE (SEE PROFILES)

STD. BERM DITCH SEE DITCH DETAIL K

SLOPE STAKE LINE

8 BIOGEN REALTY LLC
DB 9230 PG 0450
DB 6249 PG 0340
BM 1999 PG 0265
BM 1994 PG 1560

NOTE: CULVERT IS SUBMERGED IN LAKE. PRIOR TO CONSTRUCTION NCDOT WILL CONTACT THE RESEARCH TRIANGLE FOUNDATION TO HAVE WATER LEVEL LOWERED FOR CULVERT CONSTRUCTION.

LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 10 TONS
EST. 31 SY FF
EST. 5 CY DDE
SEE DITCH DETAIL G

5' X 5' BASE PREFORMED SCOUR HOLE
SEE DETAIL DD

ROCK PLATE W/ CLASS "II" RIP RAP
SEE DITCH DETAIL P

125LF OF INLET CHANNEL CLEANOUT
EST. 42 CY DDE
SEE DITCH DETAIL X

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

CLASS "B" RIP RAP
EST. 9 TONS
EST. 20 SY FF

LAT. 2' BASE DITCH
EST. 221 CY DDE
SEE DITCH DETAIL E

6G RESEARCH TRIANGLE FOUNDATION

FOR TDE AROUND POND
SEE PLAN SHEET 19A

20 OF 65

25 0 50
SCALE: 1" = 100'

LEGEND
- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS (POND)

PERMIT SITE 5
PLAN VIEW

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/23/2005
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KO & Associates, P.C.

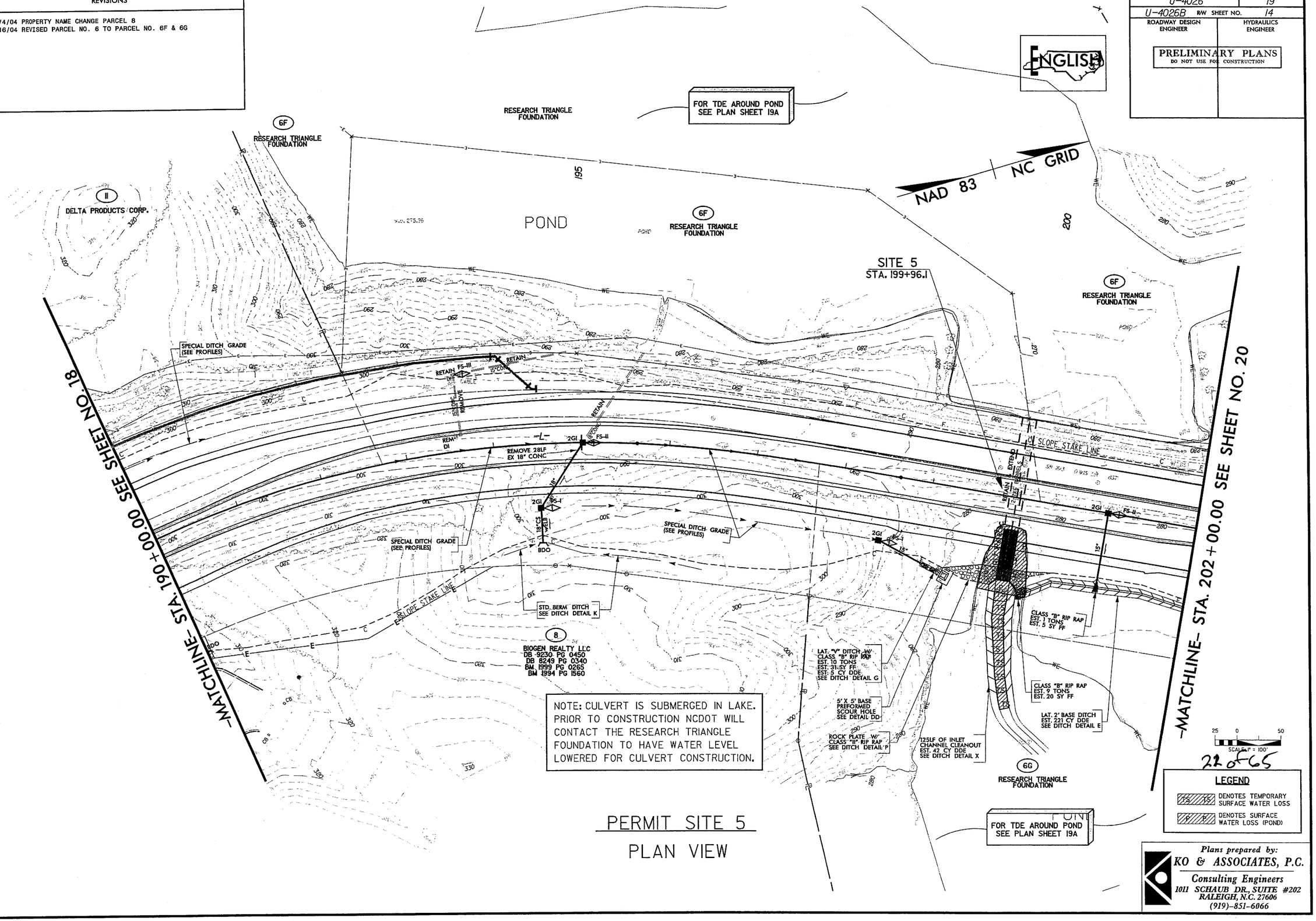
7/2/99

REVISIONS
2/4/04 PROPERTY NAME CHANGE PARCEL 8 3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6F & 6G

PROJECT REFERENCE NO.	SHEET NO.
U-4026	19
U-4026B R/W SHEET NO.	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



PERMIT SITE 5

PLAN VIEW

22 of 65

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS (POND)

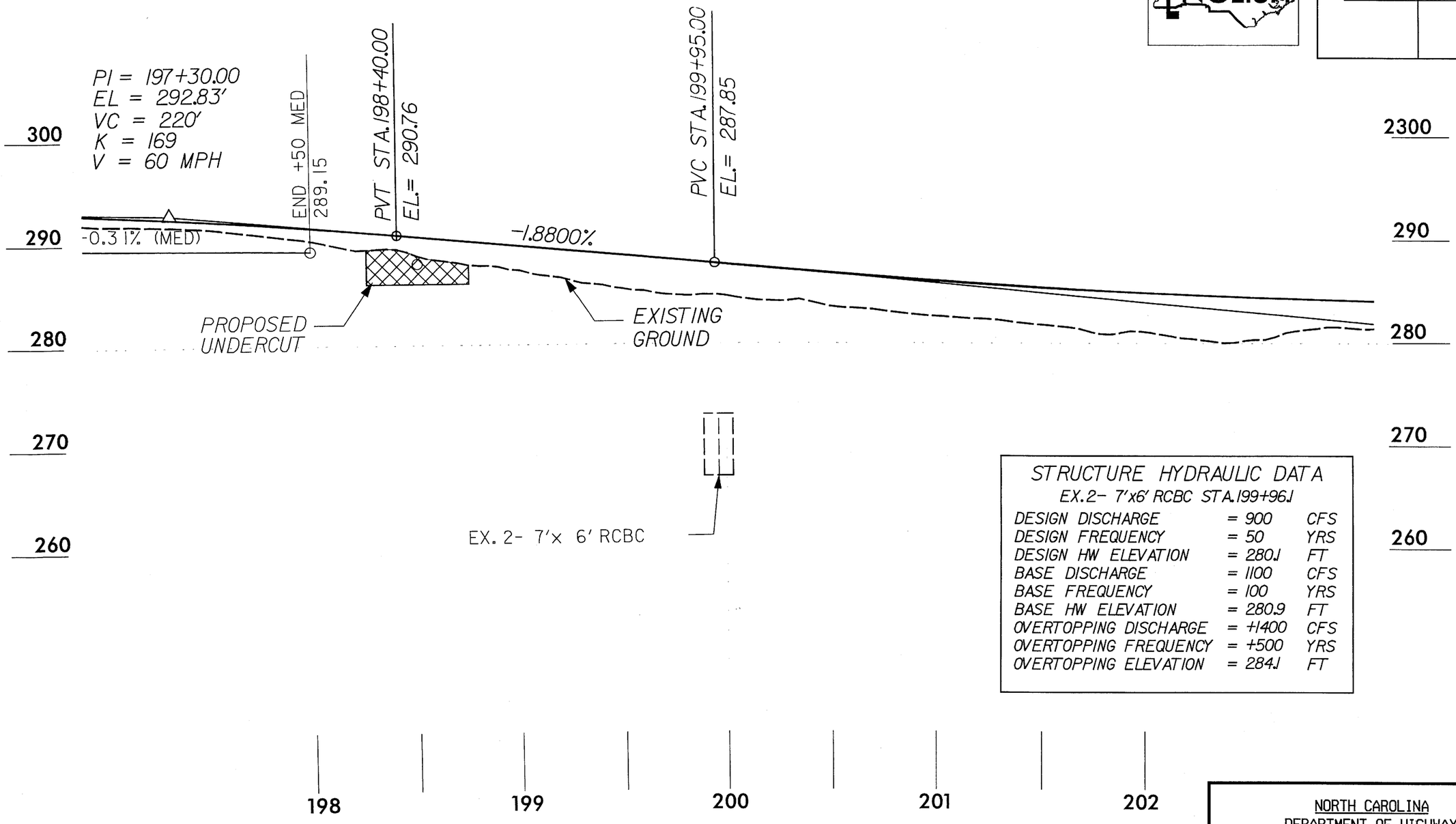
Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/23/2005
N:\KO & Associates, P.C.\Projects\u4026\Dgn\Permits\u4026_permit_19.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-4026	19-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



STRUCTURE HYDRAULIC DATA

EX.2- 7'x6' RCBC STA.199+96.1

DESIGN DISCHARGE	= 900	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 280.1	FT
BASE DISCHARGE	= 1100	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 280.9	FT
OVERTOPPING DISCHARGE	= +1400	CFS
OVERTOPPING FREQUENCY	= +500	YRS
OVERTOPPING ELEVATION	= 284.1	FT

PROFILE ALONG ROADWAY
SITE 5

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 19A OF 65

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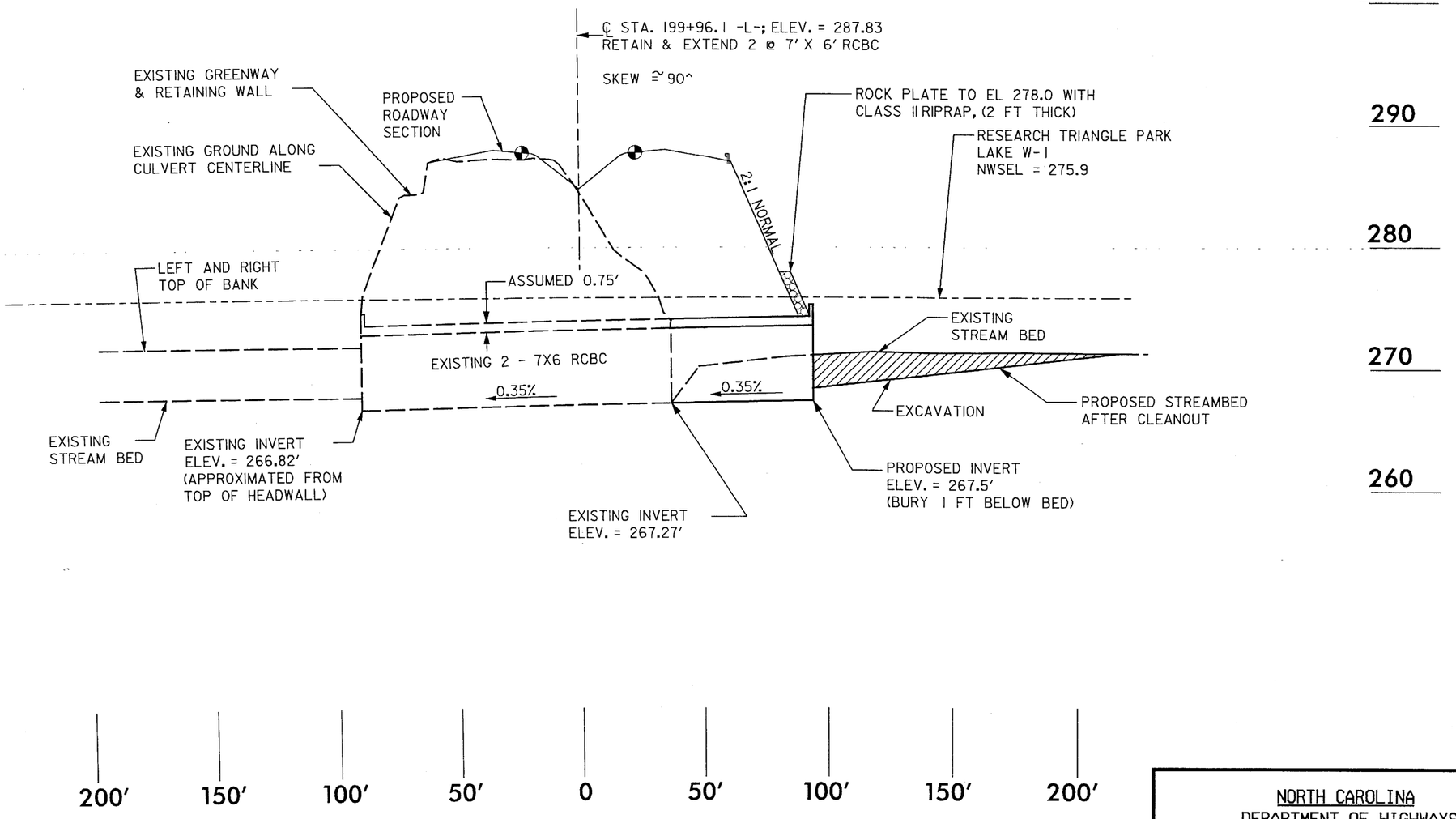
PROJECT REFERENCE NO.	SHEET NO.
U-4026	19-PAS
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG STRUCTURE
SITE 5

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 23 OF 65

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7/2/99

REVISIONS
12/29/03 REVISED R/W, CE AND PDE ON PARCEL 12
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6F & 6G
3/29/04 REVISED PARCEL NO. 8 TO PARCEL NO. 8A

PROJECT REFERENCE NO.	SHEET NO.
U-4026	20
U-4026B RW SHEET NO.	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

SCALE: 1" = 100'

-MATCHLINE- STA. 10+30.00
SEE SHEET NO. 37

NAD 83 NC GRID

-MATCHLINE- STA. 202+00.00 SEE SHEET NO. 19

-MATCHLINE- STA. 214+00.00 SEE SHEET NO. 21

FOR TDE AROUND POND
SEE PLAN SHEET 19A

6F
RESEARCH TRIANGLE FOUNDATION

12
ERICSSON TRUST

205

DO NOT DISTURB SIGN

SPECIAL DITCH GRADE (SEE PROFILES)

2' BASE HEAD DITCH
EST. 10 CY DDE
SEE DITCH DETAIL A

13

DURHAM COUNTY
WAKE COUNTY

STD BERM DITCH
SEE DITCH DETAIL K

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

STD. BERM DITCH
SEE DITCH DETAIL K

-Y10-
DEVELOPEMENT DRIVE

2GI w/ FL GR

SLOPE STAKE LINE

EXISTING R/W

SDG (SEE PROFILES)

CLASS "I" RIP RAP
EST. 12 TONS
EST. 29 SY FF

CHANNEL CHANGE W/
CLASS "B" RIP RAP -
BANKS ONLY
EST. 157 TONS
EST. 444 SY FF
EST. 331 CY DDE
SEE DITCH DETAIL M

LAT. 2' BASE DITCH
FOR QUANTITIES
SEE SHEET 14
SEE DITCH DETAIL E

BIOGEN REALTY LLC
DB 9230 PG 0450 (WAKE)
BM 1997 PG 1316 (WAKE)
DB 3211 PG 0802 (DURHAM)
PB 0138 PG 0167

8A

6G
RESEARCH TRIANGLE FOUNDATION

FOR TDE AROUND POND
SEE PLAN SHEET 19A

SITE 6
STA. 205+00 -
STA. 215+00 RT

PERMIT SITE 6
PLAN VIEW

LEGEND

WLB	PERMIT
F F	DENOTES FILL IN PERMIT
TS TS	DENOTES TEMPORARY SURFACE WATER LOSS
S S	DENOTES SURFACE WATER LOSS
	DENOTES MECHANIZED CLEARING

-Y10-
DEVELOPEMENT DRIVE

2004 ADT	2215
2024 ADT	3915
675 / 1175	1540 / 2740
22245 -L- 41345 DAVIS DRIVE	23110 42910

PROJECTED TRAFFIC VOLUMES

RTP LIMIT
MORRISVILLE CITY LIMIT

24 of 65

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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Ko & Associates, P.C.

7/2/99

REVISIONS
12/29/03 REVISED R/W, CE AND PDE ON PARCEL 12
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6F & 6G
3/29/04 REVISED PARCEL NO. 8 TO PARCEL NO. 8A

PROJECT REFERENCE NO.	SHEET NO.
U-4026	20
U-4026B R/W SHEET NO.	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 50
SCALE: 1" = 100'

NAD 83 / NC GRID

-MATCHLINE- STA. 10+30.00 SEE SHEET NO. 37

-MATCHLINE- STA. 202+00.00 SEE SHEET NO. 19

-MATCHLINE- STA. 214+00.00 SEE SHEET NO. 21

FOR TDE AROUND POND SEE PLAN SHEET 19A

6F RESEARCH TRIANGLE FOUNDATION

12 ERICSSON TRUST

13

6G RESEARCH TRIANGLE FOUNDATION

8A

DO NOT DISTURB SIGN

SPECIAL DITCH GRADE (SEE PROFILES)

2' BASE HEAD DITCH EST. 10 CY DDE SEE DITCH DETAIL A

STD. BERM DITCH SEE DITCH DETAIL K

CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF

SDG (SEE PROFILES)

CLASS "B" RIP RAP EST. 3 TONS EST. 10 SY FF

LAT. 2' BASE DITCH FOR QUANTITIES SEE SHEET 14 SEE DITCH DETAIL E

CLASS "I" RIP RAP EST. 12 TONS EST. 29 SY FF

CHANNEL CHANGE W/ CLASS "B" RIP RAP - BANKS ONLY EST. 157 TONS EST. 444 SY FF EST. 331 CY DDE SEE DITCH DETAIL M

SITE 6
STA. 205+00 - STA. 215+00 RT

PERMIT SITE 6
PLAN VIEW

BIOGEN REALTY LLC
DB 8230 PG 0450 (WAKE)
BM 1997 PG 1316 (WAKE)
DB 3211 PG 0802 (DURHAM)
PB 0138 PG 0167

DURHAM COUNTY / WAKE COUNTY

RTP LIMIT

MORRISVILLE CITY LIMIT

LEGEND

- WLB — PERMIT
- F F — DENOTES FILL IN PERMIT
- TS TS — DENOTES TEMPORARY SURFACE WATER LOSS
- S S — DENOTES SURFACE WATER LOSS
- DENOTES MECHANIZED CLEARING

-Y10- DEVELOPEMENT DRIVE

	2004 ADT	2215	675	1540
22245 -L- 41345 DAVIS DRIVE	2024 ADT	3915	1175	2740

23110 42910

PROJECTED TRAFFIC VOLUMES

25
~~26~~ - 65

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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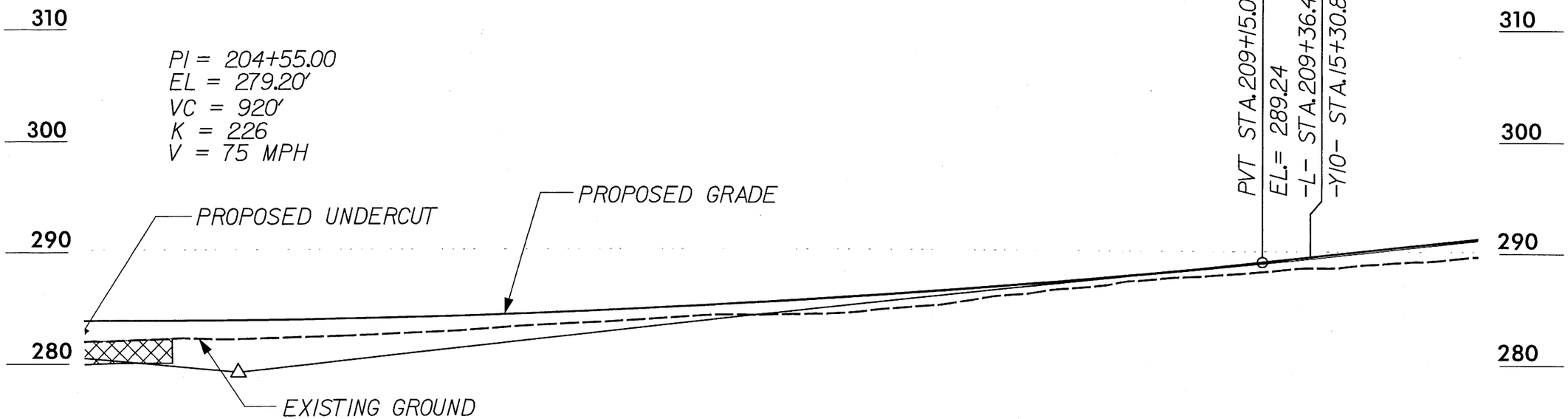
KO & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	20-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG ROADWAY
SITE 6

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 26 OF 65

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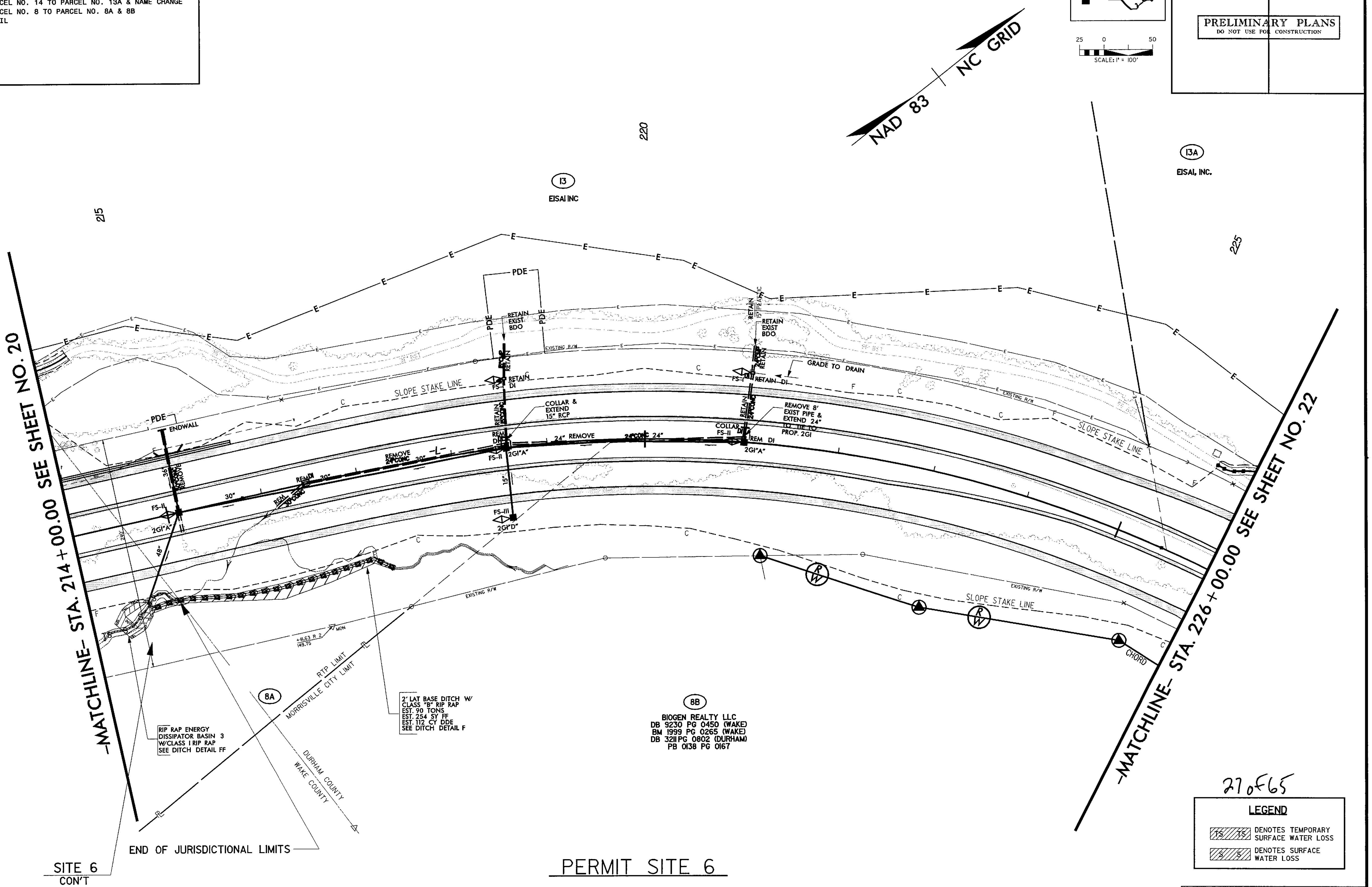
REVISIONS
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
2/4/04 REVISED R/W PARCELS 6 & 8
3/25/04 REVISED PARCEL NO. 14 TO PARCEL NO. 13A & NAME CHANGE
3/29/04 REVISED PARCEL NO. 8 TO PARCEL NO. 8A & 8B
2/23/05 REVISED TRAIL

ENGLISH

PROJECT REFERENCE NO.	SHEET NO.
U-4026	21
U-4026B RW SHEET NO.	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



25 0 50
SCALE: 1" = 100'
NAD 83 NC GRID
220
215
225
13
EISAI INC
13A
EISAI, INC.
PDE
RETAIN EXIST BDO
RETAIN DI
GRADE TO DRAIN
SLOPE STAKE LINE
EXISTING R/W
COLLAR & EXTEND 15" RCP
REMOVE 8' EXIST PIPE & EXTEND 24" TO TIE TO PROP. 2GI
24" REMOVE
REM DI
2GI"A"
2GI"D"
FS-II
FS-III
ENDWALL
30"
-L-
48"
CHORD
-MATCHLINE- STA. 214+00.00 SEE SHEET NO. 20
-MATCHLINE- STA. 226+00.00 SEE SHEET NO. 22
8A
8B
RTP LIMIT
MORRISVILLE CITY LIMIT
DURHAM COUNTY
WAKE COUNTY
BIOGEN REALTY LLC
DB 9230 PG 0450 (WAKE)
BM 1999 PG 0265 (WAKE)
DB 3211 PG 0802 (DURHAM)
PB 0138 PG 0167
2' LAT BASE DITCH W/ CLASS "B" RIP RAP
EST. 90 TONS
EST. 254 SY FF
EST. 112 CY DDE
SEE DITCH DETAIL F
RIP RAP ENERGY DISSIPATOR BASIN 3 W/CLASS I RIP RAP
SEE DITCH DETAIL FF
END OF JURISDICTIONAL LIMITS
SITE 6
CON'T

PERMIT SITE 6

PLAN VIEW

27 of 65

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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ko & Associates, P.C.

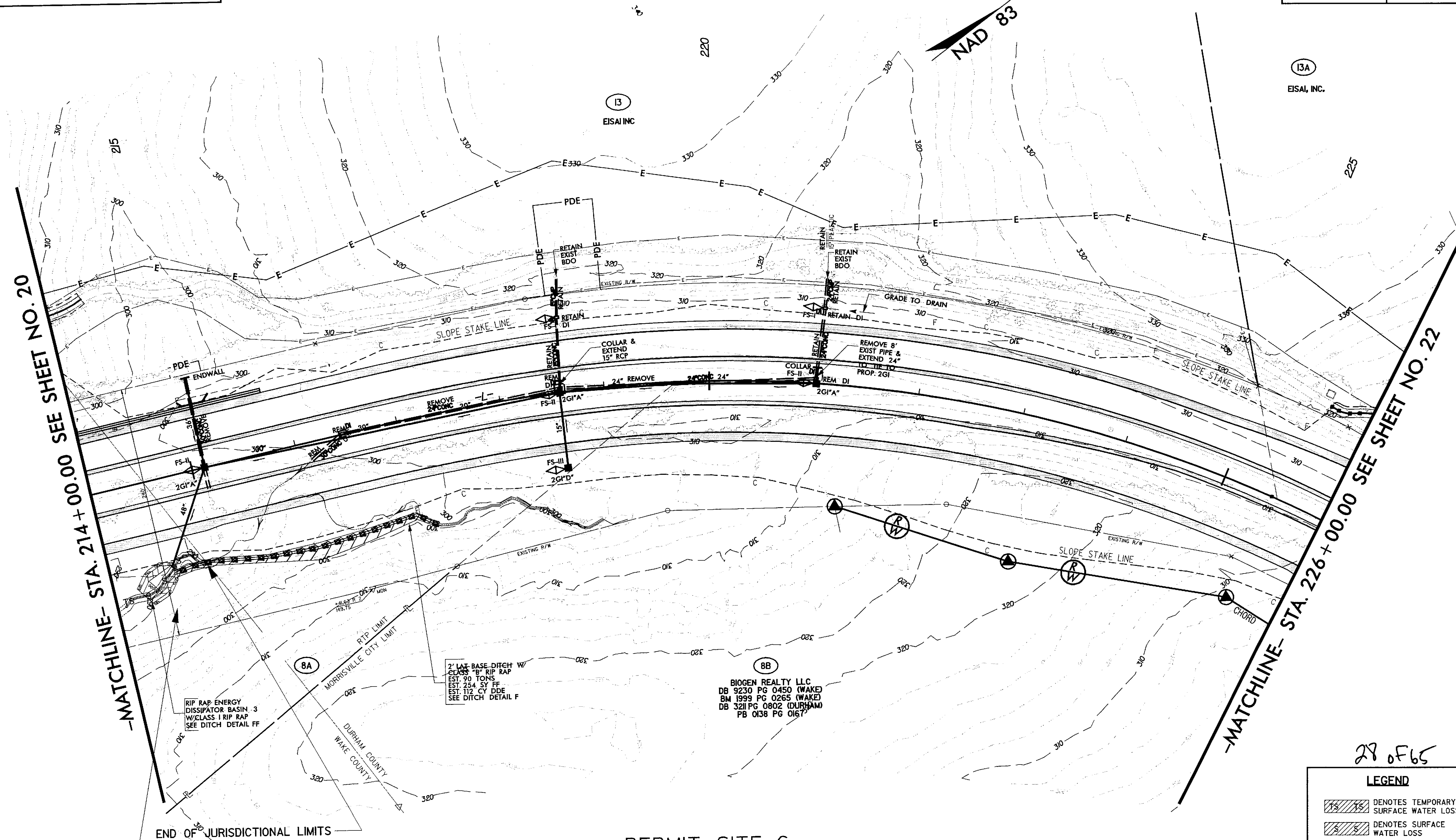
REVISIONS
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
2/4/04 REVISED R/W PARCELS 6 & 8
3/25/04 REVISED PARCEL NO. 14 TO PARCEL NO. 13A & NAME CHANGE
3/29/04 REVISED PARCEL NO. 8 TO PARCEL NO. 8A & 8B
2/23/05 REVISED TRAIL

ENGLISH

PROJECT REFERENCE NO.	SHEET NO.
U-4026	21
U-4026B R/W SHEET NO.	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SCALE: 1" = 100'



NAD 83 / NC GRID
-MATCHLINE- STA. 214+00.00 SEE SHEET NO. 20
-MATCHLINE- STA. 226+00.00 SEE SHEET NO. 22
13
EISAI INC
13A
EISAI, INC.
8A
8B
BIOGEN REALTY LLC
DB 9230 PG 0450 (WAKE)
BM 1999 PG 0265 (WAKE)
DB 3211 PG 0802 (DURHAM)
PB 0138 PG 0167
SLOPE STAKE LINE
EXISTING R/W
GRADE TO DRAIN
RETAIN EXIST BDO
COLLAR & EXTEND 15" RCP
24" REMOVE
REMOVE 8' EXIST PIPE & EXTEND 24" TO TIE TO PROP. 2GI
RTP LIMIT
MORRISVILLE CITY LIMIT
DURHAM COUNTY
WAKE COUNTY
2' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 90 TONS
EST. 254 SY FF
EST. 112 CY DDE
SEE DITCH DETAIL F
RIP RAP ENERGY DISSIPATOR BASIN 3 W/CLASS I RIP RAP SEE DITCH DETAIL FF
END OF JURISDICTIONAL LIMITS
SITE 6 CON'T
CHORD

28 of 65

PERMIT SITE 6

PLAN VIEW

LEGEND

- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

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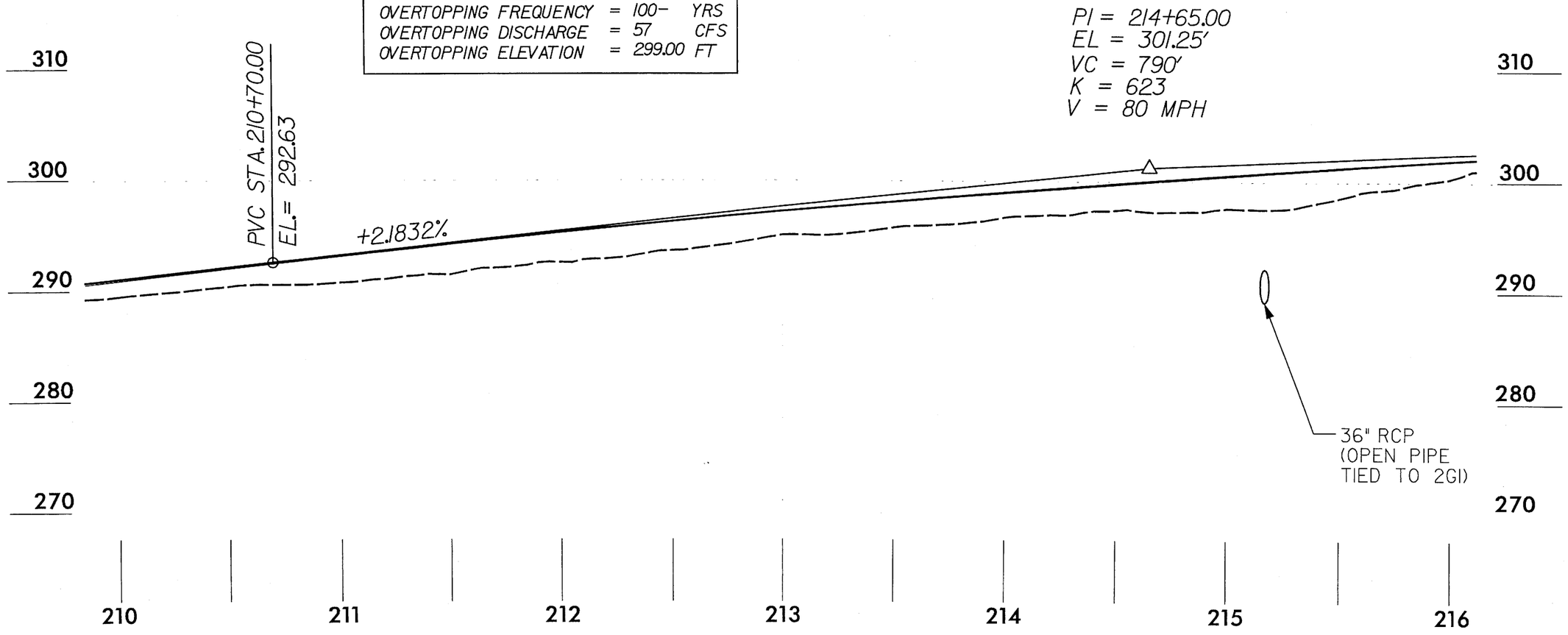
PROJECT REFERENCE NO.	SHEET NO.
U-4026	21-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA
36" RCP STA. 215+17 -L-

DRAINAGE AREA	= 17.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 49	CFS
DESIGN HW ELEVATION	= 298.50	FT
100 YEAR DISCHARGE	= 60	CFS
100 YEAR HW ELEVATION	= 299.45	FT
OVERTOPPING FREQUENCY	= 100-	YRS
OVERTOPPING DISCHARGE	= 57	CFS
OVERTOPPING ELEVATION	= 299.00	FT



PROFILE ALONG ROADWAY
SITE 6

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 29 OF 65

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7/2/99

REVISIONS

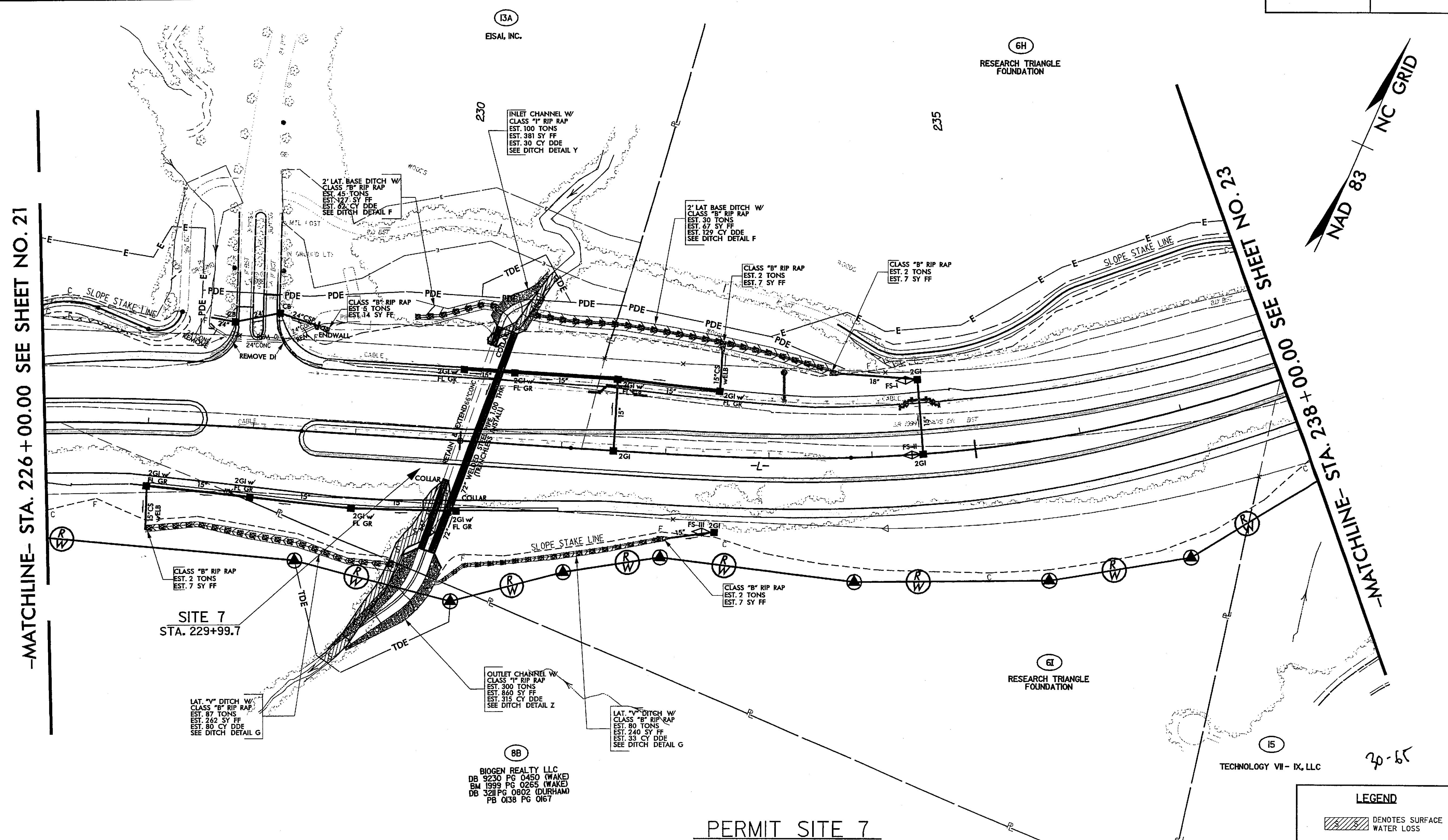
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
2/4/04 REVISED R/W & TDE PARCELS 6 & 8
3/8/04 REVISED R/W & CE TO PDE PARCEL 14
3/16/04 REVISED PARCEL NO 6 TO PARCEL NO. 6H & 6I
3/25/04 REVISED PARCEL NO 14 TO PARCEL NO. 13A & NAME CHANGE
3/29/04 REVISED PARCEL NO 8 TO PARCEL NO. 8B
7/2/04 NAME CHANGE PARCEL NO. 15
2/23/05 REVISED TRAIL

ENGLISH

25 0 50
SCALE: 1" = 100'

PROJECT REFERENCE NO.	SHEET NO.
U-4026	22
U-4026B R/W SHEET NO.	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PERMIT SITE 7

PLAN VIEW

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/23/2005
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Ko & Associates, P.C.

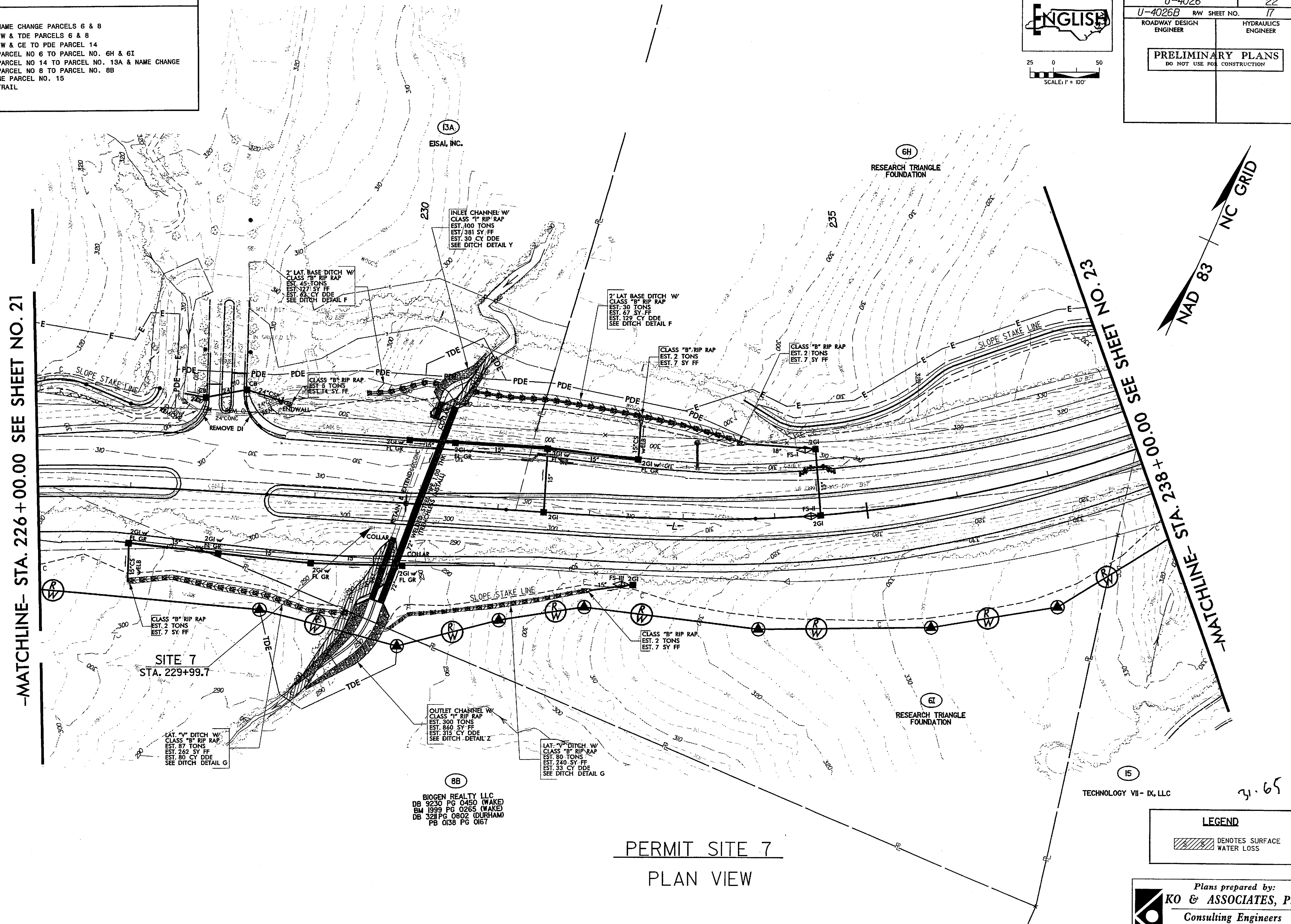
REVISIONS
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
2/4/04 REVISED R/W & TDE PARCELS 6 & 8
3/8/04 REVISED R/W & CE TO PDE PARCEL 14
3/16/04 REVISED PARCEL NO 6 TO PARCEL NO. 6H & 6I
3/25/04 REVISED PARCEL NO 14 TO PARCEL NO. 13A & NAME CHANGE
3/29/04 REVISED PARCEL NO 8 TO PARCEL NO. 8B
7/2/04 NAME CHANGE PARCEL NO. 15
2/23/05 REVISED TRAIL

PROJECT REFERENCE NO.	SHEET NO.
U-4026	22
U-4026B R/W SHEET NO.	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

SCALE: 1" = 100'



31.65

LEGEND

DENOTES SURFACE WATER LOSS

PERMIT SITE 7

PLAN VIEW

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/23/2005
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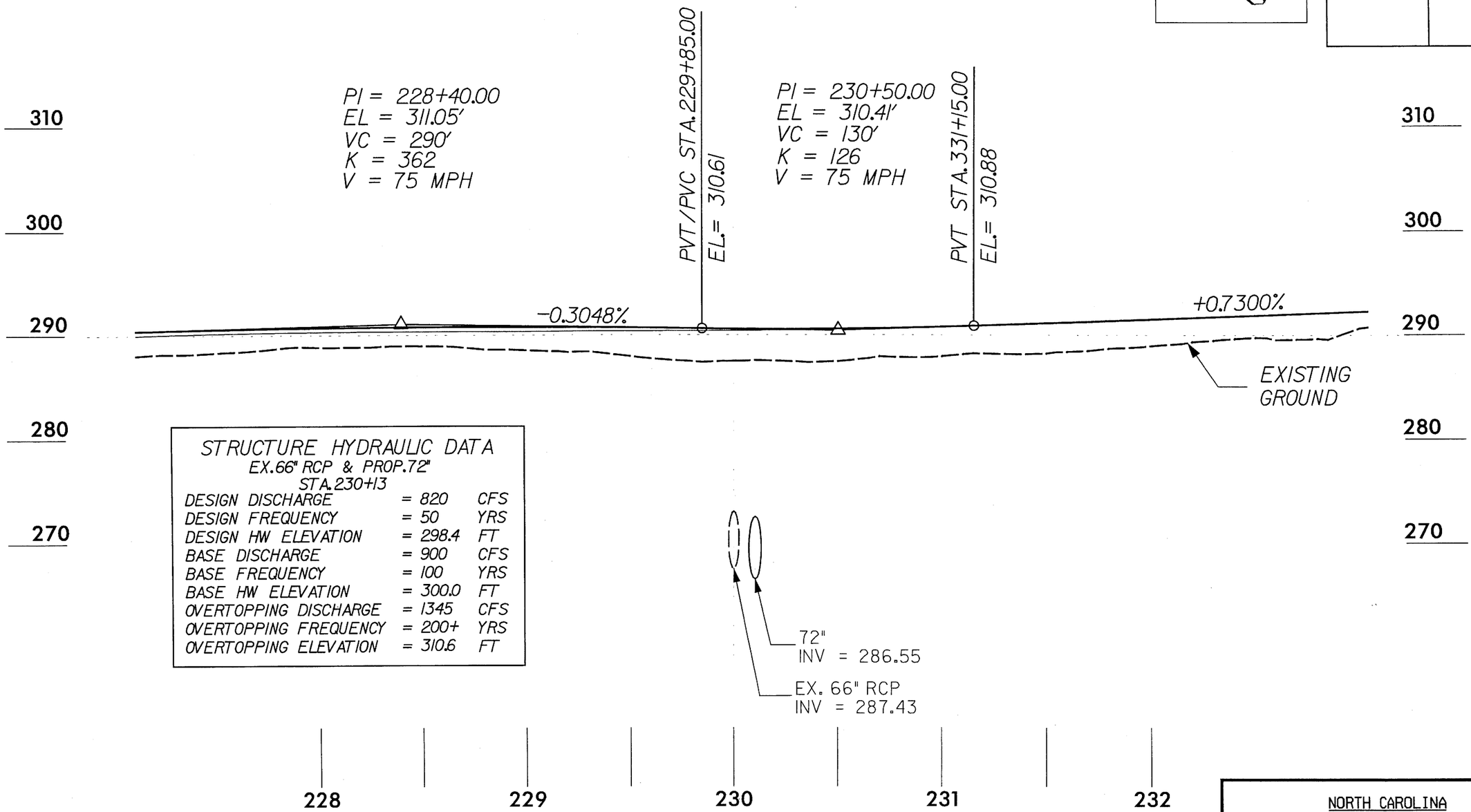
Ko & Associates, P.C.

7/2/99

PROJECT REFERENCE NO.	SHEET NO.
U-4026	22-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



STRUCTURE HYDRAULIC DATA
EX. 66" RCP & PROP. 72"
STA. 230+13

DESIGN DISCHARGE	= 820	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 298.4	FT
BASE DISCHARGE	= 900	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 300.0	FT
OVERTOPPING DISCHARGE	= 1345	CFS
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING ELEVATION	= 310.6	FT

PROFILE ALONG ROADWAY
SITE 7

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 07-06-04

SHEET 32 OF 65

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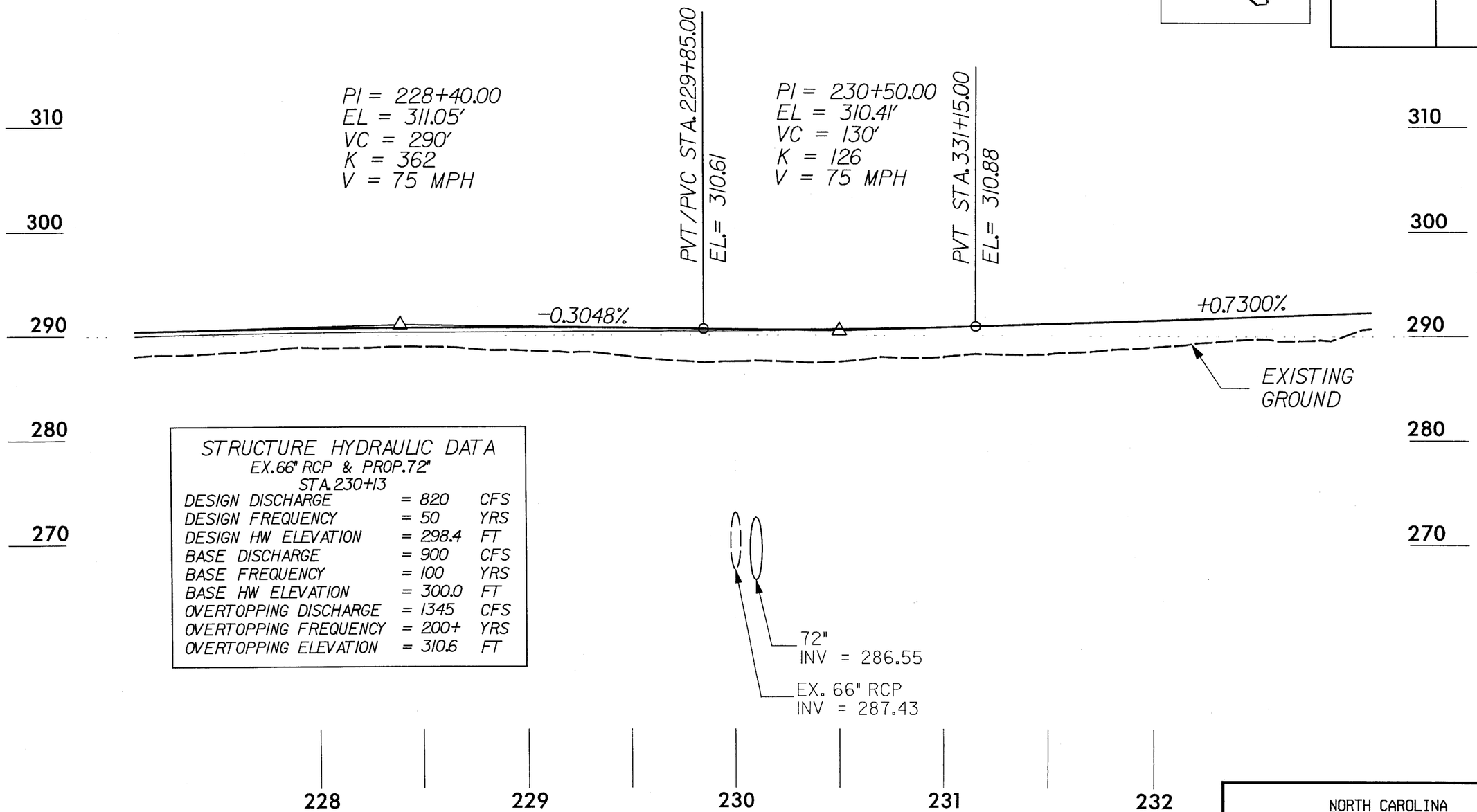
PROJECT REFERENCE NO.	SHEET NO.
U-4026	22-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



STRUCTURE HYDRAULIC DATA
EX.66" RCP & PROP.72"
STA.230+13

DESIGN DISCHARGE	= 820	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 298.4	FT
BASE DISCHARGE	= 900	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 300.0	FT
OVERTOPPING DISCHARGE	= 1345	CFS
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING ELEVATION	= 310.6	FT

PROFILE ALONG ROADWAY
SITE 7

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 33 OF 65

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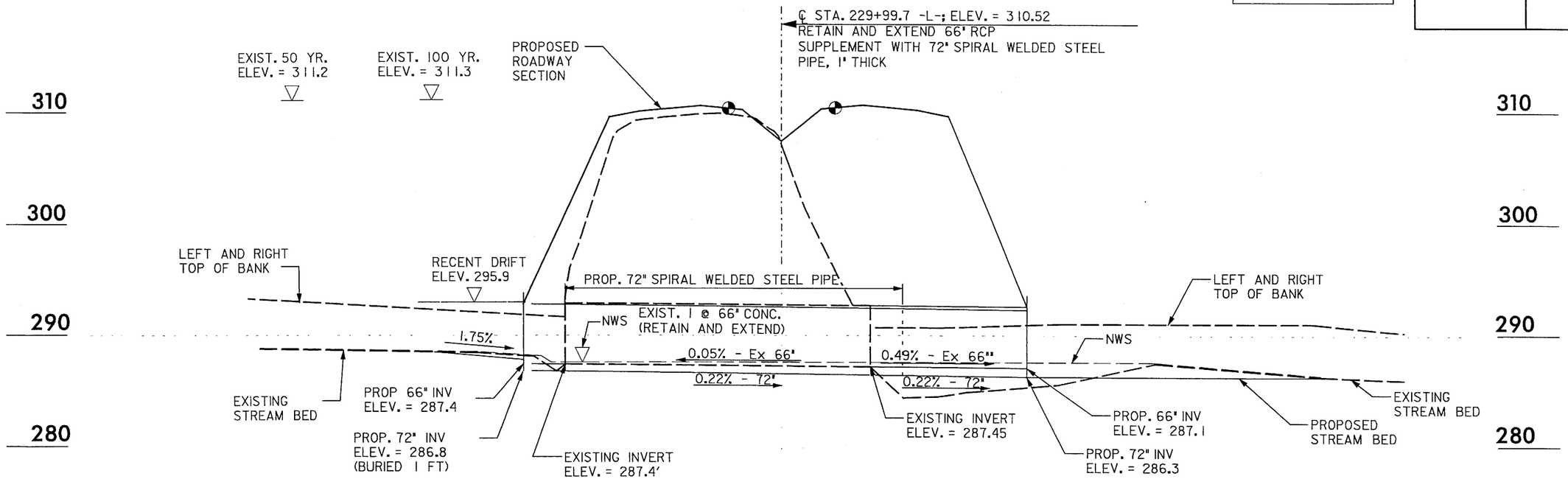
PROJECT REFERENCE NO.	SHEET NO.
U-4026	22-PAS
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG STRUCTURE
SITE 7

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 34 OF 65

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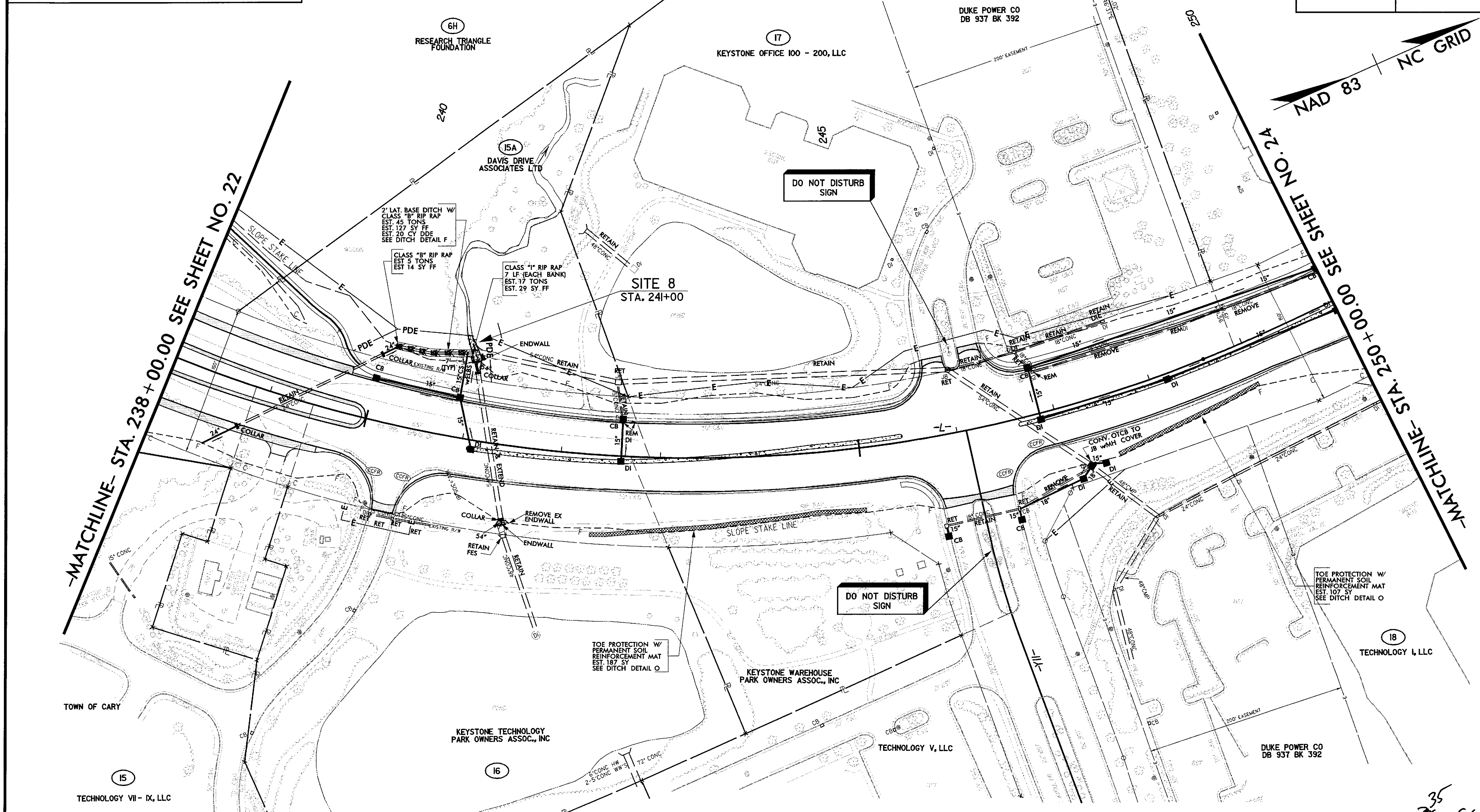
REVISIONS
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6H
3/25/04 REVISED PARCEL NO. 15 TO PARCEL NO. 15A & REVISED PARCEL NO. 15 TO PARCEL NO. 17A & NAME CHANGE
7/2/04 NAME CHANGE PARCELS 15, 17 & 17A

PROJECT REFERENCE NO.	SHEET NO.
U-4026	23
U-4026B RW SHEET NO.	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SCALE: 1" = 100'
6H
RESEARCH TRIANGLE FOUNDATION
15A
DAVIS DRIVE ASSOCIATES LTD
17
KEYSTONE OFFICE 100 - 200, LLC
17A
KEYSTONE OFFICE, 100 - 200 LLC
DUKE POWER CO DB 937 BK 392
NAD 83 NC GRID
-MATCHLINE- STA. 238+00.00 SEE SHEET NO. 22
-MATCHLINE- STA. 250+00.00 SEE SHEET NO. 24
DO NOT DISTURB SIGN
SITE 8
STA. 241+00
2' LAT. BASE DITCH W/ CLASS "B" RIP RAP EST. 45 TONS EST. 127 SY FF EST. 20 CY DDE SEE DITCH DETAIL F
CLASS "B" RIP RAP EST 5 TONS EST 14 SY FF
CLASS "I" RIP RAP 7 LF (EACH BANK) EST. 17 TONS EST. 29 SY FF
SLOPE STAKE LINE
PDE
ENDWALL
COLLAR
RETAIN
REMOVE
CONV. OTCB TO JB W/MH COVER
REMOVE EX ENDWALL
RETAIN FES
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 187 SY SEE DITCH DETAIL O
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 107 SY SEE DITCH DETAIL O
-L-
-Y1-
18
TECHNOLOGY I, LLC
TOWN OF CARY
KEYSTONE WAREHOUSE PARK OWNERS ASSOC., INC
KEYSTONE TECHNOLOGY PARK OWNERS ASSOC., INC
16
15
TECHNOLOGY VII - IX, LLC
TECHNOLOGY V, LLC
200' EASEMENT

PERMIT SITE 8

PLAN VIEW

35 of 65

LEGEND

TS DENOTES TEMPORARY SURFACE WATER LOSS

S DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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Ko & Associates, P.C.

REVISIONS
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6H
3/25/04 REVISED PARCEL NO. 15 TO PARCEL NO. 15A & REVISED PARCEL NO. 15 TO PARCEL NO. 17A & NAME CHANGE
7/2/04 NAME CHANGE PARCELS 15, 17 & 17A

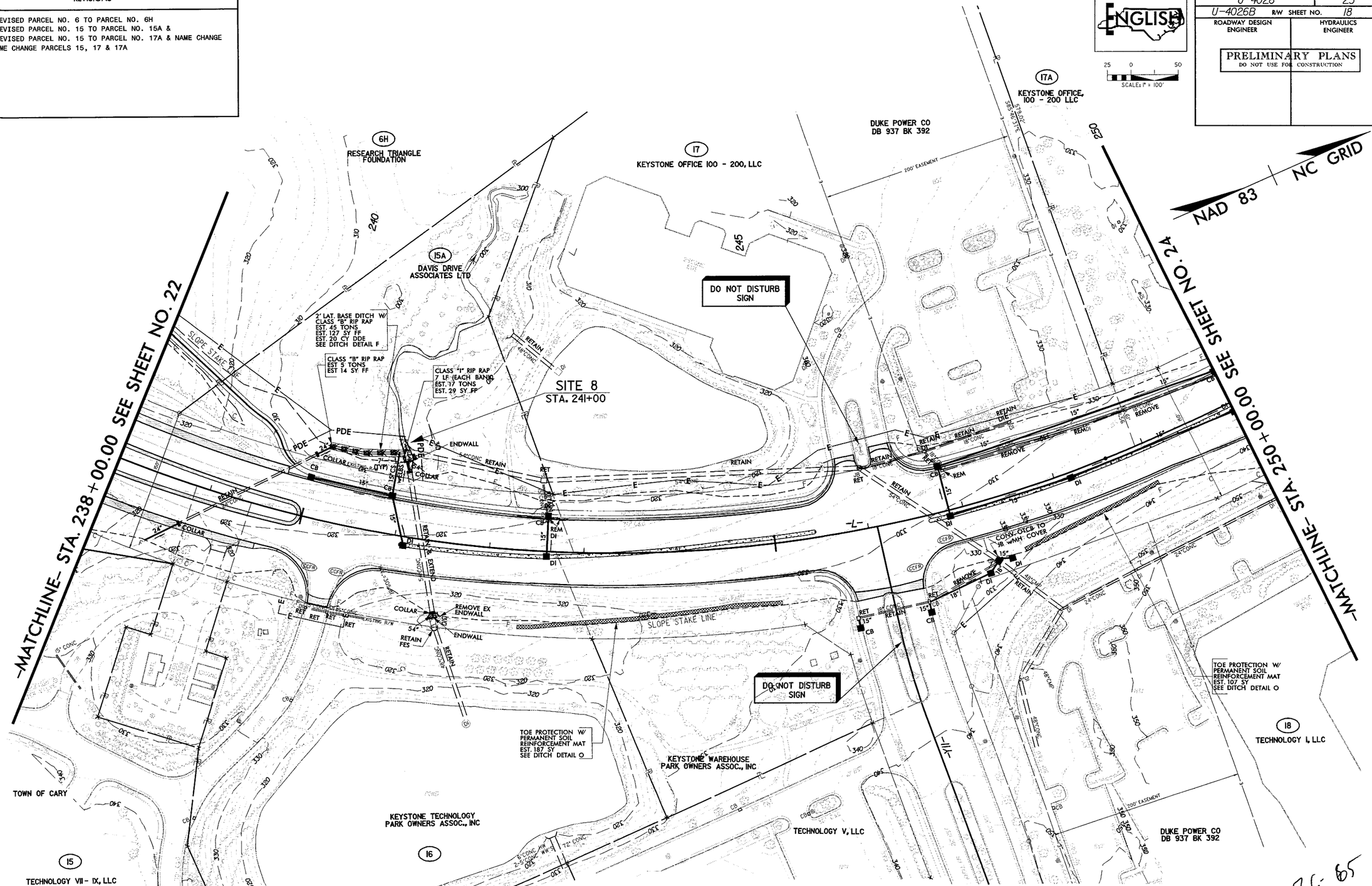
PROJECT REFERENCE NO.	SHEET NO.
U-4026	23
U-4026B R/W SHEET NO.	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 50
SCALE: 1" = 100'

NAD 83 NC GRID



PERMIT SITE 8
PLAN VIEW

36.65

LEGEND

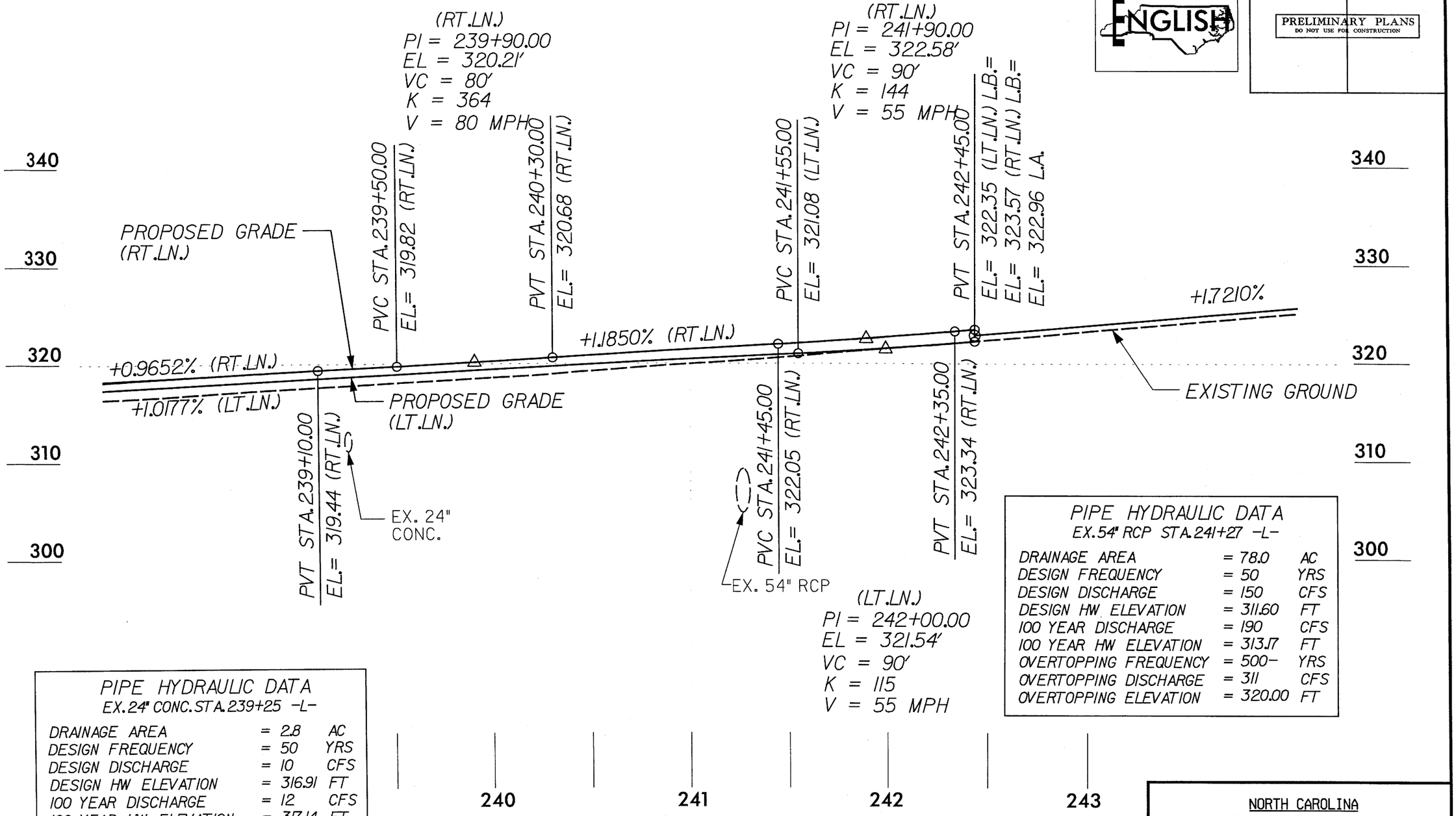
- DENOTES TEMPORARY SURFACE WATER LOSS
- DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

PROJECT REFERENCE NO.	SHEET NO.
U-4026	23-PFL
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



PIPE HYDRAULIC DATA
EX.24" CONC. STA.239+25 -L-

DRAINAGE AREA	= 2.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 10	CFS
DESIGN HW ELEVATION	= 316.91	FT
100 YEAR DISCHARGE	= 12	CFS
100 YEAR HW ELEVATION	= 317.14	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 21	CFS
OVERTOPPING ELEVATION	= 317.90	FT

PIPE HYDRAULIC DATA
EX.54" RCP STA.241+27 -L-

DRAINAGE AREA	= 78.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 150	CFS
DESIGN HW ELEVATION	= 311.60	FT
100 YEAR DISCHARGE	= 190	CFS
100 YEAR HW ELEVATION	= 313.17	FT
OVERTOPPING FREQUENCY	= 500-	YRS
OVERTOPPING DISCHARGE	= 311	CFS
OVERTOPPING ELEVATION	= 320.00	FT

PROFILE ALONG ROADWAY
SITE 8

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 37 OF 65

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7/2/99

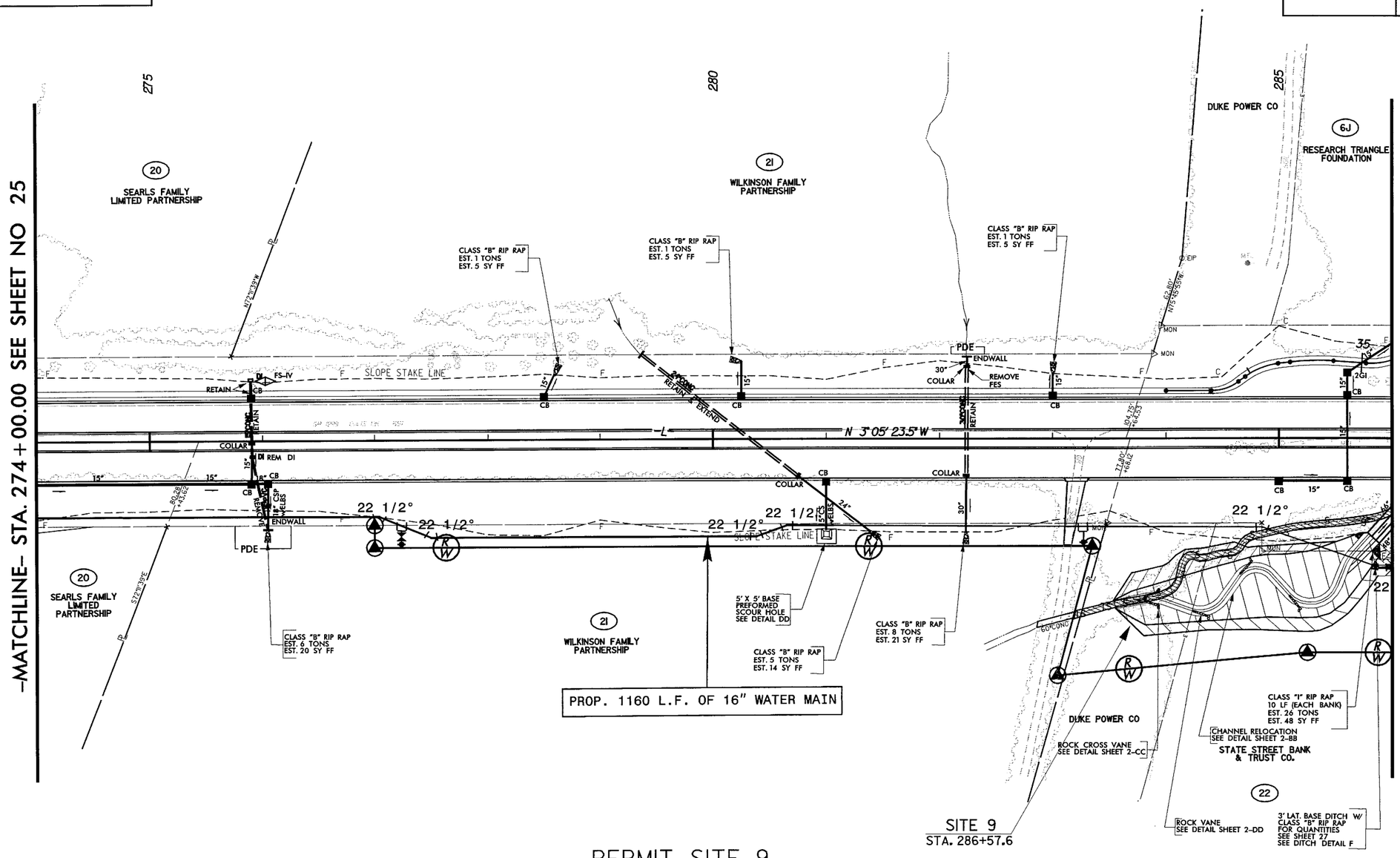
REVISIONS
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6J 4/19/04 NAME CHANGE PARCEL NO. 22

PROJECT REFERENCE NO.	SHEET NO.
U-4026	26
U-4026B RW SHEET NO.	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 | NC GRID

SCALE: 1" = 100'



PERMIT SITE 9

PLAN VIEW

38 of 65

LEGEND

15 15 DENOTES TEMPORARY SURFACE WATER LOSS

5 5 DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
J:\TIP\U4026_ko\hydro\Dgn\Permits\u4026_permit_26.dgn
KO & Associates, P.C.

REVISIONS
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6J
4/19/04 NAME CHANGE PARCEL NO. 22

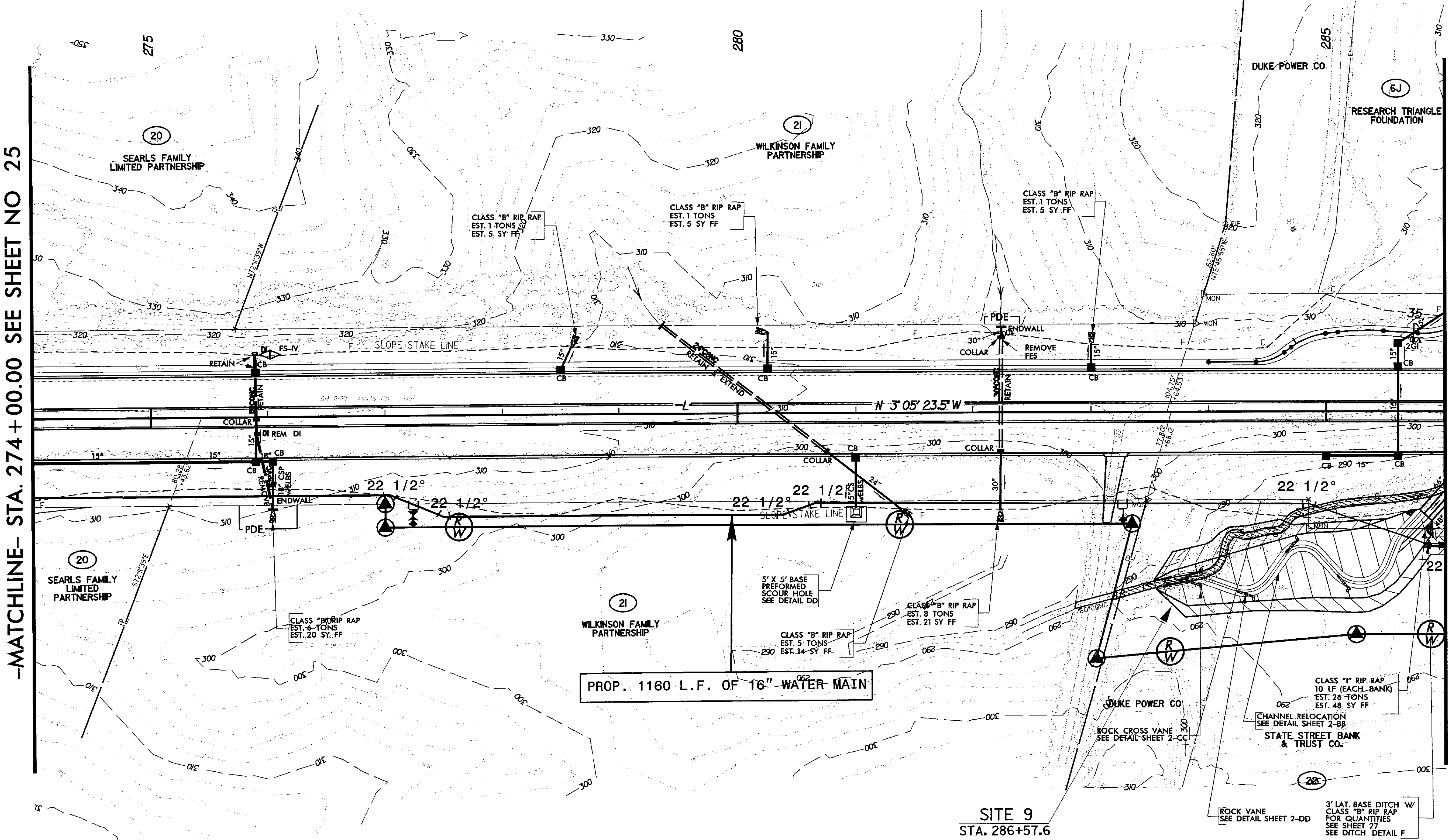
PROJECT REFERENCE NO.	SHEET NO.
U-4026	26
U-4026B RW SHEET NO.	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NAD 83 NC GRID

SCALE: 1" = 100'



PERMIT SITE 9

PLAN VIEW

39 of 65

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
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(919)-851-6066

3/22/2005
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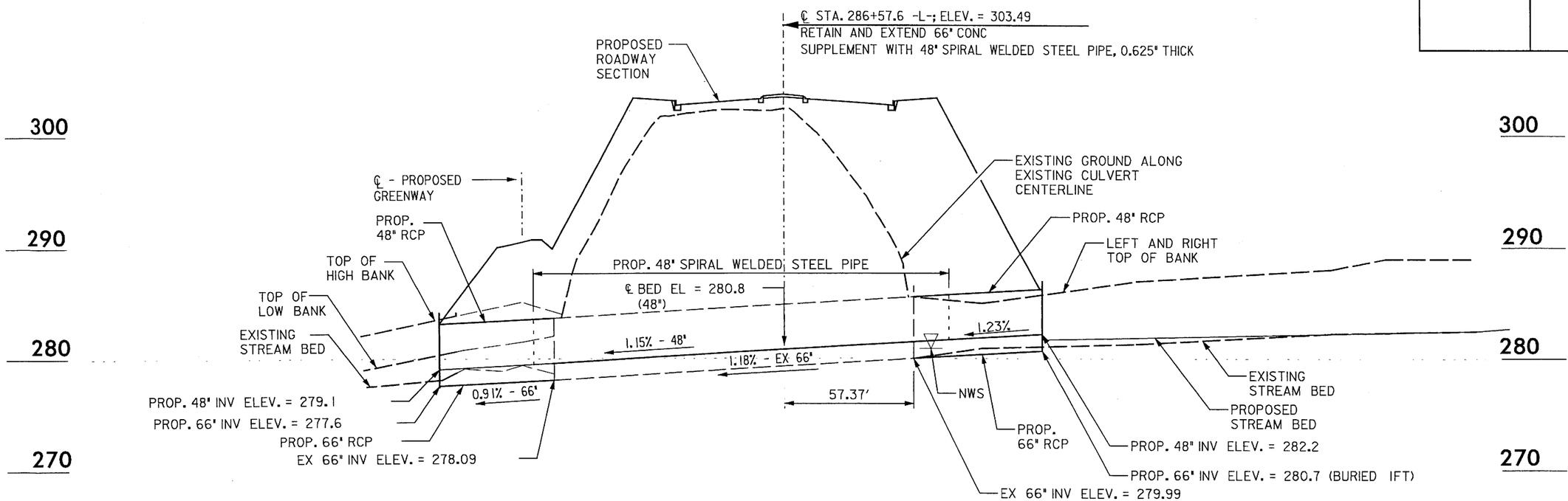
Ko & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	26&27-PAS(9)
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG STRUCTURE
SITE 9

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NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

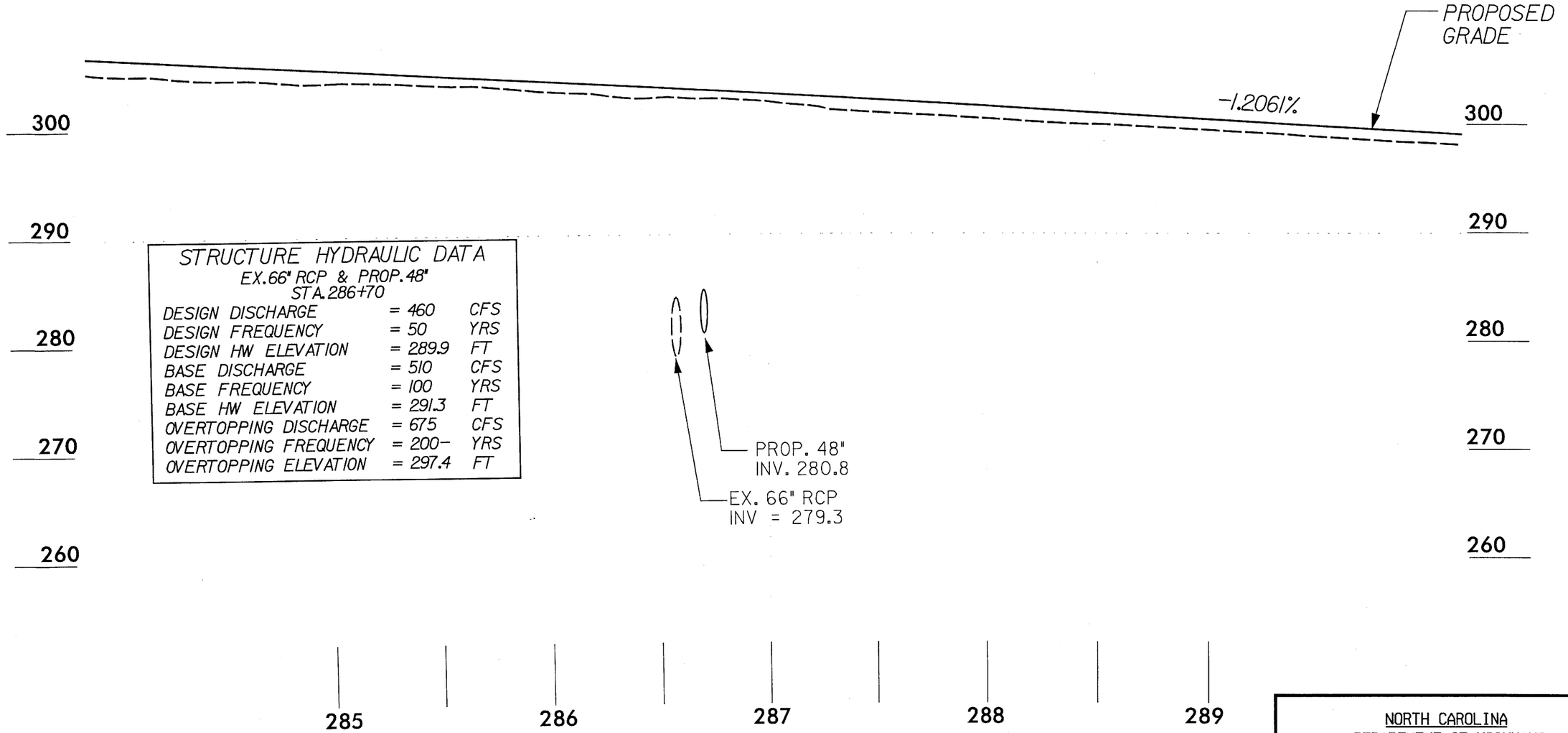
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

PROJECT REFERENCE NO.	SHEET NO.
U-4026	26&27-PFL19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH



STRUCTURE HYDRAULIC DATA

EX. 66" RCP & PROP. 48"
STA. 286+70

DESIGN DISCHARGE	= 460	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 289.9	FT
BASE DISCHARGE	= 510	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 291.3	FT
OVERTOPPING DISCHARGE	= 675	CFS
OVERTOPPING FREQUENCY	= 200-	YRS
OVERTOPPING ELEVATION	= 297.4	FT

PROFILE ALONG ROADWAY
SITE 9

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 41 OF 65

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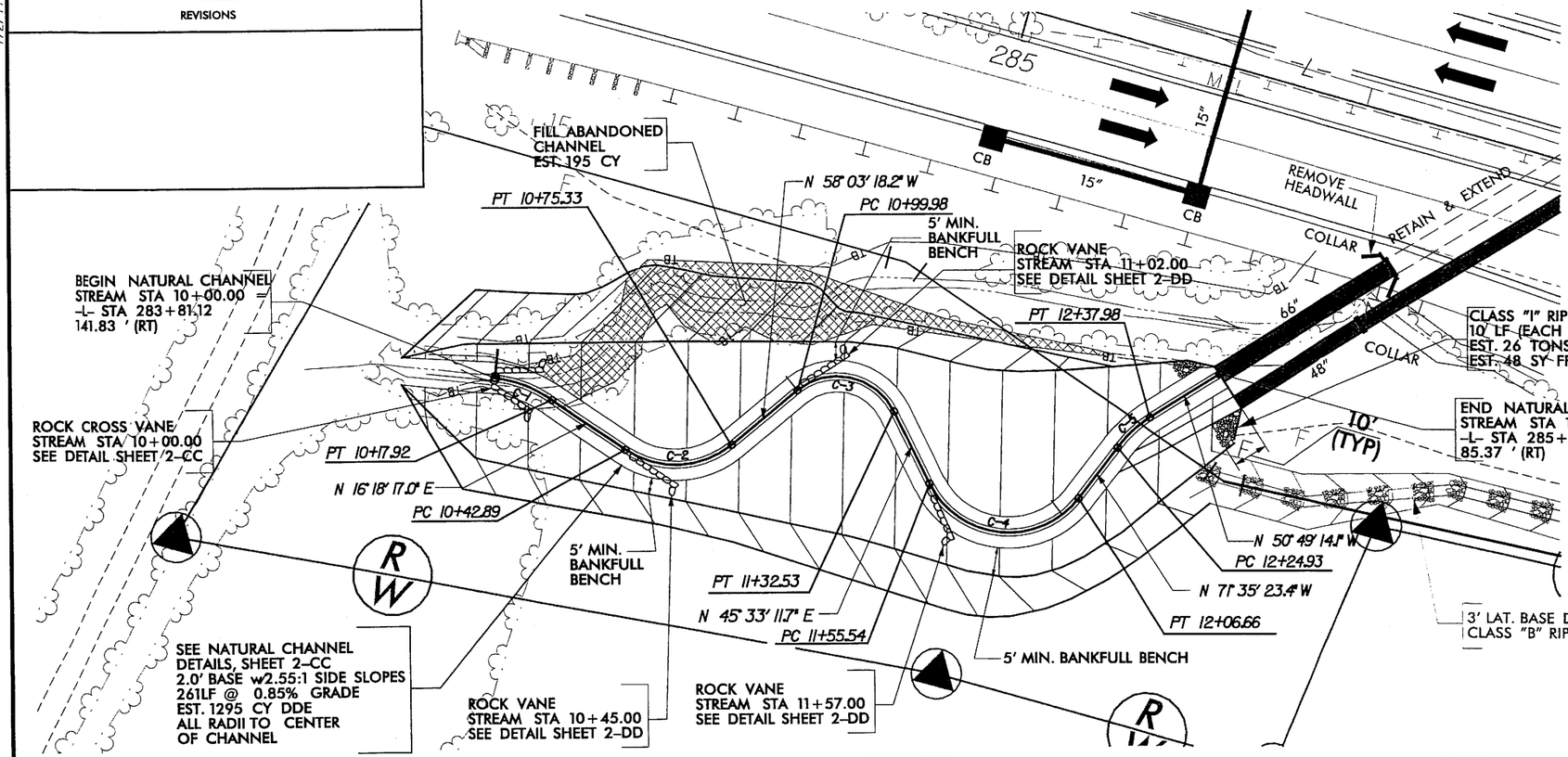
7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	2-BB
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 / NC GRID



C-1
PI Sta 10+09.15
Δ = 28° 31' 02.1" (RT)
D = 159° 09' 17.8"
L = 17.92'
T = 9.15'
R = 36.00'

C-2
PI Sta 10+61.85
Δ = 74° 21' 35.2" (LT)
D = 229° 10' 59.2"
L = 32.45'
T = 18.96'
R = 25.00'

C-3
PI Sta 11+22.86
Δ = 103° 36' 29.9" (RT)
D = 318° 18' 35.6"
L = 32.55'
T = 22.88'
R = 18.00'

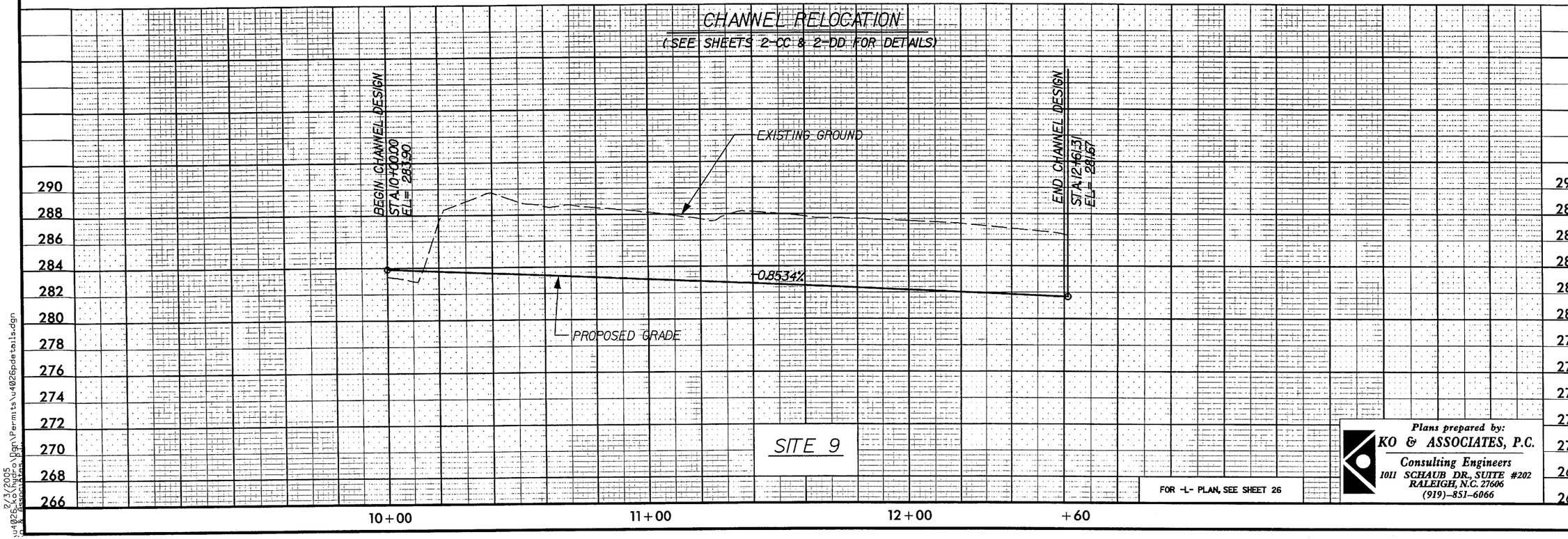
C-4
PI Sta 11+96.45
Δ = 117° 08' 35.1" (LT)
D = 229° 10' 59.2"
L = 51.11'
T = 40.91'
R = 25.00'

C-5
PI Sta 12+31.53
Δ = 20° 46' 09.3" (RT)
D = 159° 09' 17.8"
L = 13.05'
T = 6.60'
R = 36.00'

42-65

20 0 40
SCALE

CHANNEL RELOCATION
(SEE SHEETS 2-CC & 2-DD FOR DETAILS)



SITE 9

FOR -L- PLAN, SEE SHEET 26

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/3/2005
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K O & Associates, P.A.

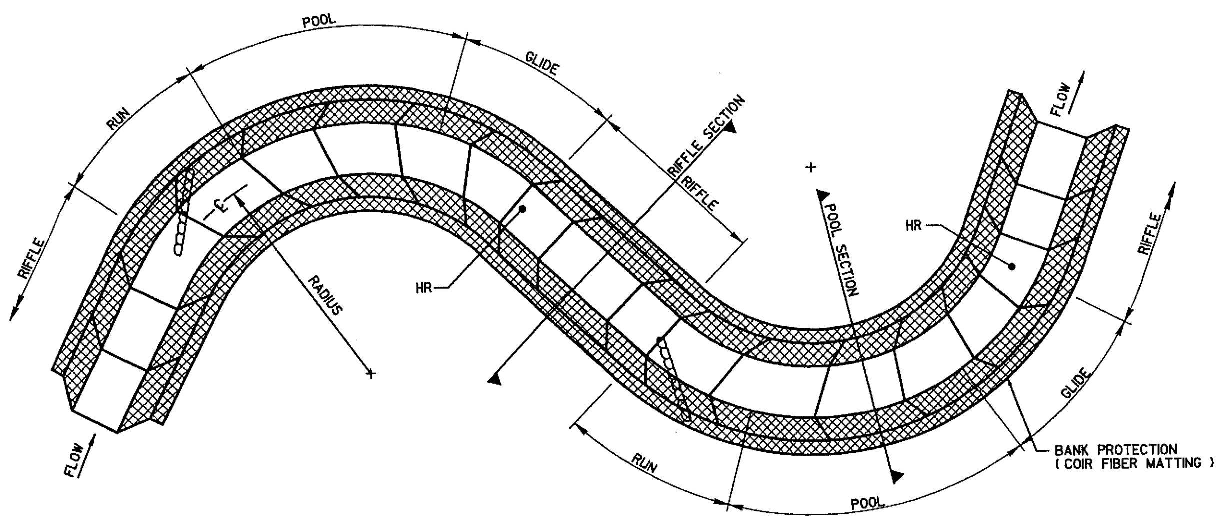
PROJECT REFERENCE NO. U-4026 | SHEET NO. 2-CC
R/W SHEET NO.
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

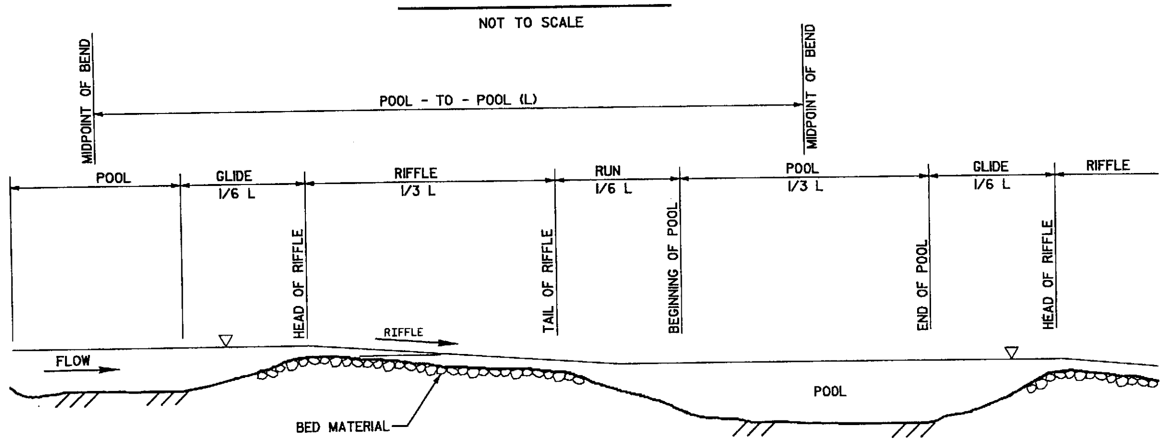
NATURAL CHANNEL DETAILS

NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT WHICH SHALL CONSIST OF STAKING OUT THE CENTER OF EACH RADIUS, SCRIBING THE CENTER LINE OF THE CHANNEL FOR EACH BEND USING THE INDICATED RADIUS, AND SCRIBING CENTERLINE OF THE TANGENT SECTIONS BY CONNECTING SUCCESSIVE BENDS WITH A STRAIGHT LINE.
2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO AVOID CERTAIN OBSTACLES. APPROVAL BY THE ENGINEER OF THE STAKE-OUT ALIGNMENT SHALL BE REQUIRED PRIOR TO INITIATION OF THE CONSTRUCTION OF THE CHANNEL.
3. LOCATE ROCK VANES ACCORDING TO PLAN SHEET.
4. BEGIN AND END STREAM ELEVATIONS SHOULD BE CHECKED PRIOR TO CONSTRUCTION TO ENSURE PROPOSED STREAM GRADE (AND ELEVATIONS) ARE ACCURATE. ELEVATIONS MAY VARY FROM PRIOR SURVEYS.



TYPICAL PLAN
NOT TO SCALE



NOTES:

1. THE POOL TO POOL SPACING (L) SHALL BE MEASURED AS THE DISTANCE FROM THE MIDPOINT OF THE UPSTREAM BEND TO THE MIDPOINT OF THE DOWNSTREAM BEND.
2. REFER TO MORPHOLOGICAL MEASUREMENT TABLE AND PLAN SHEET FOR DIMENSIONS. NOTE THAT POOL TO POOL SPACING VARIES.

TYPICAL PROFILE
NOT TO SCALE

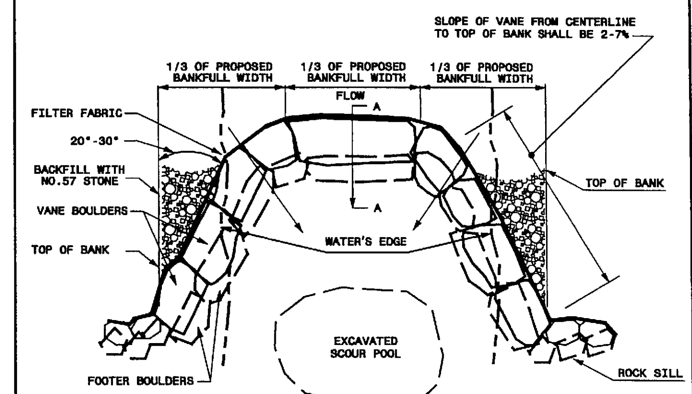
MORPHOLOGICAL MEASUREMENT TABLE

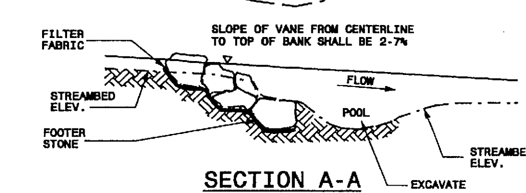
VARIABLES	EXISTING CHANNEL	PROPOSED REACH I	REFERENCE REACH
LOCATION	UT TO HOLLOW CREEK	UT TO HOLLOW CREEK	SOUTH UNNAMED TRIB TO MARKS CREEK
1) STREAM TYPE	G3/4	C4	C5
2) DRAINAGE AREA	140Ac	140Ac	65Ac
3) BANKFULL WIDTH	6.1ft	9.0ft	11.1ft
4) BANKFULL MEAN DEPTH	0.7ft	0.9ft	0.7ft
5) WIDTH/DEPTH RATIO	8	10	15.4
6) BANKFULL CROSS-SECTIONAL AREA	4.5sq.ft	8.1sq.ft	8.0sq.ft
7) BANKFULL MEAN VELOCITY	5.1fps	3.0fps	2.1fps
8) BANKFULL DISCHARGE, cfs	23cfs	23cfs	17cfs
9) BANKFULL MAX. DEPTH	1.2ft	1.6ft	1.8ft
10) WIDTH OF FLOODPRONE AREA	7ft	28ft	59ft
11) ENTRENCHMENT RATIO	1.1	3.1	5.3
12) MEANDER LENGTH	13 - 34ft	63 - 108ft	20 - 42ft
13) RATIO OF MEANDER LENGTH TO BANKFULL WIDTH	2.1- 5.6	7.0 - 12.0	1.8 - 3.8
14) RADIUS OF CURVATURE	5 - 17ft	18 - 36ft	6.6- 16ft
15) RATIO OF RADIUS OF CURVATURE TO BANKFULL WIDTH	0.8 - 2.8	2.0 - 4.0	0.6 - 1.0
16) BELT WIDTH	23ft	27 - 54ft	38ft
17) MEANDER WIDTH RATIO	3.8	3.0 - 6.0	3.4
18) SINUOSITY (STREAM LENGTH/VALLEY LENGTH	1.17	1.25	1.23
19) VALLEY SLOPE	0.0172 ft/ft	0.0105 ft/ft	0.018 ft/ft
20) AVERAGE SLOPE	0.0174 ft/ft	0.0084 ft/ft	0.0164 ft/ft
21) POOL SLOPE	0.0000 ft/ft	0.0000 ft/ft	0.0000 ft/ft- 0.0011 ft/ft
22) RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.0 - 0.1	0.00	0.00 - 0.07
23) MAXUMUM POOL DEPTH	1.5ft	2.3ft	2.78ft
24) RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	2.0	2.5	3.86
25) POOL WIDTH	8.7ft	13.5ft	11.47ft
26) RATIO OF POOL WIDTH TO BANKFULL WIDTH	1.4	1.5	1.03
27) POOL TO POOL SPACING	42 - 53ft	54ft	5 - 47ft
28) RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	6.9 - 8.7	6.0	0.4 - 4.3
29) RATIO OF LOWEST BANK HEIGHT TO BANKFULL HEIGHT(or max bankful depth)	1.1 - 5	1.0	-

ROCK CROSS VANE
SCALE:NTS

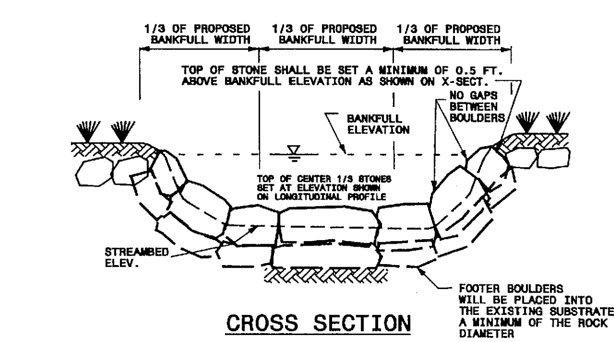
NOTES:
1. ALL STONES ARE TO BE STRUCTURE STONE.
2. GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER, PLUGGING WITH STRUCTURE STONE CLASS A AND NO.57 AND LINING WITH FILTER FABRIC.
3. DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE DESIGNER.
4. A DOUBLE FOOTER BOULDER SHALL BE UTILIZED IN SAND BED MATERIAL.
5. FOOTER BOULDERS AND VANE BOULDERS SHALL BE NATIVE STONE OR SHOT ROCK, CUBICAL OR RECTANGULAR IN NATURE.

FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF STRUCTURE.



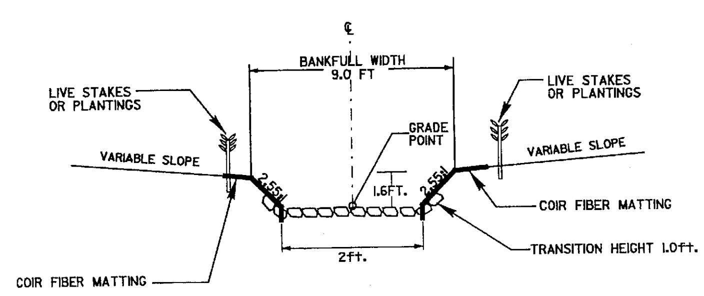


SECTION A-A

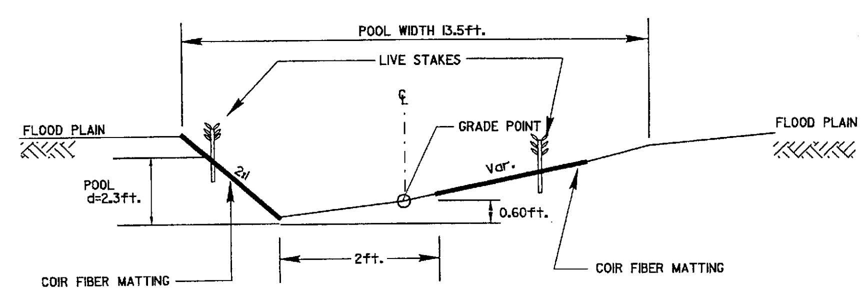


CROSS SECTION

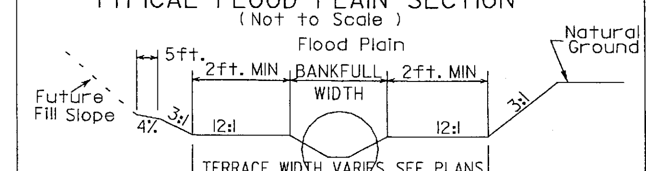
43-65
SITE 9



TYPICAL RIFFLE SECTION
NOT TO SCALE



TYPICAL POOL SECTION
NOT TO SCALE



TYPICAL FLOOD PLAIN SECTION
(Not to Scale)

SEE CHANNEL DETAILS, SHT. NO.

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/3/2005
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PROJECT REFERENCE NO.	SHEET NO.
U-4026	2-DD
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

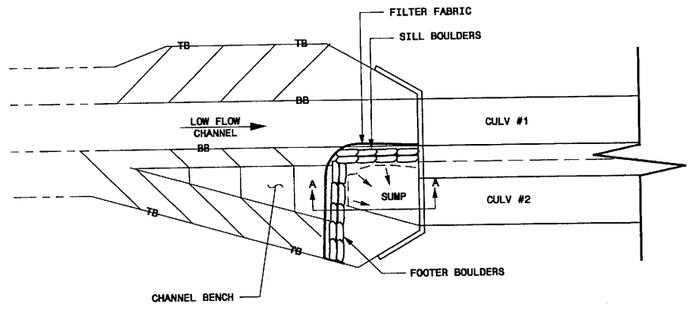
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ROCK INLET SILL

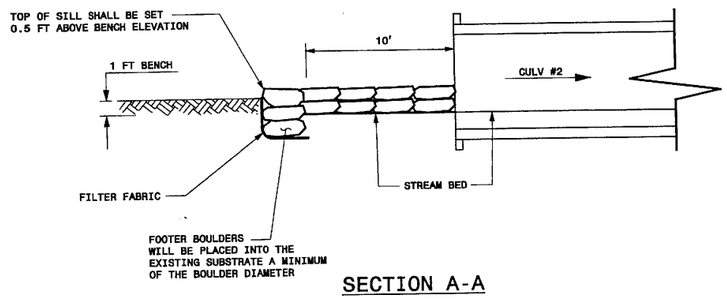
SCALE: NTS

NOTES:
1. ALL STONES ARE TO BE STRUCTURE STONE.
2. GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER, PLUGGING WITH STRUCTURE STONE CLASS A AND NO.57 AND LINING WITH FILTER FABRIC.
3. DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE ENGINEER.
4. A DOUBLE FOOTER BOULDER SHALL BE UTILIZED IN SAND BED MATERIAL.
5. FOOTER BOULDERS AND SILL BOULDERS SHALL BE NATIVE STONE OR SHOT ROCK, CUBICAL OR RECTANGULAR IN NATURE.
6. ACCEPTABLE BOULDERS SHALL HAVE THE FOLLOWING MINIMUM DIMENSIONS; 3' x 2 'x 1'.

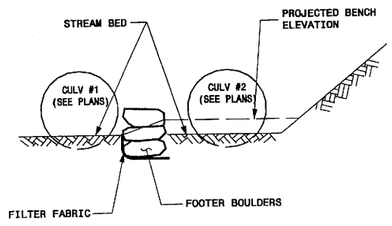
FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF STRUCTURE.



PLAN VIEW



SECTION A-A



CROSS-SECTION

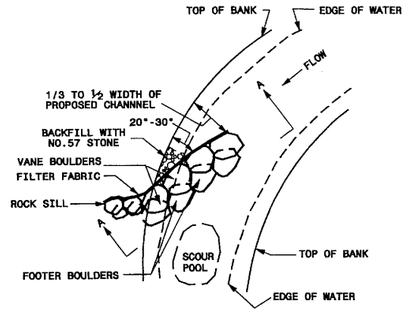
ROCK VANE

SCALE: NTS

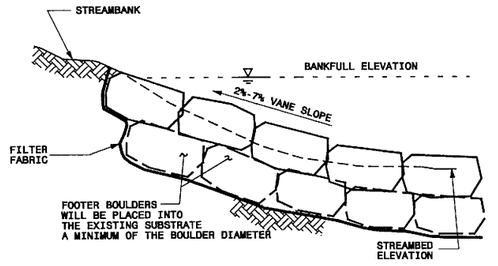
NOTES:
1. ALL STONES ARE TO BE STRUCTURE STONE.
2. GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER, PLUGGING WITH STRUCTURE STONE CLASS A AND NO.57 AND LINING WITH FILTER FABRIC.
3. DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE ENGINEER.
4. A DOUBLE FOOTER BOULDER SHALL BE UTILIZED IN SAND BED MATERIAL.
5. FOOTER BOULDERS AND VANE BOULDERS SHALL BE NATIVE STONE OR SHOT ROCK, CUBICAL OR RECTANGULAR IN NATURE.

FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF STRUCTURE.

SLOPE OF VANE FROM CENTERLINE TO TOP OF BANK SHALL BE 2-7%



PLAN VIEW



SECTION A-A

44-65

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)–851–6066

PROJECT REFERENCE NO.	SHEET NO.
U-4026	26-TXT(9)
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NATURAL CHANNEL DESIGN

UNNAMED TRIBUTARY TO HOLLOW CREEK

Right of Project Station 283+81 to Right of Station 285+80
Permit Site 9

The widening of Davis Drive from an existing two lane facility to a proposed divided four lane roadway, in Durham County, will require that a portion of an Unnamed Tributary to Hollow Creek be relocated. The relocation of the existing channel will occur from Right of Project Station 283+81 -L- to Right of Station 285+80 -L-, approximately 261 feet in length. The proposed channel relocation is designed according to "natural channel" design principles proposed by Dave Rosgen.

The Tributary's drainage area is mostly rural and wooded in nature. The stream was found to be perennial in nature, having flow through the riffles and pools.

There is no hydraulic gage data available on this stream or on nearby streams. Current discharges were estimated using the NCDOT procedures for rural watersheds.

EXISTING CHANNEL

A representative portion of the existing channel was surveyed in detail for the purpose of channel classification. The existing channel was measured to have an entrenchment ratio of 1.07, a width/depth ratio of 8.27, a sinuosity of 1.17 and an average slope of 0.0174 ft/ft. A pebble count was preformed and the channel was determined to be classified as G4 according to the Rosgen classification system. There was cobble identified within the reach surveyed, but it is not present along the entire length of the reach surveyed. It appears that the cobble is part of a narrow band of geology and is acting as armor layer in the pavement. It does not appear that the cobble is being moved by the bankfull event in the downstream direction.

REFERENCE REACH

The reference reach data utilized in the design of this channel is from a previously surveyed reference reach for a NCDOT stream mitigation project. The reference reach channel utilized had a stream classification type C5 according to the Rosgen classification system. The reference reach had an entrenchment ratio of 5.3, a width/depth ratio of 15.4, a sinuosity of 1.23 and an average slope of 0.018 ft/ft. A pebble count was preformed and the channel was found to have a classification of sand bottom.

PROPOSED CHANNEL

Based upon the existing valley type and the flood prone width desired, the proposed channel design has a C4 stream type classification. Design data is given in the attached table along with existing reach and reference reach data. A proposed cross-vane will control the channel gradient upstream, while a culvert crossing under Davis Drive will control the gradient downstream. Mean "bankfull" depth was set at 0.9 feet. Above bankfull depth it is proposed to excavate an approximately 35-55 foot wide flood plain (including the channel).

It is believed that by forming a flood plain above bankfull depth channel stability will be enhanced by reducing velocities for those discharges above the bankfull discharge. This should lead to a more stable channel. It is anticipated that the proposed channel will have a sand/gravel bottom. Maximum pool depths of 2.3 feet are proposed at outside bends of meanders.

The affected section has been classified as a G type stream; it is entrenched and has a low width to depth ratio. When converting a channel from a type G to C, the design approach is to reduce the stream power to minimize degradation. The proposed design has reduced the stream power from 25 to 12 (lbs/ft s) and the shear stress from 1.67 to 0.43 (lbs/sq ft). The largest size particle recorded from the pavement during the pebble count was 80mm. Using Rosgen's version of Shields Curve the shear stress to initiate movement of a 80mm particle can be as low as 0.30 (lbs/sq ft). The proposed shear stress of 0.43 (lbs/sq ft) will initiate movement of the largest size particle recorded from the pavement. The proposed type C stream will be a stable channel because the shear stress has been reduced, which will minimize erosion, the addition of a flood plain, which will provide a relief valve for higher than bankfull storm flows and grade control structures at the up and down stream limits of the proposed channel.

Proposed channel stabilization is shown on the attached detail sheet. It is anticipated that channel banks will be planted with native trees and shrubs above bankfull depth. Cross Vane Structures will be utilized to control the near bank shear stress in the meanders, along the proposed roadway.

SITE 9

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 45 OF 65

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7/2/99

REVISIONS
9/23/03 REVISED TDE & PDE ON PARCEL 23
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6J & 6K
4/19/04 NAME CHANGE PARCEL NO. 22
6/25/04 REVISED CE & PDE ON PARCEL NO. 6K

ENGLISH

PROJECT REFERENCE NO.	SHEET NO.
U-4026	27
U-4026B R/W SHEET NO.	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 | NC GRID

SITE 9 CON'T

-MATCHLINE- STA. 286+00.00 SEE SHEET NO. 26

-MATCHLINE- STA. 298+00.00 SEE SHEET NO. 28

290

295

6J RESEARCH TRIANGLE FOUNDATION

6K RESEARCH TRIANGLE FOUNDATION

23 BASF CORPORATION

22 STATE STREET BANK & TRUST CO.

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

TOE PROTECTION W/
CLASS "B" RIPRAP
EST. 49 TONS
EST. 146 SY FF
SEE DITCH DETAIL N

OUTLET CHANNEL W/
CLASS "I" RIP RAP
EST. 40 TONS
EST. 232 SY FF
EST. 65 CY DDE
SEE DITCH DETAIL AA

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

OUTLET CHANNEL W/
CLASS "I" RIP RAP
EST. 85 TONS
EST. 245 SY FF
EST. 140 CY DDE
SEE DITCH DETAIL CC

PROP. 8' X 6' RCBC EXTENTION
SEE STRUCTURE PLANS FOR DETAILS

LAT. 6' BASE DITCH W/
CLASS "B" RIP RAP
EST. 62 TONS
EST. 154 SY FF
EST 33 CY DDE
SEE DITCH DETAIL F

LAT. 2' BASE DITCH W/
CLASS "B" RIP RAP
EST. 670 TONS
EST. 607 SY FF
EST. 407 CY DDE
SEE DITCH DETAIL F

SLOPE STAKE LINE

REMOVE EXISTING BRIDGE

PROP. 8' X 6' RCBC EXTENTION
W/TAPERED INLET
SEE STRUCTURE PLANS FOR DETAILS

3' LAT. BASE DITCH W/
CLASS "B" RIP RAP
EST. 92 TONS
EST. 244 SY FF
EST. 85 CY DDE
SEE DITCH DETAIL F

LAT. "V" DITCH
EST. 92 CY DDE
SEE DITCH DETAIL H

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL LAT. "V" DITCH
SEE DITCH DETAIL D

CLASS "I" RIP RAP
10 LF (LT BANK)
EST. 13 TONS
EST. 24 SY FF

INLET CHANNEL W/
CLASS "I" RIP RAP
EST. 47 TONS
EST. 232 SY FF
EST. 350 CY DDE
SEE DITCH DETAIL BB

5' X 5' BASE
PREFORMED
SCOUR HOLE
SEE DETAIL DD

PROP. 1230 L.F. OF 16" WATER MAIN

SITE 10
STA. 293+82.1

SCALE: 1" = 100'

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS

PERMIT SITE 9
PLAN VIEW

PERMIT SITE 10
PLAN VIEW

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
K:\TP\u4026_Hydro\Dgn\Permits\u4026_permit_27.dgn
K & Associates, P.C.

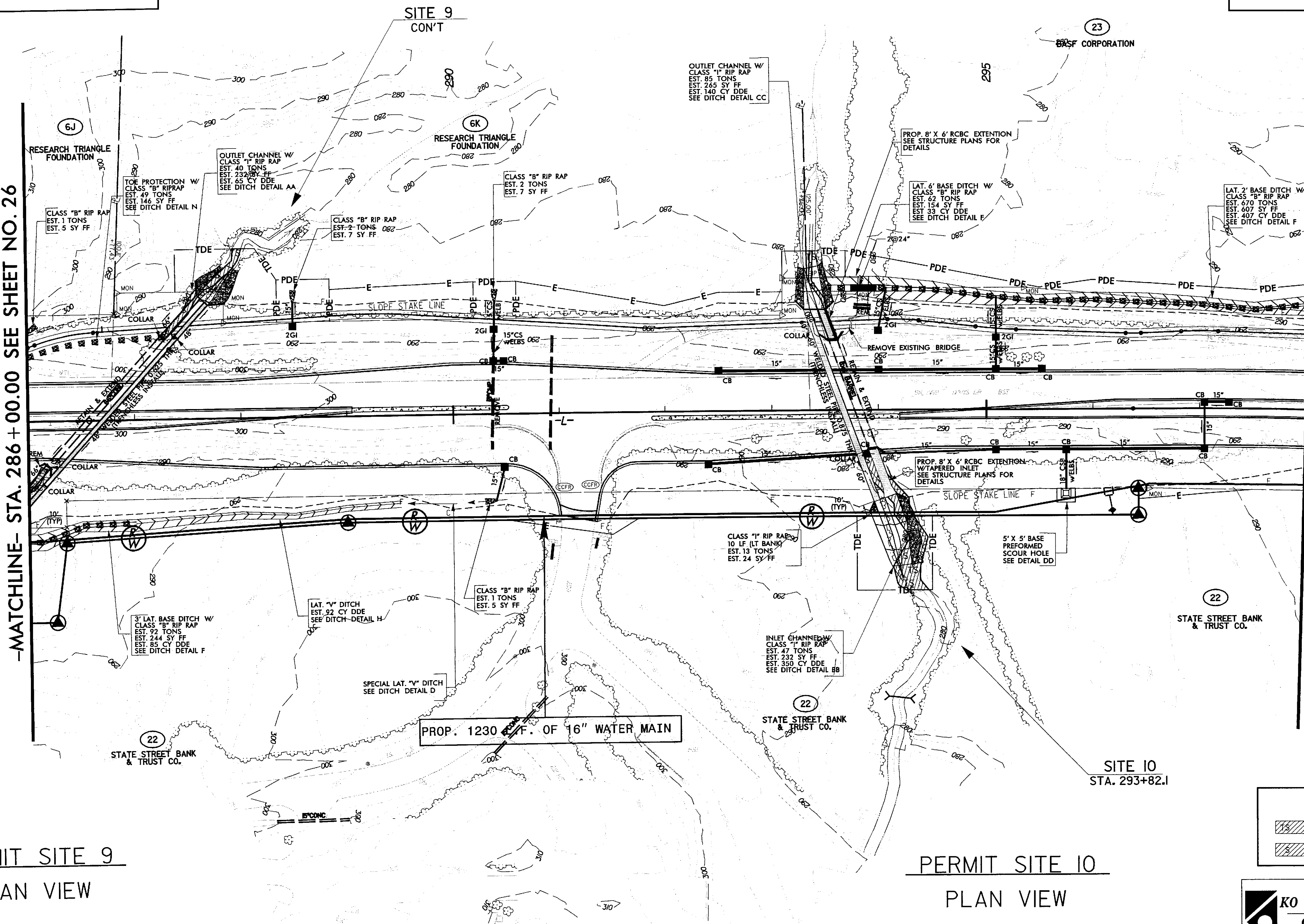
REVISIONS
9/23/03 REVISED TDE & PDE ON PARCEL 23
3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6J & 6K
4/19/04 NAME CHANGE PARCEL NO. 22
6/25/04 REVISED CE & PDE ON PARCEL NO. 6K

PROJECT REFERENCE NO.	SHEET NO.
U-4026	27
U-4026B R/W SHEET NO.	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID



SITE 9
CON'T
-MATCHLINE- STA. 286+00.00 SEE SHEET NO. 26
-MATCHLINE- STA. 298+00.00 SEE SHEET NO. 28
6J
RESEARCH TRIANGLE FOUNDATION
6K
RESEARCH TRIANGLE FOUNDATION
23
BASF CORPORATION
22
STATE STREET BANK & TRUST CO.
OUTLET CHANNEL W/ CLASS "I" RIP RAP EST. 40 TONS EST. 232 SY FF EST. 65 CY DDE SEE DITCH DETAIL AA
TOE PROTECTION W/ CLASS "B" RIPRAP EST. 49 TONS EST. 146 SY FF SEE DITCH DETAIL N
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF
OUTLET CHANNEL W/ CLASS "I" RIP RAP EST. 85 TONS EST. 265 SY FF EST. 140 CY DDE SEE DITCH DETAIL CC
PROP. 8' X 6' RCBC EXTENTION SEE STRUCTURE PLANS FOR DETAILS
LAT. 6' BASE DITCH W/ CLASS "B" RIP RAP EST. 62 TONS EST. 154 SY FF EST. 33 CY DDE SEE DITCH DETAIL F
LAT. 2' BASE DITCH W/ CLASS "B" RIP RAP EST. 670 TONS EST. 607 SY FF EST. 407 CY DDE SEE DITCH DETAIL F
REMOVE EXISTING BRIDGE
PROP. 8' X 6' RCBC EXTENTION W/TAPERED INLET SEE STRUCTURE PLANS FOR DETAILS
SLOPE STAKE LINE
CLASS "I" RIP RAP 10 LF (LT BANK) EST. 13 TONS EST. 24 SY FF
5' X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD
INLET CHANNEL W/ CLASS "I" RIP RAP EST. 47 TONS EST. 232 SY FF EST. 350 CY DDE SEE DITCH DETAIL BB
3' LAT. BASE DITCH W/ CLASS "B" RIP RAP EST. 92 TONS EST. 244 SY FF EST. 85 CY DDE SEE DITCH DETAIL F
LAT. "V" DITCH EST. 92 CY DDE SEE DITCH DETAIL H
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D
PROP. 1230 LF. OF 16" WATER MAIN
-L-
TDE
PDE
SITE 10
STA. 293+82.1

PERMIT SITE 9

PLAN VIEW

PERMIT SITE 10

PLAN VIEW

SCALE: 1" = 100'

LEGEND

DENOTES TEMPORARY SURFACE WATER LOSS

DENOTES SURFACE WATER LOSS

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

3/22/2005
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Ko & Associates, P.C.

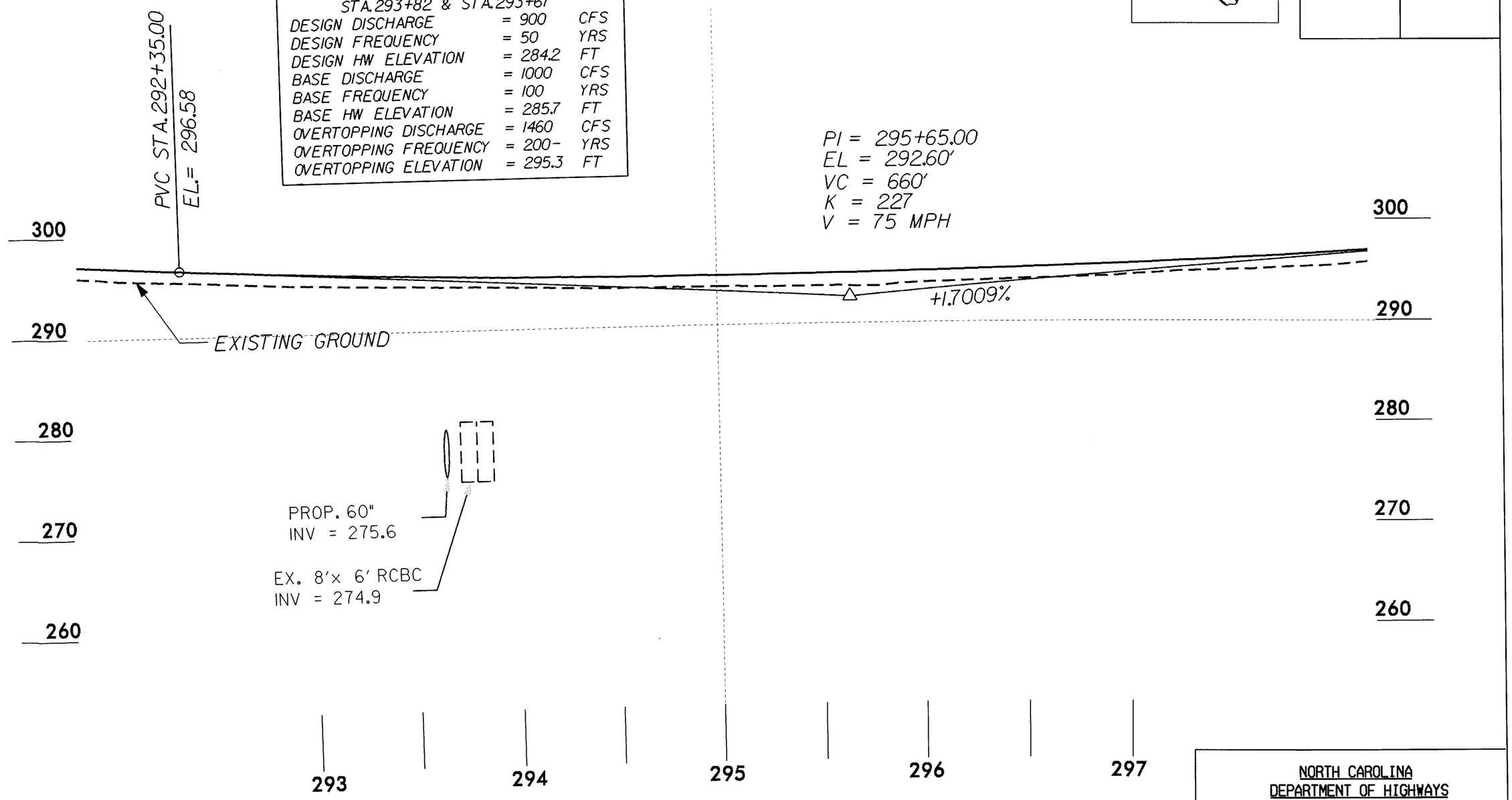
PROJECT REFERENCE NO.	SHEET NO.
U-4026	27-PFL(10)
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

STRUCTURE HYDRAULIC DATA
EX. 8'x6' RCBC W/ 60"
STA. 293+82 & STA. 293+67

DESIGN DISCHARGE	= 900	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 284.2	FT
BASE DISCHARGE	= 1000	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 285.7	FT
OVERTOPPING DISCHARGE	= 1460	CFS
OVERTOPPING FREQUENCY	= 200-	YRS
OVERTOPPING ELEVATION	= 295.3	FT



PROFILE ALONG ROADWAY
SITE 10

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

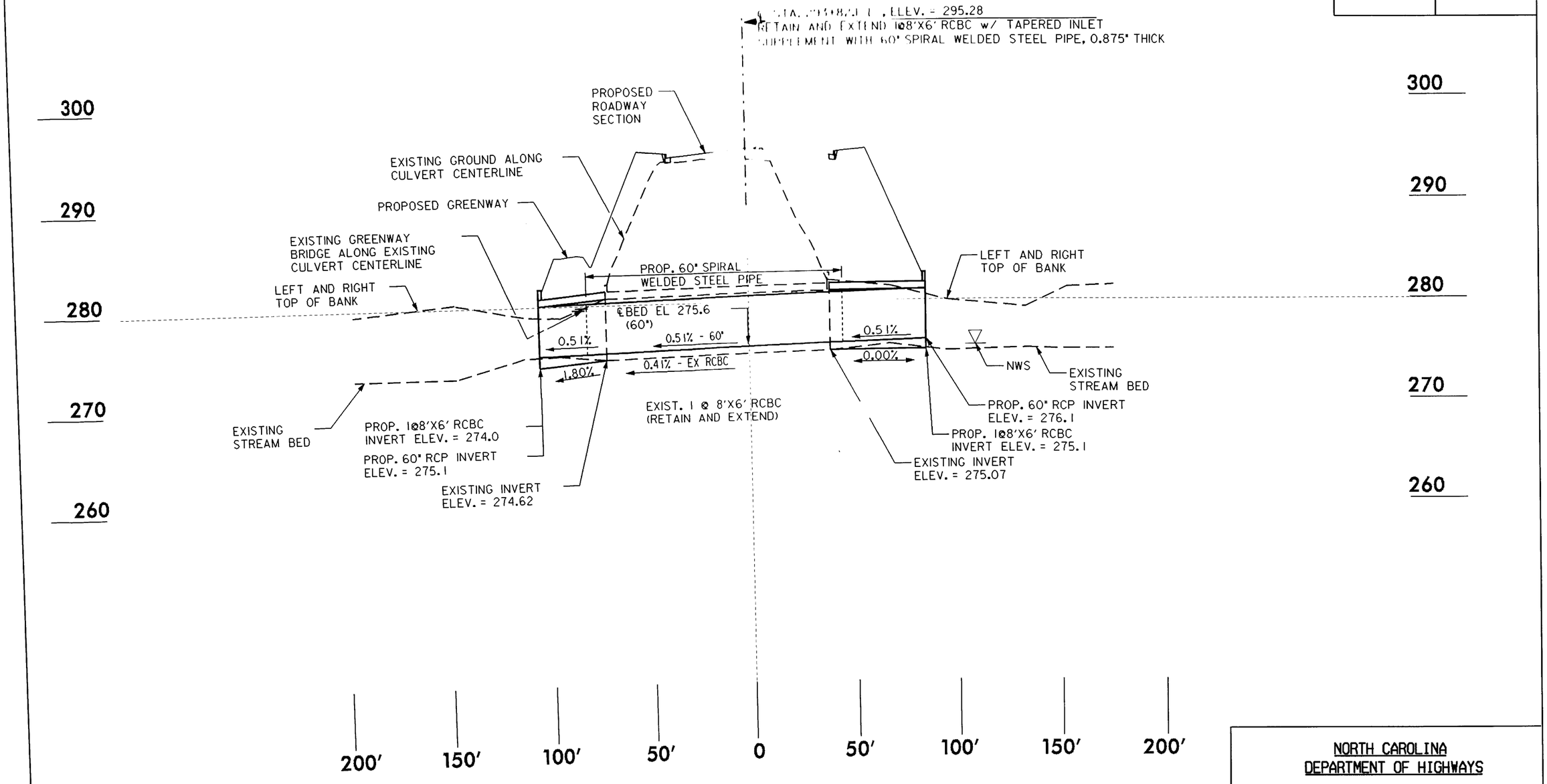
DATE: 02-04-05

SHEET 48 OF 67

$FILE$ $TIME$
$DATE$

PROJECT REFERENCE NO.	SHEET NO.
U-4026	27-PAS(10)
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROFILE ALONG STRUCTURE
SITE 10

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

DATE: 02-04-05

SHEET 49 OF 65

FILE$ $TIME$
DATE$

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	29
U-4026B R/W SHEET NO.	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NAD 83 / NC GRID

25 0 50
SCALE: 1" = 100'

-MATCHLINE- STA. 17+50.00 -Y13-
SEE SHEET NO. 36

-MATCHLINE- STA. 310+00.00 SEE SHEET NO. 28

-MATCHLINE- STA. 25+00.00 -Y13-
SEE SHEET NO. 36

TRIANGLE SERVICE CENTER, INC.
DB 317 PG 184
PB 83 PG 22
DB 3666 PG 165

ONE PARK DRIVE, LLC
GRAHAM ASSOCIATES
DB 2579 PG 382
PB MIPG 38

BASF CORPORATION
DB 159 PG 624
MB 165 PG 99

RESEARCH TRIANGLE FOUNDATION
DB 229 PG 376
MB 130 PG 109

STATE STREET BANK & TRUST CO.
DB 3162 PG 904
CB 5 PG 220

BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77
DB 374 PG 339
DB 374 PG 341
DB 374 PG 343

-L- PT 320+67.64

END TIP PROJECT U-4026
-L- POT STA. 321+07.83

-L- POT 321+53.91

-L- POT 311+23.33
-Y13- POC 20+56.13

-Y13- PT 21+03.20

-L- PC 319+39.92

-Y13- PC 20+15.50

-Y13-
PI Sta 20+59.35
Δ = 0°17' 32.4" (RT)
D = 0°20' 00.0"
L = 87.70'
T = 43.85'
R = 17,188.73'

-L-
PI Sta 320+03.79
Δ = 2°33' 15.9" (RT)
D = 2°00' 00.0"
L = 127.72'
T = 63.87'
R = 2,864.79'

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

DO NOT DISTURB SIGN

PROP. MULTI USE TRAIL

PROP. 5' SIDEWALK

PROP. 6' MONO. CONC. ISLAND

PROP. 2'-6" C&G

PROVIDE (4) 4" WIDE DRAINAGE SLOTS IN MONO. CONC. ISLAND AT 25' SPACING

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL DITCH GRADE TO TYPICAL DITCH (SEE PROFILES)

FLUSH SLOPES TO DRAIN LINE BACK

SPECIAL DITCH GRADE (SEE PROFILES)

PROP MULTIUSE TRAIL

SPECIAL LAT "V" DITCH W/CLASS "B" RIP RAP
EST. 242 TONS
EST. 173 SY FF
SEE DITCH DETAIL C

REMOVE PVD DITCH

5'X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD

SITE 18
STA. 25+00
-Y13-
25

PERMIT SITE 18

PLAN VIEW

2004 ADT	-Y13- NC 54
2024 ADT	20055 / 38955

1440 / 2640	5750 / 10750	
21775 / 40275	-L- DAVIS DRIVE	29535 / 57365
860 / 1660	4310 / 8110	
	18305 / 35335	

PROJECTED TRAFFIC VOLUMES

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-M
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 50
FOR -Y13- PROFILE, SEE SHEET 57
FOR TRAIL PLANS SEE 2-W & 2-X

50-65

LEGEND
WLB WETLAND
F/F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/23/2005
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KO & Associates, P.C.

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	29
U-4026B R/W SHEET NO.	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 50
SCALE: 1" = 100'

NAD 83 / NC GRID

-MATCHLINE- STA. 17+50.00 -Y13-
SEE SHEET NO. 36

-MATCHLINE- STA. 310+00.00 SEE SHEET NO. 28

-MATCHLINE- STA. 25+00.00 -Y13-
SEE SHEET NO. 36

TRIANGLE SERVICE CENTER, INC.
DB 317 PG 184
PB 83 PG 22
DB 3666 PG 165

ONE PARK DRIVE, LLC
GRAHAM ASSOCIATES
DB 2579 PG 382
PB 141PG 38

BASF CORPORATION
DB 159 PG 624
MB 105 PG 98

RESEARCH TRIANGLE FOUNDATION
DB 229 PG 376
MB 130 PG 109

STATE STREET BANK & TRUST CO.
DB 362 PG 904
CB 5 PG 220

BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77
DB 374 PG 339
DB 374 PG 341
DB 374 PG 343

-L- PT 320+67.64

END TIP PROJECT U-4026
-L- POT STA. 321+07.83

-L- POT 321+53.91

-L- POT 311+23.33
-Y13- POC 20+56.13

-Y13- PT 21+03.20

-L- PC 319+39.92

-Y13- PC 20+15.50

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PI Sta 20+59.35
Δ = 0° 17' 32.4" (RT)
D = 0° 20' 00.0"
L = 87.70'
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R = 17,188.73'

-L-
PI Sta 320+03.79
Δ = 2° 33' 15.9" (RT)
D = 2° 00' 00.0"
L = 127.72'
T = 63.87'
R = 2,864.79'

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

DO NOT DISTURB SIGN

PROP. MULTI-USE TRAIL

PROP. 5' SIDEWALK

PROP. 6' MONO. CONC. ISLAND

PROP. 2'-6" C&G

SPECIAL DITCH GRADE (SEE PROFILES)

FLUSH SLOPES TO DRAIN LINE BACK

PROVIDE (4) 4" WIDE DRAINAGE SLOTS IN MONO. CONC. ISLAND AT 25' SPACING

CLASS "B" RIP-RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL LAT "Y" DITCH W/CLASS "B" RIP RAP
EST. 242 TONS
EST. 173 SY FF
SEE DITCH DETAIL C

5'X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD

REMOVE PVD DITCH

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

SITE 18
STA. 25+00
-Y13-

PERMIT SITE 18

PLAN VIEW

25

-Y13-
NC 54

	2004 ADT	2024 ADT
	20055	38955
21775 -L-	1440 / 2640	5750 / 10750
40275 DAVIS DRIVE	860 / 1660	4310 / 8110
	18305	35335
		29535 / 57365

PROJECTED TRAFFIC VOLUMES

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-M
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 50
FOR -Y13- PROFILE, SEE SHEET 57
FOR TRAIL PLANS SEE 2-W & 2-X

57 - 65

LEGEND
WLB — WETLAND
F/F — DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING

Plans prepared by:
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2/23/2005
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KO & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	31
U-4026A R/W SHEET NO.	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

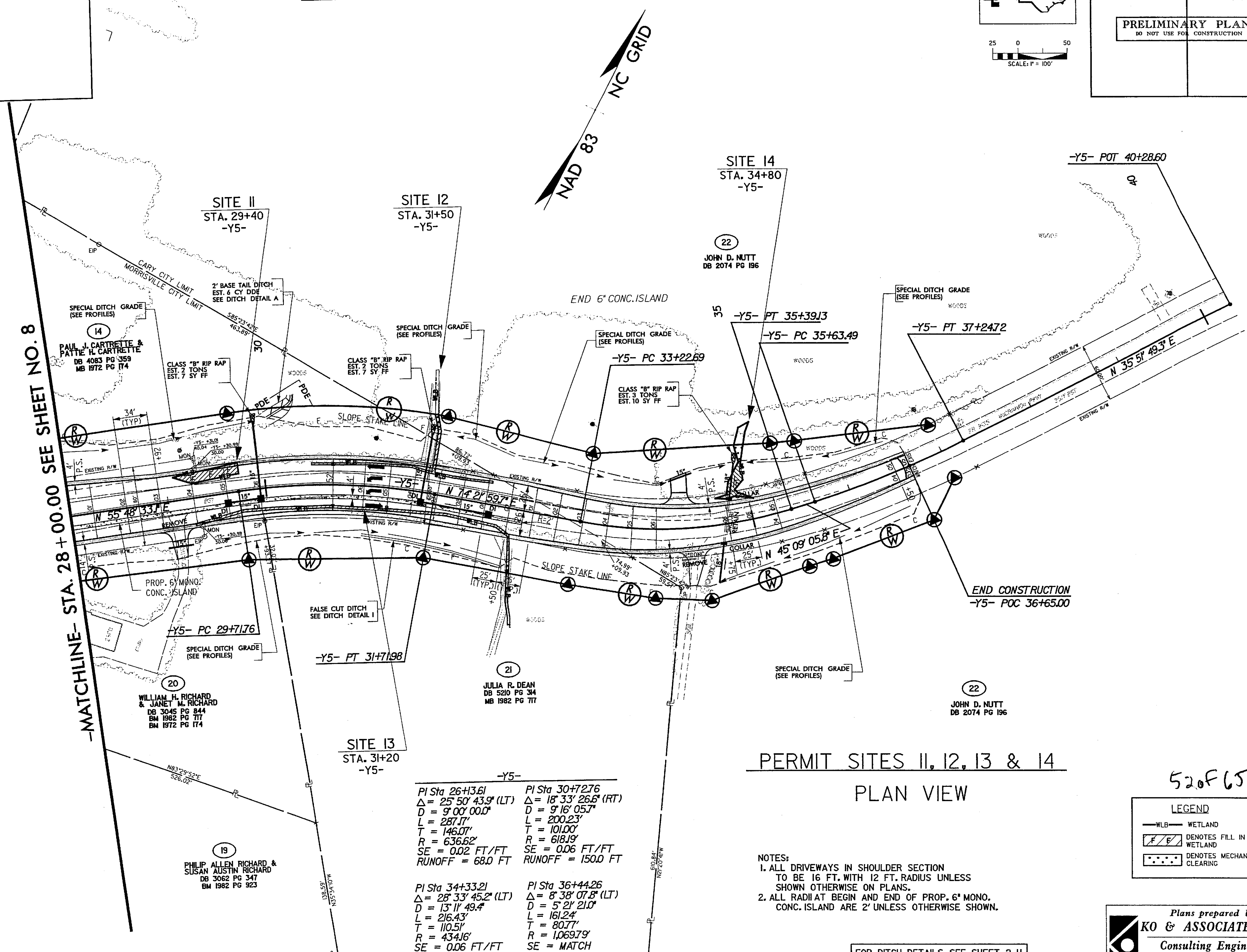
ENGLISH

SCALE: 1" = 100'

7/2/99

REVISIONS
10/26/04 REMOVED PDE ON PARCEL 21

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET



NAD 83 NC GRID
-MATCHLINE- STA. 28+00.00 SEE SHEET NO. 8
SITE 11
STA. 29+40
-Y5-
SITE 12
STA. 31+50
-Y5-
SITE 13
STA. 31+20
-Y5-
SITE 14
STA. 34+80
-Y5-
-Y5- POT 40+28.60
CARY CITY LIMIT
MORRISVILLE CITY LIMIT
2' BASE TAIL DITCH
EST. 6 CY DDE
SEE DITCH DETAIL A
SPECIAL DITCH GRADE
(SEE PROFILES)
14
PAUL J. CARTRETTE &
PATTIE H. CARTRETTE
DB 4083 PG 359
MB 1972 PG 174
CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF
CLASS "B" RIP RAP
EST. 3 TONS
EST. 10 SY FF
22
JOHN D. NUTT
DB 2074 PG 196
END 6" CONC. ISLAND
-Y5- PT 35+39.13
-Y5- PC 35+63.49
-Y5- PT 37+24.72
-Y5- PC 33+22.69
N 35°51' 49.3" E
N 74°21' 59.7" E
N 55°48' 33.1" E
N 45°09' 05.8" E
SLOPE STAKE LINE
END CONSTRUCTION
-Y5- POC 36+65.00
PROP. 6" MONO. CONC. ISLAND
-Y5- PC 29+71.76
FALSE CUT DITCH
SEE DITCH DETAIL I
-Y5- PT 31+71.98
20
WILLIAM H. RICHARD
& JANET M. RICHARD
DB 3045 PG 844
BM 1982 PG 717
BM 1972 PG 174
21
JULIA R. DEAN
DB 5210 PG 314
MB 1982 PG 717
19
PHILIP ALLEN RICHARD &
SUSAN AUSTIN RICHARD
DB 3062 PG 347
BM 1982 PG 923

-Y5-

PI Sta 26+13.61	PI Sta 30+72.76
Δ = 25° 50' 43.9" (LT)	Δ = 18° 33' 26.6" (RT)
D = 9° 00' 00.0"	D = 9° 16' 05.7"
L = 287.17'	L = 200.23'
T = 146.07'	T = 101.00'
R = 636.62'	R = 618.19'
SE = 0.02 FT/FT	SE = 0.06 FT/FT
RUNOFF = 68.0 FT	RUNOFF = 150.0 FT
PI Sta 34+33.21	PI Sta 36+44.26
Δ = 28° 33' 45.2" (LT)	Δ = 8° 38' 07.8" (LT)
D = 13° 11' 49.4"	D = 5° 21' 21.0"
L = 216.43'	L = 161.24'
T = 110.51'	T = 80.77'
R = 434.16'	R = 1,069.79'
SE = 0.06 FT/FT	SE = MATCH EXIST.
RUNOFF = 150.0 FT	

PERMIT SITES 11, 12, 13 & 14
PLAN VIEW

52 of 65

LEGEND
- WLB — WETLAND
- F/F DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEET 2-H
FOR -Y5- PROFILE, SEE SHEET 52

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

7/2/99

REVISIONS
10/26/04 REMOVED PDE ON PARCEL 21

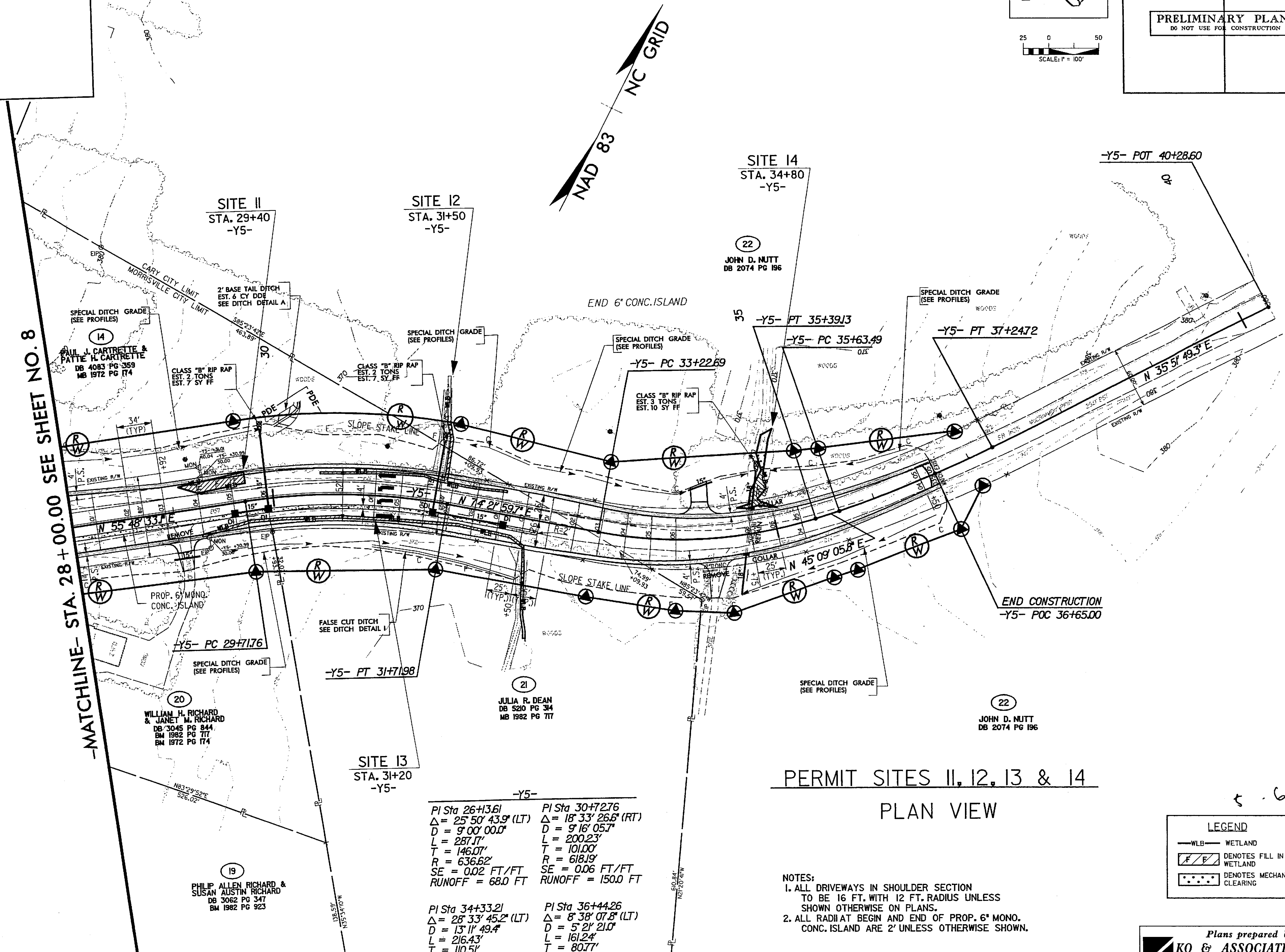
TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET

ENGLISH

25 0 50
SCALE: 1" = 100'

PROJECT REFERENCE NO.	SHEET NO.
U-4026	31
U-4026A R/W SHEET NO.	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PERMIT SITES 11, 12, 13 & 14

PLAN VIEW

5.65

-Y5-

PI Sta 26+13.61	PI Sta 30+72.76
Δ = 25° 50' 43.9" (LT)	Δ = 18° 33' 26.6" (RT)
D = 9° 00' 00.0"	D = 9° 16' 05.7"
L = 287.17'	L = 200.23'
T = 146.07'	T = 101.00'
R = 636.62'	R = 618.19'
SE = 0.02 FT/FT	SE = 0.06 FT/FT
RUNOFF = 68.0 FT	RUNOFF = 150.0 FT
PI Sta 34+33.21	PI Sta 36+44.26
Δ = 28° 33' 45.2" (LT)	Δ = 8° 38' 07.8" (LT)
D = 13° 11' 49.4"	D = 5° 21' 21.0"
L = 216.43'	L = 161.24'
T = 110.51'	T = 80.77'
R = 434.16'	R = 1,069.79'
SE = 0.06 FT/FT	SE = MATCH EXIST.
RUNOFF = 150.0 FT	

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND
- —WLB— WETLAND
- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING

FOR DITCH DETAILS, SEE SHEET 2-H
FOR -Y5- PROFILE, SEE SHEET 52

Plans prepared by:
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23/2005 ...\u4026_ko\hydro\Dgn\Permits\u4026_permit_31.dgn
Ko & Associates, P.C.

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PROJECT REFERENCE NO.	SHEET NO.
U-4026	34
U-4026B R/W SHEET NO.	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID

ENGLISH

25 0 50
SCALE: 1" = 100'

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
D.B. 980 PG. 395
PB. 94 PG. 48

SEARLS FAMILY LIMITED PARTNERSHIP
DB 2712 PG 997

RODNEY COE & MARIE S. COE
D.B. 1064 PG. 445

EISAI INC.
D.B. 2667 PG. 583

KEYSTONE OFFICE, 300, LLC
DB 3010 PG 804
MB 145 PG 55

BEGIN CONSTRUCTION
-Y12- PC 10+30.00

-Y12- PC 10+00.00

-Y12- PT 17+66.67

-Y12-
PI Sta 13+83.34
Δ = 0°05'26.4" (RT)
D = 0°00'42.6"
L = 766.67'
T = 383.34'
R = 484,515.26'
SE = 0.02 FT/FT

SITE 15
STA. 21+41
-Y12-

-MATCHLINE- STA. 22+00.00 SEE SHEET NO. 24

PERMIT SITE 15
PLAN VIEW

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -Y12- PROFILE, SEE SHEET 55

54.65

LEGEND
WLB WETLAND
F/F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
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RALEIGH, N.C. 27606
(919)-851-6066

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-4026	34
U-4026B RW SHEET NO.	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID

ENGLISH

25 0 50
SCALE: 1" = 100'

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
D.B. 980 PG. 395
PB. 94 PG. 48

SEARLS FAMILY LIMITED PARTNERSHIP
DB 2712 PG 997

RODNEY COE & MARIE S. COE
D.B. 1064 PG. 445

SEE SHEET NO. 24

SITE 15
STA. 21+41
-Y12-

-MATCHLINE- STA. 22+00.00

BEGIN CONSTRUCTION
-Y12- PC 10+30.00

-Y12- PC 10+00.00

-Y12- PT 17+66.67

EISAI INC.
D.B. 2667 PG. 583

KEYSTONE OFFICE, 300, LLC
DB 3010 PG 804
MB 145 PG 55

-Y12-
PI Sta 13+83.34
Δ = 0° 05' 26.4" (RT)
D = 0° 00' 42.6"
L = 766.57'
T = 383.34'
R = 484,515.26'
SE = 0.02 FT/FT

PERMIT SITE 15
PLAN VIEW

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -Y12- PROFILE, SEE SHEET 55

55-65

LEGEND
WLB WETLAND
F / F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING

Plans prepared by:
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PROJECT REFERENCE NO.	SHEET NO.
U-4025	24
U-4026B R/W SHEET NO.	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 50
SCALE: 1" = 100'

NAD 83 | NC GRID

-Y12-
SR 1978 (HOPSON RD)

2004 ADT	16465 / 31165
2024 ADT	

4300 / 8100 — 2780 / 5180

24155 -L- 21775 / 40275

45055 DAVIS DRIVE

2670 / 5270 — 1620 / 3220

13865 / 26565

PROJECTED TRAFFIC VOLUMES

-MATCHLINE- STA. 22+00.00
SEE SHEET NO. 34

-MATCHLINE- STA. 23+00.00 SEE SHEET NO. 23

-MATCHLINE- STA. 262+00.00 SEE SHEET NO. 25

-MATCHLINE- STA. 29+00.00
SEE SHEET NO. 35

SITE 16
STA. 23+25
-Y12-

17A KEYSTONE OFFICE, 100 - 200 LLC
DB 3149 PG 668
MB 145 PG 55

17B KEYSTONE OFFICE, 300, LLC
DB 3010 PG 804
MB 145 PG 55

18 TECHNOLOGY I, LLC
DB 2305 PG 577
BM 137 PG 204

19 TECHNOLOGY IV, LLC
DB 2411 PG 969
BM 139 PG 171

20 SEARLS FAMILY LIMITED PARTNERSHIP
DB 2712 PG 997

DO NOT DISTURB SIGN

DO NOT DISTURB LIGHT POLE

-L- ST 251+28.13

-L- POT 260+51.05 =
-Y12- POT 25+31.11

PROP. 6' MONO. CONC. ISLAND

PROP. 5' SIDEWALK

PROP. 2'-6" C&G

PROP. RETAINING WALL

SLOPE STAKE LINE

TIE TO EXIST C&G

TIE TO EXIST C&G & TIE TO EXIST SIDEWALK

TOE PROTECTION W/ CLASS "B" RIPRAP FOR QUANTITIES SEE SHEET 20 SEE DITCH DETAIL N

"V" TAIL DITCH EST 7 CY DDE SEE DITCH DETAIL R

CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF

TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 283 SY SEE DITCH DETAIL O

PERMIT SITE 16
PLAN VIEW

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-L
FOR RETAINING WALL DETAIL, SEE SHEET 2-EE
FOR -L- PROFILE, SEE SHEET 48
FOR -Y12- PROFILE, SEE SHEET 56

LEGEND
WLB — WETLAND
F F — DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING

56 OF 65

Plans prepared by:
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(919)-851-6066

2/23/2005
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KO & Associates, P.C.

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-4026	24
U-4026B RW SHEET NO.	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

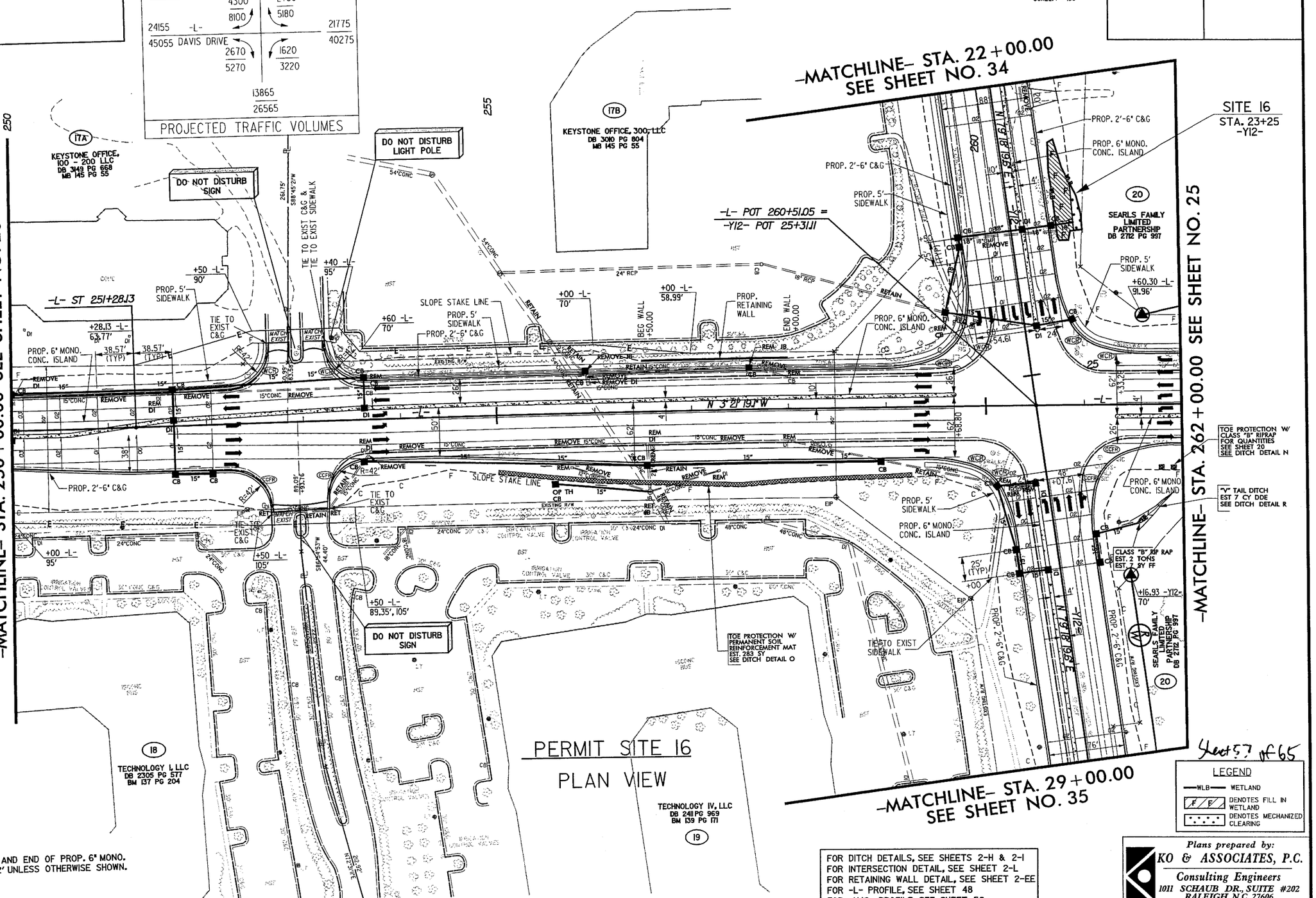
25 0 50
SCALE: 1" = 100'

-Y12-
SR 1978 (HOPSON RD)

2004 ADT / 2024 ADT	16465 / 31165		
24155 -L-	4300 / 8100	2780 / 5180	21775 / 40275
45055 DAVIS DRIVE	2670 / 5270	1620 / 3220	
	13865 / 26565		

PROJECTED TRAFFIC VOLUMES

NAD 83 | NC GRID



NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-L
FOR RETAINING WALL DETAIL, SEE SHEET 2-EE
FOR -L- PROFILE, SEE SHEET 48
FOR -Y12- PROFILE, SEE SHEET 56

Sheet 57 of 65

LEGEND
- WLB — WETLAND
- F / F — DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING

Plans prepared by:
KO & ASSOCIATES, P.C.
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REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-4026	36
U-4026B R/W SHEET NO.	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 50
SCALE: 1" = 100'

NAD 83 / NC GRID

BEGIN CONSTRUCTION
-Y13- POT 11+50.00

10

-Y13- POT 10+00.00

33
TRIANGLE SERVICE CENTER, INC.
DB 317 PG 184
PB 83 PG 22
DB 3666 PG 165

15

SPECIAL DITCH GRADE (SEE PROFILES)

TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT
EST 207 SY
SEE DITCH DETAIL O

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

PROP. 6' MONO. CONC. ISLAND

SLOPE STAKE LINE

EXISTING R/W

UNKNOWN SIZE& TYPE

RETAIN

-Y13-

S 59°53'32.8" E

SITE 17
STA. 21+00
-Y13-

PROP MULTI USE TRAIL

SPECIAL LAT "V" DITCH
SEE DITCH DETAIL D

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

24
BASF CORPORATION
DB 1159 PG 624
MB 105 PG 98

-MATCHLINE- STA. 17+50.00 -Y13-
SEE SHEET NO. 29

SITE 18
CON'T
STA. 25+00
-Y13-

34
BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77
DB 374 PG 339
DB 374 PG 341
DB 374 PG 343

SPECIAL LAT "V" DITCH
W/CLASS "B" RIP RAP
FOR QUANTITIES
SEE SHEET 24
SEE DITCH DETAIL C

PROP MULTI USE TRAIL

DO NOT DISTURB SIGN

ENDWALL

SLOPE STAKE LINE

COLLAR

R=40'

WCR

+00 -Y13-
75.55'

R=2'

-Y13-
S 59°36'00.4" E

END CONSTRUCTION
-Y13- POT 27+00.00 =
R-2904 -L- POT 16+40.63

PROP. 6' MONO. CONC. ISLAND

N26°34'07"W
462.57'

22
STATE STREET BANK & TRUST CO.
DB 3162 PG 904
CB 5 PG 220

-MATCHLINE- STA. 25+00.00 -Y13-
SEE SHEET NO. 29

PERMIT SITES 17 & 18
PLAN VIEW

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION, SEE SHEET 2-N
FOR TRAIL PLANS, SEE SHEETS 2-W & 2-X
FOR -Y13- PROFILE, SEE SHEET 57

LEGEND

—WLB—	WETLAND
F / F	DENOTES FILL IN WETLAND
F / P	DENOTES FILL IN POND
S / S	DENOTES SURFACE WATER LOSS
	DENOTES MECHANIZED CLEARING

58-60

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	36
U-4026B R/W SHEET NO.	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

25 0 50
SCALE: 1" = 100'

NAD 83 NC GRID

BEGIN CONSTRUCTION
-Y13- POT 11+50.00

-Y13- POT 10+00.00

(33) TRIANGLE SERVICE CENTER, INC.
DB 317 PG 184
PB 83 PG 22
DB 3666 PG 165

TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT
EST 207 SY
SEE DITCH DETAIL O

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

PROP. 6' MONO. CONC. ISLAND

SLOPE STAKE LINE

EXISTING R/W

S 59°53'32.8" E

-Y13-

PROP MULTI USE TRAIL

SPECIAL LAT "V" DITCH
SEE DITCH DETAIL D

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

(24) BASF CORPORATION
DB 1159 PG 624
MB 105 PG 98

SITE 17
STA. 21+00
-Y13-

(24) BASF CORPORATION
DB 1159 PG 624
MB 105 PG 98

-MATCHLINE- STA. 17+50.00 -Y13-
SEE SHEET NO. 29

SITE 18
CON'T
STA. 25+00
-Y13-

(34) BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77
DB 374 PG 339
DB 374 PG 341
DB 374 PG 343

SPECIAL LAT "V" DITCH
W/CLASS "B" RIP RAP
FOR QUANTITIES
SEE SHEET 24
SEE DITCH DETAIL C

PROP. MULTI USE TRAIL

DO NOT DISTURB SIGN

ENDWALL

SLOPE STAKE LINE

COLLAR

+00 -Y13-
75.55'

R=40'

R=2'

-Y13-

S 59°36'00.4" E

END CONSTRUCTION
-Y13- POT 27+00.00 =
R-2904 -L- POT 16+40.63

PROP. 6' MONO. CONC. ISLAND

N26°34'21"W
462.57'

(22) STATE STREET BANK & TRUST CO.
DB 3962 PG 904
CB 5 PG 220

-MATCHLINE- STA. 25+00.00 -Y13-
SEE SHEET NO. 29

PERMIT SITES 17 & 18
PLAN VIEW

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION, SEE SHEET 2-N
FOR TRAIL PLANS, SEE SHEETS 2-W & 2-X
FOR -Y13- PROFILE, SEE SHEET 57

LEGEND

WLB	WETLAND
F/F	DENOTES FILL IN WETLAND
F/P	DENOTES FILL IN POND
S/S	DENOTES SURFACE WATER LOSS
	DENOTES MECHANIZED CLEARING

55-65

Plans prepared by:
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RALEIGH, N.C. 27606
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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	25
U-4026B R/W SHEET NO.	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 | NC GRID

-L-
PI Sta 270+12.65
Δ = 2° 18' 20.7" (LT)
D = 0° 30' 00.0"
L = 461.15'
T = 230.61'
R = 11,459.16'
SE = 0.02 FT/FT

265 | 270

20
SEARLS FAMILY
LIMITED PARTNERSHIP

-MATCHLINE- STA. 262+00.00 SEE SHEET NO. 24

-L- STA. 263+10.00
BEGIN 200' TAPER
SB LANES

-L- STA. 265+10.00
END 200' TAPER
SB LANES

-L- STA. 265+60.00
BEGIN 200' TAPER
SB LANES

-L- STA. 267+60.00
END 200' TAPER
SB LANES

-L- PT 272+43.19

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

LAT. "V" DITCH
EST. 134 CY DDE
SEE DITCH DETAIL H

SPECIAL LAT "V" DITCH
SEE DITCH DETAIL D

LAT "V" DITCH
EST. 32 CY DDE
SEE DITCH DETAIL H

2' LAT. BASE DITCH W/
CLASS "B" RIP RAP
EST. 112 TONS
EST. 317 SY FF
EST. 113 CY DDE
SEE DITCH DETAIL F

±DRAWDOWN LIMITS

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL LAT "V" DITCH
SEE DITCH DETAIL D

N 3° 21' 19.1" W

SLOPE STAKE LINE

RETAIN 12" Plastic SLOPE STAKE LINE

N 3° 05' 23.5" W

SLOPE STAKE LINE

COLLAR

TOE PROTECTION W/
CLASS "B" RIPRAP
EST. 45 TONS
EST. 100 SY FF
SEE DITCH DETAIL N

-L- PC 262+67.80

-L- STA. 263+60.00
BEGIN 200' TAPER
NB LANES

-L- STA. 265+60.00
END 200' TAPER
NB LANES

-L- PRC 267+82.04

5' X 5' BASE
PREFORMED
SCOUR HOLE
SEE DETAIL DD

3' BASE TAIL DITCH W/
CLASS "1" RIP RAP
EST. 40 TONS
EST. 85 SY FF
EST. 23 CY DDE
SEE DITCH DETAIL B

20
SEARLS FAMILY
LIMITED PARTNERSHIP

-MATCHLINE- STA. 274+00.00 SEE SHEET NO. 26

-L-
PI Sta 265+24.97
Δ = 2° 34' 16.3" (RT)
D = 0° 30' 00.0"
L = 514.24'
T = 257.16'
R = 11,459.16'
SE = 0.02 FT/FT

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

PERMIT SITE 19
PLAN VIEW

ADDITIONAL IMPACT DUE TO DRAWDOWN
SITE 19 0.009 AC

LEGEND
- WLB — WETLAND
- F/B — DENOTES FILL IN WETLAND
- E/B — DENOTES EXCAVATION IN WETLAND
- DENOTES MECHANIZED CLEARING

LEGEND
- PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 48

60-65

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	25
U-4026B RW SHEET NO.	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 | NC GRID

-MATCHLINE- STA. 262+00.00 SEE SHEET NO. 24

-MATCHLINE- STA. 274+00.00 SEE SHEET NO. 26

-L-
PI Sta 270+12.65
Δ = 2° 18' 20.7" (LT)
D = 0° 30' 00.0"
L = 461.15'
T = 230.61'
R = 11,459.16'
SE = 0.02 FT/FT

-L- PT 272+43.19

-L- STA 263+10.00
BEGIN 200' TAPER
SB LANES

-L- STA 265+10.00
END 200' TAPER
SB LANES

-L- STA 265+60.00
BEGIN 200' TAPER
SB LANES

-L- STA 267+60.00
END 200' TAPER
SB LANES

-L- PC 262+67.80

-L- STA 263+60.00
BEGIN 200' TAPER
NB LANES

-L- STA 265+60.00
END 200' TAPER
NB LANES

-L- PRC 267+82.04

-L-
PI Sta 265+24.97
Δ = 2° 34' 16.3" (RT)
D = 0° 30' 00.0"
L = 514.24'
T = 257.16'
R = 11,459.16'
SE = 0.02 FT/FT

20 SEARLS FAMILY LIMITED PARTNERSHIP

20 SEARLS FAMILY LIMITED PARTNERSHIP

LAT. "V" DITCH
EST. 134 CY DDE
SEE DITCH DETAIL H

CLASS "B" RIP-RAP
EST. 1 TONS
EST. 5 SY FF

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL LAT "V" DITCH
SEE DITCH DETAIL D

LAT "V" DITCH
EST. 32 CY DDE
SEE DITCH DETAIL H

2' LAT. BASE DITCH W/
CLASS "B" RIP RAP
EST. 112 TONS
EST. 317 SY FF
EST. 113 CY DDE
SEE DITCH DETAIL F

DRAWDOWN LIMITS

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL LAT "V" DITCH
SEE DITCH DETAIL D

RETAIN 2' Plastic SLOPE STAKE LINE

N 3° 21' 19.1" W

N 3° 05' 23.5" W

SLOPE STAKE LINE

SLOPE STAKE LINE

TOE PROTECTION W/
CLASS "B" RIPRAP
EST. 45 TONS
EST. 100 SY RF
SEE DITCH DETAIL N

5' X 5' BASE
PREFORMED
SCOUR HOLE
SEE DETAIL DD

3' BASE TAIL DITCH W/
CLASS "I" RIP RAP
EST. 40 TONS
EST. 85 SY FF
EST. 23 CY DDE
SEE DITCH DETAIL B

SR 1999 DAVIS DR 45T

COLLAR

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

PERMIT SITE 19
PLAN VIEW

ADDITIONAL IMPACT DUE TO DRAWDOWN
SITE 19 0.009 AC

LEGEND
- WLB WETLAND
- F/F DENOTES FILL IN WETLAND
- E/E DENOTES EXCAVATION IN WETLAND
- DENOTES MECHANIZED CLEARING

LEGEND
- PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 48

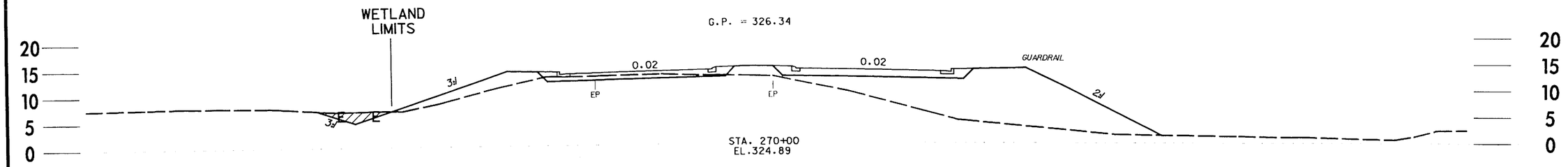
61-65

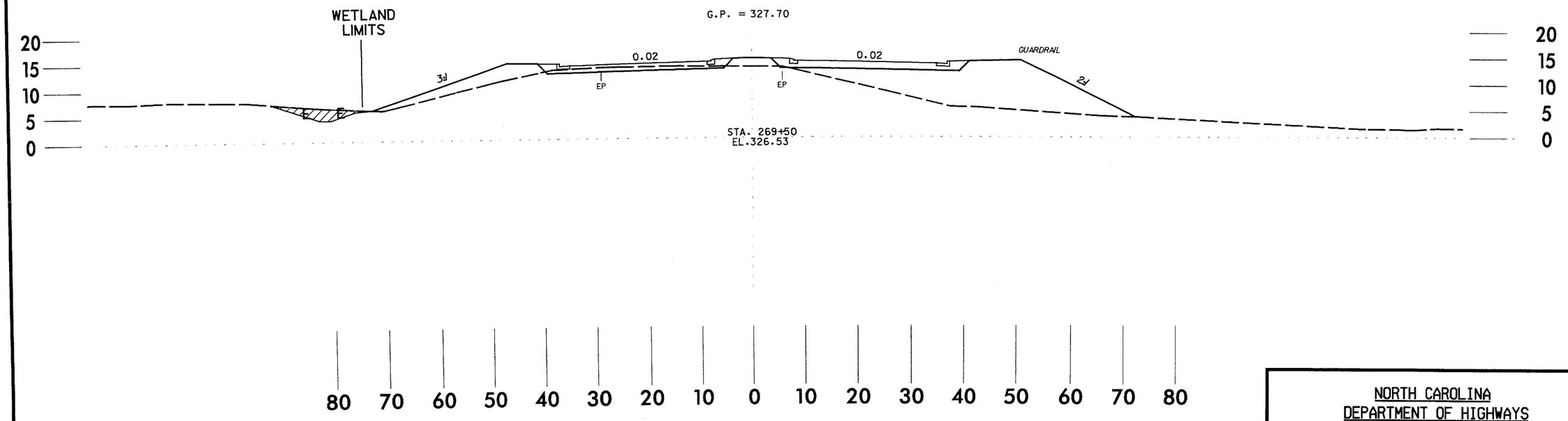
Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

PROJECT REFERENCE NO.	SHEET NO.
U-4026	25-XSEC
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





LEGEND

—WLB— WETLAND

E E DENOTES EXCAVATION IN WETLAND

TYPICAL X-SECTIONS
SITE 19

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

DATE: 07-28-05

SHEET 62 OF 65

p:\TIP\U4026_ko\hydro\Dgn\Permits\U4026p_site25.xsc
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WETLAND PERMIT IMPACT SUMMARY

Site No.	Rdwy Sht No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
				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	10-11	93+29 -L-	54" RCP / 48" SUPPL PIPE	---	---	---	---	0.0172	---	0.0115	216	---
2	11	104+58 -L-	(2) 48" PIPES	---	---	---	---	0.0089	---	0.0080	106	---
3	14	134+23 -L-	66" RCP / 72" SUPPL PIPE	---	---	---	---	0.0458	---	0.0235	186	---
4	17-18	178+23 -L-	54" RCP / 66" SUPPL PIPE	---	---	---	---	0.0557	---	0.0141	215	---
5	19	199+96 -L-	(2) 7' x 6' RCBC	---	---	---	---	---	0.0787	0.0365	---	---
6	20-21	205+00 - 215+00 -L-	Embankment / Lateral	0.0230	---	---	0.0120	0.0159	---	0.0024	423	---
7	22	229+99.7 -L-	66" RCP / 72" SUPPL PIPE	---	---	---	---	0.0807	---	---	307	---
8	23	241+00 -L-	54" RCP	---	---	---	---	0.0032	---	0.0019	21	---
9	26-27	286+57.6 -L-	66" RCP / 48" SUPPL PIPE	---	---	---	---	0.0537	---	0.0076	394	261
10	27	293+82.1 -L-	(1) 8' x 6' RCBC / 60" SUPPL PIPE	---	---	---	---	0.0465	---	0.0136	244	---
11	31	29+40 -Y5-	Embankment	0.0140	---	---	---	---	---	---	---	---
12	31	31+50 -Y5-	15" RCP / Embankment	0.0120	---	---	0.0010	---	---	---	---	---
13	31	31+20 -Y5-	Embankment	0.0198	---	---	0.0007	---	---	---	---	---
14	31	34+80 -Y5-	18" RCP / Embankment	0.0090	---	---	0.0023	---	---	---	---	---
15	34	21+41 -Y12-	Embankment	0.0125	---	---	---	---	---	---	---	---
16	24	23+25 -Y12-	18" RCP / Embankment	0.0361	---	---	0.0073	---	---	---	---	---
17	36	21+00 -Y13-	Embankment	---	---	---	---	---	0.0029	---	---	---
18	29&36	25+00 -Y13-	30" RCP w EW / Embankment / Trail	0.0267	---	---	0.0065	0.0006	---	---	13	---
19	25	269+05-270+67 -L- Lt	Proposed Ditches	0.0130		0.0770						
TOTALS:				0.1661	0.0000	0.0770	0.0298	0.3282	0.0816	0.1191	2125	261

** The 0.077 ac of Excavation in Wetlands Sta 269+05 -L- Lt consists of 0.042 Excavated and 0.035 Drained

Form Revised 3/22/01

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 35018.1.1 (U-4026)

8/25/2005

SHT ____ OF ____

SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
1	RTP / PARKSIDE, L.L.C.	448 VIKING DR STE 220 VIRGINIA BEACH, VA 23452-7331	1
2	DIOSYNTH RTP, INC	100 N COLLEGE ST CHARLOTTE, NC 28255-0001	1
6 A,B,G&K	RESEARCH TRIANGLE FOUNDATION	P.O. BOX 12255 RTP, NC 27709	1,2,3,5, 6,7,9 & 10
8 A&B	BIOGEN REALTY, LLC	P.O. BOX 12255 DURHAM, NC 27709-2255	4,6 & 7
10B	CISCO SYSTEMS, INC	550 W C ST STE 1300 SAN DIEGO, CA 92101-8582	4
13A	EISAI, INC	P.O. BOX 12255 DURHAM, NC 27709-2255	7
15A	DAVIS DRIVE ASSOCIATES LTD	1002 E CHATHAM ST CARY, NC 27511	8
20	SEARLS FAMILY LIMITED PARTNERSHIP	4623 HOPSON RD MORRISVILLE, NC 27560	15, 16 & 19
22	NORTHERN TELECOM, INC	DEPT 8413 200 ATHENS WAY NASHVILLE, TN 37228-1397	9 & 10
23	BASF CORPORATION	3000 CONTINENTAL DR NORTH MT. OLIVE, NJ 07828	10
24	BASF CORPORATION	3000 CONTINENTAL DR NORTH MT. OLIVE, NJ 07828	17
34	BECTON, DICKINSON & COMPANY	PO BOX 12016 RTP, NC 27709-2016	18

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

NOT TO SCALE

DATE: 06-29-05

SUMMARY OF AFFECTED PROPERTY OWNERS

TRACT NO.	PROPERTY OWNER	ADDRESS	SITE NO.
(14)	PAUL J. CARTRETTE & PATTIE H. CARTRETTE	6218 McCRIMMON PKWY MORRISVILLE, NC 27560-8684	11
(21)	JULIA R. DEAN	204 GRAYWICK WAY CARY, NC 27513-1611	13
(22)	WILLIAM H. RICHARD & JANET M. RICHARD	6221 McCRIMMON PKWY MORRISVILLE, NC 27560-8684	12 & 14

NORTH CAROLINA
DEPARTMENT OF HIGHWAYS

WAKE - DURHAM COUNTIES
35018.1.1 (U-4026)

DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE-CARPENTER RD (SR 3016) TO NC HWY 54

NOT TO SCALE

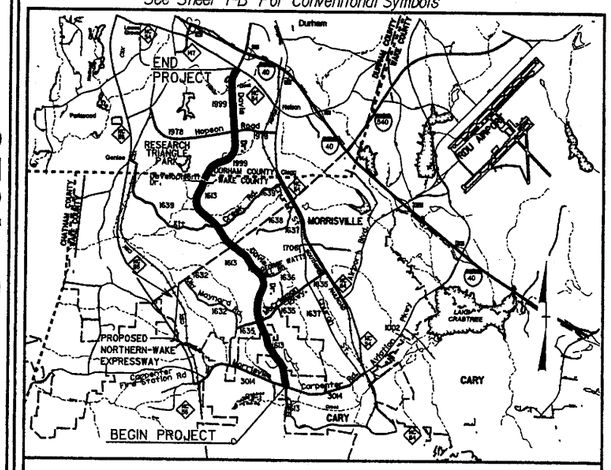
DATE: 02-04-05

p:\TIP\u4026_ko\hydro\Dgn\Permits\u4026_permit_tsh.dgn
2/4/2005 8:47:34 AM

9/09/99

CONTRACT: C200840 TIP PROJECT: U-4026

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

100%

WAKE–DURHAM COUNTIES

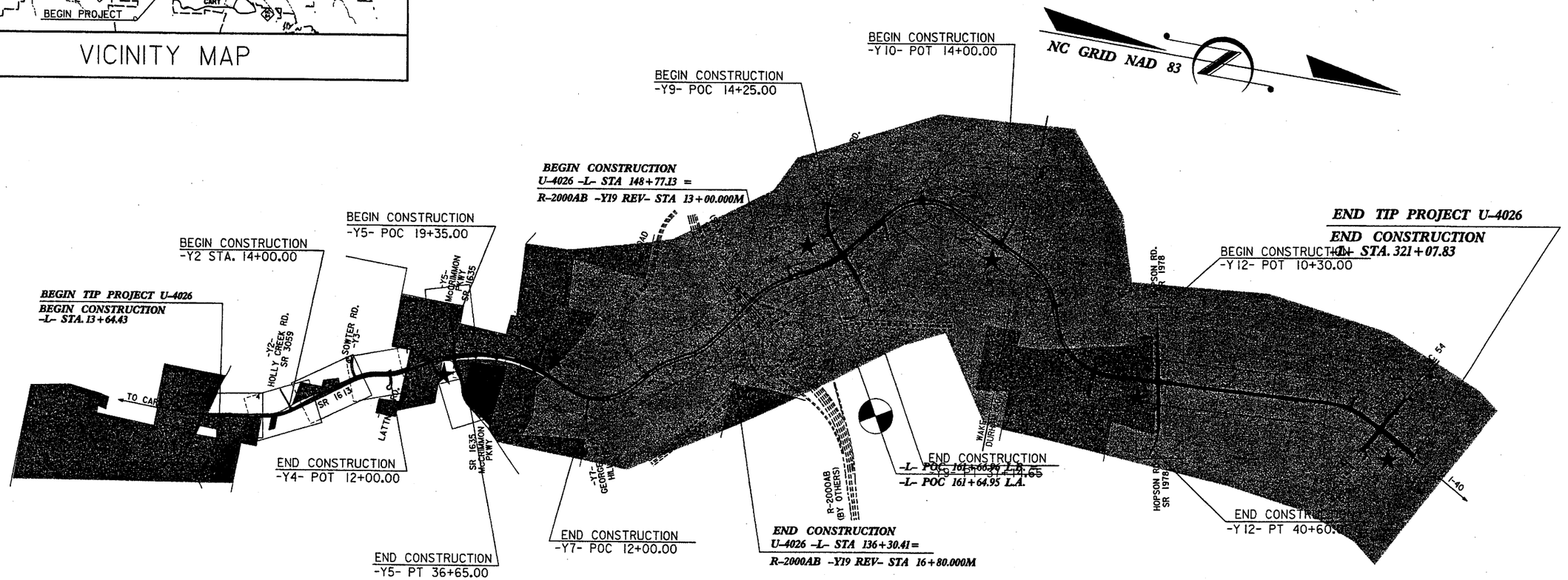
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4026	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
35018.1.1		P.E.
35018.2.1		R/W
35018.3.1		CONST

LOCATION: DAVIS DRIVE (SR 1613/1999) FROM 390' NORTH OF MORRISVILLE–CARPENTER ROAD (SR 3014) TO NORTH OF NC 54

TYPE OF WORK: GRADING, DRAINAGE, PAVING, CULVERTS AND SIGNALS.

LEGEND
- ★ SIGNALED INTERSECTION
- CARY CITY LIMITS
- MORRISVILLE CITY LIMITS
- RTP CITY LIMITS
- DURHAM CITY LIMITS



NCDOT CONTACT: TERESA BRUTON, P.E.
PROJECT SERVICES - ENGINEERING COORDINATION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

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

DESIGN DATA

ADT (2004)= 24155
ADT (2024)= 45055
DHV = 12 %
D = 65 %
T = 4 % *
V = 55 MPH (SHLD)
= 50 MPH (C&G)
* TTST 1 % DUAL 3 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-4026 = 5.587 MI.
TOTAL LENGTH OF TIP PROJECT U-4026 = 5.587 MI.

Prepared In the Office of:
KO & ASSOCIATES, P.C.
1011 Schaub Dr. Suite 202, Raleigh, NC 27606 919-851-6066
for
North Carolina Department of Transportation

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
U-4026A – APRIL 29, 2003
U-4026B – JUNE 30, 2003

LETTING DATE:

Warren F. Lamb, P.E.
PROJECT ENGINEER

Stephen R. Whitley, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATI
FEDERAL HIGHWAY ADMINISTR

APPROVED
DIVISION ADMINISTRATOR

2/8/2005
K:\projects\Proj\4026.tsh

RIGHT OF WAY AREA DATA SHEET

PROJECT REFERENCE NO.	SHEET NO.
U-4026	3-X
U-4026A R/W SHEET NO.	3-
U-4026B R/W SHEET NO.	3-S

U-4026A

Parcels 1-22 in this section to be handled by Town of Cary

PARCEL NO.	PROPERTY OWNERS NAME	TOTAL ACREAGE	AREA TAKEN	AREA REMAINING RIGHT	AREA REMAINING LEFT	CONSTR. EASEMENT	PERMANENT DRAINAGE EASEMENT	TEMPORARY DRAINAGE EASEMENT	
1	Danny E. & Patricia R. Blackburn	2.05 Ac	0.16 Ac		1.89 Ac				
2	KEP Morrisville Realty, LLC	4.46 Ac	0.36 Ac	4.10 Ac		458 SF			
3	Billy H. & Wilma Sauls	3.21 Ac	0.29 Ac		2.92 Ac				
4	Melvin D. & Nancy T. Barnes	5.81 Ac	0.33 Ac		5.48 Ac				
5	William L. & Edith A. Wright	1.71 Ac	214 SF		1.70 Ac				
6	Ferrell Land Company, LCC	12.69 Ac	0.26 Ac	12.43 Ac					
7	Raymond W. & Yuk Mui Wong	35728 SF	7430 SF	28298 SF					
8	William T. Hatch, et al	66.43 Ac	2.20 Ac	64.23 Ac			0.77 Ac		
9	Woody A. Yates & Stephanie S. Yates	3.80 Ac	150 SF		3.80 Ac		770 SF	1808 SF	
10	James Ray Seagroves	1.46 Ac	2645 SF		1.40 Ac				
11	Carpenter Associates	19.27 Ac	1.11 Ac	4.12 Ac	14.04 Ac	0.22 Ac	0.35 Ac		
12	Kat Parthners, LLC	11.32 Ac	0.30 Ac		11.02 Ac	3288 SF			
13	Davis Recreational Facilities	7.81 Ac	0.43 Ac		7.38 Ac	667 SF			
14	Davis Partners, LLC	4.58 Ac	1.21 Ac	3.37 Ac			832 SF		
15	Forrest Development Co., Inc.	1.80 Ac	0.40 Ac	1.40 Ac					
16	DVS Investors, LLC	19.76 Ac	1.33 Ac	18.43 Ac					
17	Daniel O. & Ina P. Rhew	3.45 Ac	0.72 Ac		2.06 Ac	1557 SF			
18	Wexford Investors, LLC	33.97 Ac	0.50 Ac	1.91 Ac	32.06 Ac	0.41 Ac			
18A	Park South Villages, LLC	22.48 Ac	1.58 Ac		20.90 Ac	0.19 Ac	1056 SF		
19	Philip Allen Richard & Susan Austin Richard	2.21 Ac	0.13 Ac	2.08 Ac					
19Z	Philip Allen Richard & Susan Austin Richard	573 SF	573 SF						
20	William H. Richard & Janet M. Richard	1.94 Ac	0.39 Ac	1.55 Ac					
21	Julia R. Dean	4.78 Ac	0.35 Ac	4.43 Ac					
22	John D Nutt	82.28 Ac	0.68 Ac	81.60 Ac					

U-4026B

PARCEL NO.	PROPERTY OWNERS NAME	TOTAL ACREAGE	AREA TAKEN	AREA REMAINING RIGHT	AREA REMAINING LEFT	CONSTR. EASEMENT	PERMANENT DRAINAGE EASEMENT	TEMPORARY DRAINAGE EASEMENT	
1	RTP/Parkside, LLC	30.50 Ac	0.17 Ac	30.33 Ac		0.23 Ac			
2	Diosynth RTP, Inc.	312.81 Ac	0.72 Ac	312.09 Ac		0.18 Ac			
3	Parkside Development LLP	1.94 Ac	3241 SF		1.87 Ac		690 SF		
4	The Manors at Breckenridge Association, Inc.	20.21 Ac	1158 SF		20.18 Ac	362 SF			
4A	The Manors at Breckenridge Association, Inc.	35.82 Ac	3677 SF		35.74 Ac				
5	Not Used								
6A	Research Triangle Foundation		0.38 Ac			1468 SF	0.31 Ac		
6B	Research Triangle Foundation					0.57 Ac		3014 SF	
6C	Research Triangle Foundation						3176 SF		
6D	Research Triangle Foundation					0.13 Ac			
6E	Research Triangle Foundation					1100 SF	4123 SF		
6F	Research Triangle Foundation							26.32 Ac	
6G	Research Triangle Foundation	8.86 Ac						7.41 Ac	
6H	Research Triangle Foundation					0.82 Ac	0.17 Ac		
6I	Research Triangle Foundation	3.97 Ac	1.17 Ac	2.80 Ac					

U-4026B

PARCEL NO.	PROPERTY OWNERS NAME	TOTAL ACREAGE	AREA TAKEN	AREA REMAINING RIGHT	AREA REMAINING LEFT	CONSTR. EASEMENT	PERMANENT DRAINAGE EASEMENT	TEMPORARY DRAINAGE EASEMENT	
6J	Research Triangle Foundation		NO TAKE						
6K	Research Triangle Foundation					0.22 Ac	3400 SF	0.13 Ac	
6L	Research Triangle Foundation	21363 SF				5720 SF			
7	Not Used								
8	Biogen Realty LLC	87.65 Ac				0.50 Ac	0.27 Ac		
8A	Biogen Realty LLC			No Claim					
8B	Biogen Realty LLC	78.82 Ac	0.73 Ac	78.09 Ac				0.21 Ac	
9	ARE-7030 Kit Creek, LLC	18.00 Ac	2263 SF		17.95 Ac	1.36 Ac	578 SF		
10	Cisco Systems, INC	32.31 Ac	0.63 Ac		31.68 Ac	0.31 Ac	2015 SF		
10A	Cisco Systems, INC		0.14 Ac			0.58 Ac			
10B	Cisco Systems, INC	53.00 Ac				3062 SF	3508 SF		
11	Delta Products Corporation	10.46 Ac					0.18 Ac		
12	Ericsson Trust	24.52 Ac				0.36 Ac	0.12 Ac		
13	Eisai INC	58.42 Ac				3.29 Ac	0.17 Ac		
13A	Eisai INC	51.69 Ac			51.69 Ac	0.66 Ac	0.44 Ac	2772 SF	
14	Not Used								
15	Technology VII - IX	12.50 Ac	2597 SF	12.44 Ac					
15A	Davis Drive Assoc. Ltd Partnership	1.50 Ac				0.23 Ac	0.10 Ac		
16	Keystone Technology Park Owners Assoc, INC	4.10 Ac				1155 SF			
17	Keystone Office 100 - 200, LLC	6.20 Ac				0.16 Ac			
17A	Keystone Office 100 - 200, LLC	5.09 Ac				3313 SF			
17B	Keystone Office 300, LLC	10.43 Ac				0.12 Ac			
18	Technology I, LLC	7.93 Ac					0.12 Ac		
19	Technology IV, LLC	7.39 Ac	0.13 Ac	7.26 Ac		895 SF			
20	Searls Family Limited Partnership	69.27 Ac	0.50 Ac	40.91 Ac	27.86 Ac	3090 SF	0.11 Ac		
21	Wilkinson Family Partnership	66.0 Ac	0.31 Ac	65.69 Ac			1191 SF		
22	State Street Bank & Trust Co.	108.00 Ac	1.09 Ac	106.91 Ac		0.68 Ac		0.11 Ac	
23	BASF Corporation	25.54 Ac					0.17 Ac	926 SF	
24	BASF Corporation	46.19 Ac				0.86 Ac	430 SF		
25	Technology III, LLC	9.23 Ac	0.49 Ac	8.74 Ac		1620 SF			
26	Raymond M Proctor & wife Faye B. Proctor	3.37 Ac	0.24 Ac	3.13 Ac					
27	Robert H & Nancy C Mallett	43124 SF	7893 SF		35231 SF				
28	Susan S O'Brien & Patricia S O'Brien	43124 SF	7262 SF		35862 SF				
29	Estate of Agatha L Hurst	1.10 Ac	0.13 Ac		0.97 Ac				
30	Charles Kennedy & wife Jane W. Kennedy	1.02 Ac	0.13 Ac		0.89 Ac				
31	Ronald K. Maynor	1.00 Ac	0.11 Ac		0.89 Ac				
32	Gerald K. Searles	32670 SF	3078 SF		29592 SF				
33	Triangle Service Center, INC		0.33 Ac			0.13 Ac			
34	Becton, Dickinson, and Company	38.10 Ac	0.27 Ac	37.83 Ac		0.48 Ac			

2/22/05 REVISED PDE & ADDED TDE ON PARCEL 9 (U-4026A)
2/16/05 REVISED R/W ON PARCEL 2 (U-4026B)
11/9/04 REVISED PDE ON PARCEL 9
10/26/04 REVISED ROW & PDE ON PARCELS 8, 11 & 21
10/04/04 REVISED NAMES ON PARCELS 2,7,9,14,15,16,18 & 19
10/04/04 REVISED PARCEL NOs. ON PARCELS 18 & 19
9/9/04 REVISED PARCEL NO. 2A TO PARCEL NO. 2 & CE AREA ON PARCEL 2
7/14/04 REVISED CE AREA ON PARCEL 6K
7/9/04 REVISED CE AREA ON PARCEL 6B & ADD PARCEL 2A W/ CE
7/2/04 REVISED SHEET NUMBER
7/2/04 REVISED NAME &/OR ACREAGE ON PARCELS 15,17,17A,17B,20,23, & 34
7/2/04 REVISED CE ON PARCEL 6L
7/2/04 REVISED R/W AREA ON PARCEL 3 & PDE ON PARCELS 6A & 8E

10/17/03 REVISED CE ON PARCEL 1
12/29/03 REVISED R/W, CE and PDE ON PARCEL 12
2/4/04 REVISED R/W, CE & TDE ON PARCELS 6 & 8
3/8/04 REVISED R/W, CE & PDE ON PARCEL 14
3/15/04 REVISED CE & PDE ON PARCEL 9
3/25/04 REVISED PARCEL NO. 6 TO PARCEL 6A - 6L
4/19/04 REVISED PARCELS NO. 2,4,5,7,8,9,10,15,17 & 24
6/24/04 REVISED NAME ON PARCELS NO. 22, 29 & 33
6/24/04 REVISED CE & PDE ON PARCEL 6K
6/24/04 REVISED CE ON PARCEL 6B
6/24/04 REVISED R/W & CE ON PARCEL 2 & 10A
6/24/04 REVISED R/W ON PARCEL 18
9/23/03 REVISED R/W ON PARCELS 3, 4, 5, 7, 8, 11, 23 & 25

2/23/2005
F:\Roadway\Proj\u4026_3.sss

REVISIONS
10/04/04 REVISED NAME ON PARCEL 2

PROJECT REFERENCE NO.	SHEET NO.
U-4026	4
U-4026A R/W SHEET NO.	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET

NAD 83 / NC GRID

KAMAL ALIMANSOUR
DB 3241 PG 525

GROVER O. & PEGGY H. LEWTER
DB 251 PG 206

J. T. HOBBY & SON INC.
DB 1230 PG 354

WILLIAM M. & GALE D. YEAGER
DB 2545 PG 30

LEE MOORE OIL COMPANY
DB 4088 PG 495

CLARENCE B. & PEGGY C. RIDOUT
DB 3005 PG 926

LEE-MOORE OIL COMPANY
DB 4160 PG 409

JAMES L. MICHAEL, ET UX
DB 2926 PG 604

KEP MORRISVILLE REALTY, LLC.
DB 8328 PG 807

DANNY E. & PATRICIA R. BLACKBURN
DB 5190 PG 302

IDA WILLIAMS MILLS
DB 2577 PG 346

BILLY G. & WILMA
DB 2878 PG 466

SR 1613 DAVIS DR BST

SR 3014 MORRISVILLE-CARPENTER RD BST

BY-202 PINC 8+60.76
-L- STA. 11+52.19
(304.900' LT.)

BL-1 PINC 18+93.58
BY-203 PINC 12+39.58
GPS U-4026-1
-L- STA. 10+25.26
(53.531' RT.)

BY-204 PINC 16+85.75

BL-2 PINC 28+17.37
GPS U-4026-2
-L- STA. 20+04.74
(18.185' RT.)

WETLANDS DO NOT DISTURB

FUTURE PROJECT BY OTHERS

BEGIN TIP PROJECT U-4026
-L- PT STA. 13+64.43 =
PROJECT TOC 99-040
-L- PT STA. 220+71.66

-L- STA. 13+64.43
BEGIN 200' TAPER
LT. TURN LANE, SB

-L- STA. 15+64.43
END 200' TAPER
LT. TURN LANE, SB

SLOPE STAKE LINE

2' BASE TAIL DITCH
EST 16 CY DDE
SEE DITCH DETAIL A

CLASS "B" RIP RAP
EST 2 TONS
EST 7 SY FF

SPECIAL DITCH GRADE
(SEE PROFILES)

PROP. 1'-6" C&G

REMOVE

-MATCHLINE- STA. 22+00.00 SEE SHEET NO. 5

-L-
PI Sta 11+83.85
Δ = 5° 25' 17.3" (LT)
D = 1° 30' 00.0"
L = 361.43'
T = 180.85'
R = 3,819.72'
SE = 0.024 FT/FT

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEET 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 38

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2000-26" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 765 141.403(ft) EASTING: 2040223.344(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999 1540 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2000-26" TO -L- STATION 13+64.43 IS S 23°09'22.0" E 12,375.43' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

LEGEND
PAVED SHOULDER

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/8/2005
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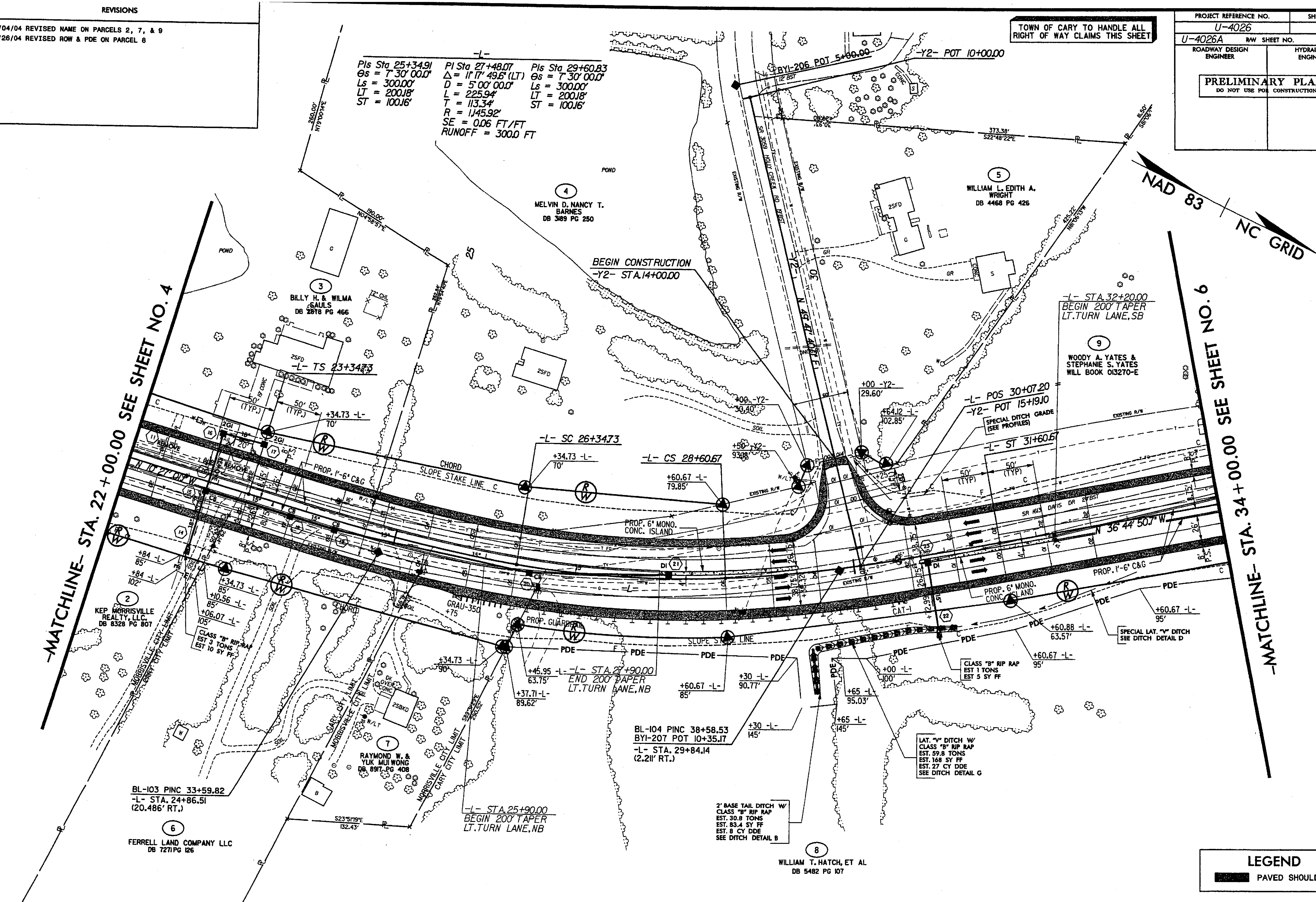
KO & Associates, P.C.

REVISIONS
10/04/04 REVISED NAME ON PARCELS 2, 7, & 9
10/26/04 REVISED ROW & PDE ON PARCEL 8

PROJECT REFERENCE NO.	SHEET NO.
U-4026	5
U-4026A R/W SHEET NO.	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET



-L-
PIs Sta 25+34.91
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'
PI Sta 27+48.07
Δ = 11° 17' 49.6" (LT)
D = 5° 00' 00.0"
L = 225.94'
T = 113.34'
R = 1145.92'
SE = 0.06 FT/FT
RUNOFF = 300.0 FT
PIs Sta 29+60.83
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'
NAD 83
NC GRID
-MATCHLINE- STA. 22+00.00 SEE SHEET NO. 4
-MATCHLINE- STA. 34+00.00 SEE SHEET NO. 6
BEGIN CONSTRUCTION
-Y2- STA.14+00.00
-Y2- POT 10+00.00
BYI-206 POT 5+00.00
MELVIN D. NANCY T. BARNES
DB 3189 PG 250
WILLIAM L. EDITH A. WRIGHT
DB 4468 PG 426
BILLY H. & WILMA SAULS
DB 2878 PG 466
WOODY A. YATES & STEPHANIE S. YATES
WILL BOOK 013270-E
KEP MORRISVILLE REALTY, LLC.
DB 8328 PG 807
RAYMOND W. & YUK MUI WONG
DB 8917 PG 408
FERRELL LAND COMPANY LLC
DB 7271 PG 126
WILLIAM T. HATCH, ET AL
DB 5482 PG 107
-L- TS 23+34.73
-L- SC 26+34.73
-L- CS 28+60.67
-L- ST 31+60.67
-L- POS 30+07.20
-Y2- POT 15+19.10
-L- STA. 32+20.00
BEGIN 200' TAPER
LT. TURN LANE, SB
-L- STA. 27+90.00
END 200' TAPER
LT. TURN LANE, NB
-L- STA. 25+90.00
BEGIN 200' TAPER
LT. TURN LANE, NB
BL-103 PINC 33+59.82
-L- STA. 24+86.51
(20.486' RT.)
BL-104 PINC 38+58.53
BYI-207 POT 10+35.17
-L- STA. 29+84.14
(2.211' RT.)
N 10° 27' 00.1" W
N 36° 44' 50.7" W
SPECIAL DITCH GRADE (SEE PROFILES)
PROP. 6" MONO. CONC. ISLAND
PROP. 1'-6" C&G
PROP. GUARDRAIL
SLOPE STAKE LINE
CHORD
SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D
CLASS "B" RIP RAP
EST 3 TONS
EST 10 SY FF
CLASS "B" RIP RAP
EST 1 TONS
EST 5 SY FF
LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 59.8 TONS
EST. 168 SY FF
EST. 27 CY DDE
SEE DITCH DETAIL G
2' BASE TAIL DITCH W/ CLASS "B" RIP RAP
EST. 30.8 TONS
EST. 83.4 SY FF
EST. 8 CY DDE
SEE DITCH DETAIL B
MORRISVILLE CITY LIMIT
CARY CITY LIMIT
POND

LEGEND

▬	PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEET 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-J
FOR -L- PROFILE, SEE SHEET 38
FOR -Y2- PROFILE, SEE SHEET 51

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/8/2005
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Ko & Associates, P.C.

7/2/99

REVISIONS
10/04/04 REVISED NAME ON PARCEL 9
10/26/04 REVISED ROW & PDE ON PARCELS 8 & 11
11/09/04 REVISED PDE ON PARCEL 9
2/22/05 REVISED PDE & ADDED TDE TO PARCEL 9

PROJECT REFERENCE NO.	SHEET NO.
U-4026	6
U-4026A RW SHEET NO.	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET

NAD 83 / NC GRID

-Y3-
PI Sta 12+07.09
Δ = 39° 44' 38.3" (LT)
D = 10° 00' 00.0"
L = 397.44'
T = 207.09'
R = 572.96'
SE = 0.02 FT/FT
RUNOFF = 30.0 FT

-MATCHLINE- STA. 34+00.00 SEE SHEET NO. 5

-MATCHLINE- STA. 46+00.00 SEE SHEET NO. 7

-L- STA. 34+20.00
END 200' TAPER
LT. TURN LANE, SB

PROP 6'x6' PREFORMED SCOUR HOLE SEE DETAIL HH

9 WOODY A. YATES & STEPHANIE S. YATES WILL BOOK 013270-E

CARY CITY LIMIT
MORRISVILLE CITY LIMIT

2' BASE TAIL DITCH W/ CLASS "B" RIP RAP
EST. 5.6 TONS
EST. 15.2 SY FF
EST. 3 CY DDE
10LF @ 0.50%
SEE DITCH DETAIL B

SPECIAL DITCH GRADE (SEE PROFILES)

TDE

SR 1613 DAVIS DR 24'BST

N 36° 44' 50.7" W

PROP. 1'-6" C&G

SLOPE STAKE LINE

PDE

SPECIAL DITCH GRADE (SEE PROFILES)

ISFD ABAND

BL-105 PINC 48+55.64
-L- STA. 39+80.93
(22.928' LT.)

10 JAMES RAY SEAGROVES DB 931 PG 217

ISFD

N34°09'37"W 230.89'

11 CARPENTER ASSOCIATES DB 3756 PG 444

BEGIN CONSTRUCTION
-Y3- POC 13+00.00

-Y3- PT 13+97.44

-L- POS 45+77.62
-Y3- POT 15+02.12

BL-106-RINC 54+22.31
BK2-209 ROT 9+92.09
-L- STA. 45+47.01
(1.895' LT.)

DIRT STOCK PILE

DIRT STOCKPILE

AREA U/C

CHORD 85.37'

SLOPE STAKE LINE

8 WILLIAM T. HATCH, ET AL DB 5482 PG 107

-L- STA. 41+58.06
BEGIN 200' TAPER
LT. TURN LANE

WETLANDS
DO NOT DISTURB

-L- TS 43+42.62

-L- STA. 43+58.06
END 200' TAPER
LT. TURN LANE

CLASS "B" RIP RAP
EST 2 TONS
EST 5 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

2' SPEC LAT BASE DITCH
SEE DITCH DETAIL S

11 CARPENTER ASSOCIATES DB 3756 PG 444

-L-
PIs Sta 45+42.80
θs = 1° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEET 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-J
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 39
FOR -Y3- PROFILE, SEE SHEET 51

LEGEND
PAVED SHOULDER

Plans prepared by:
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(919)-851-6066

2/22/2005
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KO & Associates, P.C.

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	7
U-4026A R/W SHEET NO.	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET

NAD 83 / NC GRID

-MATCHLINE- STA. 46+00.00 SEE SHEET NO. 6

-MATCHLINE- STA. 58+00.00 SEE SHEET NO. 8

-Y3-
PI Sta 12+07.09
Δ = 39° 44' 38.3" (LT)
D = 10° 00' 00.0"
L = 397.44'
T = 207.09'
R = 572.96'
SE = 0.02 FT/FT
RUNOFF = 30.0 FT

-L-
PIs Sta 54+31.89
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'

-L-
PI Sta 55+47.04
Δ = 1° 32' 00.0" (LT)
D = 5° 00' 00.0"
L = 30.67'
T = 15.33'
R = 1,145.92'
SE = 0.06 FT/FT
RUNOFF = 300.0 FT

-L-
PIs Sta 56+62.54
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'

12 KAT PARTNERS LLC DB 8339 PG 1365

13 DAVIS RECREATIONAL FACILITIES LLC BK 8339 PG 1361

11 CARPENTER ASSOCIATES DB 3756 PG 444

14 DAVIS PARTNERS, LLC BK 10067 PG 457

15 FORREST DEVELOPMENT CO., INC. BK 8808 PG 781

16 DVS INVESTORS, LLC BK 10613 PG 939

17 DANIEL O & INA P RHEW DB 2538 PG 523

BILLY W. & MAGARET S. MAYNARD BK 2408 PG 623

EVA R. MAYNARD, ET AL BK 6268 PG 208

BL-107 PINC 61+80.24
BY3-210 POT 5+00.00
-L- STA. 53+10.76
(25.652' RT.)

BY3-211 POT 7+16.81
-L- STA. 53+22.03
(242.145' RT.)

-L- CS 55+62.37

-L- SC 55+31.71

-L- TS 52+31.71

-L- CS 47+96.71

-L- SC 46+42.62

-L- POS 53+58.34 =
-Y4- POT 10+00.00

-Y4- PC 11+65.84

-Y4- PT 12+35.73

-Y4- PC 12+45.59

-Y4- PT 13+14.59

-Y4- END CONSTRUCTION
-Y4- POT 12+00.00

-L- ST 50+96.71

-L- STA.47+96.71 BEGIN 200' TAPER LT.TURN LANE

-L- STA.49+96.71 END 200' TAPER RT.TURN LANE

-L- STA.49+90.00 BEGIN 200' TAPER RT.TURN LANE,NB

-L- STA.51+50.00 END 200' TAPER LT.TURN LANE,NB

-L- STA.49+50.00 BEGIN 200' TAPER LT.TURN LANE,NB

-L- STA.51+90.00 END 200' TAPER RT.TURN LANE,NB

-L- STA.57+60.00 END 200' TAPER LT.TURN LANE,SB

-L- STA.56+60.00 END 150' TAPER RT.TURN LANE,SB

-L- STA.55+60.00 BEGIN 200' TAPER LT.TURN LANE,SB

-L- STA.55+10.00 BEGIN 150' TAPER RT.TURN LANE,SB

-L- STA.54+60.00 BEGIN 210' TAPER BUS LANE,NB

-L- STA.56+70.00 END 210' TAPER BUS LANE,NB

-Y4-
PI Sta 12+01.05
Δ = 17° 17' 49.2" (RT)
D = 24° 45' 00.0"
L = 69.89'
T = 35.21'
R = 231.50'
SE = MATCH EXIST.

-Y4-
PI Sta 12+81.70
Δ = 4° 44' 29.7" (RT)
D = 60° 30' 00.0"
L = 68.99'
T = 36.11'
R = 94.70'

-L-
PIs Sta 45+42.80
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'

-L-
PI Sta 47+19.78
Δ = 7° 42' 15.5" (RT)
D = 5° 00' 00.0"
L = 154.09'
T = 77.16'
R = 1,145.92'
SE = 0.06 FT/FT
RUNOFF = 300.0 FT

-L-
PIs Sta 48+96.87
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND
PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEET 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-J
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 39
FOR -Y4- PROFILE, SEE SHEET 51

Plans prepared by:
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Consulting Engineers
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2/8/2005
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Ko & Associates, P.A.

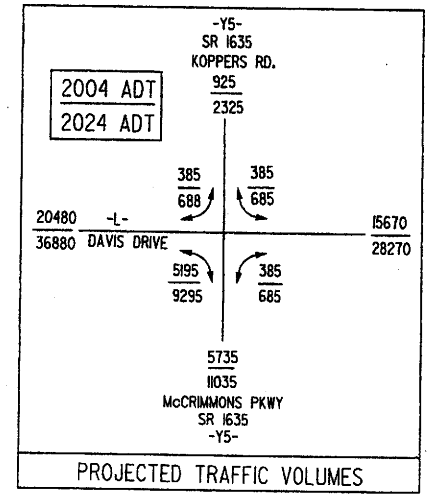
REVISIONS

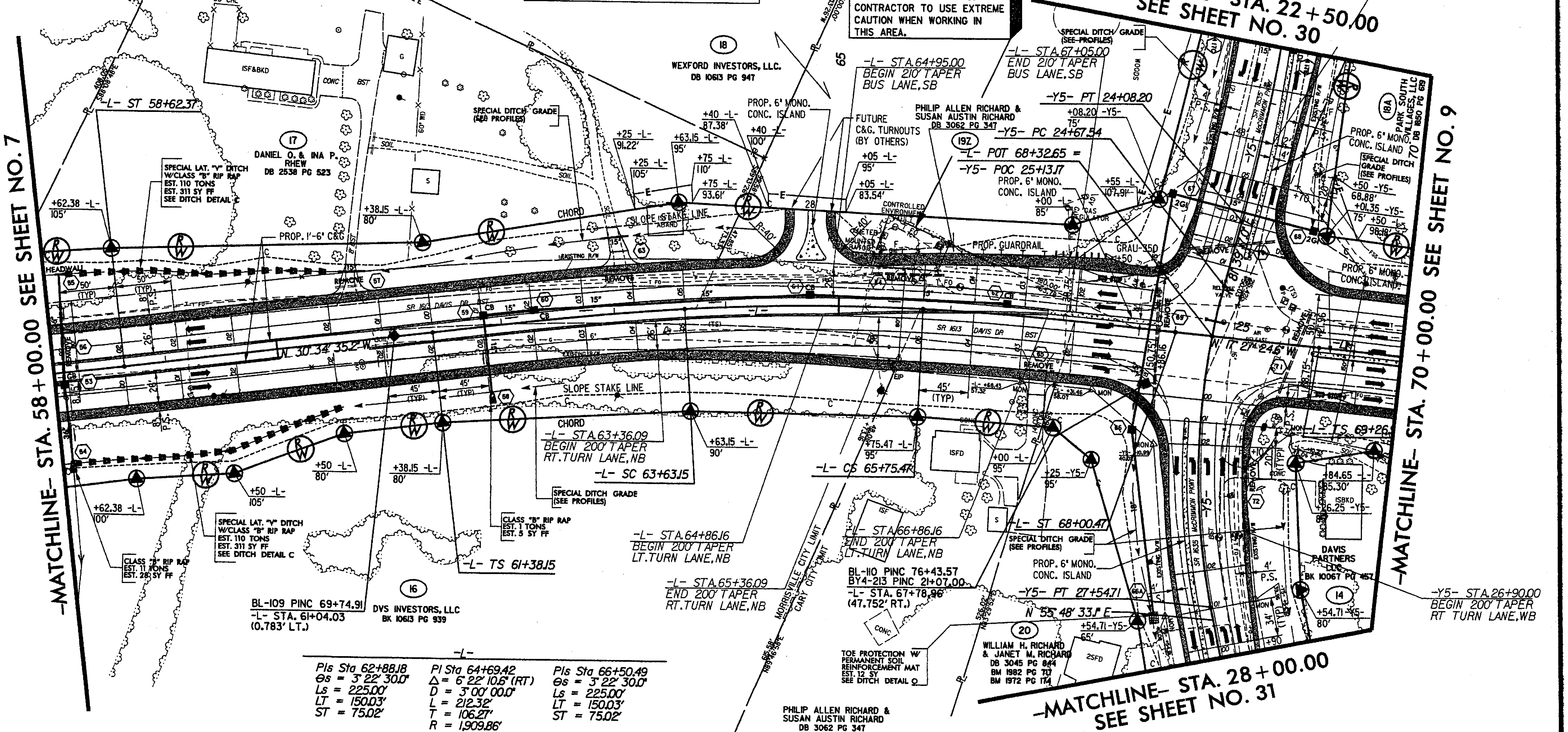
7/18/03 REVISED ROW, CE & ENTRANCES ON PARCEL 18
10/04/04 REVISED ROW, CE & ENTRANCES ON PARCEL 18
10/04/04 ADDED PARCEL NO. FOR ADDITIONAL CLAIM ON PARCEL 19 TO PARCEL 19Z & CHANGED NAME ON PARCEL 14

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET

PROJECT REFERENCE NO.	SHEET NO.
U-4026	8
U-4026A RW SHEET NO.	8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





NAD 83
NC GRID
-Y5-
PI Sta 22+49.68
Δ = 9° 31' 59.3" (RT)
D = 3° 00' 00.0"
L = 317.77'
T = 159.25'
R = 1,909.86'
SE = 0.05 FT/FT
RUNOFF = 100.0 FT
DO NOT DISTURB. CONTROLLED ENVIRONMENT VAULT AND FIBER OPTIC. CONTRACTOR TO USE EXTREME CAUTION WHEN WORKING IN THIS AREA.
-MATCHLINE- STA. 22+50.00 SEE SHEET NO. 30
-Y5- STA. 23+35.00 END 400' TAPER LT TURN LANES, EB
-MATCHLINE- STA. 58+00.00 SEE SHEET NO. 7
-MATCHLINE- STA. 70+00.00 SEE SHEET NO. 9
-MATCHLINE- STA. 28+00.00 SEE SHEET NO. 31
WEXFORD INVESTORS, LLC. DB 10613 PG 947
DANIEL O. & INA P. RHEW DB 2538 PG 523
DVS INVESTORS, LLC BK 10613 PG 939
PHILIP ALLEN RICHARD & SUSAN AUSTIN RICHARD DB 3062 PG 347
WILLIAM H. RICHARD & JANET M. RICHARD DB 3045 PG 844
DAVIS PARTNERS LLC BK 10067 PG 457
-L- ST 58+62.37
-L- TS 61+38.15
-L- SC 63+63.15
-L- CS 65+75.47
-L- ST 68+00.47
-L- POT 68+32.65 =
-Y5- POC 25+13.17
-Y5- PT 24+08.20
-Y5- PC 24+67.54
-Y5- PT 27+54.71
-L- TS 69+26.1
-Y5- STA. 26+90.00 BEGIN 200' TAPER RT TURN LANE, WB
-L- STA. 64+95.00 BEGIN 210' TAPER BUS LANE, SB
-L- STA. 67+05.00 END 210' TAPER BUS LANE, SB
-L- STA. 63+36.09 BEGIN 200' TAPER RT. TURN LANE, NB
-L- STA. 64+86.16 BEGIN 200' TAPER LT. TURN LANE, NB
-L- STA. 65+36.09 END 200' TAPER RT. TURN LANE, NB
-L- STA. 66+86.16 END 200' TAPER LT. TURN LANE, NB
BL-109 PINC 69+74.91 -L- STA. 61+04.03 (0.783' LT.)
BL-110 PINC 76+43.57 BY4-213 PINC 21+07.00 -L- STA. 67+78.96 (47.752' RT.)
N 30° 34' 35.2" W
N 17° 27' 24.6" W
N 55° 48' 33.1" E
SR 1613 DAVIS DR
MORRISVILLE CITY LIMIT
CARY CITY LIMIT
SLOPE STAKE LINE
PROP. GUARDRAIL
PROP. 6" MONO. CONC. ISLAND
FUTURE C&G TURNOUTS (BY OTHERS)
SPECIAL DITCH GRADE (SEE PROFILES)
SPECIAL LAT. "V" DITCH W/CLASS "B" RIP RAP EST. 110 TONS EST. 311 SY FF SEE DITCH DETAIL C
CLASS "B" RIP RAP EST. 11 TONS EST. 28 SY FF
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 12 SY SEE DITCH DETAIL Q

-L-		
PIs Sta 62+88.18 θs = 3° 22' 30.0" Ls = 225.00' LT = 150.03' ST = 75.02'	PI Sta 64+69.42 Δ = 6° 22' 10.6" (RT) D = 3° 00' 00.0" L = 212.32' T = 106.27' R = 1,909.86' SE = 0.05 FT/FT RUNOFF = 225.0 FT	PIs Sta 66+50.49 θs = 3° 22' 30.0" Ls = 225.00' LT = 150.03' ST = 75.02'

-L-	-Y5-
PIs Sta 70+60.27 θs = 2° 00' 00.0" Ls = 200.00' LT = 133.34' ST = 66.67'	PI Sta 26+13.61 Δ = 25° 50' 43.9" (LT) D = 9° 00' 00.0" L = 287.17' T = 146.07' R = 636.62' SE = 0.02 FT/FT RUNOFF = 68.0 FT

FOR DITCH DETAILS, SEE SHEET 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-J
FOR -L- PROFILE, SEE SHEET 40
FOR -Y5- PROFILE, SEE SHEET 52

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND
PAVED SHOULDER

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

5/6/2005
Ko & Associates, P.C.

7/2/99

REVISIONS
7/18/03 REVISED ROW, CE, ENTRANCE & LAT "V" DITCH ON PARCEL 18
10/04/04 REVISED NAME AND PARCEL NO. ON PARCEL 18 & CHANGED NAME ON PARCEL 14

TOWN OF CARY TO HANDLE CLAIMS ON PARCEL NO. 14 & 18 THIS SHEET

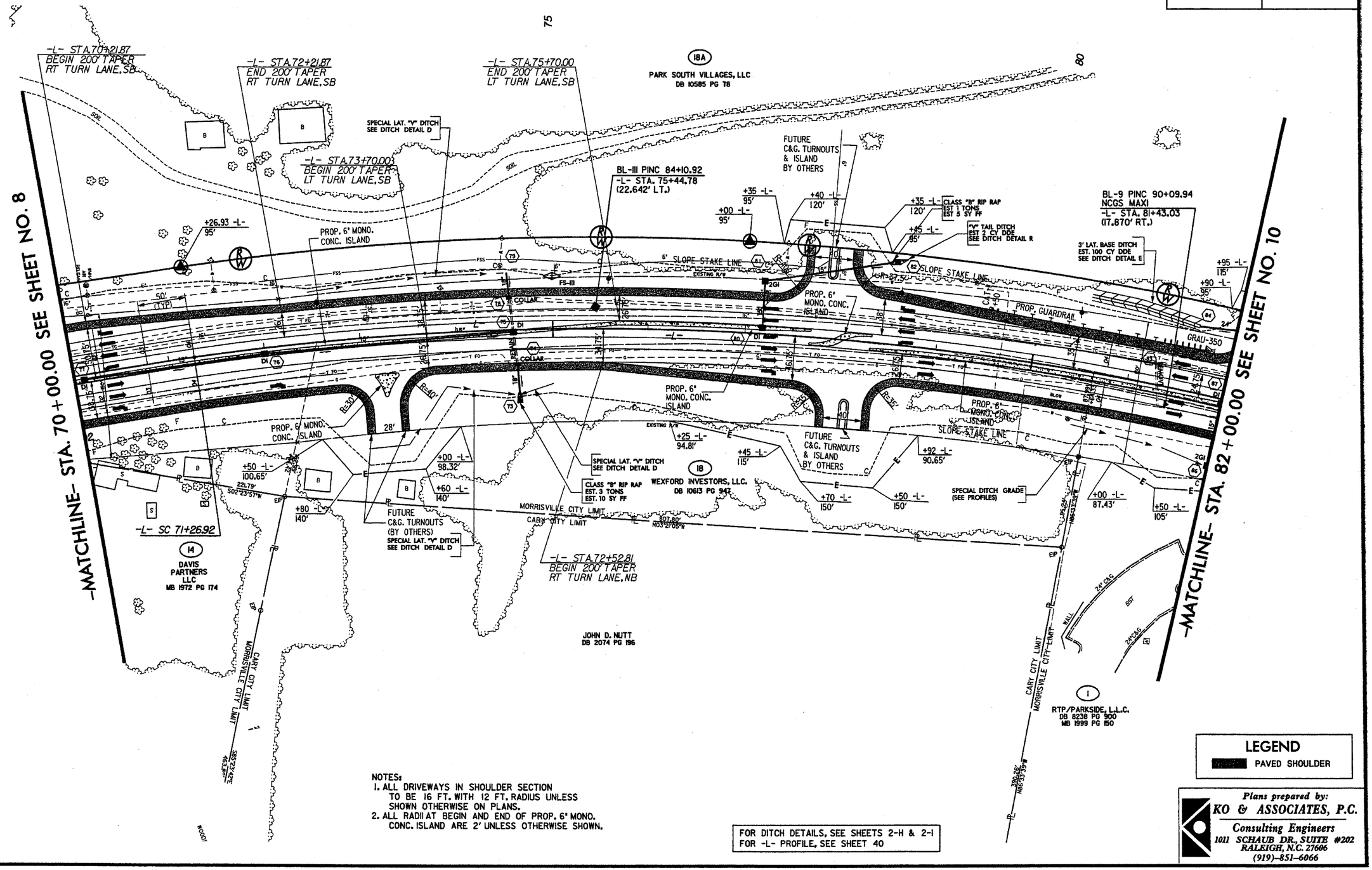
PROJECT REFERENCE NO.	SHEET NO.
U-4026	9
U-4026A RW SHEET NO.	9
U-4026B RW SHEET NO.	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

Pls Sta 70+60.27	Pl Sta 80+83.70	Pls Sta 90+40.41
Θs = 2° 00' 00.0"	Δ = 36° 56' 10.4" (RT)	Θs = 2° 00' 00.0"
Ls = 200.00'	D = 2° 00' 00.0"	Ls = 200.00'
LT = 133.34'	L = 1,846.81'	LT = 133.34'
ST = 66.67'	T = 956.77'	ST = 66.67'
	R = 2,864.79'	
	SE = 0.04 FT/FT	
	RUNOFF = 200.0 FT	

NAD 83 / NC GRID



NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 40

LEGEND
PAVED SHOULDER

Plans prepared by:
KO & ASSOCIATES, P.C.
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1011 SCHAUB DR., SUITE #202
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(919)-851-6066

5/6/2005
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Ko & Associates, P.C.

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	10
U-4026A R/W SHEET NO.	10
U-4026B R/W SHEET NO.	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-
Pls Sta 70+60.27
Θs = 2° 00' 00.0"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

Pl Sta 80+83.70
Δ = 36° 56' 10.4" (RT)
D = 2° 00' 00.0"
L = 1,846.81'
T = 956.77'
R = 2,864.79'
SE = 0.04 FT/FT
RUNOFF = 200.0 FT

Pls Sta 90+40.41
Θs = 2° 00' 00.0"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

NAD 83 / NC GRID

-MATCHLINE- STA. 82+00.00 SEE SHEET NO. 9

-MATCHLINE- STA. 94+00.00 SEE SHEET NO. 11

TOWN OF CARY TO HANDLE CLAIMS ON PARCEL NO. 18 THIS SHEET

18A
PARK SOUTH VILLAGES, LLC
DB 10585 PG 78

3
PARKSIDE DEVELOPMENT, L.L.P.
DB 9303 PG 590
MB 1997 PG 1728

4
THE MANORS AT BRECKENRIDGE ASSOCIATION
DB 8590 PG 1204
DB 10654 PG 2058

4A
THE MANORS AT BRECKENRIDGE ASSOCIATION
DB 8590 PG 1204
DB 10654 PG 2058

6A
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

PULTE HOME CORPORATION

PUBLIC SERVICE COMPANY
DB 1224 PG 598

MORRISVILLE CITY LIMIT
RTP LIMIT

BEGIN CONSTRUCTION
-Y6- POT 14+00.00

-L- STA. 88+48.95
BEGIN 200' TAPER
RT TURN LANE, SB
LT TURN LANE, SB

-L- STA. 90+48.95
END 200' TAPER
RT TURN LANE, SB
LT TURN LANE, SB

BL-3 PINC 98+51.63
GPS U-4026-3
-L- STA. 89+79.65
(53.048' LT.)

DO NOT DISTURB SIGN & FENCE

DO NOT DISTURB SIGN

BL-112 PINC 95+20.48
BY5-216 POT 10+52.42
-L- STA. 86+56.04
(4.045' RT.)

FUTURE C&G. TURNOUTS BY OTHERS

CLASS "B" RIP RAP
EST 5 TONS
EST 14 SY FF

3' LAT. BASE DITCH
EST. 175 CY DDE
SEE DITCH DETAIL E

SPECIAL DITCH GRADE (SEE PROFILES)

ENDWALL

PROP. 6" MONO. CONC. ISLAND

PROP. GUARDRAIL

SLOPE STAKE LINE

SR 1613

DAVIS DR

-L- STA. 83+75.00
END 200' TAPER
LT TURN LANE, SB

-L- STA. 85+48.58
END 200' TAPER
RT. TURN LANE, NB

-L- STA. 83+48.58
BEGIN 200' TAPER
RT. TURN LANE, NB

DO NOT DISTURB SIGN

-L- POC 87+03.10 =
-Y6- POT 15+01.12

-L- STA. 88+40.00
BEGIN 210' TAPER
BUS LANE, NB

-L- STA. 90+50.00
END 210' TAPER
BUS LANE, NB

-L- CS 89+73.74

-L- ST 91+73.74

ISFBUS

35SFAPT

EXIST. EARTH BERM TO BE REMOVED

TOWN OF MORRISVILLE
MB 1998 PG 104

1
RTP/PARKSIDE, L.L.C.
DB 8238 PG 900
MB 1999 PG 150

CHANNEL CHANGE W/
CLASS "B" RIP RAP -
BANKS ONLY
EST. 55 TONS
EST. 142 SY FF
EST. 125 CY DDE
SEE DITCH DETAIL M

LAT. "V" DITCH W/
CLASS "B" RIP RAP
EST. 78.2 TONS
EST. 220 SY FF
EST. 55 CY DDE
SEE DITCH DETAIL G

2' HEAD BASE DITCH
20 LF
EST. 3 CY DDE
SEE DITCH DETAIL A

2' LAT. BASE DITCH W/
CLASS "B" RIP RAP
EST. 192 TONS
EST. 320 SY FF
EST. 850 CY DDE
SEE DITCH DETAIL F

TIE EXISTING TO CHANNEL

2
DIOSYNTH RTP, INC.
DB 8561 PG 1761
DB 9065 PG 782
DB 9471 PG 929

LEGEND
PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-K
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 41
FOR -Y6- PROFILE, SEE SHEET 53

Plans prepared by:
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2/8/2005
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Ko & Associates, P.C.

REVISIONS

3/16/04 REVISED PARCEL NO. 6 TO PARCEL NO. 6A & 6B
3/25/04 NAME CHANGE PARCEL NO. 2
6/24/04 REVISED R/W & CE PARCEL NO. 2 & REVISED CE ON PARCEL NO. 6B
7/9/04 REVISED PARCEL NO. AND OWNER PARCEL 6B
9/9/04 REVISED PARCEL NO. 2A TO PARCEL NO. 2
2/16/05 REVISED ACCESS TO LEFT OVER CONDITION AT-Y7-
2/16/05 REVISED R/W AND TCE ON PARCEL NO. 2

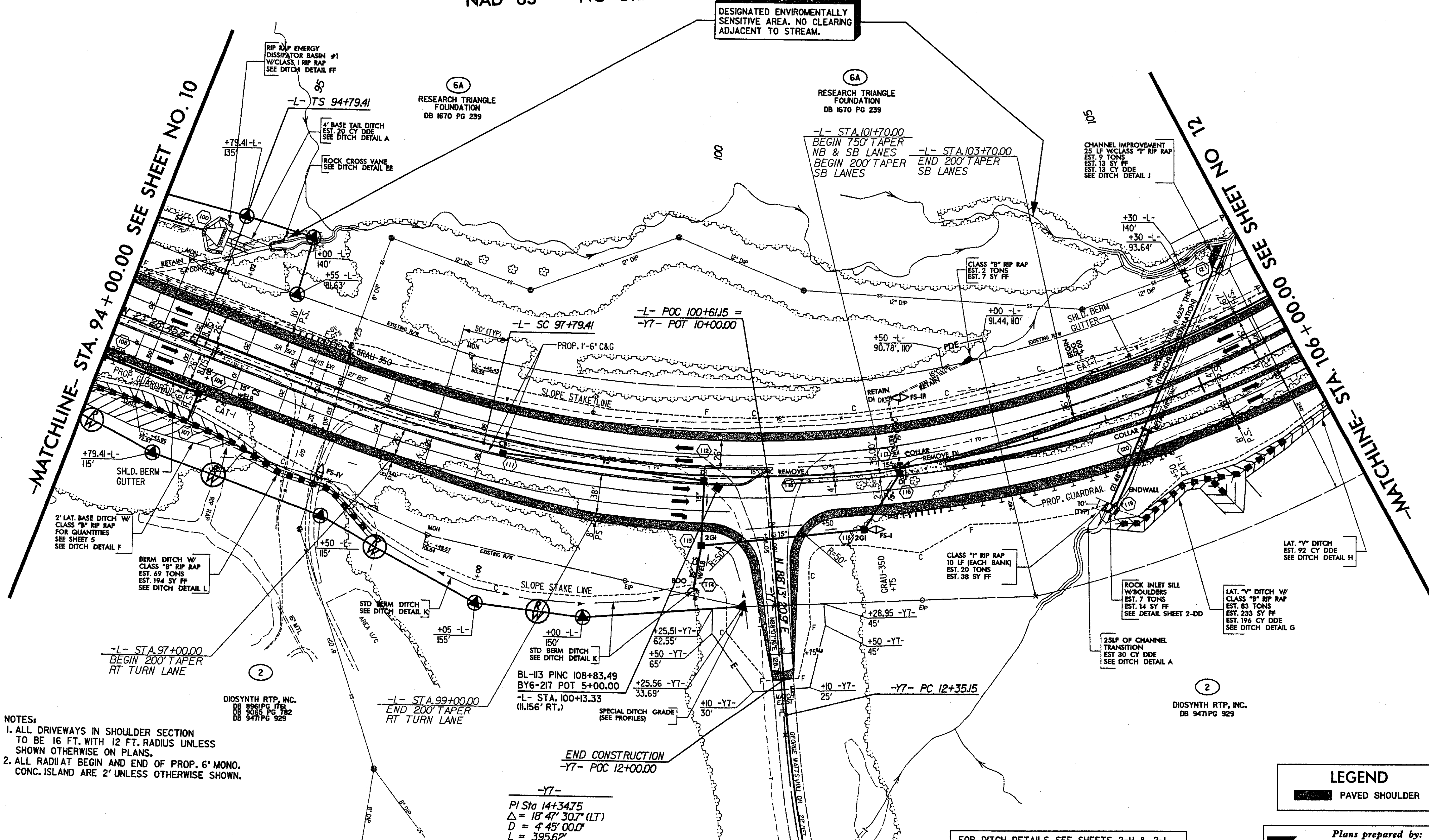
PROJECT REFERENCE NO.	SHEET NO.
U-4026	11
U-4026B R/W SHEET NO.	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PIs Sta 96+79.59	PI Sta 103+87.90
Θs = 7° 30' 00.0"	Δ = 55° 56' 12.8" (LT)
Ls = 300.00'	D = 5° 00' 00.0"
LT = 200.18'	L = 1,118.74'
ST = 100.16'	T = 608.48'
	R = 1,145.92'
	SE = 0.06 FT/FT
	RUNOFF = 300.0 FT

NAD 83 | NC GRID



DESIGNATED ENVIROMENTALLY SENSITIVE AREA. NO CLEARING ADJACENT TO STREAM.
-MATCHLINE- STA. 94+00.00 SEE SHEET NO. 10
-MATCHLINE- STA. 106+00.00 SEE SHEET NO. 12
6A
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239
RIP RAP ENERGY DISSIPATOR BASIN #1 W/CLASS I RIP RAP SEE DITCH DETAIL FF
-L- TS 94+79.41
4' BASE TAIL DITCH EST. 20 CY DDE SEE DITCH DETAIL A
ROCK CROSS VANE SEE DITCH DETAIL EE
-L- STA. 101+70.00 BEGIN 750' TAPER NB & SB LANES BEGIN 200' TAPER SB LANES
-L- STA. 103+70.00 END 200' TAPER SB LANES
CHANNEL IMPROVEMENT 25 LF W/CLASS "I" RIP RAP EST. 9 TONS EST. 13 SY FF EST. 13 CY DDE SEE DITCH DETAIL J
CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF
-L- SC 97+79.41
PROP. 1'-6" C&G
-L- POC 100+61.15 = -Y7- POT 10+00.00
SLOPE STAKE LINE
SHLD. BERM GUTTER
PROP. GUARDRAIL
2' LAT. BASE DITCH W/ CLASS "B" RIP RAP FOR QUANTITIES SEE SHEET 5 SEE DITCH DETAIL F
BERM DITCH W/ CLASS "B" RIP RAP EST. 69 TONS EST. 194 SY FF SEE DITCH DETAIL L
STD BERM DITCH SEE DITCH DETAIL K
-L- STA. 97+00.00 BEGIN 200' TAPER RT TURN LANE
-L- STA. 99+00.00 END 200' TAPER RT TURN LANE
BL-113 PINC 108+83.49 BY6-217 POT 5+00.00 -L- STA. 100+13.33 (11.156' RT.)
SPECIAL DITCH GRADE (SEE PROFILES)
END CONSTRUCTION -Y7- POC 12+00.00
-Y7- PC 12+35.15
CLASS "I" RIP RAP 10 LF (EACH BANK) EST. 20 TONS EST. 38 SY FF
ROCK INLET SILL W/BOULDERS EST. 7 TONS EST. 14 SY FF SEE DETAIL SHEET 2-DD
25LF OF CHANNEL TRANSITION EST 30 CY DDE SEE DITCH DETAIL A
LAT. "V" DITCH EST. 92 CY DDE SEE DITCH DETAIL H
LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 83 TONS EST. 233 SY FF EST. 196 CY DDE SEE DITCH DETAIL G
2
DIOSYNTH RTP, INC. DB 8961 PG 1761 DB 9065 PG 782 DB 9471 PG 929
DIOSYNTH RTP, INC. DB 9471 PG 929
GEORGE WATTS HILL DR

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

-Y7-
PI Sta 14+34.75
Δ = 18° 47' 30.7" (LT)
D = 4° 45' 00.0"
L = 395.62'
T = 199.60'
R = 1,206.23'
SE = MATCH

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-K
FOR ROCK INLET SILL DETAIL, SEE SHEET 2-DD
FOR -L- PROFILE, SEE SHEET 41
FOR -Y7- PROFILE, SEE SHEET 53

LEGEND
PAVED SHOULDER

Plans prepared by:
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2/16/2005
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Ko & Associates, P.C.

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	12
U-4026B RW SHEET NO.	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-
PI Sta 103+87.90
Δ = 55° 56' 12.8" (LT)
D = 5° 00' 00.0"
L = 1,118.74'
T = 608.48'
R = 1,145.92'
SE = 0.06 FT/FT
RUNOFF = 300.0 FT

PIs Sta 109+98.31
θs = 7° 30' 00.0"
Ls = 300.00'
LT = 200.18'
ST = 100.16'

NAD 83 / NC GRID

DESIGNATED ENVIROMENTALLY SENSITIVE AREA. NO CLEARING ADJACENT TO STREAM.

-MATCHLINE- STA. 106+00.00 SEE SHEET NO. 11

-MATCHLINE- STA. 118+00.00 SEE SHEET NO. 13

BL-114 PINC 117+86.39
-L- STA. 109+42.42
(14.480' LT.)

-L- STA.117+61.78
BEGIN 200' TAPER
SB LT.TURN LANE

-L- ST 111+98.15

-L- STA.109+20.00
END 750' TAPER
NB & SB LANES

-L- CS 108+98.15

-L- STA.110+91.81
BEGIN 200' TAPER
NB LT.TURN LANE

-L- STA.112+91.81
END 200' TAPER
NB LT.TURN LANE

-L- TS 115+74.22

SOUTH LOOP RD.BY OTHERS

RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239 (6A)

DIOSYNTH RTP, INC.
DB 9471 PG 929 (2)

RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239 (6B)

CLASS "I" RIP RAP
EST. 26 TONS
EST. 50 SY FF

CLASS "B" RIP RAP
EST. 8 TONS
EST. 21 SY FF

LAT. "V" DITCH
FOR QUANTITIES
SEE SHEET 6
SEE DITCH DETAIL H

LAT. "V" DITCH W/
CLASS "B" RIP RAP
EST. 37 TONS
EST. 104 SY FF
EST. 126 CY DDE
SEE DITCH DETAIL G

LAT. "V" DITCH W/
CLASS "B" RIP RAP
EST. 33 TONS
EST. 91 SY FF
EST. 72 CY DDE
SEE DITCH DETAIL G

BERM DITCH W/
CLASS "B" RIP RAP
EST. 92 TONS
EST. 259 SY FF
SEE DITCH DETAIL L

STD BERM DITCH
SEE DITCH DETAIL K

30" WELDED STEEL PIPE
0.50 THK (TRENCHLESS INSTALLATION)

PROP. GUARDRAIL ENDWALL

SLOPE STAKE LINE

N 41° 27' 26.9" W

-L-
PIs Sta 117+74.37
θs = 6° 45' 00.0"
Ls = 300.00'
LT = 200.15'
ST = 100.13'

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 42

LEGEND
PAVED SHOULDER

Plans prepared by:
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2/8/2005
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PROJECT REFERENCE NO.	SHEET NO.
U-4026	13
U-4026B R/W SHEET NO.	8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 / NC GRID

-L-
Pls Sta 126+49.22
θs = 6°45'00.0"
Ls = 300.00'
LT = 200.15'
ST = 100.13'

Pl Sta 128+78.04
Δ = 11°34'03.7" (LT)
D = 4°30'00.0"
L = 257.06'
T = 128.97'
R = 1,273.24'
SE = 0.08 FT/FT
RUNOFF = 300.0 FT

-MATCHLINE- STA. 118+00.00 SEE SHEET NO 12

-MATCHLINE- STA. 130+00.00 SEE SHEET NO. 14

6A
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

6B
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

BL-115 PINC 126+96.75
-L- STA. 118+52.34
(22.633' LT.)

-L- STA 119+61.78
END 200' TAPER
SB LT. TURN LANE

BL-25 PINC 135+81.05
R2000-25 (GPS)
-L- STA. 127+35.29
(16.086' LT.)

-L- TS 124+49.08

-L- SC 127+49.08

-L- SC 118+74.22

-L- CS 119+83.10

-L- ST 122+83.10

SLOPE STAKE LINE

EXISTING R/W

CLASS "B" RIP RAP
EST. 11 TONS
EST. 28 SY FF

CLASS "B" RIP RAP
EST. 9 TONS
EST. 10 SY FF

CLASS "B" RIP RAP
EST. 8 TONS
EST. 14 SY FF

SPECIAL DITCH GRADE
(SEE PROFILES)

SPEC. FALSE CUT
SEE DITCH DETAIL I

BERM DITCH W/
CLASS "B" RIP RAP
EST. 14 TONS
EST. 39 SY FF
SEE DITCH DETAIL L

BERM DITCH W/
CLASS "B" RIP RAP
EST. 23 TONS
EST. 65 SY FF
SEE DITCH DETAIL L

BERM DITCH W/
CLASS "B" RIP RAP
EST. 28 TONS
EST. 78 SY FF
SEE DITCH DETAIL L

BERM DITCH W/
CLASS "B" RIP RAP
EST. 14 TONS
EST. 39 SY FF
SEE DITCH DETAIL L

+50 -L- 120'
+50 -L- 93.29'
PDE
+00 -L- 120'
+00 -L- 91.66'
+66.09
47.87' (TYP.)
+50 -L- 115'
+50 -L- 93.44'
+00 -L- 115'
+00 -L- 93.74'
+30 -L- 145.31'
+65 -L- 148.44'
+25 -L- 193'
+95 -L- 190'
+75 -L- 147.53'
+75 -L- 147.65'
+60 -L- 173'
+50 -L- 149.30'

N 29°03'28.3"W

-L-
Pls Sta 117+74.37
θs = 6°45'00.0"
Ls = 300.00'
LT = 200.15'
ST = 100.13'

Pl Sta 119+28.69
Δ = 4°53'58.6" (RT)
D = 4°30'00.0"
L = 108.88'
T = 54.47'
R = 1,273.24'
SE = 0.08 FT/FT

Pls Sta 120+83.23
θs = 6°45'00.0"
Ls = 300.00'
LT = 200.15'
ST = 100.13'

SOIL

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 42

LEGEND
PAVED SHOULDER

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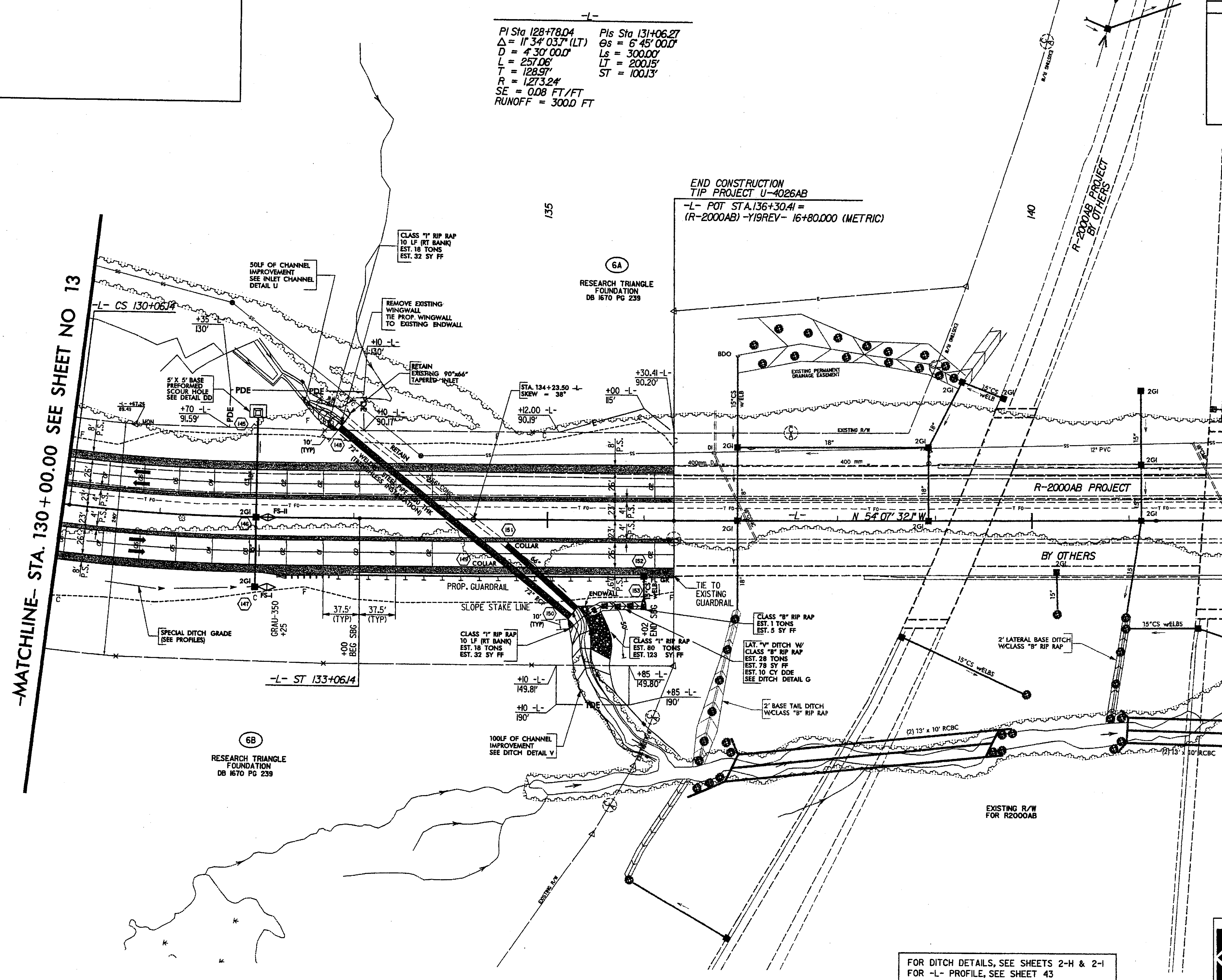
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	14
U-4026B R/W SHEET NO.	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-
PI Sta 128+78.04
Δ = 11° 34' 03.7" (LT)
D = 4° 30' 00.0"
L = 257.06'
T = 128.97'
R = 1,273.24'
SE = 0.08 FT/FT
RUNOFF = 300.0 FT
Pls Sta 131+06.27
θs = 6° 45' 00.0"
Ls = 300.00'
LT = 200.15'
ST = 100.13'
END CONSTRUCTION
TIP PROJECT U-4026AB
-L- POT STA.136+30.41 =
(R-2000AB) -Y19REV- 16+80.000 (METRIC)
-MATCHLINE- STA. 130+00.00 SEE SHEET NO 13
-MATCHLINE- STA. 142+00.00 SEE SHEET NO. 15
NAD 83
NC GRID
R-2000AB PROJECT BY OTHERS
R-2000AB PROJECT
BY OTHERS
N 54° 07' 32.1" W
RESEARCH TRIANGLE FOUNDATION DB 1670 PG 239
PROP. GUARDRAIL
SLOPE STAKE LINE
TIE TO EXISTING GUARDRAIL
EXISTING PERMANENT DRAINAGE EASEMENT
EXISTING R/W FOR R2000AB
-L- CS 130+06.14
-L- ST 133+06.14
CLASS "I" RIP RAP 10 LF (RT BANK) EST. 18 TONS EST. 32 SY FF
50LF OF CHANNEL IMPROVEMENT SEE INLET CHANNEL DETAIL U
REMOVE EXISTING WINGWALL TIE PROP. WINGWALL TO EXISTING ENDWALL
RETAIN EXISTING 90"x66" TAPERED INLET
5' X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD
STA. 134+23.50 -L- SKEW = 38°
SPECIAL DITCH GRADE (SEE PROFILES)
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
CLASS "I" RIP RAP EST. 80 TONS EST. 123 SY FF
LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 28 TONS EST. 78 SY FF EST. 10 CY DDE SEE DITCH DETAIL G
2' BASE TAIL DITCH W/CLASS "B" RIP RAP
2' LATERAL BASE DITCH W/CLASS "B" RIP RAP
100LF OF CHANNEL IMPROVEMENT SEE DITCH DETAIL V
(2) 13' x 10' RCBC
15"CS wELBS

LEGEND
PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 43

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2/8/2005
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7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	15
U-4026B R/W SHEET NO.	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 / NC GRID

* 2GI TO BE CONSTRUCTED UNDER TIP PROJECT R-2000AB

BEGIN CONSTRUCTION
TIP PROJECT U-4026AB
-L- POC STA.148+77.13 =
(R-2000AB) -Y19REV- STA.13+00.000 (METRIC)

BL-26 PINC 155+50.61=
R2000-26 (GPS)
-L- STA. 147+12.65
(58.052' L.T.)

-MATCHLINE- STA. 142+00.00 SEE SHEET NO. 14

-MATCHLINE- STA. 154+00.00 SEE SHEET NO. 16

R-2000AB PROJECT BY OTHERS

EXISTING R/W FOR R2000AB

R-2000AB PROJECT

N 54°07'32.1" W
BY OTHERS

-L- TS 144+35.84

-L- SC 147+14.71

-L- STA.150+40.00
BEGIN 200' TAPER
LT. TURN LANE, NB

-L- CS 150+90.97

-L- STA.152+40.00
END 200' TAPER
LT. TURN LANE, NB

-L- ST 153+70.97

-L- SLOPE STAKE LINE

PROP. GUARDRAIL

TIE TO EXISTING GUARDRAIL

CLASS "B" RIP RAP
EST. 3 TONS
EST. 10 SY FF

CLASS "I" RIP RAP
EST. 20 TONS
EST. 39 SY FF

CLASS "B" RIP RAP
EST. 3 TONS
EST. 10 SY FF

(2) 13' x 10' RCBC

WINGWALLS SUBMERGED (WATER LEVEL TO TOP OF HW)

SIZE AND TYPE OF SEWER PIPE AS PER TOWN OF CARY SEWER DEPARTMENT

12" PVC

6C
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

6D
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

10
CISCO SYSTEMS, INC.
DB 9390 PG 1902
MB 1994 PG 950

-L-

PIs Sta 146+21.82	PI Sta 149+03.70	PIs Sta 151+84.37
θs = 4° 58' 10.3"	Δ = 13° 24' 36.7" (RT)	θs = 4° 59' 22.8"
Ls = 278.87'	D = 3° 33' 50.5"	Ls = 280.00'
LT = 185.99'	L = 376.26'	LT = 186.74'
ST = 93.02'	T = 189.00'	ST = 93.40'
	R = 1,607.61'	
	SE = 0.06 FT/FT	
	RUNOFF = 280.0 FT	

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 43

LEGEND
PAVED SHOULDER

Plans prepared by:
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2/8/2005
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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	16
U-4026B RW SHEET NO.	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

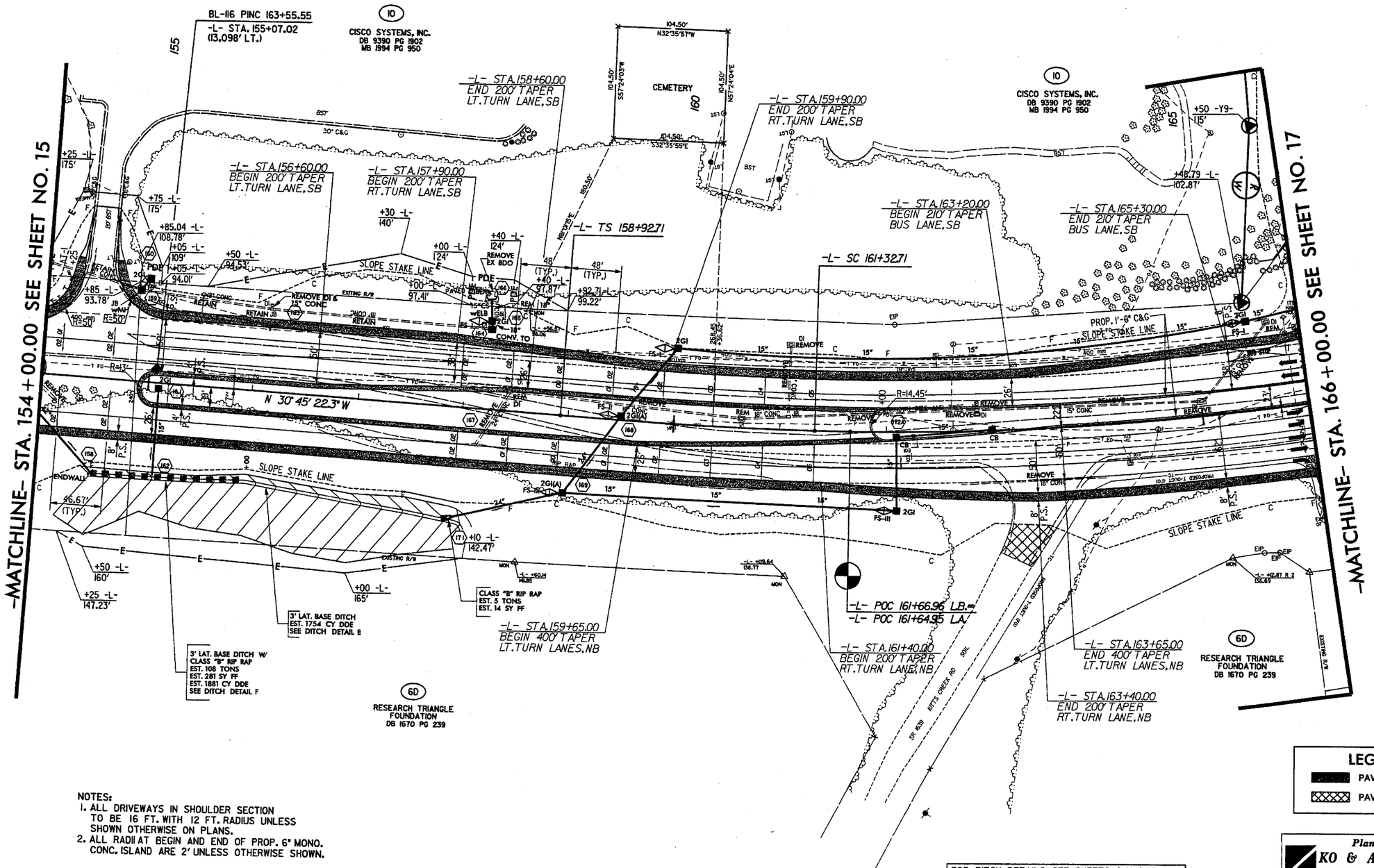
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 / NC GRID

-L-
PIs Sta 160+52.73
θs = 2° 24' 00.0"
Ls = 240.00'
LT = 160.01'
ST = 80.01'

PI Sta 161+49.84
Δ = 0° 41' 05.9" (LT)
D = 2° 00' 00.0"
L = 34.25'
T = 17.12'
R = 2,864.79'
SE = 0.05 FT/FT
RUNOFF = 240.0 FT

PI Sta 165+33.95
Δ = 14° 40' 45.7" (LT)
D = 2° 00' 00.0"
L = 733.97'
T = 369.00'
R = 2,864.79'



NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 44

LEGEND
PAVED SHOULDER
PAVEMENT REMOVAL

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02/08/2005
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Ko & Associates, P.C.

7/2/9

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	17
U-4026B R/W SHEET NO.	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 / NC GRID

-Y9-
SR 1639 KIT CREEK ROAD
19800
39800

1530 / 2930	4765 / 9465	
15285 / 27585	-L- DAVIS DRIVE	21950 / 40950
1335 / 2635	4765 / 9465	
19605 / 39505		

2004 ADT
2024 ADT

PROJECTED TRAFFIC VOLUMES

-MATCHLINE- STA. 23+00.00
SEE SHEET NO. 32

-MATCHLINE- STA. 166+00.00 SEE SHEET 16

-MATCHLINE- STA. 178+00.00 SEE SHEET NO. 18

-MATCHLINE- STA. 29+00.00
SEE SHEET NO. 33

(10) CISCO SYSTEMS, INC.
DB 9390 PG 1902
MB 1994 PG 950

(9) ARE - 7030
KIT CREEK, LLC
DB 8638 PG 425
MB 1994 PG 574

(10B) CISCO SYSTEMS, INC.
DB 8119 PG 1199
MB 1998 PG 1391

(6D) RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

(8) BIOGEN REALTY LLC
DB 8249 PG 340
DB 6317 PG 83
MB 1999 PG 264
MB 1994 PG 1560

-Y9- ST 23+31.45
PROP. MULTI USE TRAIL
PROP. 6' MONO. CONC. ISLAND
BL-117 PINC 174+86.37
BY7-220 PINC 21+20.65
-L- STA. 166+41.95
(15.060' LT.)
-L- ST 171+38.92
-L- CS 168+98.92
SPECIAL DITCH GRADE (SEE PROFILES)
SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D
-L- STA.173+50.47
BEGIN 400' TAPER LT.TURN LANES,SB
PROP. MULTI USE TRAIL
BL-118 PINC 184+36.78
-L- STA. 175+94.71
(3.453' LT.)
CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF
TIE PIPE TO EXISTING DITCH
SLOPE STAKE LINE
PROP. 1'-6" C&G
TIE TO EXISTING DRAW
-L- POC 166+96.91 = -Y9- POT 26+19.50
-Y9- PC 26+62.65
-L- STA.168+50.00
BEGIN 210' TAPER BUS LANE,NB
-L- STA.170+60.00
END 210' TAPER BUS LANE,NB
-Y9- PT 28+49.35
SPEC. LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 69 TONS EST. 194 SY FF SEE DITCH DETAIL C
-L- STA.174+60.00
BEGIN 200' TAPER LT.TURN LANE,NB
-L- STA.174+95.00
BEGIN 200' TAPER RT.TURN LANE,NB
-L- STA.176+60.00
END 200' TAPER LT.TURN LANE,NB
-L- STA.176+95.00
END 200' TAPER RT.TURN LANE,NB
-L- STA.177+50.47
END 400' TAPER LT.TURN LANES,SB
RIP RAP ENERGY DISSIPATOR BASIN # 2 W/CLASS I RIP RAP SEE DITCH DETAIL FF
PROP. GUARDRAIL
SHLD. BERM-GUTTER
CLASS "I" RIP RAP 10 LF (LT BANK) EST. 12 TONS EST. 21 SY FF
LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 28 TONS EST. 84 SY FF EST. 6 CY DDE SEE DITCH DETAIL Q
35 LF OF CHANNEL IMPROVEMENT W/ CLASS "I" RIPRAP EST. 20 TONS EST. 137 SY FF SEE DITCH DETAIL W
ROCK INLET SILL W/BOULDERS EST. 7 TONS EST. 14 SY FF SEE DETAIL SHEET 2-DD

-Y9-
PI Sta 27+56.01
Δ = 1° 52' 01.5" (RT)
D = 1° 00' 00.0"
L = 186.71'
T = 93.36'
R = 5,729.58'
SE = 0.02 FT/FT

-L-
PI Sta 165+33.95
Δ = 14° 40' 45.6" (LT)
D = 2° 00' 00.0"
L = 733.97'
T = 369.00'
R = 2,864.79'
SE = 0.05 FT/FT
RUNOFF = 240.0 FT

PIs Sta 169+78.93
θs = 2° 24' 00.0"
Ls = 240.00'
LT = 160.01'
ST = 80.01'

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H& 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-K
FOR TRAIL PLANS, SEE SHEETS 2-O THRU 2-P
FOR ROCK INLET SILL DETAIL, SEE SHEET 2-DD
FOR -L- PROFILE, SEE SHEET 44
FOR -Y9- PROFILE, SEE SHEET 54

LEGEND
PAVED SHOULDER

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2/8/2005
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KO & Associates, P.C.

7/2/96

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	18
U-4026B R/W SHEET NO.	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 / NC GRID

-MATCHLINE- STA. 178+00.00 SEE SHEET NO. 17

-MATCHLINE- STA. 190+00.00 SEE SHEET NO. 19

(108) CISCO SYSTEMS, INC.
DB 8119 PG 1199
MB 1998 PG 1391

(6E) RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

(11) DELTA PRODUCTS CORP.
DB 7319 PG 615
MB 1997 PG 160

(8) BIOGEN REALTY LLC
DB 9230 PG 0450
DB 8249 PG 0340
BM 1999 PG 0265
BM 1994 PG 1560

-L- STA.178+05.00
BEGIN 200' TAPER
BUS LANE, SB

-L- STA.180+05.00
END 200' TAPER
BUS LANE, SB

-L- STA.180+60.00
BEGIN 200' TAPER
LT. TURN LANE, SB

-L- STA.182+60.00
END 200' TAPER
LT. TURN LANE, SB

-L- STA.185+65.00
BEGIN 210' TAPER
BUS LANE, SB

-L- STA.187+75.00
END 210' TAPER
BUS LANE, SB

SPECIAL CONCRETE OUTLET STRUCTURE W/5 FT WEIR SEE STRUCTURE PLANS FOR DETAILS

BL-119 PINC 193+06.72
-L- STA. 184+48.08
(14.702' LT.)

CLASS "B" RIP RAP
EST. 11 TONS
EST. 28 SY FF

SPECIAL DITCH GRADE (SEE PROFILES)

DO NOT DISTURB SIGN

-L- SC 182+45.03

-L- STA.179+55.00
BEGIN 210' TAPER
BUS LANE, NB

-L- TS 179+45.03

-L- STA.181+65.00
END 210' TAPER
BUS LANE, NB

TIE TO EXISTING DITCH

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

TIE TO EXISTING SWALE

2' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 108 TONS
EST. 304 SY FF
EST. 275 CY DDE
SEE DITCH DETAIL F

-L- STA.185+41.09
BEGIN 200' TAPER
RT. & LT TURN LANES, NB

-L- STA.187+41.09
END 200' TAPER
RT & LT TURN LANES, NB

STD. BERM DITCH SEE DITCH DETAIL K

SPEC. FALSE CUT SEE DITCH DETAIL I

SLOPE STAKE LINE

BERM "V" DITCH W/ CLASS "B" RIP RAP
EST. 52 TONS
EST. 157 SY FF
SEE DITCH DETAIL L

TIE EXIST. DITCH TO PROP. BERM DITCH

PROP C&G TRANSITION SECTION (TYP)

-L-
Pls Sta 181+45.20
θs = 1° 07' 30.0"
Ls = 300.00'
LT = 200.16'
ST = 100.15'

Pl Sta 189+78.62
Δ = 62° 36' 45.7" (RT)
D = 4° 45' 00.0"
L = 1,318.16'
T = 733.58'
R = 1,206.23'
SE = 0.08 FT/FT
RUNOFF = 300.0 FT

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 45

DELTA

PROJECTED TRAFFIC VOLUMES

21950 / 40950	-L- DAVIS DRIVE	22245 / 41345
95 / 195		95 / 195
190 / 390		485 / 785
675 / 1175	WALLY GILBERT DRIVE	

2004 ADT
2024 ADT

LEGEND
PAVED SHOULDER

Plans prepared by:
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7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	19
U-4026B R/W SHEET NO.	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID

FOR TDE AROUND POND SEE PLAN SHEET 19A

RESEARCH TRIANGLE FOUNDATION DB 1670 PG 239

DELTA PRODUCTS CORP. DB 7311 PG 615 MB 1997 PG 160

-L- STA. 190+55.71 BEGIN 200' TAPER LT&RT TURN LANES, SB

BL-120 PINC 200+69.49
-L- STA. 191+89.49
(30.443' LT.)

-L- STA. 192+55.71 END 200' TAPER LT & RT. TURN LANES, SB

BL-121 PINC 205+87.52=
-L- STA. 197+01.59
(16.173' LT.)

-MATCHLINE- STA. 190+00.00 SEE SHEET NO. 18

-MATCHLINE- STA. 202+00.00 SEE SHEET NO. 20

SPECIAL DITCH GRADE (SEE PROFILES)

REMOVE 28LF EX 18" CONC

PROP. GUARDRAIL

DO NOT DISTURB EXISTING TIMBER WALL

SLOPE STAKE LINE

SR 1613 DAVIS DR

N 25° 56' 31.9" E

STD. BERM DITCH SEE DITCH DETAIL K

BIOGEN REALTY LLC
DB 9230 PG 0450
DB 8249 PG 0340
BM 1999 PG 0265
BM 1994 PG 1560

-L- ST. A. 192+40.00 END 210' TAPER BUS LANE, NB

-L- ST. A. 190+30.00 BEGIN 210' TAPER BUS LANE, NB

-L- CS 195+63.20

-L- ST 198+63.20

-L- ST. A. 201+60.00 BEGIN 200' TAPER LT. TURN LANE, NB

-L-	
PI Sta 189+78.62	PIs Sta 196+63.34
Δ = 62° 36' 45.7" (RT)	θs = 7° 01' 30.0"
D = 4° 45' 00.0"	Ls = 300.00'
L = 1,318.16'	LT = 200.16'
T = 733.58'	ST = 100.15'
R = 1,206.23'	
SE = 0.08 FT/FT	
RUNOFF = 300.0 FT	

LAT. "V" DITCH W/ CLASS "B" RIP RAP EST. 10 TONS EST. 31 SY FF EST. 5 CY DDE SEE DITCH DETAIL G

5' X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD

ROCK PLATE W/ CLASS "I" RIP RAP SEE DITCH DETAIL P

125LF OF INLET CHANNEL CLEANOUT EST. 42 CY DDE SEE DITCH DETAIL X

CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF

CLASS "B" RIP RAP EST. 9 TONS EST. 20 SY FF

LAT. 2' BASE DITCH EST. 221 CY DDE SEE DITCH DETAIL E

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 45
FOR CULVERT PLANS, SEE CULVERT SHEETS C- __ - C-__

FOR TDE AROUND POND SEE PLAN SHEET 19A

LEGEND
PAVED SHOULDER

Plans prepared by:
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7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	19A
U-4026B R/W SHEET NO.	14A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

50 0 100
SCALE

NAD 83 NC GRID

11 DELTA PRODUCTS CORP.
DB 731 PG 615
MB 1997 PG 160

8 BIOGEN REALTY LLC
DB 9230 PG 0450
DB 8249 PG 0340
MB 1999 PG 265
MB 1994 PG 1560

6F RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

6G RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239

BIOGEN, INC
DB 8249 PG 340
MB 1999 PG 265

12 ERICSSON TRUST
DB 7126 PG 64
MB 1996 PG 1253

FIRST UNION NATIONAL BANK
c/o ERICSSON TRUST
DB 7648 PG 247
MB 1997 PG 1511

190 195 200 205

EX R/W -L- 111.49'
EX R/W -L- 149.56'
EX R/W -L- 90.12'
EX R/W -L- 150.00'

191+03.51 -L- 717.31'
191+75.78 -L- 681.30'
192+10.37 -L- 1046.15'
192+63.88 -L- 1021.36'
192+86.13 -L- 966.80'
193+59.20 -L- 1092.88'
194+50.46 -L- 1009.51'
195+00.03 -L- 1088.66'
196+20.39 -L- 871.51'
196+40.37 -L- 1148.20'
196+63.25 -L- 639.72'
197+18.00 -L- 1261.95'
197+72.93 -L- 1302.92'
197+98.91 -L- 312.84'
198+48.67 -L- 580.90'
199+07.84 -L- 568.85'
199+55.96 -L- 1387.00'
199+96.14 -L- 560.67'
200+60.66 -L- 1192.89'
201+32.45 -L- 588.40'
201+39.06 -L- 391.78'
201+85.88 -L- 1545.49'
202+23.04 -L- 487.35'
202+33.84 -L- 1398.23'
202+50 -L- 1507.00'
202+56.17 -L- 198.44'
203+92.38 -L- 488.10'
204+16.59 -L- 380.49'
204+52.99 -L- 363.54'
204+63.81 -L- 491.01'
204+95.98 -L- 380.49'
207+38.37 -L- 564.72'

THIS SHEET TO BE USED FOR POND TDE LOCATION ONLY

FOR -L- & -Y10- PLANS, SEE SHEETS 18, 19, 20 & 37

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2/8/2005
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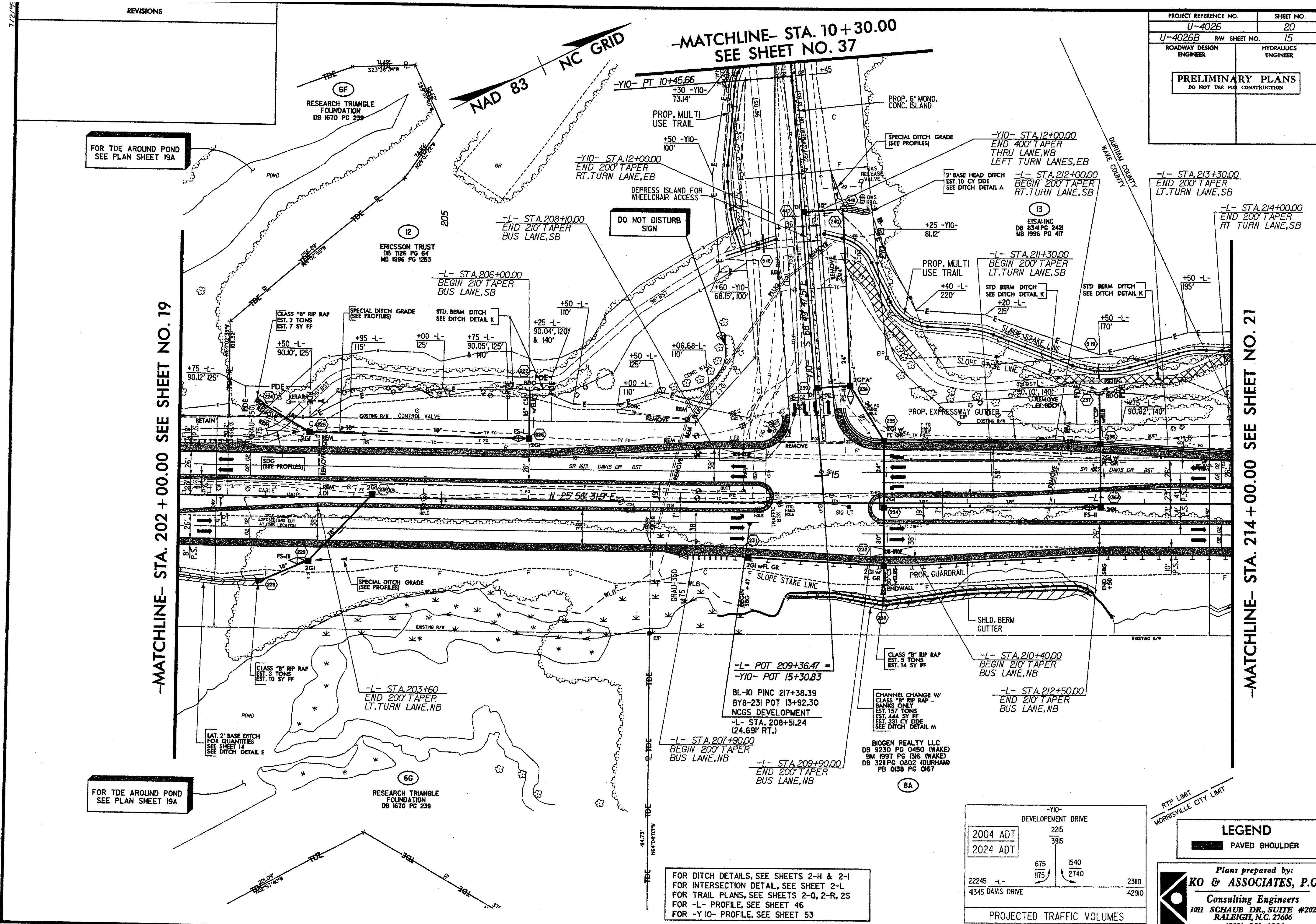
KO & Associates, P.C.



REVISIONS
PROJECT REFERENCE NO. U-4026
SHEET NO. 20
U-4026B RW SHEET NO. 15
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
-MATCHLINE- STA. 10+30.00 SEE SHEET NO. 37
-MATCHLINE- STA. 202+00.00 SEE SHEET NO. 19
-MATCHLINE- STA. 214+00.00 SEE SHEET NO. 21
NAD 83
NC GRID
RESEARCH TRIANGLE FOUNDATION DB 1670 PG 239
FOR TDE AROUND POND SEE PLAN SHEET 19A
ERICSSON TRUST DB 7126 PG 64 MB 1996 PG 1253
EISAI INC DB 8341 PG 2421 MB 1996 PG 417
BIOGEN REALTY LLC DB 9230 PG 0450 (WAKE) BM 1997 PG 1316 (WAKE) DB 3211 PG 0802 (DURHAM) PB 0138 PG 0167
DURHAM COUNTY
WAKE COUNTY
-Y10- PT 10+45.66
PROP. MULTI USE TRAIL
PROP. 6' MONO. CONC. ISLAND
SPECIAL DITCH GRADE (SEE PROFILES)
-Y10- STA. 12+00.00 END 400' TAPER THRU LANE, WB LEFT TURN LANES, EB
-Y10- STA. 12+00.00 END 200' TAPER RT. TURN LANE, EB
2' BASE HEAD DITCH EST. 10 CY DDE SEE DITCH DETAIL A
-L- STA. 212+00.00 BEGIN 200' TAPER RT. TURN LANE, SB
-L- STA. 213+30.00 END 200' TAPER LT. TURN LANE, SB
-L- STA. 214+00.00 END 200' TAPER RT TURN LANE, SB
DEPRESS ISLAND FOR WHEELCHAIR ACCESS
DO NOT DISTURB SIGN
-L- STA. 208+10.00 END 210' TAPER BUS LANE, SB
-L- STA. 206+00.00 BEGIN 210' TAPER BUS LANE, SB
-L- STA. 211+30.00 BEGIN 200' TAPER LT. TURN LANE, SB
STD. BERM DITCH SEE DITCH DETAIL K
CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF
SR 1613 DAVIS DR BST
N 25°56'31.9" E
PROP. EXPRESSWAY GUTTER
PROP. GUARDRAIL
SLOPE STAKE LINE
SHLD. BERM GUTTER
CLASS "B" RIP RAP EST. 5 TONS EST. 14 SY FF
CLASS "B" RIP RAP EST. 3 TONS EST. 10 SY FF
-L- STA. 210+40.00 BEGIN 210' TAPER BUS LANE, NB
-L- STA. 212+50.00 END 210' TAPER BUS LANE, NB
-L- STA. 203+60 END 200' TAPER LT. TURN LANE, NB
-L- POT 209+36.47 = -Y10- POT 15+30.83
BL-10 PINC 217+38.39
BY8-231 POT 13+92.30
NCGS DEVELOPMENT
-L- STA. 208+51.24 (24.69' RT.)
CHANNEL CHANGE W/ CLASS "B" RIP RAP - BANKS ONLY EST. 157 TONS EST. 444 SY FF EST. 331 CY DDE SEE DITCH DETAIL M
-L- STA. 207+90.00 BEGIN 200' TAPER BUS LANE, NB
-L- STA. 209+90.00 END 200' TAPER BUS LANE, NB
LAT. 2' BASE DITCH FOR QUANTITIES SEE SHEET 14 SEE DITCH DETAIL E
POND
FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-L
FOR TRAIL PLANS, SEE SHEETS 2-Q, 2-R, 2S
FOR -L- PROFILE, SEE SHEET 46
FOR -Y10- PROFILE, SEE SHEET 53
-Y10- DEVELOPEMENT DRIVE
2004 ADT
2024 ADT
2215
3915
675
1175
1540
2740
22245 -L-
41345 DAVIS DRIVE
23110
42910
PROJECTED TRAFFIC VOLUMES
RTP LIMIT
MORRISVILLE CITY LIMIT
LEGEND
PAVED SHOULDER
Plans prepared by:
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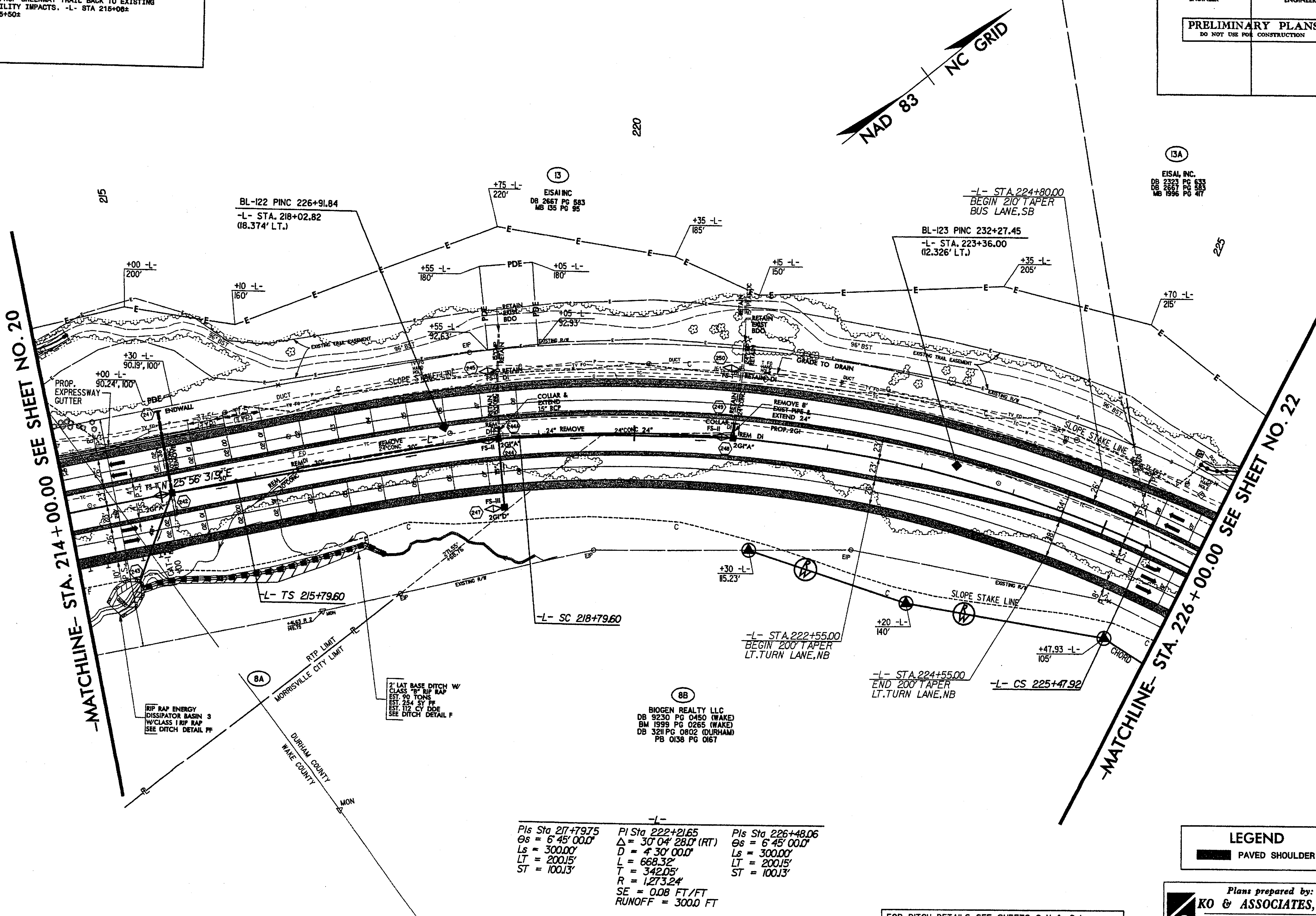
2/8/2005

REVISIONS

2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
2/4/04 REVISED R/W PARCELS 6 & 8
3/25/04 REVISED PARCEL NO. 14 TO PARCEL NO. 13A & NAME CHANGE
3/29/04 REVISED PARCEL NO. 8 TO PARCEL NO. 8A & 8B
2/23/05 REVERTED PROP GREENWAY TRAIL BACK TO EXISTING DUE TO UTILITY IMPACTS. -L- STA 215+06± TO STA 225+50±

PROJECT REFERENCE NO.	SHEET NO.
U-4026	21
U-4026B R/W SHEET NO.	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NAD 83 NC GRID
-MATCHLINE- STA. 214+00.00 SEE SHEET NO. 20
-MATCHLINE- STA. 226+00.00 SEE SHEET NO. 22
BL-122 PINC 226+91.84
-L- STA. 218+02.82
(18.374' LT.)
BL-123 PINC 232+27.45
-L- STA. 223+36.00
(12.326' LT.)
-L- STA.224+80.00
BEGIN 210' TAPER
BUS LANE,SB
13
EISAI INC
DB 2667 PG 583
MB 135 PG 95
13A
EISAI, INC.
DB 2323 PG 633
DB 2667 PG 583
MB 1996 PG 417
8A
8B
BIOGEN REALTY LLC
DB 9230 PG 0450 (WAKE)
BM 1999 PG 0265 (WAKE)
DB 3211 PG 0802 (DURHAM)
PB 0138 PG 0167
PROP. EXPRESSWAY GUTTER
ENDWALL
SLOPE STAKE LINE
EXISTING TRAIL EASEMENT
GRADE TO DRAIN
COLLAR & EXTEND 15" RCP
REMOVE 8' EXIST PIPE & EXTEND 24"
-L- TS 215+79.60
-L- SC 218+79.60
-L- STA.222+55.00
BEGIN 200' TAPER
LT.TURN LANE,NB
-L- STA.224+55.00
END 200' TAPER
LT.TURN LANE,NB
-L- CS 225+47.92
RTP LIMIT
MORRISVILLE CITY LIMIT
DURHAM COUNTY
WAKE COUNTY
RIP RAP ENERGY
DISSIPATOR BASIN 3
W/CLASS I RIP RAP
SEE DITCH DETAIL FF
2' LAT BASE DITCH W/
CLASS "B" RIP RAP
EST. 90 TONS
EST. 254 SY FF
EST. 112 CY DDE
SEE DITCH DETAIL F

-L-

PIs Sta 217+79.75	PI Sta 222+21.65	PIs Sta 226+48.06
θs = 6° 45' 00.0"	Δ = 30° 04' 28.0" (RT)	θs = 6° 45' 00.0"
Ls = 300.00'	D = 4° 30' 00.0"	Ls = 300.00'
LT = 200.15'	L = 668.32'	LT = 200.15'
ST = 100.13'	T = 342.05'	ST = 100.13'
	R = 1,273.24'	
	SE = 0.08 FT/FT	
	RUNOFF = 300.0 FT	

LEGEND

PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR TRAIL PLANS, SEE SHEETS 2-R & 2-S
FOR -L- PROFILE, SEE SHEET 46

Plans prepared by:
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5/5/2005
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REVISIONS
2/4/04 PROPERTY NAME CHANGE PARCELS 6 & 8
2/4/04 REVISED R/W & TDE PARCELS 6 & 8
3/8/04 REVISED R/W & CE TO PDE PARCEL 14
3/16/04 REVISED PARCEL NO 6 TO PARCEL NO. 6H & 6I
3/25/04 REVISED PARCEL NO 14 TO PARCEL NO. 13A & NAME CHANGE
3/29/04 REVISED PARCEL NO 8 TO PARCEL NO. 8B
7/2/04 NAME CHANGE PARCEL NO. 15
2/23/05 REVISED PROPOSED GREENWAY TRAIL, -L- STA 225+50± TO -L- STA 227+25±, DUE TO EXISTING UTILITY IMPACTS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	22
U-4026B R/W SHEET NO.	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-MATCHLINE- STA. 226+00.00 SEE SHEET NO. 21

-L- STA 226+90.00
END 210' TAPER
BUS LANE, SB

-L- STA 226+85.00
BEGIN 200' TAPER
BUS LANE, NB

-L- ST 228+47.92

BL-124 PINC 237+41.91=
-L- STA. 228+49.47
(8.076' LT.)

-L- STA 229+35.00
BEGIN 210' TAPER
BUS LANE, NB

-L- STA 228+85.00
END 200' TAPER
BUS LANE, NB

-L-
Pls Sta 226+48.06
Θs = 6° 45' 00.0"
Ls = 300.00'
LT = 200.15'
ST = 100.13'

-L- STA 230+00.00
BEGIN 200' TAPER
LT. TURN LANE, SB

-L- STA 231+45.00
BEGIN 200' TAPER
RT. TURN LANE, SB

-L- STA 232+00.00
END 200' TAPER
LT. TURN LANE, SB

-L- STA 233+45.00
END 200' TAPER
RT. TURN LANE, SB

-L- TS 231+09.21

-L- SC 233+79.21

-L- STA 231+45.00
END 210' TAPER
BUS LANE, NB

-L- STA 234+95.00
BEGIN 750' TAPER
NB & SB LANES

Pls Sta 232+89.30
Θs = 5° 37' 30.0"
Ls = 270.00'
LT = 180.09'
ST = 90.08'

Pl Sta 241+99.29
Δ = 61° 37' 18.9" (LT)
D = 4° 10' 00.0"
L = 1,478.93'
T = 820.08'
R = 1,375.10'
SE = 0.07 FT/FT
RUNOFF = 270.0 FT

13A
EISAL, INC.
DB 2323 PG 633
DB 2667 PG 583
MB 1996 PG 417

6H
RESEARCH TRIANGLE FOUNDATION
DB 148 PG 331
DB 385 PG 537

6I
RESEARCH TRIANGLE FOUNDATION
DB 148 PG 331
DB 385 PG 537

8B
BIOGEN REALTY LLC
DB 9230 PG 0450 (WAKE)
BM 1999 PG 0265 (WAKE)
DB 3211 PG 0802 (DURHAM)
PB 0138 PG 0167

15
TECHNOLOGY VII - IX, LLC
DB 382 PG 930

INLET CHANNEL W/ CLASS "I" RIP RAP
EST. 100 TONS
EST. 381 SY FF
EST. 30 CY DDE
SEE DITCH DETAIL Y

2' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 46 TONS
EST. 127 SY FF
EST. 69 CY DDE
SEE DITCH DETAIL F

2' LAT BASE DITCH W/ CLASS "B" RIP RAP
EST. 90 TONS
EST. 67 SY FF
EST. 129 CY DDE
SEE DITCH DETAIL F

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

CLASS "B" RIP RAP
EST. 5 TONS
EST. 14 SY FF

LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 87 TONS
EST. 262 SY FF
EST. 80 CY DDE
SEE DITCH DETAIL G

OUTLET CHANNEL W/ CLASS "I" RIP RAP
EST. 300 TONS
EST. 860 SY FF
EST. 313 CY DDE
SEE DITCH DETAIL Z

LAT. "V" DITCH W/ CLASS "B" RIP RAP
EST. 80 TONS
EST. 240 SY FF
EST. 33 CY DDE
SEE DITCH DETAIL G

-MATCHLINE- STA. 238+00.00 SEE SHEET NO. 23

NAD 83 / NC GRID

LEGEND
PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR TRAIL PLANS, SEE SHEETS 2-S & 2-T
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 47

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
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(919)-851-6066

5/5/2005
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KO & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	23
U-4026B R/W SHEET NO.	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

7/2/99

-L-

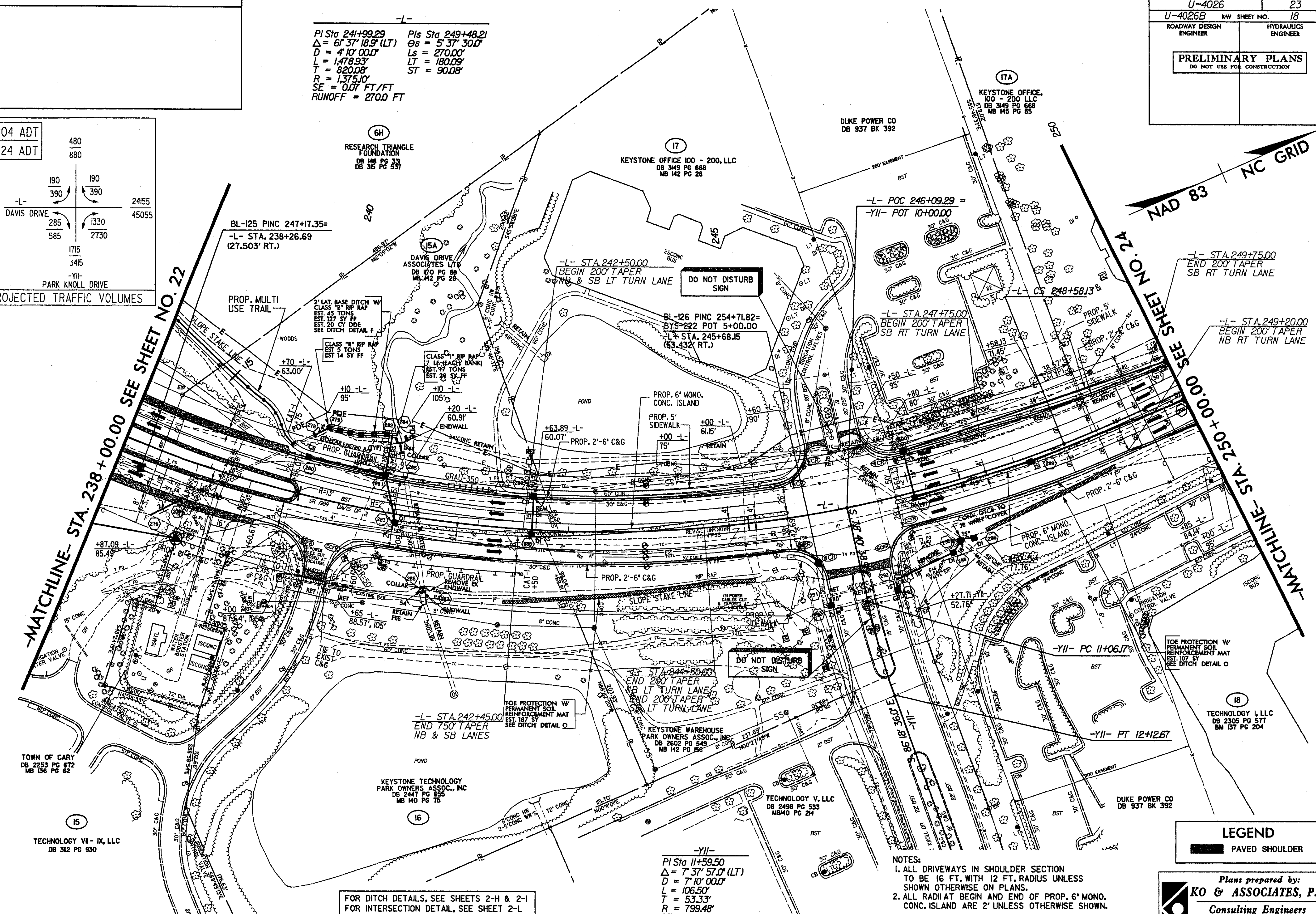
PI Sta 241+99.29	PIs Sta 249+48.21
Δ = 61° 37' 18.9" (LT)	θs = 5° 37' 30.0"
D = 4° 10' 00.0"	Ls = 270.00'
L = 1,478.93'	LT = 180.09'
T = 820.08'	ST = 90.08'
R = 1,375.10'	
SE = 0.07 FT/FT	
RUNOFF = 270.0 FT	

2004 ADT	480
2024 ADT	880

-L- DAVIS DRIVE: 23110 / 42910; 24155 / 45055; 190 / 390; 190 / 390; 285 / 585; 1330 / 2730; 1715 / 3415

-YII- PARK KNOLL DRIVE

PROJECTED TRAFFIC VOLUMES



NAD 83 NC GRID
-MATCHLINE- STA. 238+00.00 SEE SHEET NO. 22
-MATCHLINE- STA. 250+00.00 SEE SHEET NO. 24
BL-125 PINC 247+17.35= -L- STA. 238+26.69 (27.503' RT.)
BL-126 PINC 254+71.82= BY9-222 POT 5+00.00 -L- STA. 245+68.15 (53.432' RT.)
-L- POC 246+09.29 = -YII- POT 10+00.00
-L- CS 248+58.13
-L- STA. 242+50.00 BEGIN 200' TAPER NB & SB LT TURN LANE
-L- STA. 247+75.00 BEGIN 200' TAPER SB RT TURN LANE
-L- STA. 249+75.00 END 200' TAPER SB RT TURN LANE
-L- STA. 249+20.00 BEGIN 200' TAPER NB RT TURN LANE
-L- STA. 244+50.00 END 200' TAPER NB LT TURN LANE END 200' TAPER SB LT TURN LANE
-L- STA. 242+45.00 END 750' TAPER NB & SB LANES
-YII- PC 11+06.17
-YII- PT 12+12.67
DO NOT DISTURB SIGN
PROP. MULTI USE TRAIL
PROP. GUARDRAIL
PROP. 2'-6" C&G
PROP. 6' MONO. CONC. ISLAND
PROP. 5' SIDEWALK
SLOPE STAKE LINE
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 187 SY SEE DITCH DETAIL O
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 107 SY SEE DITCH DETAIL O
RESEARCH TRIANGLE FOUNDATION DB 148 PG 331 DB 315 PG 537
DAVIS DRIVE ASSOCIATES LTD DB 1170 PG 80 MB 142 PG 28
KEYSTONE OFFICE 100 - 200, LLC DB 3149 PG 668 MB 142 PG 28
KEYSTONE OFFICE, 100 - 200 LLC DB 3149 PG 668 MB 145 PG 55
DUKE POWER CO DB 937 BK 392
TECHNOLOGY I, LLC DB 2305 PG 577 BM 137 PG 204
TECHNOLOGY V, LLC DB 2498 PG 533 MB140 PG 214
KEYSTONE WAREHOUSE PARK OWNERS ASSOC., INC MB 142 PG 156
KEYSTONE TECHNOLOGY PARK OWNERS ASSOC., INC DB 2447 PG 655 MB 140 PG 75
TOWN OF CARY DB 2253 PG 672 MB 136 PG 62
TECHNOLOGY VII - IX, LLC DB 3112 PG 930

-YII-

PI Sta 11+59.50
Δ = 7° 37' 57.0" (LT)
D = 7° 10' 00.0"
L = 106.50'
T = 53.33'
R = 799.48'
SE = MATCH

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-L
FOR TRAIL PLANS, SEE SHEETS 2-T
FOR -L- PROFILE, SEE SHEET 47

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND
PAVED SHOULDER

Plans prepared by:
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(919)-851-6066

2/8/2005
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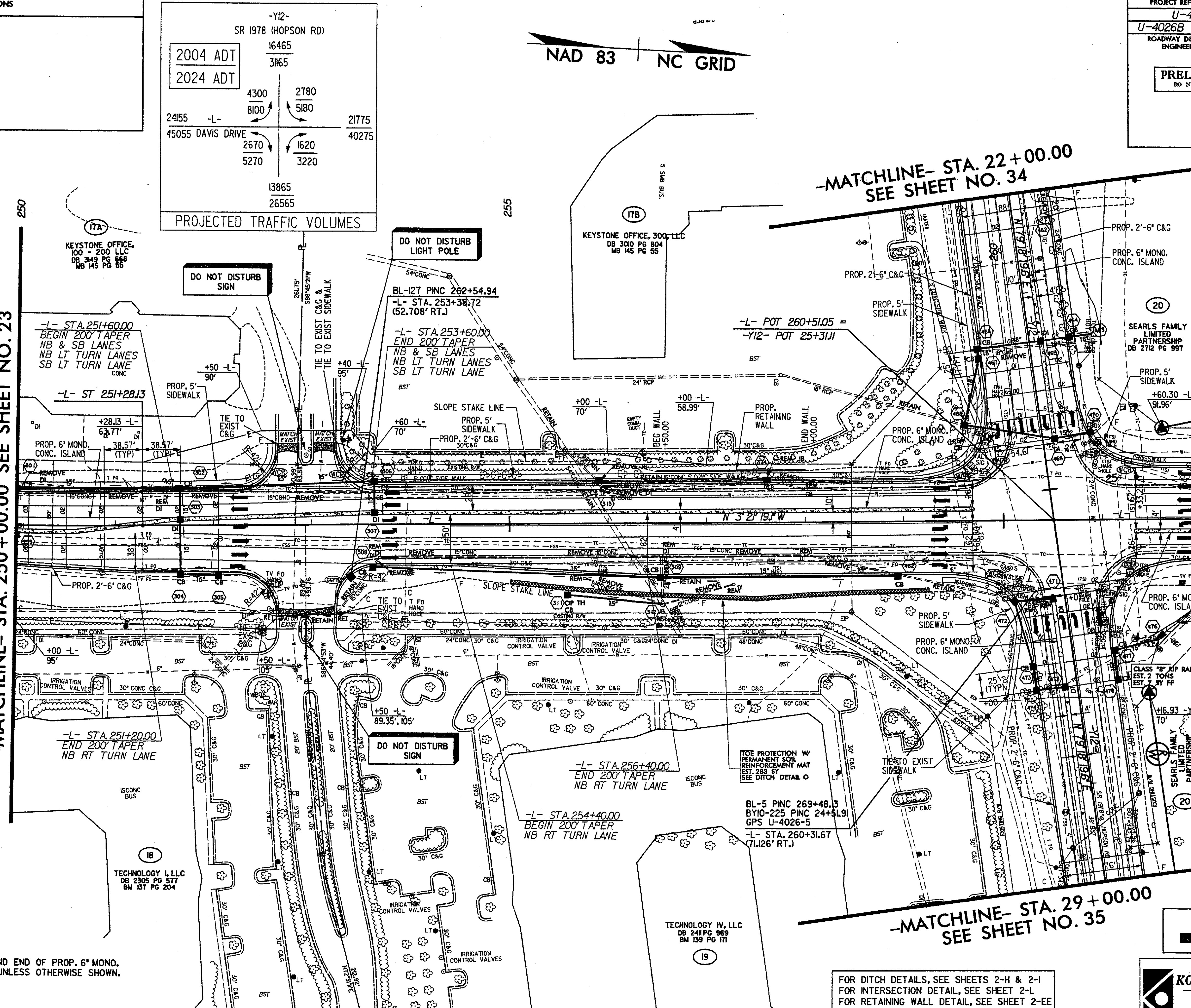
Ko & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	24
U-4026B R/W SHEET NO.	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

7/2/99



-Y12-
SR 1978 (HOPSON RD)
2004 ADT
2024 ADT
16465
31165
4300
8100
2780
5180
24155 -L-
45055 DAVIS DRIVE
21775
40275
2670
5270
1620
3220
13865
26565
PROJECTED TRAFFIC VOLUMES
NAD 83 NC GRID
-MATCHLINE- STA. 22+00.00 SEE SHEET NO. 34
-MATCHLINE- STA. 250+00.00 SEE SHEET NO. 23
-MATCHLINE- STA. 262+00.00 SEE SHEET NO. 25
-MATCHLINE- STA. 29+00.00 SEE SHEET NO. 35
DO NOT DISTURB SIGN
DO NOT DISTURB LIGHT POLE
DO NOT DISTURB SIGN
KEYSTONE OFFICE, 100 - 200 LLC DB 3149 PG 668 MB 145 PG 55
KEYSTONE OFFICE, 300 LLC DB 3010 PG 804 MB 145 PG 55
SEARLS FAMILY LIMITED PARTNERSHIP DB 2712 PG 997
TECHNOLOGY I, LLC DB 2305 PG 577 BM 137 PG 204
TECHNOLOGY IV, LLC DB 2411 PG 969 BM 139 PG 171
BL-127 PINC 262+54.94
-L- STA. 253+38.72 (52.708' RT.)
-L- STA. 251+60.00 BEGIN 200' TAPER NB & SB LANES NB LT TURN LANES SB LT TURN LANE
-L- STA. 253+60.00 END 200' TAPER NB & SB LANES NB LT TURN LANES SB LT TURN LANE
-L- ST 251+28.13
-L- POT 260+51.05 = -Y12- POT 25+31.11
-L- STA. 251+20.00 END 200' TAPER NB RT TURN LANE
-L- STA. 256+40.00 END 200' TAPER NB RT TURN LANE
-L- STA. 254+40.00 BEGIN 200' TAPER NB RT TURN LANE
BL-5 PINC 269+48.13 BY10-225 PINC 24+51.91 GPS U-4026-5
-L- STA. 260+31.67 (71.126' RT.)
N 3°21'19.1" W
TOE PROTECTION W/ CLASS "B" RIPRAP FOR QUANTITIES SEE SHEET 20 SEE DITCH DETAIL N
"V" TAIL DITCH EST 7 CY DDE SEE DITCH DETAIL R
CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 283 SY SEE DITCH DETAIL O
PROP. 5' SIDEWALK
PROP. 6' MONO. CONC. ISLAND
PROP. 2'-6" C&G
PROP. RETAINING WALL
SLOPE STAKE LINE
TIE TO EXIST SIDEWALK
IRRIGATION CONTROL VALVES

LEGEND

PAVED SHOULDER

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-L
FOR RETAINING WALL DETAIL, SEE SHEET 2-EE
FOR -L- PROFILE, SEE SHEET 48
FOR -Y12- PROFILE, SEE SHEET 56

Plans prepared by:
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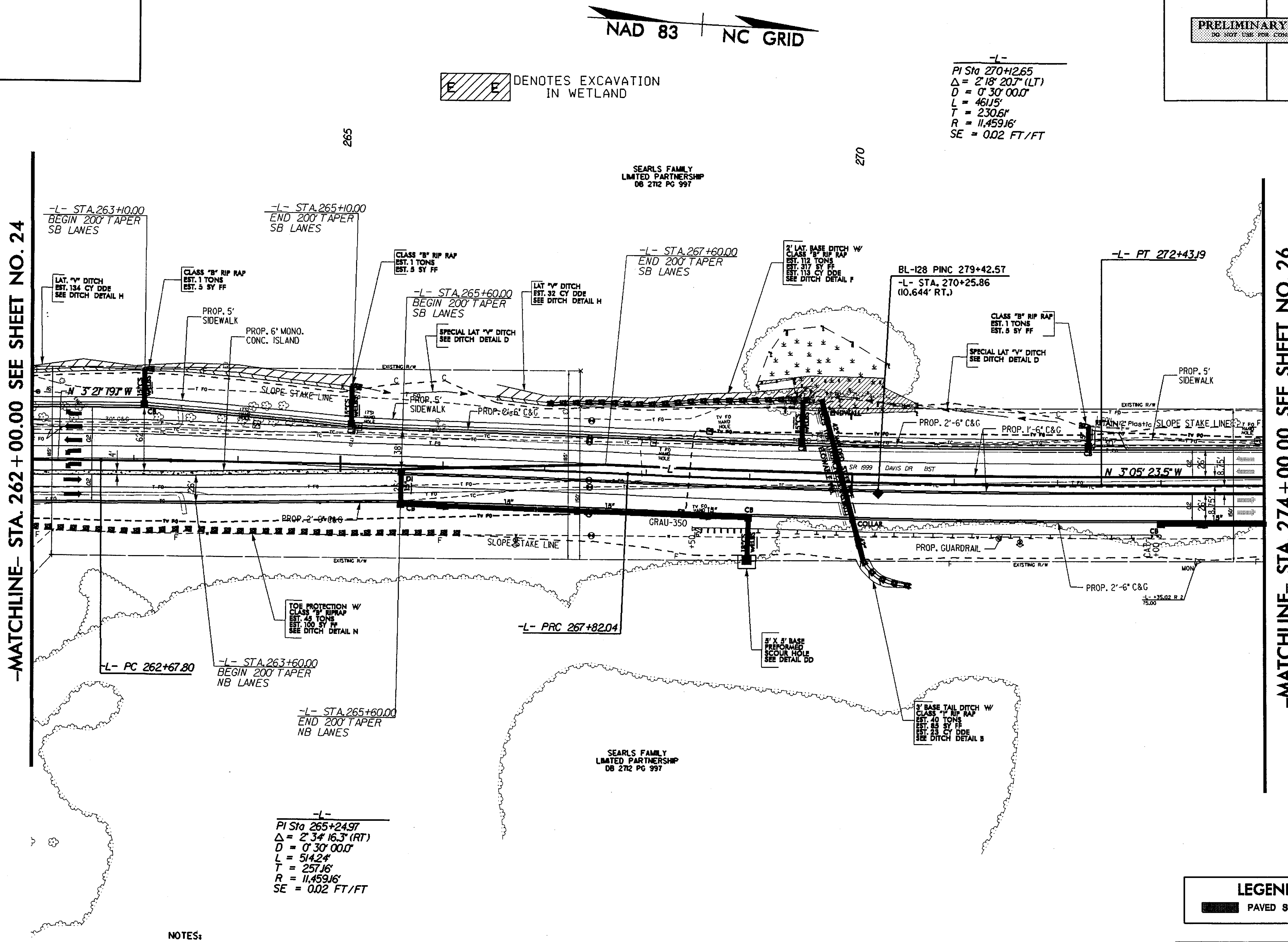
Ko & Associates, P.C.

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	25
U-4026B R/W SHEET NO.	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NAD 83
NC GRID
E DENOTES EXCAVATION IN WETLAND
-L-
PI Sta 270+12.65
Δ = 2° 18' 20.7" (LT)
D = 0° 30' 00.0"
L = 461.15'
T = 230.61'
R = 11,459.16'
SE = 0.02 FT/FT
265
270
SEARLS FAMILY LIMITED PARTNERSHIP DB 2712 PG 997
-MATCHLINE- STA. 262+00.00 SEE SHEET NO. 24
-MATCHLINE- STA. 274+00.00 SEE SHEET NO. 26
-L- STA. 263+10.00 BEGIN 200' TAPER SB LANES
-L- STA. 265+10.00 END 200' TAPER SB LANES
-L- STA. 265+60.00 BEGIN 200' TAPER SB LANES
-L- STA. 267+60.00 END 200' TAPER SB LANES
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
LAT. "V" DITCH EST. 134 CY DDE SEE DITCH DETAIL H
LAT "V" DITCH EST. 32 CY DDE SEE DITCH DETAIL H
SPECIAL LAT "V" DITCH SEE DITCH DETAIL D
2' LAT. BASE DITCH W/ CLASS "B" RIP RAP EST. 112 TONS EST. 317 SY FF EST. 113 CY DDE SEE DITCH DETAIL F
BL-128 PINC 279+42.57
-L- STA. 270+25.86 (10.644' RT.)
-L- PT 272+43.19
PROP. 5' SIDEWALK
PROP. 6" MONO. CONC. ISLAND
SLOPE STAKE LINE
EXISTING R/W
PROP. 2'-6" C&G
PROP. 1'-6" C&G
N 3° 21' 19.7" W
N 3° 05' 23.5" W
SR 1999 DAVIS DR BST
GRAU-350
COLLAR
PROP. GUARDRAIL
ENDWALL
TOE PROTECTION W/ CLASS "B" RIPRAP EST. 44 TONS EST. 100 SY FF SEE DITCH DETAIL N
-L- PRC 267+82.04
5' X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD
-L- PC 262+67.80
-L- STA. 263+60.00 BEGIN 200' TAPER NB LANES
-L- STA. 265+60.00 END 200' TAPER NB LANES
3' BASE TAIL DITCH W/ CLASS "I" RIP RAP EST. 40 TONS EST. 85 SY FF EST. 23 CY DDE SEE DITCH DETAIL B
SEARLS FAMILY LIMITED PARTNERSHIP DB 2712 PG 997
-L-
PI Sta 265+24.97
Δ = 2° 34' 16.3" (RT)
D = 0° 30' 00.0"
L = 514.24'
T = 257.16'
R = 11,459.16'
SE = 0.02 FT/FT

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND

PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 48

Plans prepared by:
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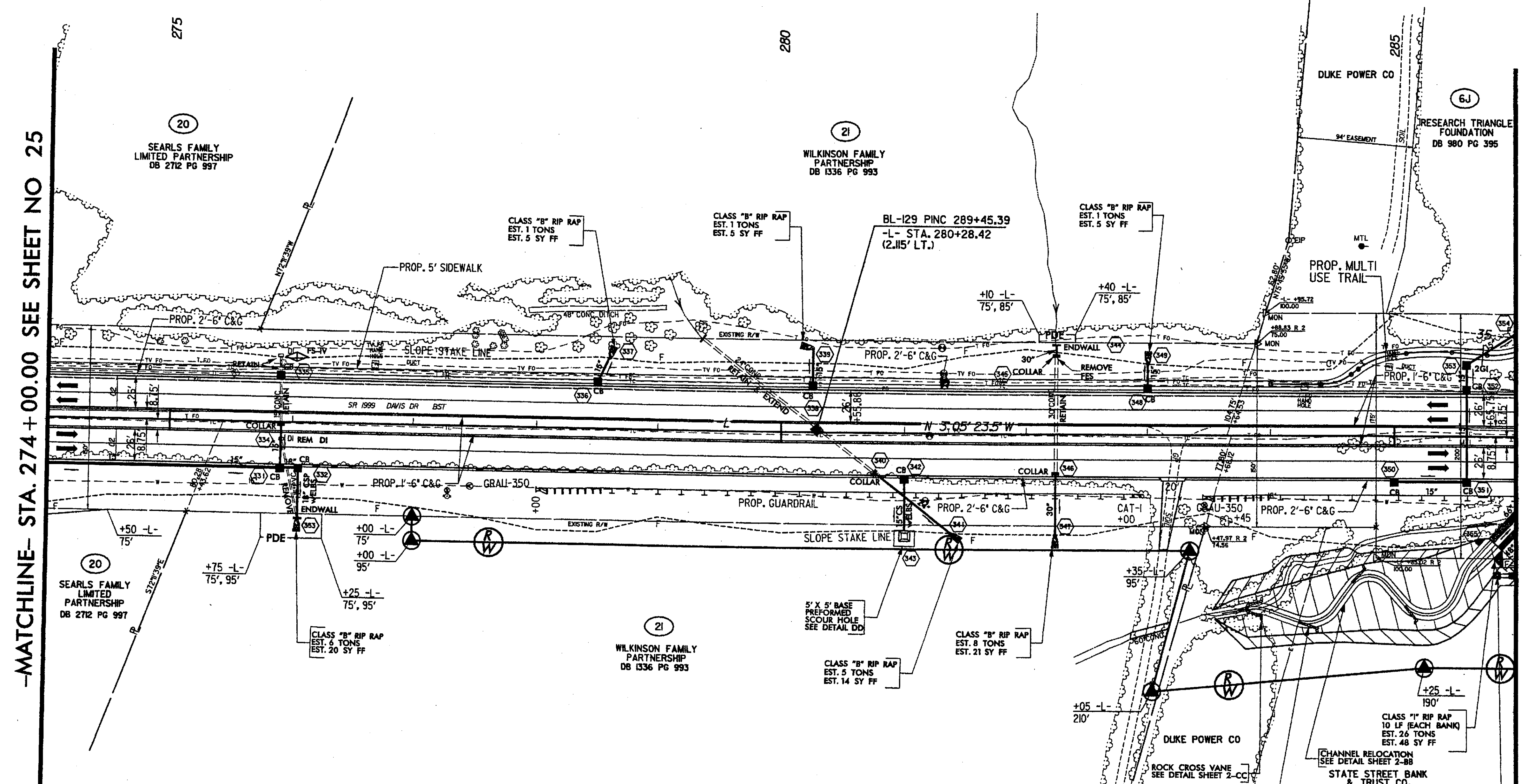
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	26
U-4026B RW SHEET NO.	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID



-MATCHLINE- STA. 274+00.00 SEE SHEET NO 25
-MATCHLINE- STA. 286+00.00 SEE SHEET NO. 27
SEARLS FAMILY LIMITED PARTNERSHIP DB 2712 PG 997
WILKINSON FAMILY PARTNERSHIP DB 1336 PG 993
DUKE POWER CO
RESEARCH TRIANGLE FOUNDATION DB 980 PG 395
STATE STREET BANK & TRUST CO. DB 3162 PG 904 CB 5 PG 220
BL-129 PINC 289+45.39
-L- STA. 280+28.42
(2.115' LT.)
PROP. 5' SIDEWALK
PROP. 2'-6" C&G
PROP. MULTI USE TRAIL
SLOPE STAKE LINE
PROP. 1'-6" C&G
PROP. GUARDRAIL
GRAU-350
SR 1999 DAVIS DR BST
N 5°05'23.5" W
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
CLASS "B" RIP RAP EST. 6 TONS EST. 20 SY FF
CLASS "B" RIP RAP EST. 5 TONS EST. 14 SY FF
CLASS "B" RIP RAP EST. 8 TONS EST. 21 SY FF
5' X 5' BASE PREFORMED SCOUR HOLE SEE DETAIL DD
CLASS "I" RIP RAP 10 LF (EACH BANK) EST. 26 TONS EST. 48 SY FF
CHANNEL RELOCATION SEE DETAIL SHEET 2-BB
ROCK CROSS VANE SEE DETAIL SHEET 2-CC
ROCK VANE SEE DETAIL SHEET 2-DD
3' LAT. BASE DITCH W/ CLASS "B" RIP RAP FOR QUANTITIES SEE SHEET 27 SEE DITCH DETAIL F
94' EASEMENT

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR TRAIL PLANS, SEE SHEET 2-U
FOR CHANNEL RELOCATION, SEE SHEET 2-BB
FOR ROCK CROSS VANE DETAIL, SEE SHEET 2-CC
FOR ROCK VANE DETAIL, SEE SHEET 2-DD
FOR -L- PROFILE, SEE SHEET 49

LEGEND
PAVED SHOULDER

Plans prepared by:
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(919)-851-6066

2/8/2005
Ko & Associates, P.C.

7/2/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4026	27
U-4026B R/W SHEET NO.	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 | NC GRID

-MATCHLINE- STA. 286+00.00 SEE SHEET NO. 26

-MATCHLINE- STA. 298+00.00 SEE SHEET NO. 28

6J
RESEARCH TRIANGLE FOUNDATION
DB 980 PG 395

6K
RESEARCH TRIANGLE FOUNDATION
DB 315 PG 537

23
BASF CORPORATION
DB 2327 PG 535
MB 138 PG 72

22
STATE STREET BANK & TRUST CO.
DB 3162 PG 904
CB 5 PG 220

-L- STA. 286+20.00
BEGIN 200' TAPER
RT. TURN LANE, NB

-L- STA. 287+05.00
BEGIN 200' TAPER
LT. TURN LANE, NB

-L- STA. 287+90.00
BEGIN 210' TAPER
BUS LANE, SB

-L- STA. 288+20.00
END 200' TAPER
RT. TURN LANE, NB

-L- STA. 289+05.00
END 200' TAPER
LT TURN LANE, NB

-L- STA. 290+00.00
END 210' TAPER
BUS LANE, SB

-L- STA. 290+50.00
BEGIN 200' TAPER
BUS LANE, SB

-L- STA. 292+40.00
BEGIN 210' TAPER
BUS LANE, NB

-L- STA. 292+50.00
END 200' TAPER
BUS LANE, SB

-L- STA. 294+20.00
BEGIN 200' TAPER
LT. TURN LANE, SB

-L- STA. 294+50.00
END 210' TAPER
BUS LANE, NB

-L- STA. 296+20.00
END 200' TAPER
LT. TURN LANE, SB

-L- TS 296+37.68

BL-130 PINC 298+98.61
-L- STA. 289+80.73
(39.674' RT.)

BL-131 PINC 304+90.47
-L- STA. 295+71.34
(1.239' RT.)

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

TOE PROTECTION W/ CLASS "B" RIPRAP
EST. 49 TONS
EST. 146 SY FF
SEE DITCH DETAIL N

OUTLET CHANNEL W/ CLASS "I" RIP RAP
EST. 40 TONS
EST. 232 SY FF
EST. 65 CY DDE
SEE DITCH DETAIL AA

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF

OUTLET CHANNEL W/ CLASS "I" RIP RAP
EST. 85 TONS
EST. 265 SY FF
EST. 140 CY DDE
SEE DITCH DETAIL CC

PROP. 8' X 6' RCBC EXTENTION
SEE STRUCTURE PLANS FOR DETAILS

LAT. 6' BASE DITCH W/ CLASS "B" RIP RAP
EST. 62 TONS
EST. 154 SY FF
EST. 33 CY DDE
SEE DITCH DETAIL F

LAT. 2' BASE DITCH W/ CLASS "B" RIP RAP
EST. 670 TONS
EST. 607 SY FF
EST. 407 CY DDE
SEE DITCH DETAIL F

3' LAT. BASE DITCH W/ CLASS "B" RIP RAP
EST. 92 TONS
EST. 244 SY FF
EST. 85 CY DDE
SEE DITCH DETAIL F

LAT. "V" DITCH
EST. 92 CY DDE
SEE DITCH DETAIL H

CLASS "B" RIP RAP
EST. 1 TONS
EST. 5 SY FF

SPECIAL LAT. "V" DITCH
SEE DITCH DETAIL D

CLASS "I" RIP RAP
10 LF (LT BANK)
EST. 13 TONS
EST. 24 SY FF

INLET CHANNEL W/ CLASS "I" RIP RAP
EST. 47 TONS
EST. 232 SY FF
EST. 350 CY DDE
SEE DITCH DETAIL BB

5' X 5' BASE PREFORMED SCOUR HOLE
SEE DETAIL DD

PROP. 6" MONO. CONC. ISLAND

PROP. 2'-6" C&G

PROP. 1'-6" C&G

PROP. MULTIUSE TRAIL

PROP. GUARDRAIL

SLOPE STAKE LINE

REMOVE EXISTING BRIDGE

-L-
PIs Sta 297+87.71
Θs = 3°22'30.0"
Ls = 225.00'
LT = 150.03'
ST = 75.02'

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR -L- PROFILE, SEE SHEET 49
FOR TRAIL PLANS, SEE SHEETS 2-U & 2-V
FOR CULVERT PLANS, SEE CULVERT SHEETS C- __ - C-__

LEGEND
PAVED SHOULDER

Plans prepared by:
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Consulting Engineers
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2/8/2005
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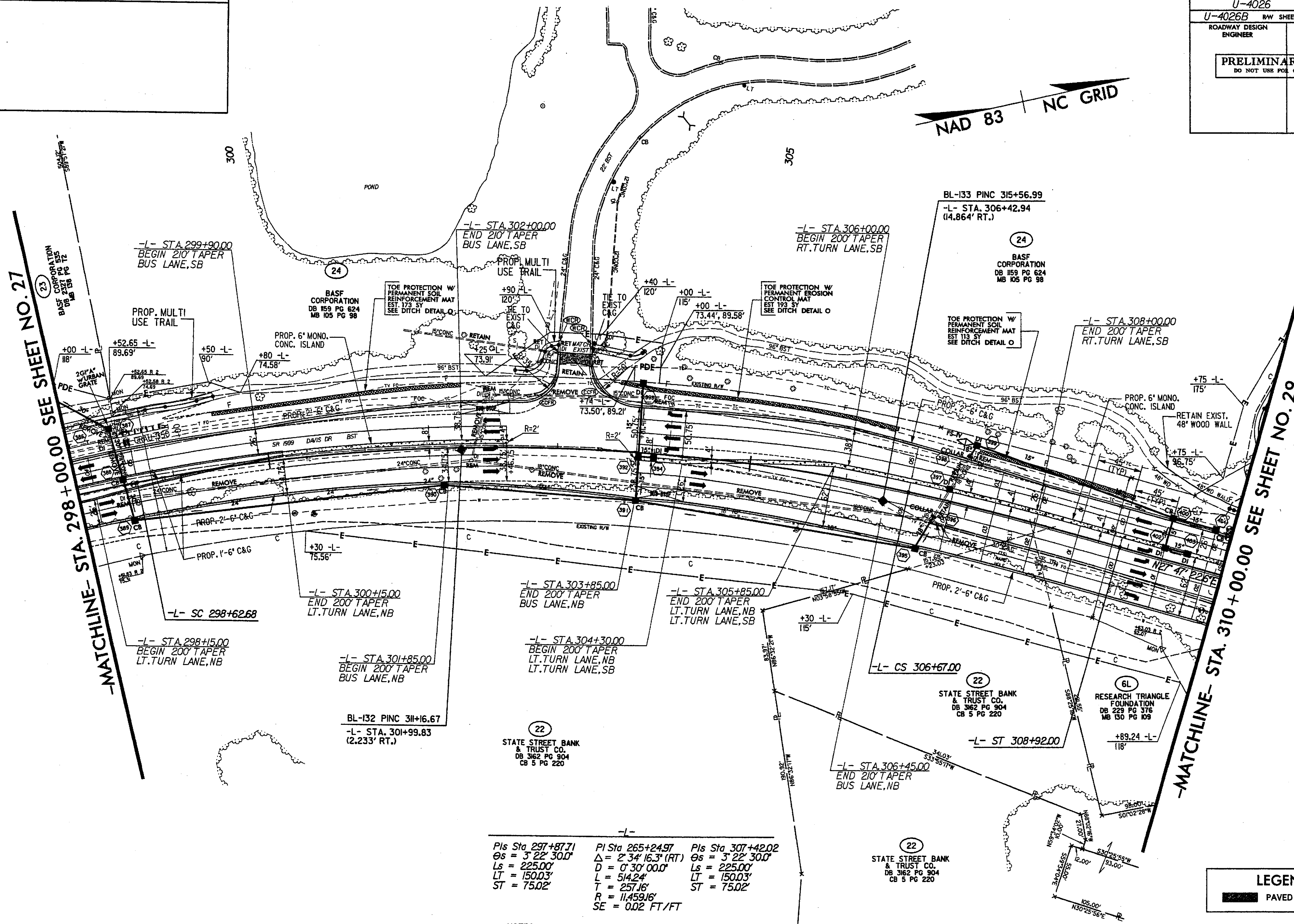
Ko & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	28
U-4026B R/W SHEET NO.	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



NAD 83
NC GRID
-MATCHLINE- STA. 298+00.00 SEE SHEET NO. 27
-MATCHLINE- STA. 310+00.00 SEE SHEET NO. 29
-L- STA. 299+90.00 BEGIN 210' TAPER BUS LANE, SB
-L- STA. 302+00.00 END 210' TAPER BUS LANE, SB
-L- STA. 306+00.00 BEGIN 200' TAPER RT. TURN LANE, SB
-L- STA. 308+00.00 END 200' TAPER RT. TURN LANE, SB
BL-133 PINC 315+56.99
-L- STA. 306+42.94 (14.864' RT.)
BASF CORPORATION DB 1159 PG 624 MB 105 PG 98
PROP. MULTI USE TRAIL
PROP. 6" MONO. CONC. ISLAND
RETAIN EXIST. 48" WOOD WALL
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 173 SY SEE DITCH DETAIL O
TOE PROTECTION W/ PERMANENT EROSION CONTROL MAT EST. 193 SY SEE DITCH DETAIL O
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST. 113 SY SEE DITCH DETAIL O
-L- SC 298+62.68
-L- STA. 298+15.00 BEGIN 200' TAPER LT. TURN LANE, NB
-L- STA. 300+15.00 END 200' TAPER LT. TURN LANE, NB
-L- STA. 301+85.00 BEGIN 200' TAPER BUS LANE, NB
-L- STA. 303+85.00 END 200' TAPER BUS LANE, NB
-L- STA. 304+30.00 BEGIN 200' TAPER LT. TURN LANE, NB LT. TURN LANE, SB
-L- STA. 305+85.00 END 200' TAPER LT. TURN LANE, NB LT. TURN LANE, SB
-L- CS 306+67.00
-L- ST 308+92.00
-L- STA. 306+45.00 END 210' TAPER BUS LANE, NB
BL-132 PINC 311+16.67
-L- STA. 301+99.83 (2.233' RT.)
STATE STREET BANK & TRUST CO. DB 3162 PG 904 CB 5 PG 220
RESEARCH TRIANGLE FOUNDATION DB 229 PG 376 MB 130 PG 109
PROP. 2'-6" C&G
PROP. 1'-6" C&G
SR 1999 DAVIS DR
N27° 41' 22.6"E

-L-

PIs Sta 297+87.71	PI Sta 265+24.97	PIs Sta 307+42.02
θs = 3° 22' 30.0"	Δ = 2° 34' 16.3" (RT)	θs = 3° 22' 30.0"
Ls = 225.00'	D = 0° 30' 00.0"	Ls = 225.00'
LT = 150.03'	L = 514.24'	LT = 150.03'
ST = 75.02'	T = 257.16'	ST = 75.02'
	R = 11,459.16'	
	SE = 0.02 FT/FT	

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR TRAIL PLANS, SEE SHEETS 2-V & 2-W
FOR -L- PROFILE, SEE SHEET 50

LEGEND
PAVED SHOULDER

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
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(919)-851-6066

7/2/99
2/8/2005
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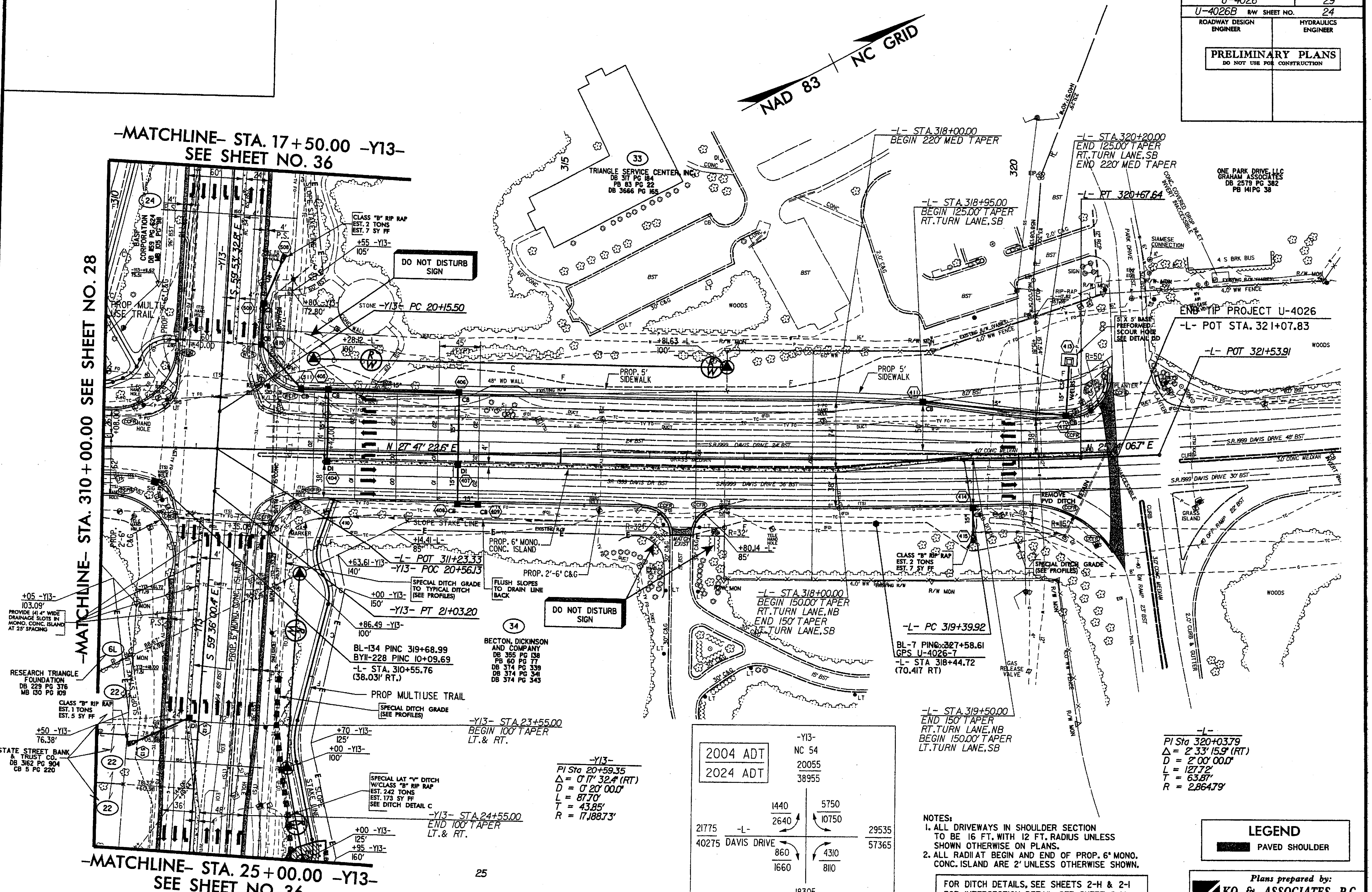
Ko & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	29
U-4026B R/W SHEET NO.	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



-MATCHLINE- STA. 17+50.00 -Y13-
SEE SHEET NO. 36
-MATCHLINE- STA. 310+00.00 SEE SHEET NO. 28
-MATCHLINE- STA. 25+00.00 -Y13-
SEE SHEET NO. 36
NAD 83 NC GRID
TRIANGLE SERVICE CENTER, INC.
DB 317 PG 184
PB 83 PG 22
DB 3666 PG 165
ONE PARK DRIVE, LLC
GRAHAM ASSOCIATES
DB 2579 PG 382
PB 141 PG 38
BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77
DB 374 PG 339
DB 374 PG 341
DB 374 PG 343
RESEARCH TRIANGLE FOUNDATION
DB 229 PG 376
MB 130 PG 109
STATE STREET BANK & TRUST CO.
DB 3162 PG 904
CB 5 PG 220
DO NOT DISTURB SIGN
DO NOT DISTURB SIGN
-L- STA. 318+00.00
BEGIN 220' MED TAPER
-L- STA. 320+20.00
END 125.00' TAPER
RT. TURN LANE, SB
END 220' MED TAPER
-L- STA. 318+95.00
BEGIN 125.00' TAPER
RT. TURN LANE, SB
-L- PT 320+67.64
END TIP PROJECT U-4026
-L- POT STA. 321+07.83
-L- POT 321+53.91
-Y13- PC 20+15.50
-L- POT 311+23.33
-Y13- POC 20+56.13
-Y13- PT 21+03.20
BL-134 PINC 319+68.99
BY11-228 PINC 10+09.69
-L- STA. 310+55.76
(38.031' RT.)
-L- STA. 318+00.00
BEGIN 150.00' TAPER
RT. TURN LANE, NB
END 150' TAPER
LT. TURN LANE, SB
-L- PC 319+39.92
BL-7 PINC 327+58.61
GPS U-4026-7
-L- STA 318+44.72
(70.417 RT)
-L- STA. 319+50.00
END 150' TAPER
RT. TURN LANE, NB
BEGIN 150.00' TAPER
LT. TURN LANE, SB
-Y13- STA. 23+55.00
BEGIN 100' TAPER
LT. & RT.
-Y13- STA. 24+55.00
END 100' TAPER
LT. & RT.
PROP. MULTI USE TRAIL
PROP MULTIUSE TRAIL
PROP. 5' SIDEWALK
PROP. 6' MONO. CONC. ISLAND
PROP. 2'-6" C&G
SLOPE STAKE LINE
S.R. 1999 DAVIS DRIVE
N 27° 47' 22.6" E
-Y13-
PI Sta 20+59.35
Δ = 0° 17' 32.4" (RT)
D = 0° 20' 00.0"
L = 87.70'
T = 43.85'
R = 17,188.73'
-L-
PI Sta 320+03.79
Δ = 2° 33' 15.9" (RT)
D = 2° 00' 00.0"
L = 127.72'
T = 63.87'
R = 2,864.79'

PROJECTED TRAFFIC VOLUMES

2004 ADT / 2024 ADT

- -Y13- NC 54: 20055 / 38955
- -L- DAVIS DRIVE (west): 21775 / 40275
- East: 29535 / 57365
- South: 18305 / 35335
- Turning movements: 1440 / 2640; 5750 / 10750; 860 / 1660; 4310 / 8110

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-M
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -L- PROFILE, SEE SHEET 50
FOR -Y13- PROFILE, SEE SHEET 57
FOR TRAIL PLANS SEE 2-W & 2-X

LEGEND
PAVED SHOULDER

Plans prepared by:
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2/8/2005
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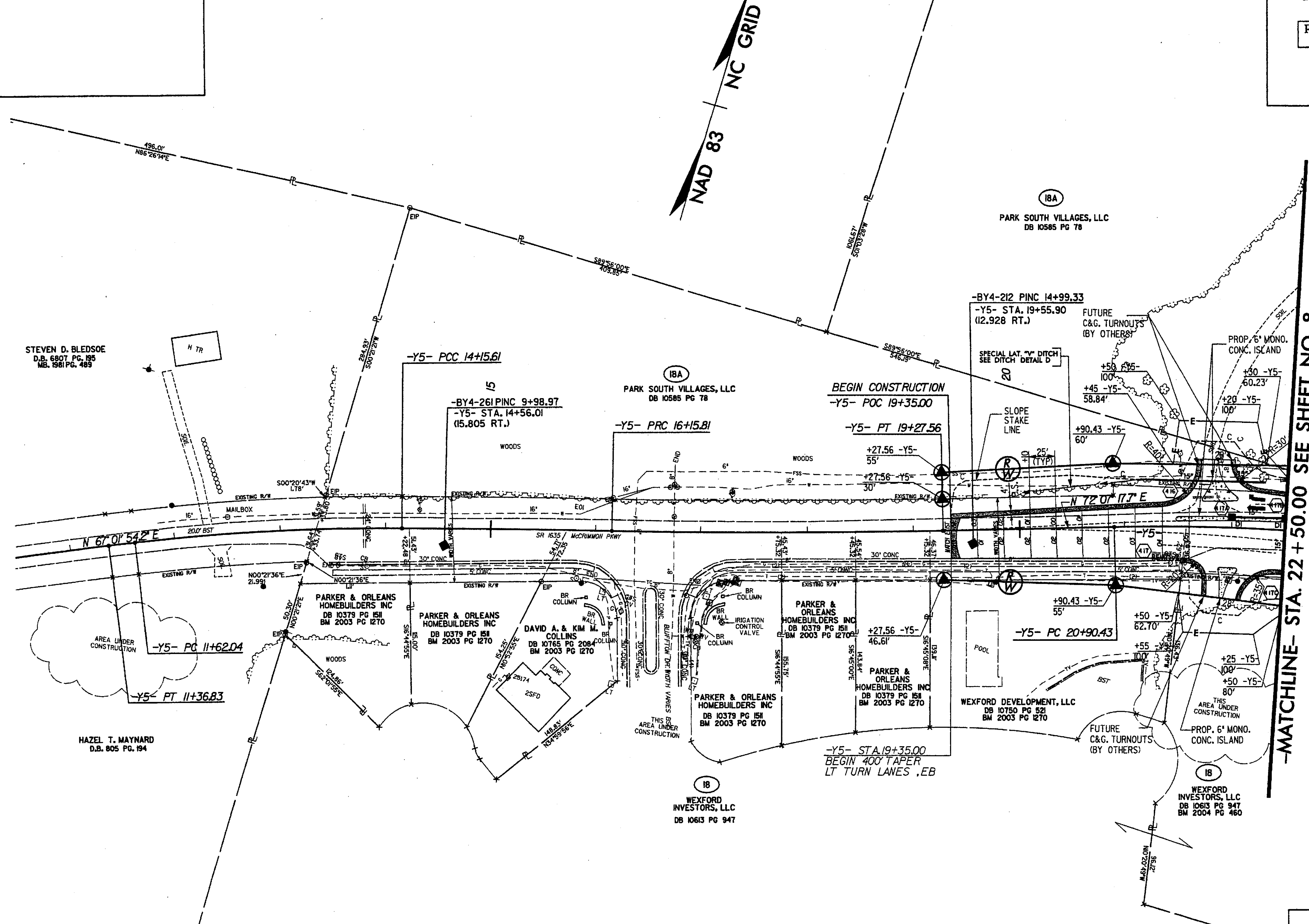
PROJECT REFERENCE NO.	SHEET NO.
U-4026	30
U-4026A RW SHEET NO.	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

7/2/99

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET



NAD 83 NC GRID
496.01' N86°26'14"E
S89°56'00"E 409.85'
S89°56'00"E 546.19'
STEVEN D. BLEDSOE
D.B. 6807 PG. 195
MB. 1981 PG. 489
-Y5- PCC 14+15.61
-BY4-261 PINC 9+98.97
-Y5- STA. 14+56.01
(15.805 RT.)
PARK SOUTH VILLAGES, LLC
DB 10585 PG 78
-Y5- PRC 16+15.81
BEGIN CONSTRUCTION
-Y5- POC 19+35.00
-Y5- PT 19+27.56
-BY4-212 PINC 14+99.33
-Y5- STA. 19+55.90
(12.928 RT.)
FUTURE C&G. TURNOUTS (BY OTHERS)
SPECIAL LAT. "V" DITCH SEE DITCH DETAIL D
SLOPE STAKE LINE
PROP. 6" MONO. CONC. ISLAND
N 67°01'54.2" E
N 72°07'17.7" E
SR 1635 / McCRIMMON PKWY
PARKER & ORLEANS HOMEBUILDERS INC
DB 10379 PG 1511
BM 2003 PG 1270
DAVID A. & KIM M. COLLINS
DB 10765 PG 2084
BM 2003 PG 1270
AREA UNDER CONSTRUCTION
-Y5- PC 11+62.04
-Y5- PT 11+36.83
HAZEL T. MAYNARD
D.B. 805 PG. 194
WEXFORD INVESTORS, LLC
DB 10613 PG 947
-Y5- STA. 19+35.00
BEGIN 400' TAPER
LT TURN LANES, EB
-Y5- PC 20+90.43
WEXFORD DEVELOPMENT, LLC
DB 10750 PG 521
BM 2003 PG 1270
WEXFORD INVESTORS, LLC
DB 10613 PG 947
BM 2004 PG 460
-MATCHLINE- STA. 22+50.00 SEE SHEET NO. 8

-Y5-

PI Sta 10+68.42	PI Sta 12+88.98	PI Sta 15+15.71	PI Sta 17+71.71	PI Sta 22+49.68
Δ = 0° 45' 05.2" (RT)	Δ = 6° 47' 36.3" (RT)	Δ = 0° 33' 57.3" (RT)	Δ = 2° 36' 25.6" (LT)	Δ = 9° 31' 59.3" (RT)
D = 0° 32' 57.0"	D = 2° 40' 44.6"	D = 0° 16' 57.7"	D = 0° 50' 10.6"	D = 3° 00' 00.0"
L = 136.83'	L = 253.57'	L = 200.19'	L = 311.75'	L = 317.77'
T = 68.42'	T = 126.94'	T = 100.10'	T = 155.90'	T = 159.25'
R = 10,433.18'	R = 2,138.65'	R = 20,268.54'	R = 6,851.31'	R = 1,909.86'
				SE = 0.05 FT/FT
				RUNOFF = 100.0 FT

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEET 2-H
FOR -Y5- PROFILE, SEE SHEET 52

LEGEND
PAVED SHOULDER

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2/8/2005
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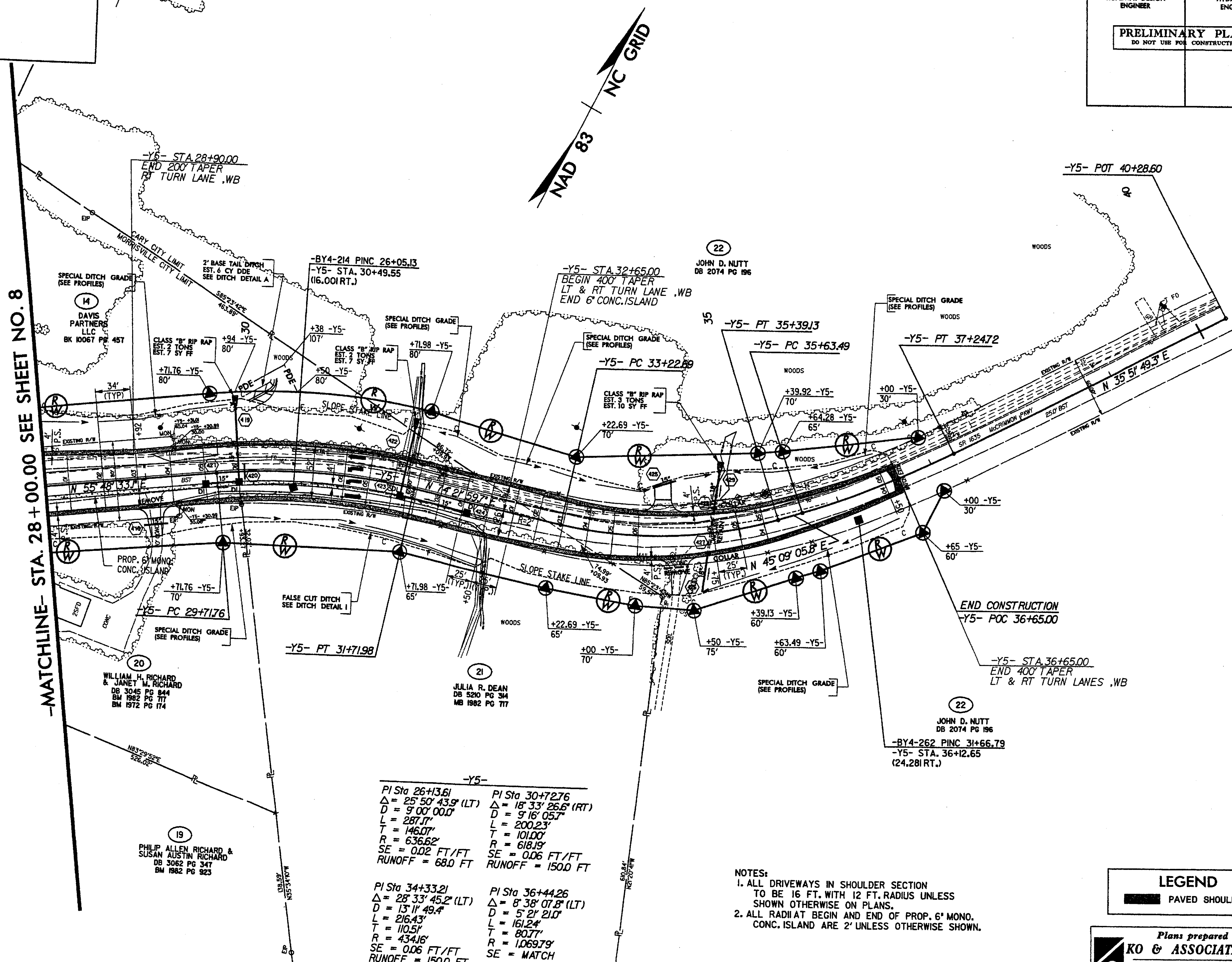
10/04/04 CHANGED NAME ON PARCEL 14
10/26/04 REMOVED PDE ON PARCEL 21

TOWN OF CARY TO HANDLE ALL RIGHT OF WAY CLAIMS THIS SHEET

PROJECT REFERENCE NO.	SHEET NO.
U-4026	31
U-4026A RW SHEET NO.	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-MATCHLINE- STA. 28+00.00 SEE SHEET NO. 8
NAD 83 / NC GRID
-Y5- STA.28+90.00 END 200' TAPER RT TURN LANE ,WB
-BY4-214 PINC 26+05.13 -Y5- STA. 30+49.55 (16.001 RT.)
-Y5- STA.32+65.00 BEGIN 400' TAPER LT & RT TURN LANE ,WB END 6" CONC.ISLAND
-Y5- PT 35+39.13
-Y5- PC 35+63.49
-Y5- PT 37+24.72
-Y5- POT 40+28.60
-Y5- PC 33+22.69
-Y5- PC 29+71.76
-Y5- PT 31+71.98
END CONSTRUCTION -Y5- POC 36+65.00
-Y5- STA.36+65.00 END 400' TAPER LT & RT TURN LANES ,WB
-BY4-262 PINC 31+66.79 -Y5- STA. 36+12.65 (24.281 RT.)
DAVIS PARTNERS LLC BK 10067 PG 457
JOHN D. NUTT DB 2074 PG 196
WILLIAM H. RICHARD & JANET M. RICHARD DB 3045 PG 844 BM 1982 PG 717 BM 1972 PG 174
JULIA R. DEAN DB 5210 PG 314 MB 1982 PG 717
PHILIP ALLEN RICHARD & SUSAN AUSTIN RICHARD DB 3062 PG 347 BM 1982 PG 923
CARY CITY LIMIT
MORRISVILLE CITY LIMIT
SPECIAL DITCH GRADE (SEE PROFILES)
FALSE CUT DITCH SEE DITCH DETAIL I
SLOPE STAKE LINE
WOODS

-Y5-

PI Sta 26+13.61	PI Sta 30+72.76
Δ = 25° 50' 43.9" (LT)	Δ = 18° 33' 26.6" (RT)
D = 9° 00' 00.0"	D = 9° 16' 05.7"
L = 287.17'	L = 200.23'
T = 146.07'	T = 101.00'
R = 636.62'	R = 618.19'
SE = 0.02 FT/FT	SE = 0.06 FT/FT
RUNOFF = 68.0 FT	RUNOFF = 150.0 FT

PI Sta 34+33.21	PI Sta 36+44.26
Δ = 28° 33' 45.2" (LT)	Δ = 8° 38' 07.8" (LT)
D = 13° 11' 49.4"	D = 5° 21' 21.0"
L = 216.43'	L = 161.24'
T = 110.51'	T = 80.77'
R = 434.16'	R = 1,069.79'
SE = 0.06 FT/FT	SE = MATCH EXIST.
RUNOFF = 150.0 FT	

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND
PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEET 2-H
FOR -Y5- PROFILE, SEE SHEET 52

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5/6/2005
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3/16/04 REVISED CE PARCEL NO. 9
3/ 25/ 04 CHANGED PARCEL NO. 7 TO PARCEL NO. 10 & NAME CHANGE
CHANGED PARCEL NO. 10 TO PARCEL NO. 10A
NAME CHANGE PARCEL NO. 9
6/24/04 REVISED R/W & CE ON PARCEL NO. 10A
7/2/04 ADDED DO NOT DISTURB SIGN NOTE ON PARCEL 9
2/23/05 ADDED C&G ON Y-9 LT SIDE

PROJECT REFERENCE NO.	SHEET NO.
U-4026	32
U-4026B R/W SHEET NO.	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y9-
PIs Sta 11+18.69
Θs = 3° 27' 00.0"
Ls = 120.00'
LT = 80.02'
ST = 40.01'

PI Sta 17+40.19
Δ = 60° 32' 05.6" (LT)
D = 5° 45' 00.0"
L = 1,052.78'
T = 581.52'
R = 996.45'
SE = 0.06 FT/FT
RUNOFF = 120.0 FT

PIs Sta 22+51.46
Θs = 3° 27' 00.0"
Ls = 120.00'
LT = 80.02'
ST = 40.01'

-Y9- STA.10+00.00 BEGIN 270' TAPER LT.& RT.
BEGIN CONSTRUCTION -Y9- POT 10+00.00
-Y9- TS 10+38.67
-Y9- SC 11+58.67
+58.67 -Y9- 75.17'
DEPRESS ISLAND FOR WHEELCHAIR ACCESS
-Y9- STA.12+70.00 END 270' TAPER LT.& RT.
DO NOT DISTURB SIGN
PROP. 2'-6" C&G GRADE TO DRAIN
+50 -Y9- 100'
TIE TO EXISTING DITCH
PROP. MULTI USE TRAIL
+45 -Y9- 125'
SPECIAL DITCH GRADE (SEE PROFILES)
+70 -Y9- 100'
+80 -Y9- 78.48'
CLASS "B" RIP RAP EST 3 TONS EST 10 SY FF
+40 -Y9- 135'
-Y9- STA.16+10.00 BEGIN 210' TAPER LT.& RT.
CLASS "B" RIP RAP EST 3 TONS EST 10 SY FF
TOE PROTECTION W/ CLASS "B" RIPRAP EST. 26 TONS EST. 78 SY FF SEE DITCH DETAIL N
+00 -Y9- 110'
+00 -Y9- 78.70'
+20.00 TAPER
SPECIAL DITCH GRADE (SEE PROFILES)
+00-Y9- 115'
+00 -Y9- 110'
+00 -Y9- 78.70'
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
+70 -Y9- 100'
+50 -Y9- 100'
NOTE: TEMPORARY TELE. LINE TO CONSTRUCTION SITE ATTACHED TO TREE
+60 -Y9- 125'
-Y9- CS 22+11.45
SLOPE STAKE LINE
20' (TYP.)
-MATCHLINE- STA. 23+00.00 SEE SHEET NO. 17
NAD 83 NC GRID
BY7-264 POT 5+00.00
-Y9- STA. 9+99.25
(16.93 RT.)
CISCO SYSTEM INC. DB 7346 PG 569 BM 1997 PG 303
WOODS
-Y9A- POT 13+45.88 = -Y9- POC 14+10.41
-Y9A- PT 13+05.60
BEGIN CONSTRUCTION -Y9A- POT 10+00.00
+40 -Y9- 72.92' WOODS
PROP. 1'-6" C&G
+50 -Y9A- 35'
+75 -Y9A- 25'
+00 -Y9A- 30'
+75 -Y9A- 25'
+75 -Y9A- 60'
+00 -Y9A- 50'
BY7-265 PINC 9+66.29
-Y9- STA. 14+62.55
(17.352 RT.)
-Y9A- PRC 11+60.93
-Y9A- PC 10+05.55
-Y9A- POT 9+62.62
-Y9A-
PI Sta 10+85.73
Δ = 34° 49' 50.0" (RT)
D = 22° 25' 00.0"
L = 155.38'
T = 80.17'
R = 255.59'
PI Sta 12+36.97
Δ = 43° 37' 32.4" (LT)
D = 30° 09' 20.2"
L = 144.67'
T = 76.04'
R = 190.00'
GRAU-350 100
+00 -Y9- 71.76'
PROP. 6" MONO. CONC. ISLAND
+50 -Y9- 90'
10A CISCO SYSTEM INC. DB 7346 PG 569 BM 1997 PG 303
+50 -Y9- 135'
CLASS "B" RIP RAP EST. 11 TONS EST. 28 SY FF
-Y9- STA.19+00.00 BEGIN 210' TAPER RT.
BY7-219 PINC 14+85.22
-Y9- STA. 19+76.49
(24.275 RT.)
9 ARE - 7030 KIT CREEK, LLC DB 8638 PG 425 MB 1994 PG 574
10 CISCO SYSTEMS, INC. DB 9390 PG 1902 MB 1994 PG 950
SR 1639 KIT CREEK RD
-Y9-
GRAU-350 +00
CAT-1 +00
SLOPE STAKE LINE
+00 -Y9- 90'
+45 -Y9- 115'
+25 -Y9- 100'
+00 -Y9- 115'
+11.45 -Y9- 190'
-Y9- STA.21+10.00 END 210' TAPER RT.
PROP. 1'-6" C&G

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

LEGEND
PAVED SHOULDER

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR INTERSECTION DETAIL, SEE SHEET 2-L
FOR TRAIL PLAN, SEE SHEET 2-O
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -Y9- PROFILE, SEE SHEET 54
FOR -Y9A- PROFILE, SEE SHEET 55

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2/23/2005
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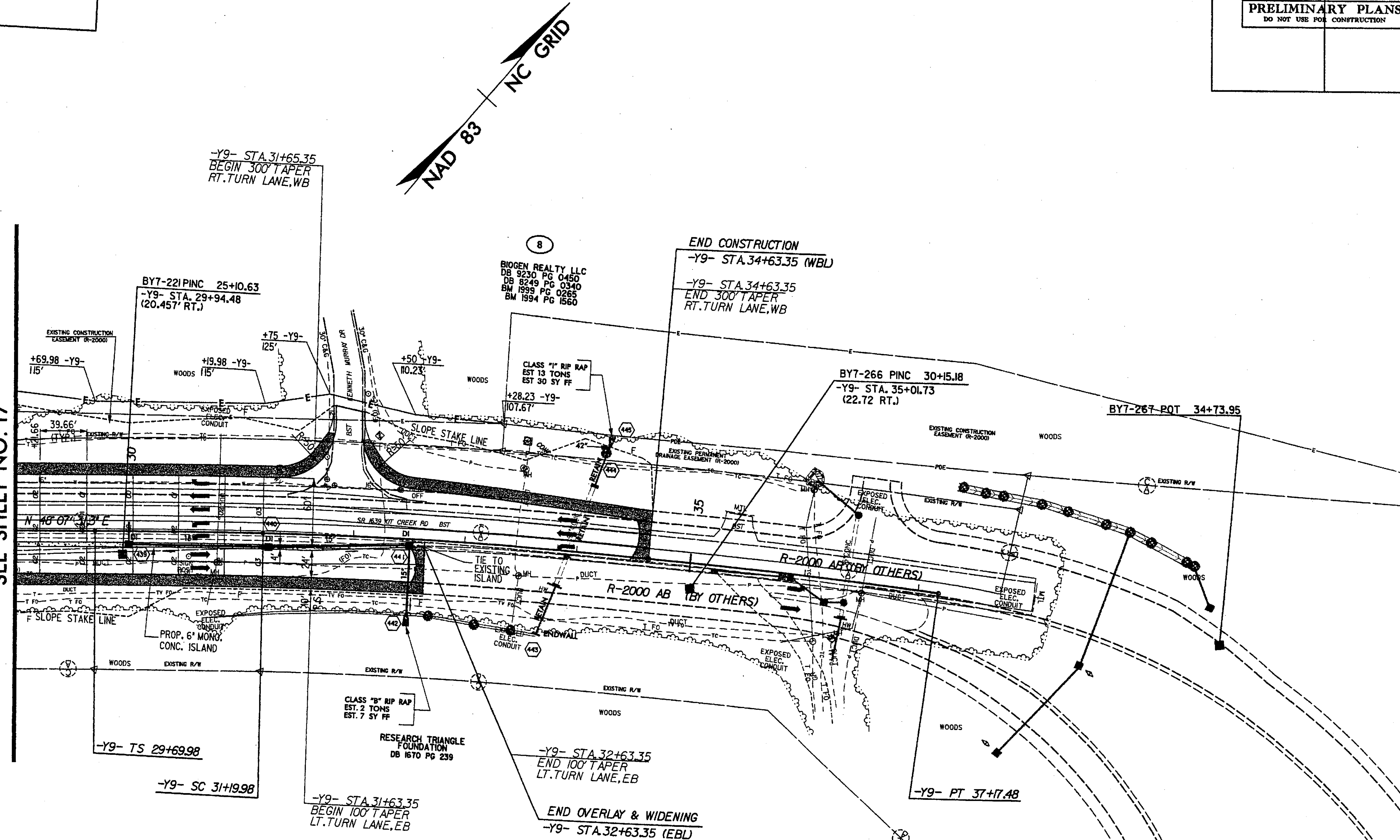
PROJECT REFERENCE NO.	SHEET NO.
U-4026	33
U-4026B R/W SHEET NO.	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NAD 83
NC GRID
-MATCHLINE- STA. 29+00.00
SEE SHEET NO. 17
-Y9- STA.31+65.35
BEGIN 300' TAPER
RT.TURN LANE,WB
BY7-221 PINC 25+10.63
-Y9- STA. 29+94.48
(20.457' RT.)
BIOGEN REALTY LLC
DB 9230 PG 0450
DB 8249 PG 0340
BM 1999 PG 0265
BM 1994 PG 1560
END CONSTRUCTION
-Y9- STA.34+63.35 (WBL)
-Y9- STA.34+63.35
END 300' TAPER
RT.TURN LANE,WB
BY7-266 PINC 30+15.18
-Y9- STA. 35+01.73
(22.72 RT.)
BY7-267 POT 34+73.95
CLASS "I" RIP RAP
EST 13 TONS
EST 30 SY FF
SLOPE STAKE LINE
WOODS
R-2000 AB (BY OTHERS)
TIE TO EXISTING ISLAND
PROP. 6' MONO. CONC. ISLAND
EXPOSED ELEC. CONDUIT
EXISTING R/W
CLASS "B" RIP RAP
EST. 2 TONS
EST. 7 SY FF
RESEARCH TRIANGLE FOUNDATION
DB 1670 PG 239
-Y9- TS 29+69.98
-Y9- SC 31+19.98
-Y9- STA.31+63.35
BEGIN 100' TAPER
LT.TURN LANE,EB
-Y9- STA.32+63.35
END 100' TAPER
LT.TURN LANE,EB
END OVERLAY & WIDENING
-Y9- STA.32+63.35 (EBL)
-Y9- PT 37+17.48

-Y9-

PIs Sta 30+69.98	PI Sta 34+19.26
Θs = 1° 03' 01.7"	Δ = 8° 22' 07.0" (RT)
Ls = 150.00'	D = 1° 24' 02.2"
LT = 100.00'	L = 597.49'
ST = 50.00'	T = 299.28'
	R = 4,090.75'
	SE = 0.03 FT/FT
	RUNOFF = 150.0 FT

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -Y9- PROFILE, SEE SHEET 54

LEGEND
PAVED SHOULDER

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PROJECT REFERENCE NO.	SHEET NO.
U-4026	34
U-4026B R/W SHEET NO.	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID

RESEARCH TRIANGLE FOUNDATION OF NORTH CAROLINA
D.B. 980 PG. 395
PB. 94 PG. 48

SEARLS FAMILY LIMITED PARTNERSHIP
DB 2712 PG 997

RODNEY COE & MARIE S. COE
D.B. 1064 PG. 445

EISAI INC.
D.B. 2667 PG. 583

KEYSTONE OFFICE, 300, LLC
DB 3010 PG 804
MB 145 PG 55

BY10-269 PINC 10+00.01
-Y12- STA. 11+52.53
(22.769' LT)

-Y12- STA.10+30.00
BEGIN 500' TAPER
LT. LANE, WB &
RT. LANE, EB

BEGIN CONSTRUCTION
-Y12- PC 10+30.00

-Y12- PC 10+00.00

-Y12- STA.15+30.00
END 500' TAPER
LT. LANE, WB &
RT. LANE, EB

BY10-224 PINC 14+88.38
GPS U-4026-6
-Y12- STA. 16+39.56
(58.312' LT)

-Y12- PT 17+66.67

-Y12- STA.17+76.00
BEGIN 200' TAPER
RT. LANE, EB

-Y12- STA.18+50.00
BEGIN 200' TAPER
LT. LANE, WB

-Y12- STA.19+76.00
END 200' TAPER
RT. LANE, EB

-Y12- STA.20+50.00
END 200' TAPER
LT. LANE, WB

-Y12-
PI Sta 13+83.34
Δ = 0° 05' 26.4" (RT)
D = 0° 00' 42.6"
L = 766.67'
T = 383.34'
R = 484,515.26'
SE = 0.02 FT/FT

-MATCHLINE- STA. 22+00.00 SEE SHEET NO. 24

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -Y12- PROFILE, SEE SHEET 55

LEGEND
PAVED SHOULDER

Plans prepared by:
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PROJECT REFERENCE NO.	SHEET NO.
U-4026	35
U-4026B R/W SHEET NO.	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NC GRID

-MATCHLINE- STA. 29+00.00 SEE SHEET NO. 24

-Y12- STA. 31+60.00
BEGIN 200' TAPER
LT. LANE, WB &
RT. LANE, EB

-Y12- STA. 33+60.00
END 200' TAPER
LT. LANE, WB &
RT. LANE, EB

-Y12- STA. 36+10.00
BEGIN 200' TAPER
LT. LANE, WB

BY10-270 PINC 34+32.11
-Y12- STA. 35+77.36
(14.42 LT)

-Y12- STA. 38+10.00
END 200' TAPER
LT. LANE, WB
BEGIN 250' TAPER
WB & EB

BY10-271 POT 38+67.09
-Y12- STA. 40+08.07
(25.59 LT)

-Y12- STA. 40+60.00
END 250' TAPER
WB & EB

-Y12- PC 33+83.66

BY10-226 PINC 30+29.33
-Y12- STA. 31+76.57
(22.94 RT)

-Y12- PCC 36+05.51

-Y12- PCC 38+13.43

-Y12- PCC 38+67.51

-Y12- PT 40+56.31

-Y12- POT 41+03.12

END CONSTRUCTION
-Y12- POT 40+60.00

-Y12-			
PI Sta 34+94.63	PI Sta 37+09.84	PI Sta 38+40.50	PI Sta 39+62.00
Δ = 4° 10' 04.6" (RT)	Δ = 11° 54' 47.1" (RT)	Δ = 6° 53' 10.9" (RT)	Δ = 5° 58' 31.2" (RT)
D = 1° 52' 43.5"	D = 5° 43' 46.5"	D = 12° 43' 56.7"	D = 3° 09' 54.1"
L = 221.85'	L = 207.92'	L = 54.08'	L = 188.79'
T = 110.97'	T = 104.34'	T = 27.08'	T = 94.48'
R = 3,049.69'	R = 1,000.00'	R = 450.00'	R = 1,810.28'
SE = 0.04 FT/FT	SE = 0.06 FT/FT	SE = 0.06 FT/FT	SE = 0.06 FT/FT
RUNOFF = 110.0 FT			RUNOFF = 165.0 FT

NOTES:
1. ALL RADII AT BEGIN AND END OF PROP. 6" MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION SECTION, SEE SHEET 2-N
FOR -Y12- PROFILE, SEE SHEET 56

LEGEND
PAVED SHOULDER

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606
(919)-851-6066

2/8/2005
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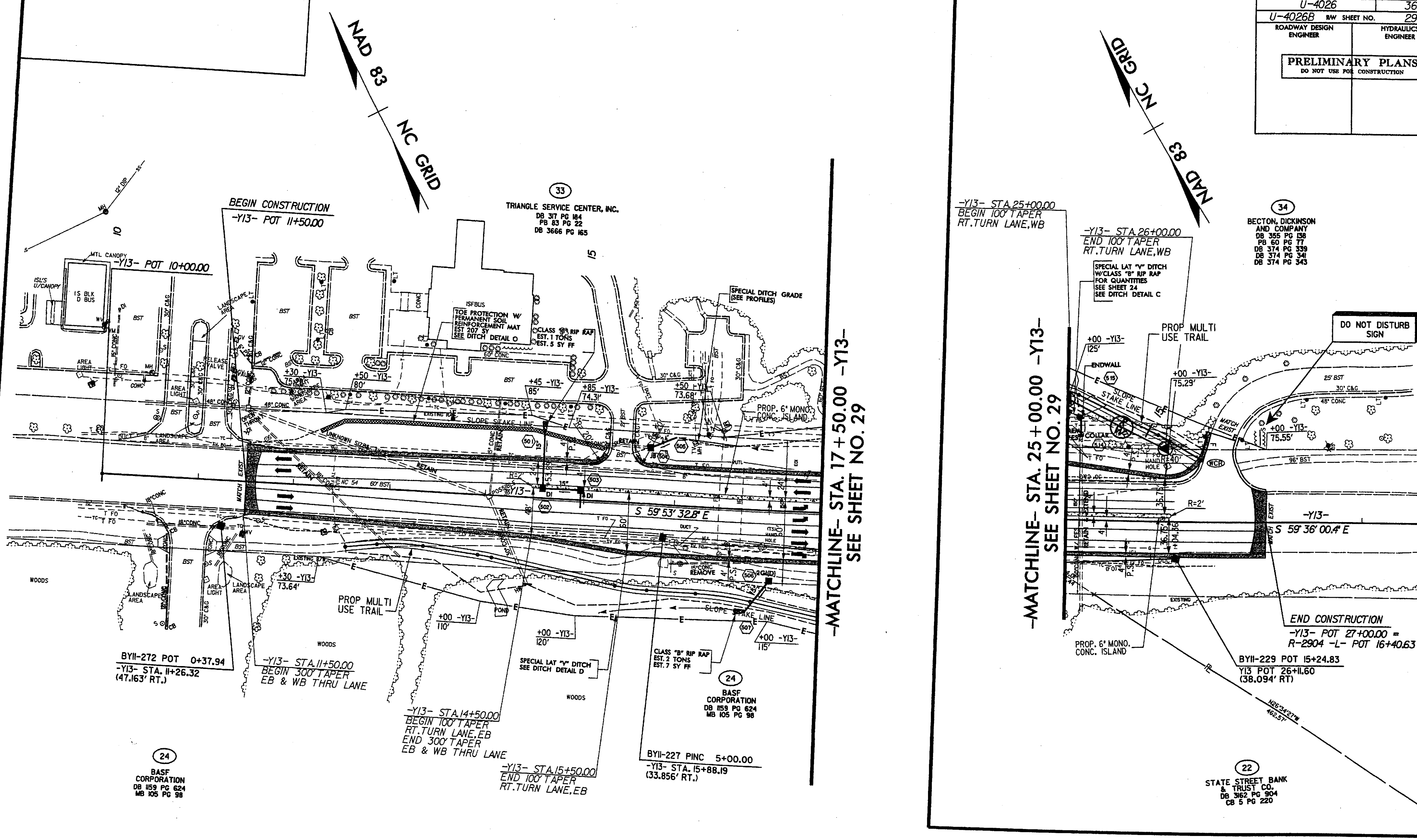
KO & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	36
U-4026B R/W SHEET NO.	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NAD 83 / NC GRID
BEGIN CONSTRUCTION
-Y13- POT 11+50.00
-Y13- POT 10+00.00
TRIANGLE SERVICE CENTER, INC.
DB 317 PG 184
PB 83 PG 22
DB 3666 PG 165
TOE PROTECTION W/ PERMANENT SOIL REINFORCEMENT MAT EST 207 SY SEE DITCH DETAIL O
CLASS "B" RIP RAP EST. 1 TONS EST. 5 SY FF
SPECIAL DITCH GRADE (SEE PROFILES)
PROP. 6" MONO. CONC. ISLAND
SLOPE STAKE LINE
S 59°53' 32.8" E
-MATCHLINE- STA. 17+50.00 -Y13- SEE SHEET NO. 29
PROP MULTI USE TRAIL
BY11-272 POT 0+37.94
-Y13- STA. 11+26.32 (47.163' RT.)
-Y13- STA. 11+50.00 BEGIN 300' TAPER EB & WB THRU LANE
SPECIAL LAT "V" DITCH SEE DITCH DETAIL D
CLASS "B" RIP RAP EST. 2 TONS EST. 7 SY FF
-Y13- STA. 14+50.00 BEGIN 100' TAPER RT. TURN LANE, EB END 300' TAPER EB & WB THRU LANE
-Y13- STA. 15+50.00 END 100' TAPER RT. TURN LANE, EB
BY11-227 PINC 5+00.00
-Y13- STA. 15+88.19 (33.856' RT.)
BASF CORPORATION
DB 1159 PG 624
MB 105 PG 98
WOODS
-Y13- STA. 25+00.00 BEGIN 100' TAPER RT. TURN LANE, WB
-Y13- STA. 26+00.00 END 100' TAPER RT. TURN LANE, WB
SPECIAL LAT "V" DITCH W/CLASS "B" RIP RAP FOR QUANTITIES SEE SHEET 24 SEE DITCH DETAIL C
BECTON, DICKINSON AND COMPANY
DB 355 PG 138
PB 60 PG 77
DB 374 PG 339
DB 374 PG 341
DB 374 PG 343
DO NOT DISTURB SIGN
-MATCHLINE- STA. 25+00.00 -Y13- SEE SHEET NO. 29
S 59°36' 00.4" E
END CONSTRUCTION
-Y13- POT 27+00.00 = R-2904 -L- POT 16+40.63
BY11-229 POT 15+24.83
Y13 POT 26+11.60 (38.094' RT)
STATE STREET BANK & TRUST CO.
DB 3162 PG 904
CB 5 PG 220

FOR DITCH DETAILS, SEE SHEETS 2-H & 2-I
FOR C&G TRANSITION, SEE SHEET 2-N
FOR TRAIL PLANS, SEE SHEETS 2-W & 2-X
FOR -Y13- PROFILE, SEE SHEET 57

LEGEND

PAVED SHOULDER

Plans prepared by:
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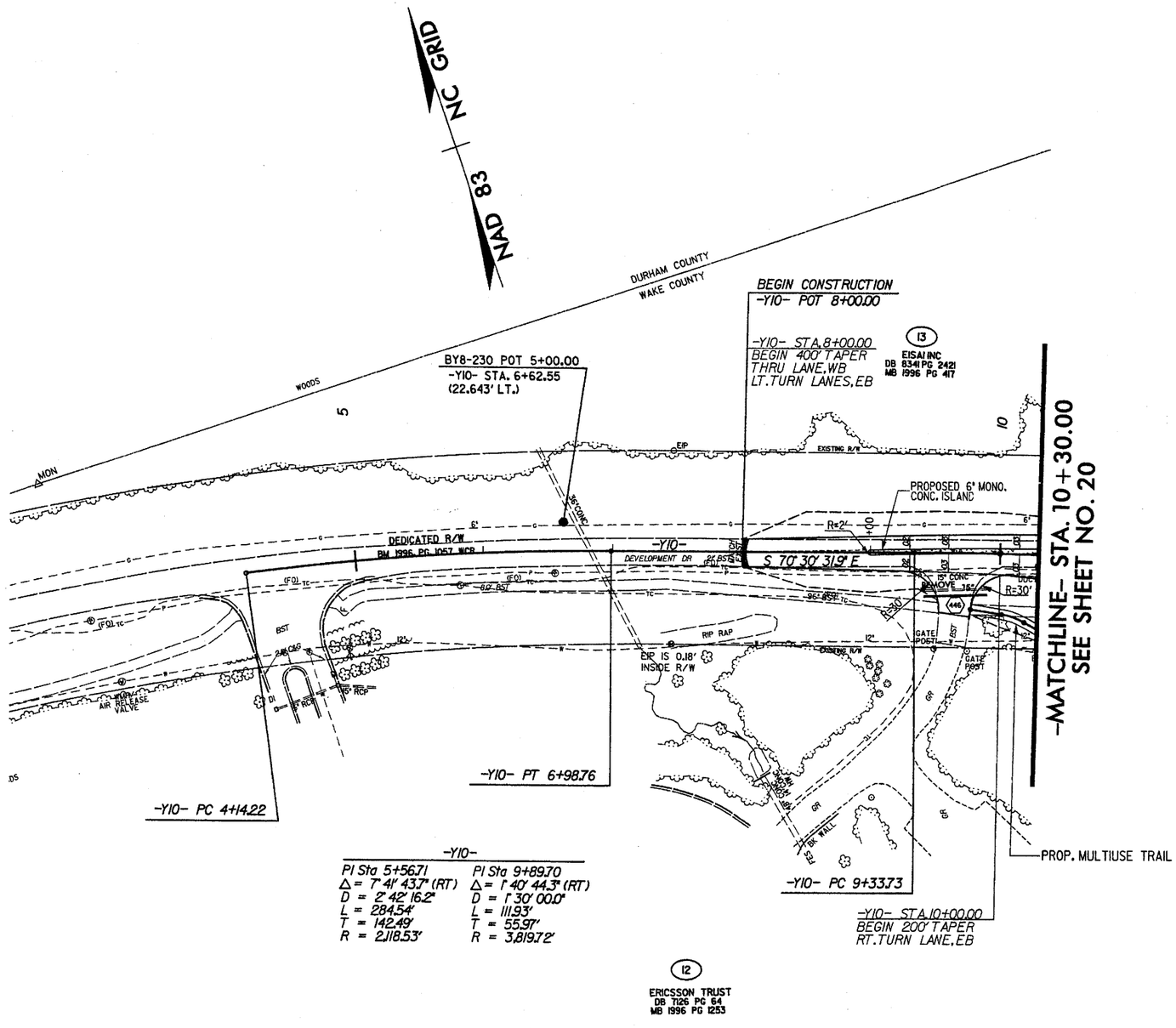
Ko & Associates, P.C.

REVISIONS

7/2/99

PROJECT REFERENCE NO.	SHEET NO.
U-4026	37
U-4026B R/W SHEET NO.	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-Y10-

PI Sta 5+56.71	PI Sta 9+89.70
Δ = 7° 41' 43.7" (RT)	Δ = 1° 40' 44.3" (RT)
D = 2° 42' 16.2"	D = 1° 30' 00.0"
L = 284.54'	L = 111.93'
T = 142.49'	T = 55.97'
R = 2,118.53'	R = 3,819.72'

NOTES:
1. ALL DRIVEWAYS IN SHOULDER SECTION TO BE 16 FT. WITH 12 FT. RADIUS UNLESS SHOWN OTHERWISE ON PLANS.
2. ALL RADII AT BEGIN AND END OF PROP. 6' MONO. CONC. ISLAND ARE 2' UNLESS OTHERWISE SHOWN.

FOR TRAIL PLANS SEE SHEET 2-Q
FOR DITCH DETAILS SEE SHEET 2-H & 2-I
FOR -Y10- PROFILE, SEE SHEET 53

LEGEND
PAVED SHOULDER

Plans prepared by:
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