FREUDENBERG DATA CENTER
FIBER OPTIC CABLE ROUTE

December 16, 2010

Designed by:

ONUG DESIGN CORPORATION
3315 Atlantic Avenue • Raleigh, NC 27604
(919) 876-5455

RESEARCH TRIANGLE PARK

SHEET INDEX

G1	LOCATION MAP
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Designed for:

FREUDENBERG IT FIT

-AND-

BC&K Building Group
A KBR Company

PROJECT DESCRIPTION:

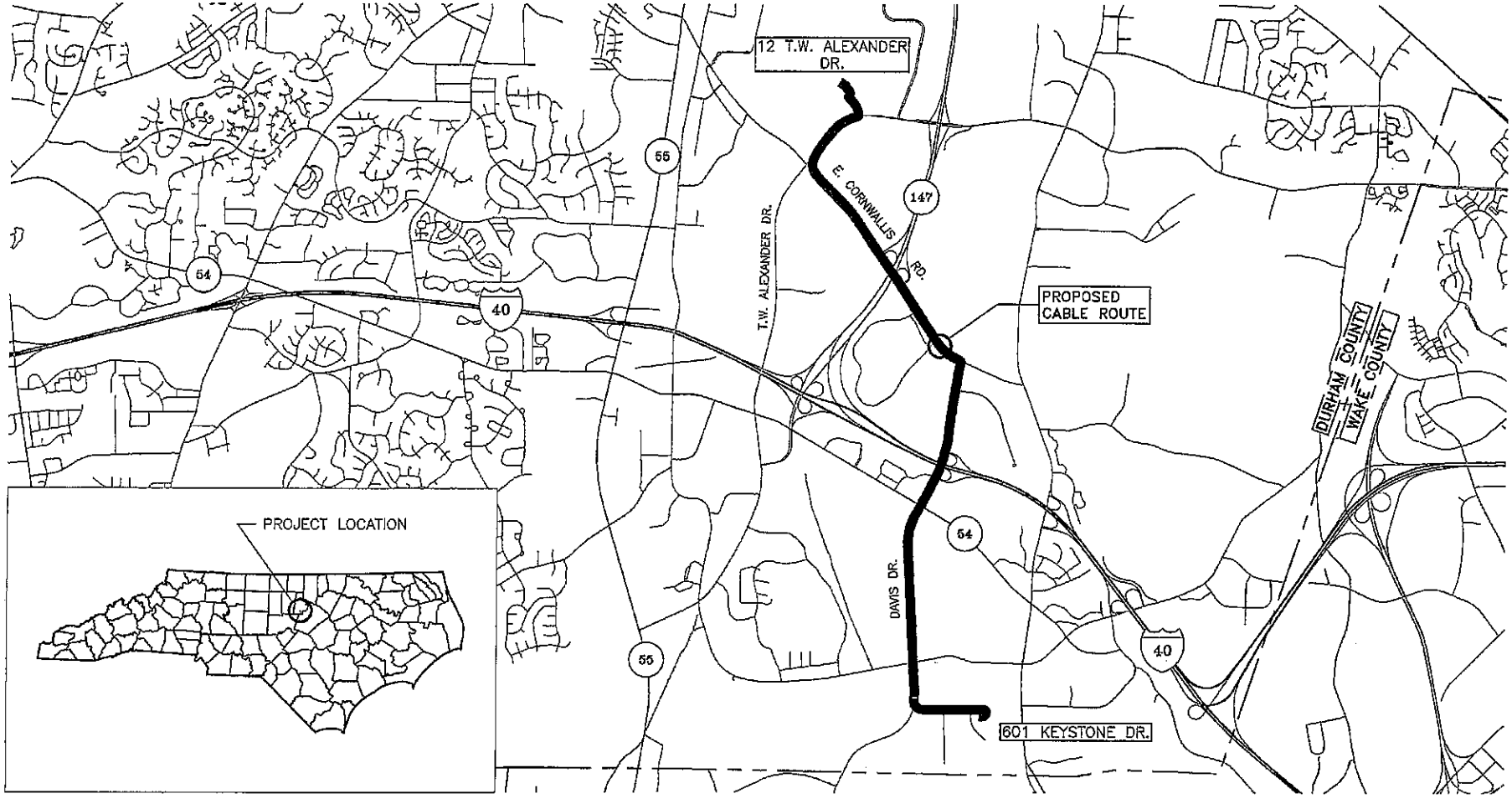
THIS PROJECT CONSISTS OF DESIGN AND PLACEMENT OF A 144–COUNT FIBER OPTIC CABLE AT RESEARCH TRIANGLE PARK, NORTH CAROLINA FOR THE PURPOSE OF CONNECTING DATA CENTERS AT 601 KEYSTONE DRIVE AND 12 T.W. ALEXANDER DRIVE.

APPROVED
NC DOT
DISTRICT ENGINEER

PROJECT STATUS (PERMITTING 16.1)

E52 32 10 191

ROUTE LOCATION MAP



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REVISIONS		

Designed for:
FREUDENBERG IT
FIT
JE&K Building Group
A KBR Company

PROJECT #:	OCI–12755
DATE:	12/16/2010
SCALE:	NOT TO SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET: G1

GENERAL NOTES/ADDENDUM NOTES

1. THE CONTRACTOR IS REQUIRED TO CONTACT THE APPROPRIATE UTILITY COMPANIES INVOLVED AND MAKE SATISFACTORY ARRANGEMENTS TO ADJUST THE UTILITIES IN CONFLICT WITH THE PROPOSED WORK PRIOR TO BEGINNING CONSTRUCTION.
2. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.
3. TRENCHING, BORE PITS, AND/OR OTHER EXCAVATIONS SHALL NOT BE LEFT OPEN OR UNSAFE OVERNIGHT. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AND PROVIDE A COMPETENT PERSON ON SITE TO SUPERVISE EXCAVATION AT ALL TIMES.
4. ALL FILL AREAS/BACKFILL SHALL BE COMPACTED TO 95% DENSITY IN ACCORDANCE WITH AASHTO T99 AS MODIFIED BY THE NCDOT. ALL MATERIAL TO A DEPTH OF 8 INCHES BELOW THE FINISHED SURFACE OF THE SUBGRADE SHALL BE COMPACTED TO DENSITY EQUAL TO AT LEAST 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T99.
5. VEGETATIVE COVER SHALL BE ESTABLISHED ON ALL DISTURBED AREAS IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE DIVISION ROADSIDE ENVIRONMENTAL ENGINEER.
6. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE N.C.D.O.T. STANDARDS AND SPECIFICATIONS MANUALS.
7. ANY DRAINAGE STRUCTURE DISTURBED OR DAMAGED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AS DIRECTED BY THE DISTRICT ENGINEER. NOTIFICATION SHALL BE GIVEN TO DISTRICT ENGINEER PRIOR TO MAKING ANY REPAIR.
8. ALL DRIVEWAYS ALTERED DURING CONSTRUCTION SHALL BE RETURNED TO A STATE COMPARABLE WITH THE CONDITION OF THE DRIVEWAYS PRIOR TO CONSTRUCTION.
9. RIGHT OF WAY MONUMENTS DISTURBED DURING CONSTRUCTION SHALL BE REFERENCED BY A REGISTERED LAND SURVEYOR AND RESET AFTER CONSTRUCTION.
10. PROPER TRAFFIC CONTROL DEVICES, SIGNS, ETC., SHALL BE INSTALLED TO ENSURE PUBLIC SAFETY IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND ANY SUPPLEMENTS THERETO AND NCDOT ROADWAY STANDARD DRAWINGS.
11. ALL LANES OF TRAFFIC ARE TO BE OPEN DURING THE HOURS OF 6:00AM TO 9:00AM AND FROM 4:00PM TO 7:00PM MONDAY THRU FRIDAY. TWO WAY TRAFFIC WILL BE MAINTAINED AT ALL TIMES.
12. INGRESS AND EGRESS SHALL BE MAINTAINED TO ALL BUSINESSES AND DWELLINGS AFFECTED BY THE PROJECT.
13. ANY WORK REQUIRING EQUIPMENT OR PERSONNEL WITHIN 5' OF THE EDGE OF ANY TRAVEL LANE OF AN UNDIVIDED FACILITY AND WITHIN 10' OF THE EDGE OF ANY TRAVEL LANE OF A DIVIDED FACILITY SHALL REQUIRE A LANE CLOSURE WITH APPROPRIATE TAPERS.
14. NO PARKING OR MATERIAL STORAGE SHALL BE ALLOWED ALONG THE SHOULDERS OF ANY ROADWAY.
15. DURING NON-WORKING HOURS, EQUIPMENT SHALL BE REMOVED FROM THE RIGHT OF WAY.
16. ALL ROADWAY SIGNS THAT ARE REMOVED DUE TO CONSTRUCTION SHALL BE REINSTALLED AT THE END OF THE WORKING DAY.
17. EXCAVATION MATERIAL SHALL NOT BE PLACED ON THE PAVEMENT. DRAINAGE STRUCTURES SHALL NOT BE BLOCKED WITH EXCAVATION MATERIALS.
18. MANHOLES AND/OR VAULTS SHALL NOT BE PLACED IN THE DITCH LINE, SIDE SLOPES OF THE DITCHES OR IN THE PAVEMENT.
19. ALL MANHOLES, HAND HOLES, AND/OR VAULTS WITHIN NCDOT RIGHT-OF-WAY SHALL BE OF A PRE-APPROVED DESIGN.
20. PROPOSED TRAFFIC-BEARING MANHOLES AND VALVE COVERS SHALL BE FLUSH MOUNTED AND SHALL BE OF A NCDOT APPROVED DESIGN FOR HS-20 LOADING.
21. ALL WORK TO BE PERFORMED IN STRICT ACCORDANCE WITH THE APPLICABLE CODES OR REQUIREMENTS OF ANY REGULATING GOVERNMENTAL AGENCY AND THE RIGHT-OF-WAY GRANTOR.
22. LOCATIONS OF SOME OF THE PHYSICAL FEATURES WERE OBTAINED FROM DATED EVALUATION MAPS OR OTHER DRAWINGS AND MAY NOT BE SHOWN OR DEPICTED ON THESE DRAWINGS.
23. UNDERGROUND UTILITY LOCATIONS SHOWN ON THESE PLANS HAVE NOT BEEN FIELD VERIFIED AND ARE APPROXIMATE ONLY. UNDERGROUND UTILITY LOCATIONS WILL BE VERIFIED AT LEAST 100 FEET IN ADVANCE OF TRENCHING OR PLOWING, SO THAT CHANGES IN CABLE PLACEMENT CAN BE MADE IN THE EVENT OF CONFLICT.
24. ANY AND ALL IMPROVEMENTS, SUCH AS ASPHALT OR CONCRETE PAVEMENT, CURBS, GUTTERS, WALKS, DRAINAGE DITCHES, EMBANKMENTS, SHRUBS, TREES, GRASS SOD, ETC., IF DAMAGED, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND RESTORED TO ORIGINAL OR BETTER CONDITION.
25. SHORING OF BORE PITS AND TRENCHES IN ACCORDANCE WITH OSHA REGULATIONS SHALL BE MANDATORY. ANY SHORING NOT IN COMPLIANCE WITH OSHA REGULATIONS WILL CAUSE AN AUTOMATIC AND IMMEDIATE WORK STOPPAGE.
26. BURIED CABLE MARKERS WILL BE PLACED AT ALL UNDERGROUND UTILITY LOCATIONS AND ALL OTHER LOCATIONS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. MARKERS SHALL ALWAYS BE PLACED PERPENDICULAR TO THE CABLE RUNNING LINE.
27. UNDERGROUND CONDUIT WILL BE PLACED AT 36" MINIMUM COVER UNLESS SPECIFIED ON THE CONSTRUCTION DRAWINGS.
28. HAND HOLES MAY BE MOVED A MAXIMUM OF 10'-0 ALONG THE RUNNING LINE OF FIBER TO ACCOMMODATE PLACEMENT OBSTACLES. ANY OTHER ADJUSTMENTS MUST BE APPROVED BY THE DESIGNER.
29. ALL HDPE DUCTS SHALL BE SPLICED WITH COUPLER. FUSED SPLICES SHALL NOT BE USED UNLESS APPROVED BY OWNER. NO HDPE SPLICES SHALL BE PERMITTED WITHIN BORES.
30. THE SUBCONTRACTOR SHALL BORE AT APPROXIMATE DEPTH WHERE NECESSARY TO MAINTAIN MINIMUM 2'-0" CLEARANCE FROM OTHER UTILITIES.
31. ALL HANDHOLE/MANHOLES SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
32. THE COLOR CODE FOR THE DUCT SHALL BE AS FOLLOWS:

1 - BLUE	6 - WHITE
2 - ORANGE	7 - RED
3 - GREEN	8 - BLACK
4 - BROWN	9 - YELLOW
5 - SLATE	10 - VIOLET

33. ALL TREES POTENTIALLY AFFECTED BY THE WORK, WHETHER IN THE RIGHT-OF-WAY OR NOT, SHALL BE BROUGHT TO THE ATTENTION OF THE CONSTRUCTION MANAGER WHO WILL REQUIRE THAT PRECAUTION SUCH AS DEEPENING THE FIBER OPTIC LINE BORE OR MOVING THE RUNNING LINE OUT FROM THE DRIP LINE BE TAKEN TO AVOID DAMAGE TO THE TREE ROOT SYSTEM.
34. FLOWABLE FILL WITHIN NCDOT RIGHT OF WAY LIMITS SHALL ONLY BE USED WITH WRITTEN APPROVAL FROM THE DISTRICT ENGINEER.
35. CONTRACTOR MUST FOLLOW NORTH CAROLINA SEDIMENTATION POLLUTION CONTROL ACT OF 1973.
36. ALL DIRECTIONAL BORES UNDER STATE ROADWAYS TO BE A MINIMUM OF 10' DEEP. ALL DIRECTIONAL BORES UNDER CONTROLLED ACCESS TO BE A MINIMUM OF 15' DEEP.
37. UTILITIES SHOWN ARE KNOWN TO BE IN AREA BUT HAVE NOT BEEN PHYSICALLY LOCATED AND DO NOT RELIEVE CONTRACTOR RESPONSIBILITY OF CALLING NC ONE CALL SERVICE PRIOR TO WORK START.

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FREUDENBERG IT FIT

DE&K Building Group
A KBR Company

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PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET G3

LEGEND

DB 46'	DIRECTIONAL BORE WITH LENGTH SHOWN
	KNOWN UTILITIES IN AREA
	EXISTING UTILITY POLE
	EXISTING WATER VALVE
	FIRE HYDRANT
	ELECTRICAL MANHOLE
	SEWER MANHOLE
	STORM MANHOLE
	TELEPHONE MANHOLE
	FIBER MANHOLE
	EXISTING STREET LIGHT
	CROSSBOX
CB	TRAFFIC SIGNAL CONTROL BOX
EH	EXISTING HANDHOLE
H	PROPOSED HANDHOLE
	STORM DRAINAGE INLET
	STORM CATCH BASIN
	CULVERT
B	PROPOSED BURIED CABLE
B	EXISTING BURIED CABLE OWNER AS SHOWN (WHERE AVAILABLE)
EB	EXISTING DUCTBANK
G	EXISTING GASLINE
W	EXISTING WATERLINE
S	EXISTING SEWER LINE
ST	EXISTING STORM DRAINAGE
PL	PROPERTY LINE
X	FENCE
	GUARDRAIL
	ROAD RIGHT-OF-WAY
	RAILROAD
	EXISTING HYDROLOGY

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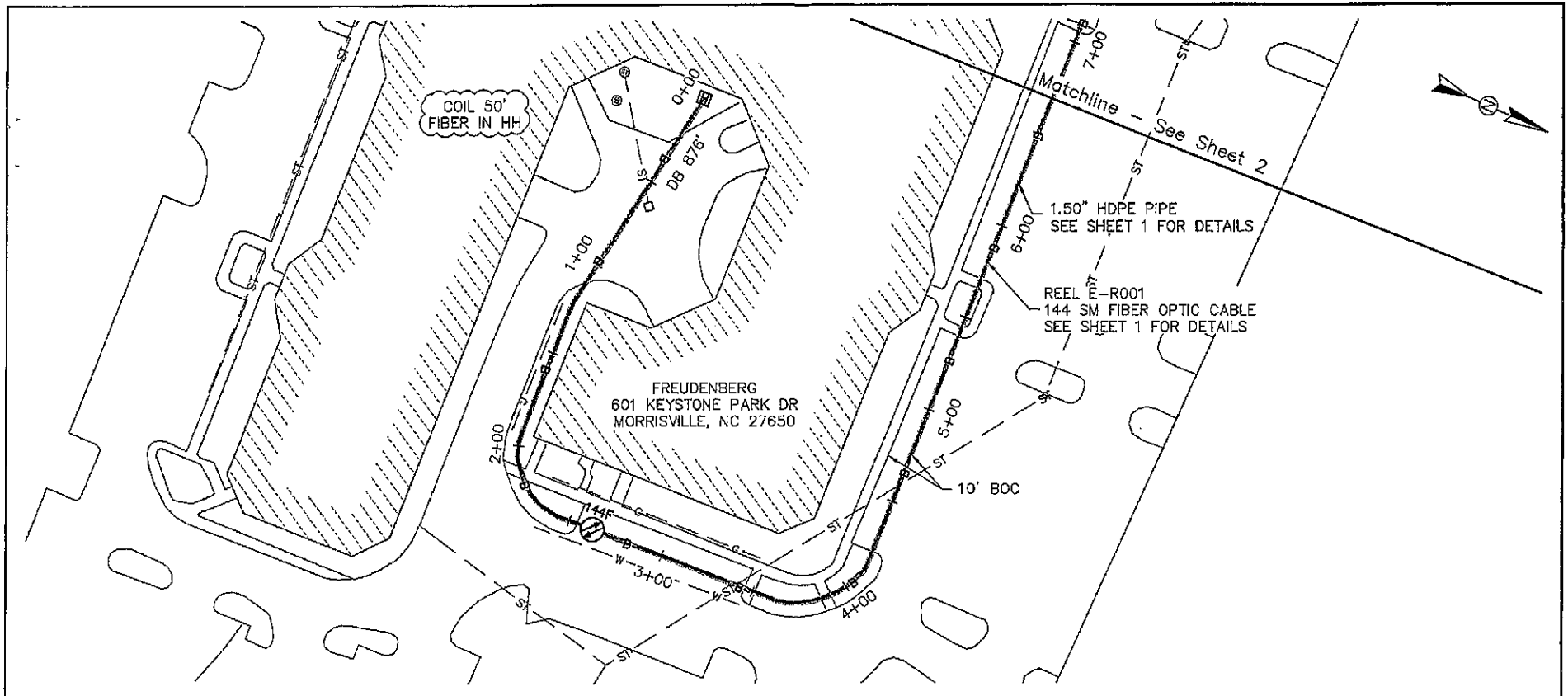
SHEET G4



NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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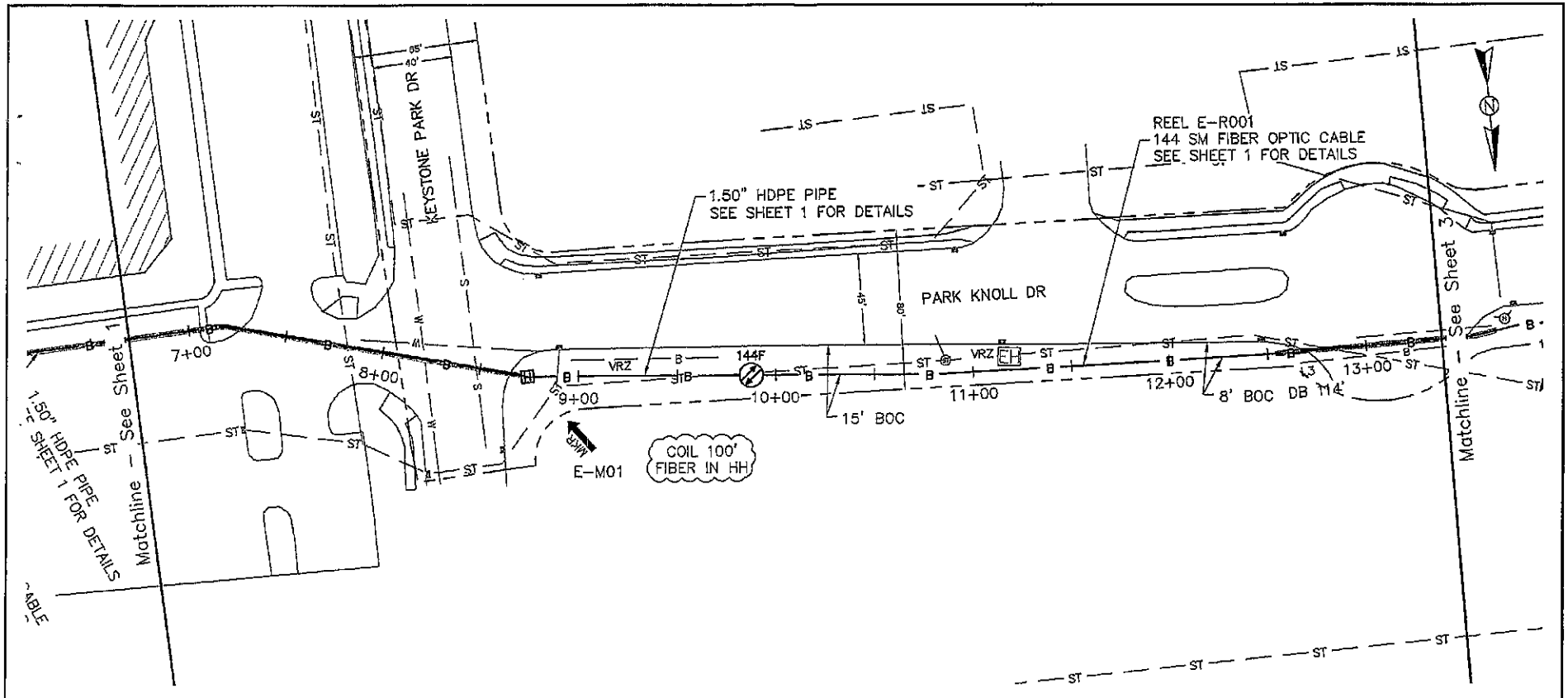
SHEET 1



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SHEET
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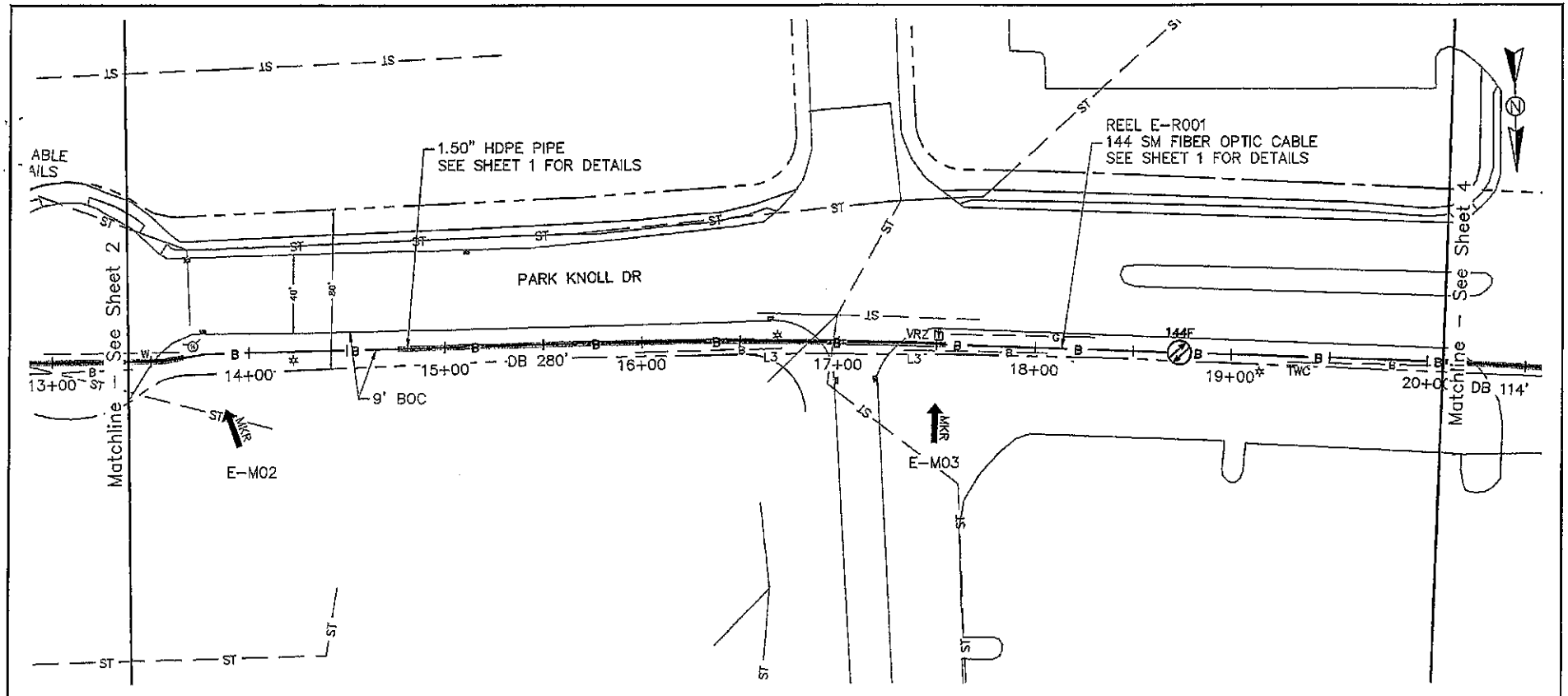

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SHEET
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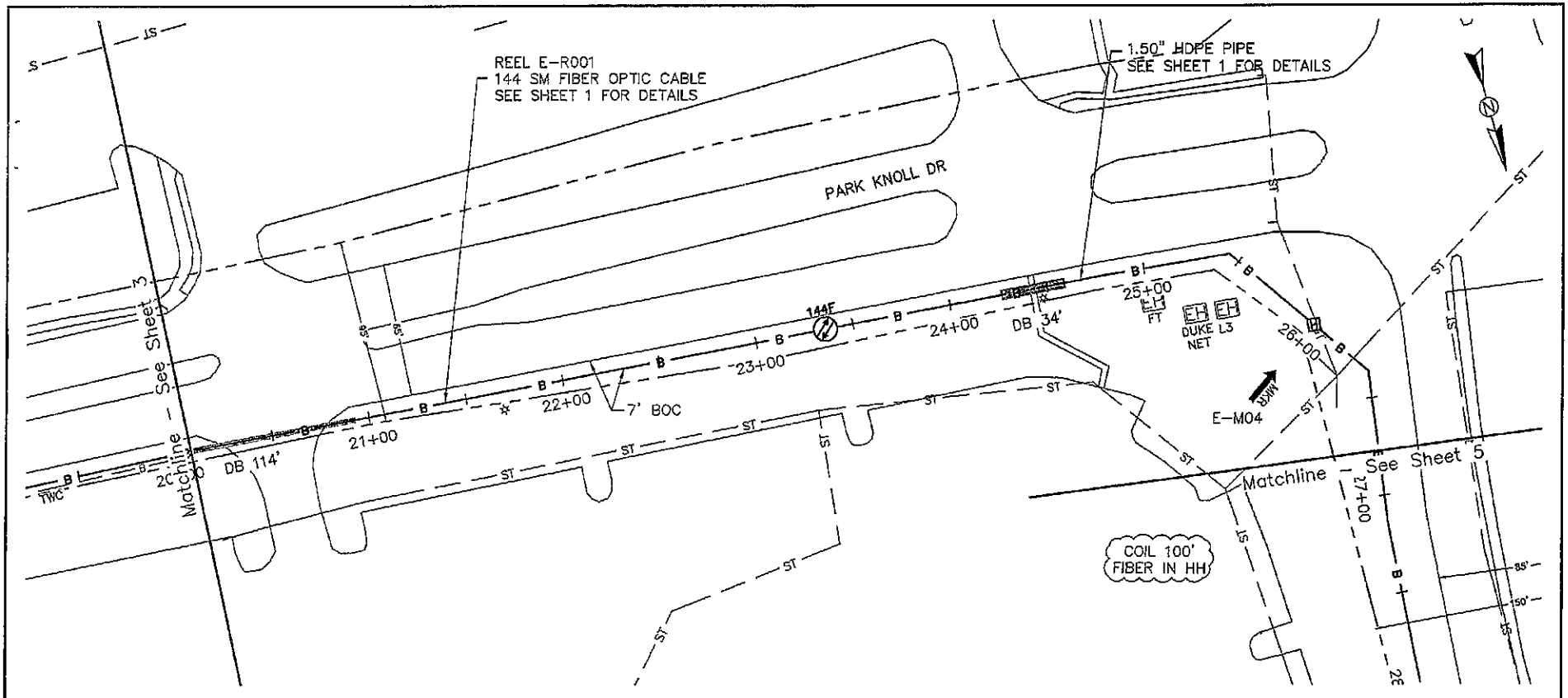

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Designed for:
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FIT
J.C.&K. Building Group
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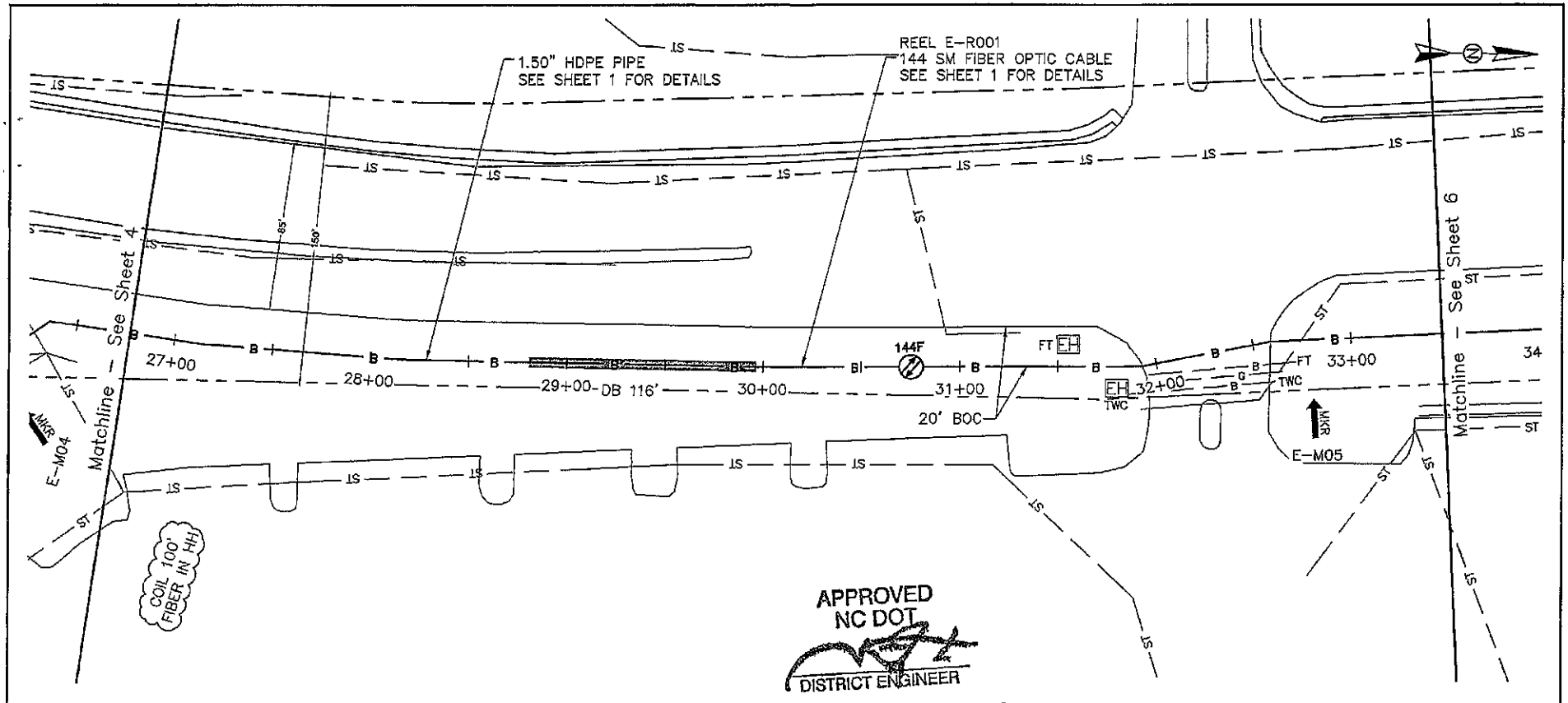
SHEET
4



APPROVED
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DISTRICT ENGINEER

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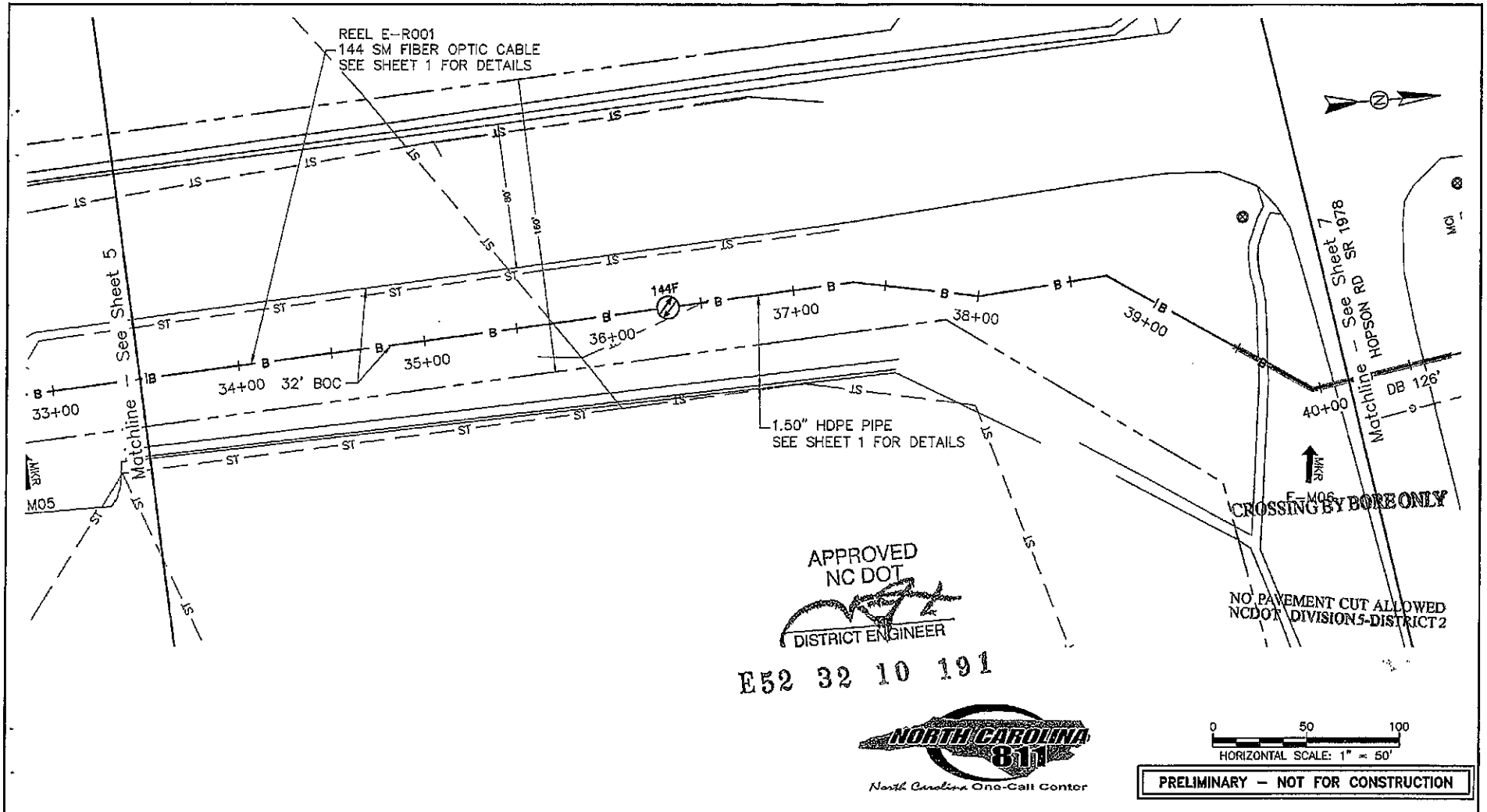

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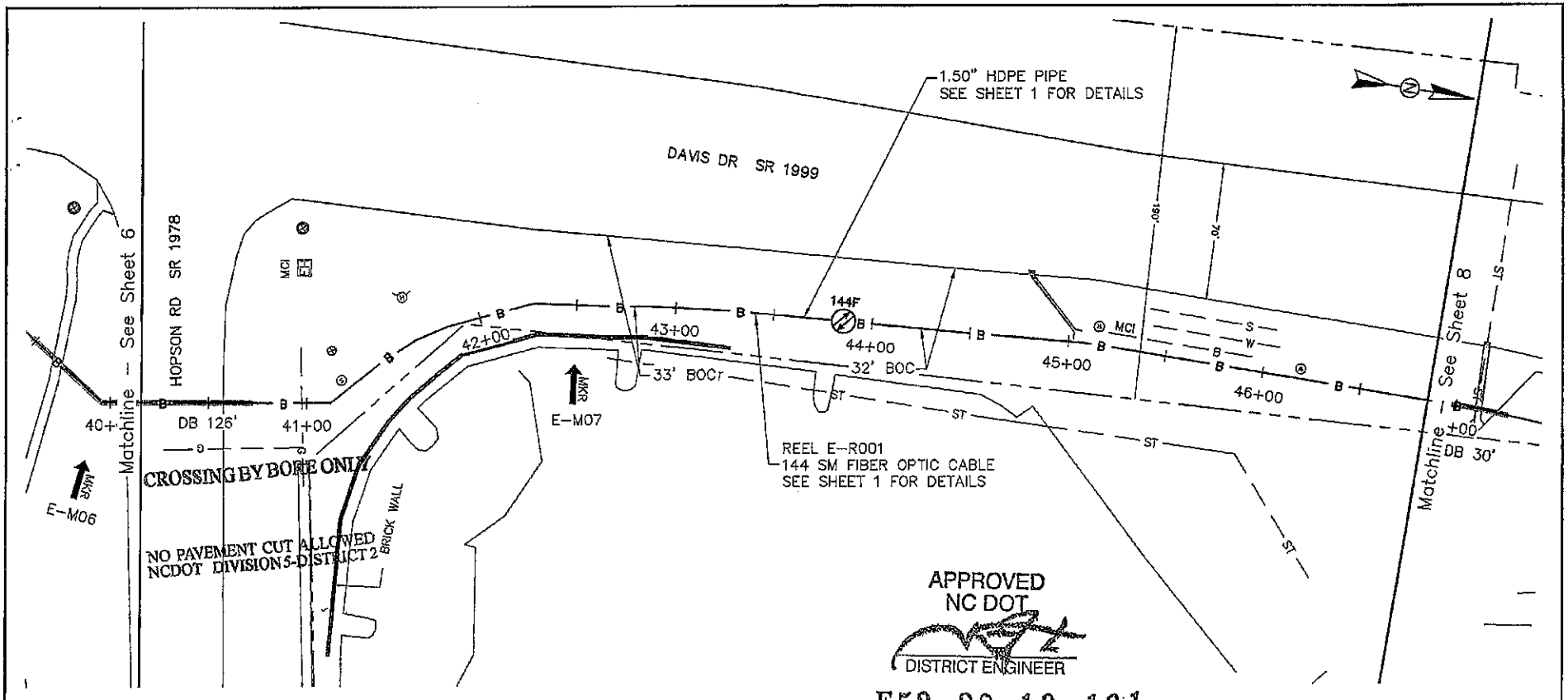

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SHEET
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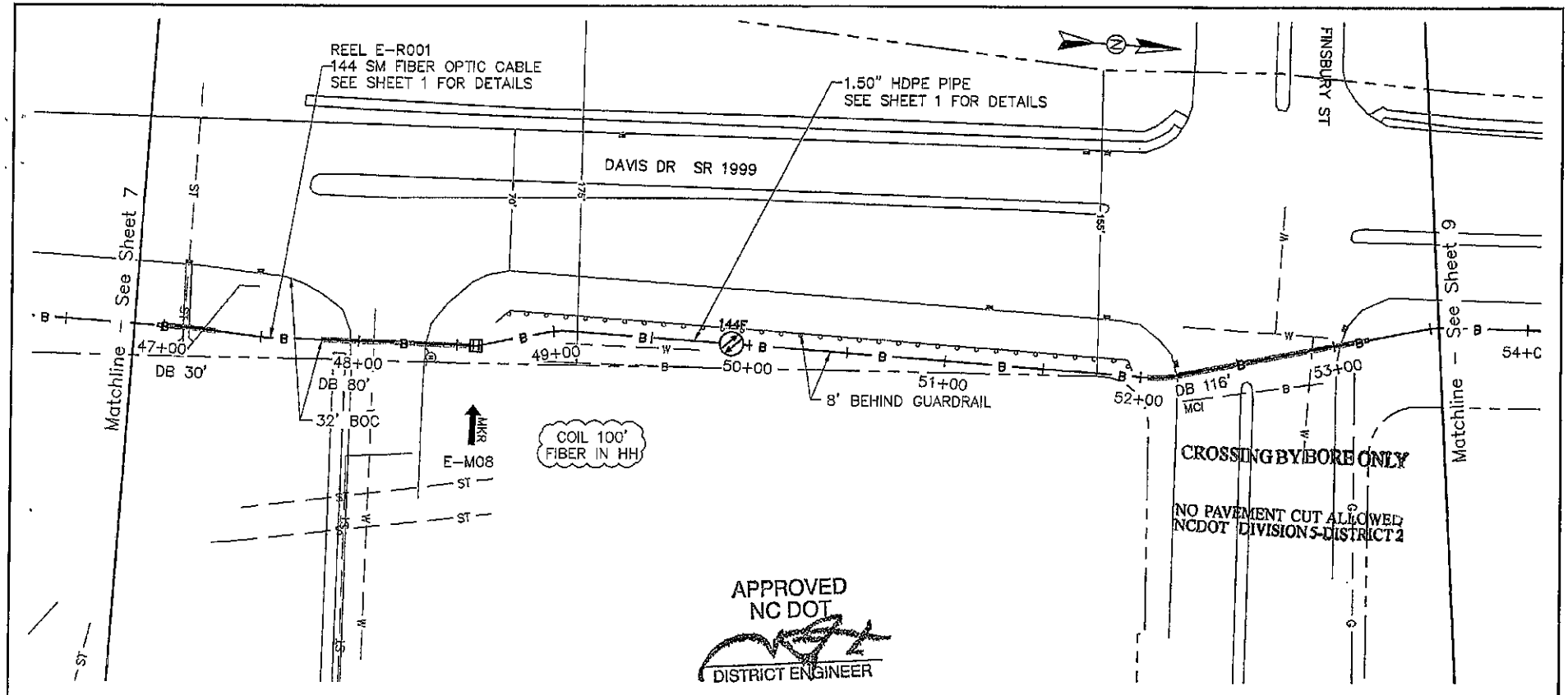

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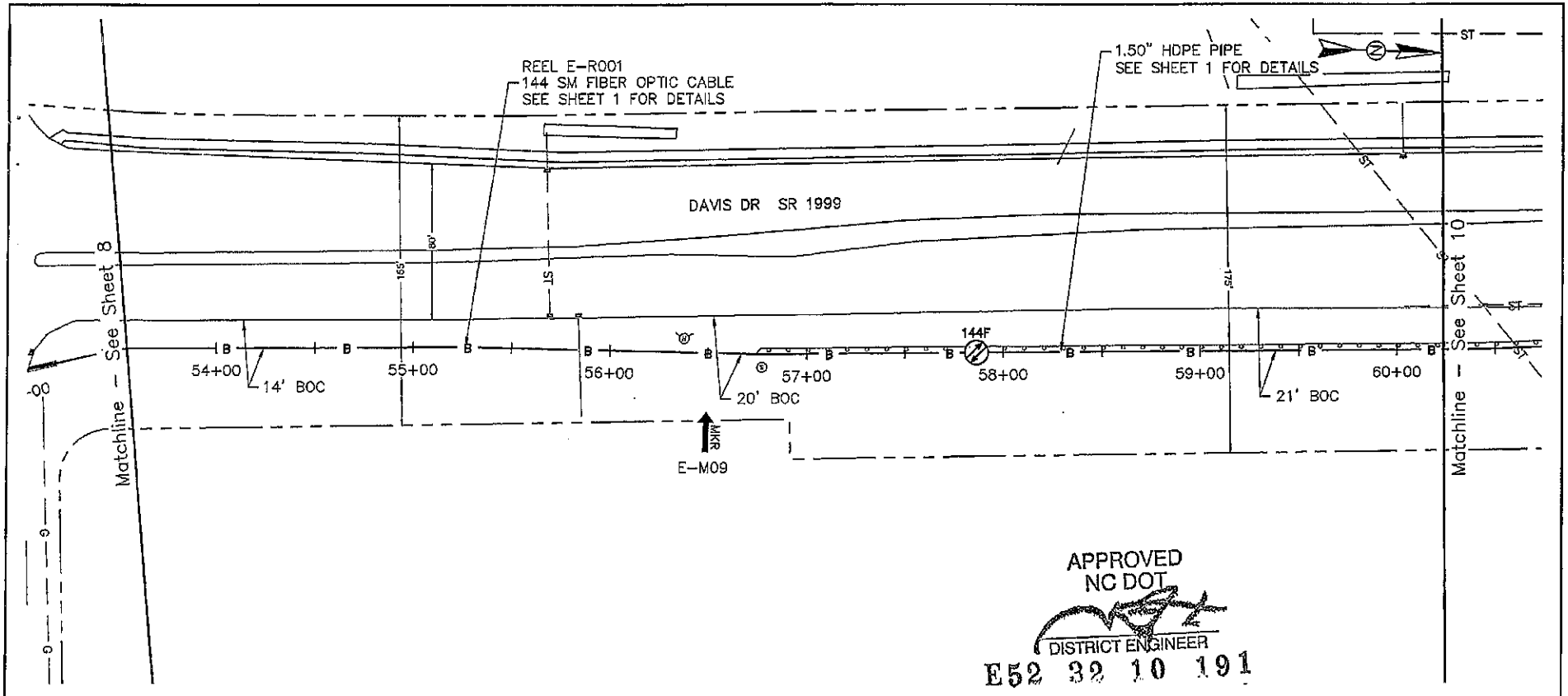
SHEET 8



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SHEET
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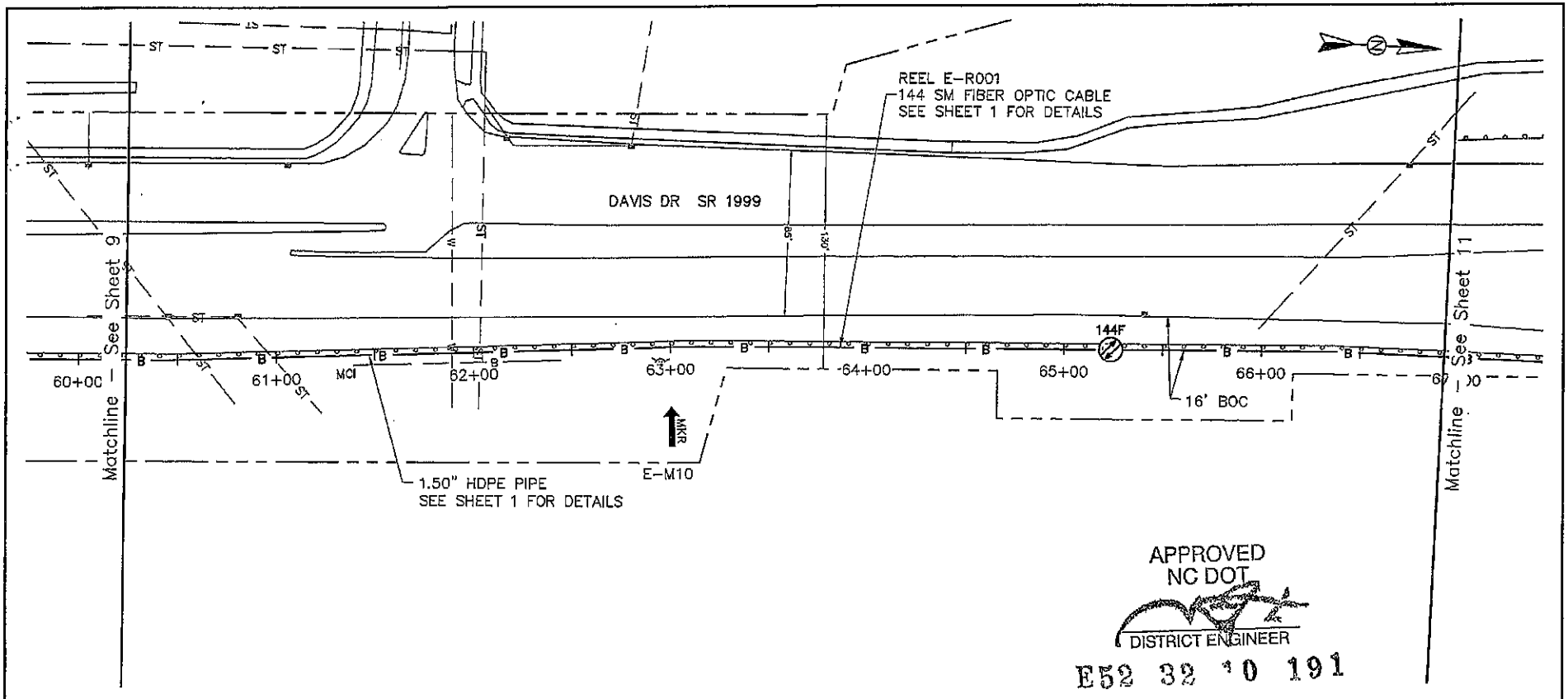

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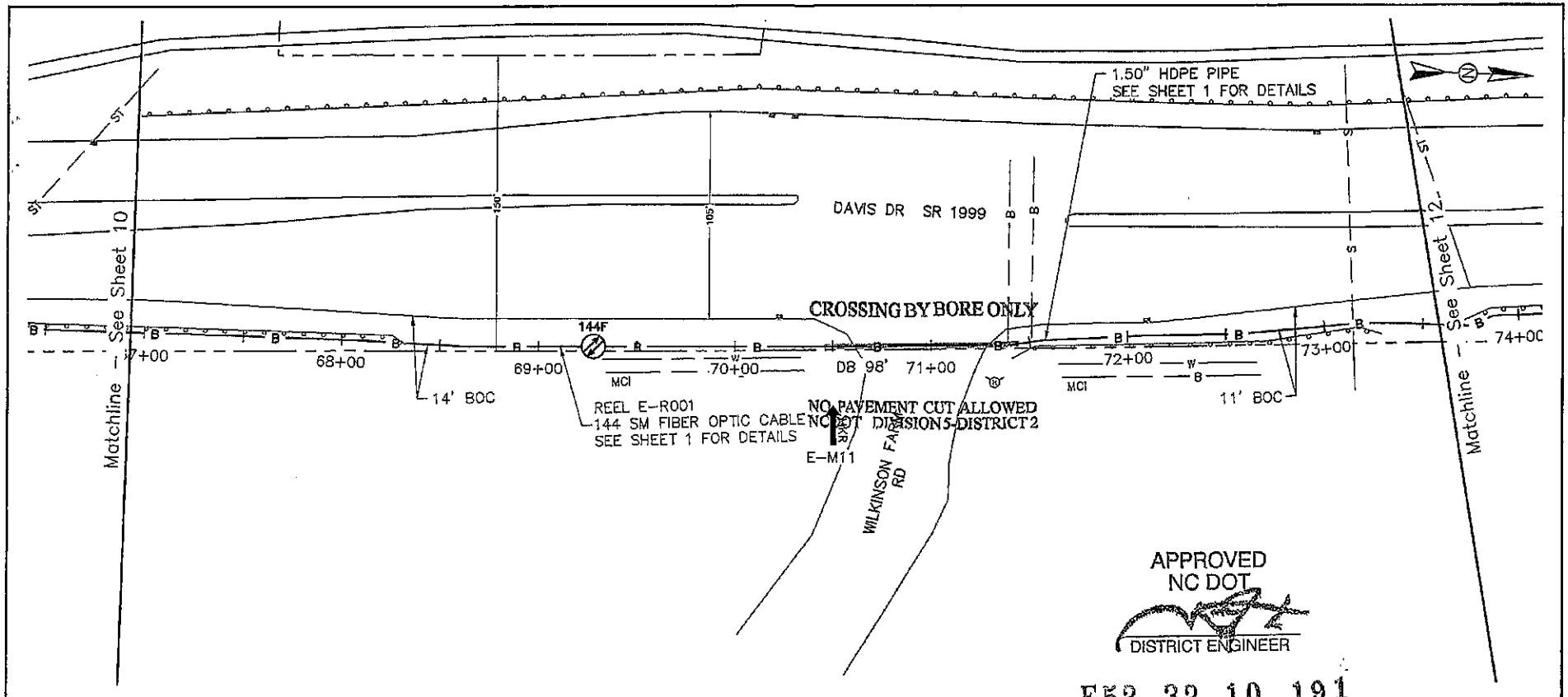
10



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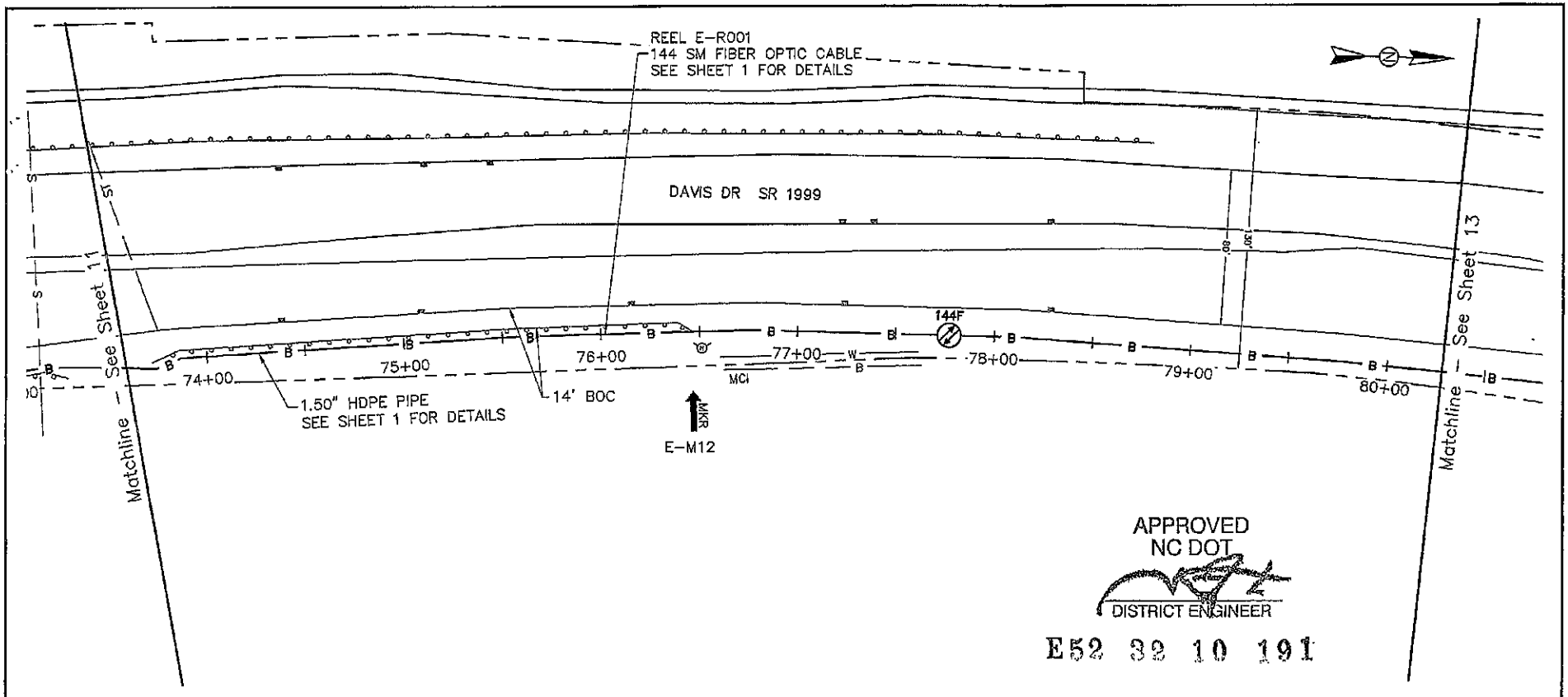
SHEET 11



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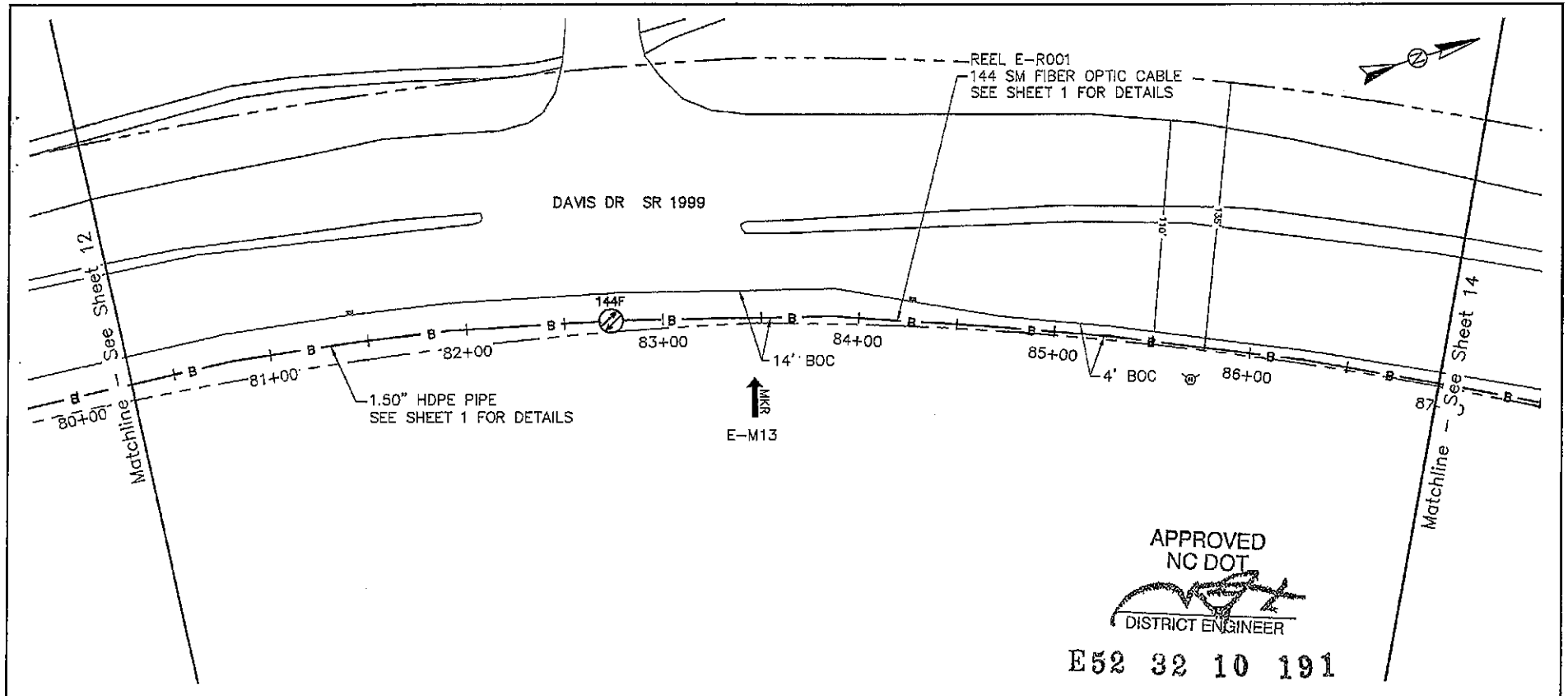
SHEET 12



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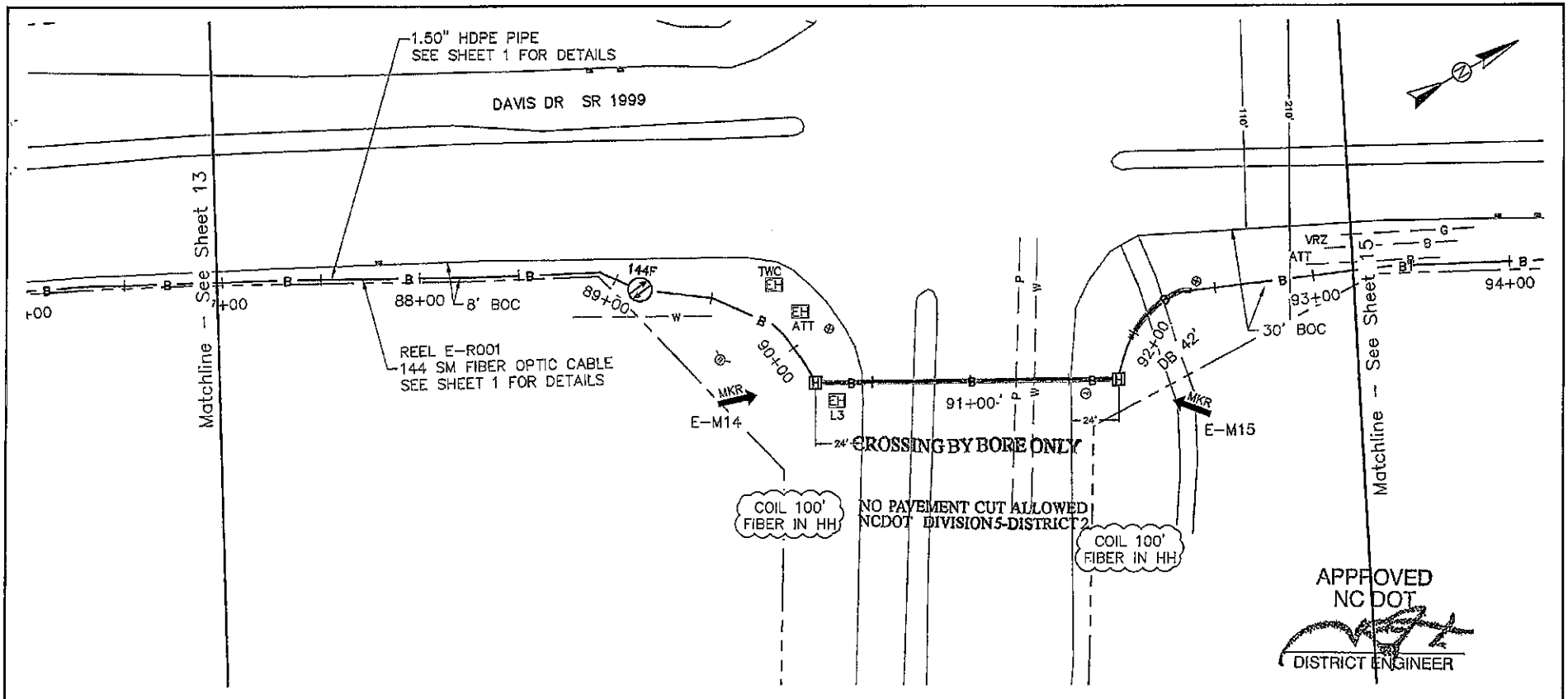

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A KBR Company

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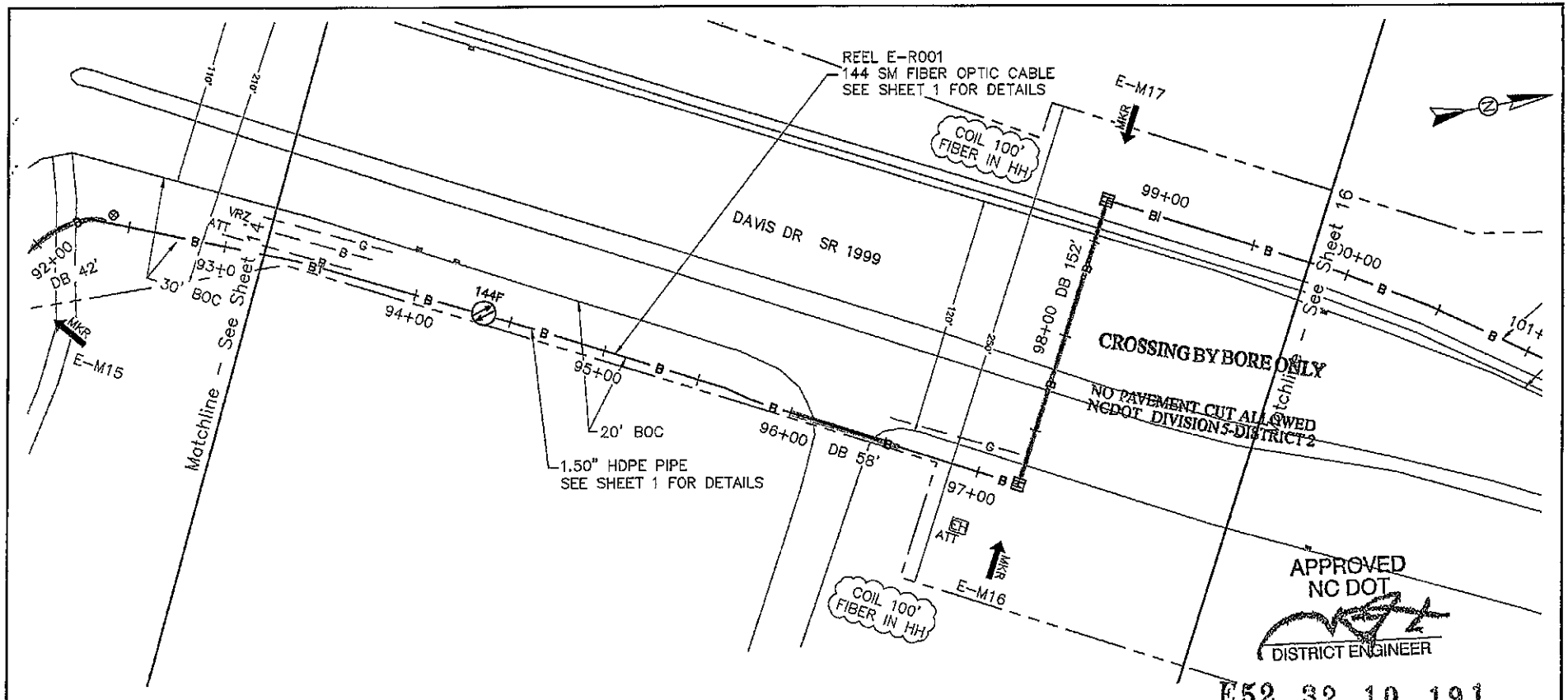
DATE:	12/16/2010
SCALE:	1" = 50'
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 14



NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

PRELIMINARY – NOT FOR CONSTRUCTION

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(919) 876-5455

REVISIONS		

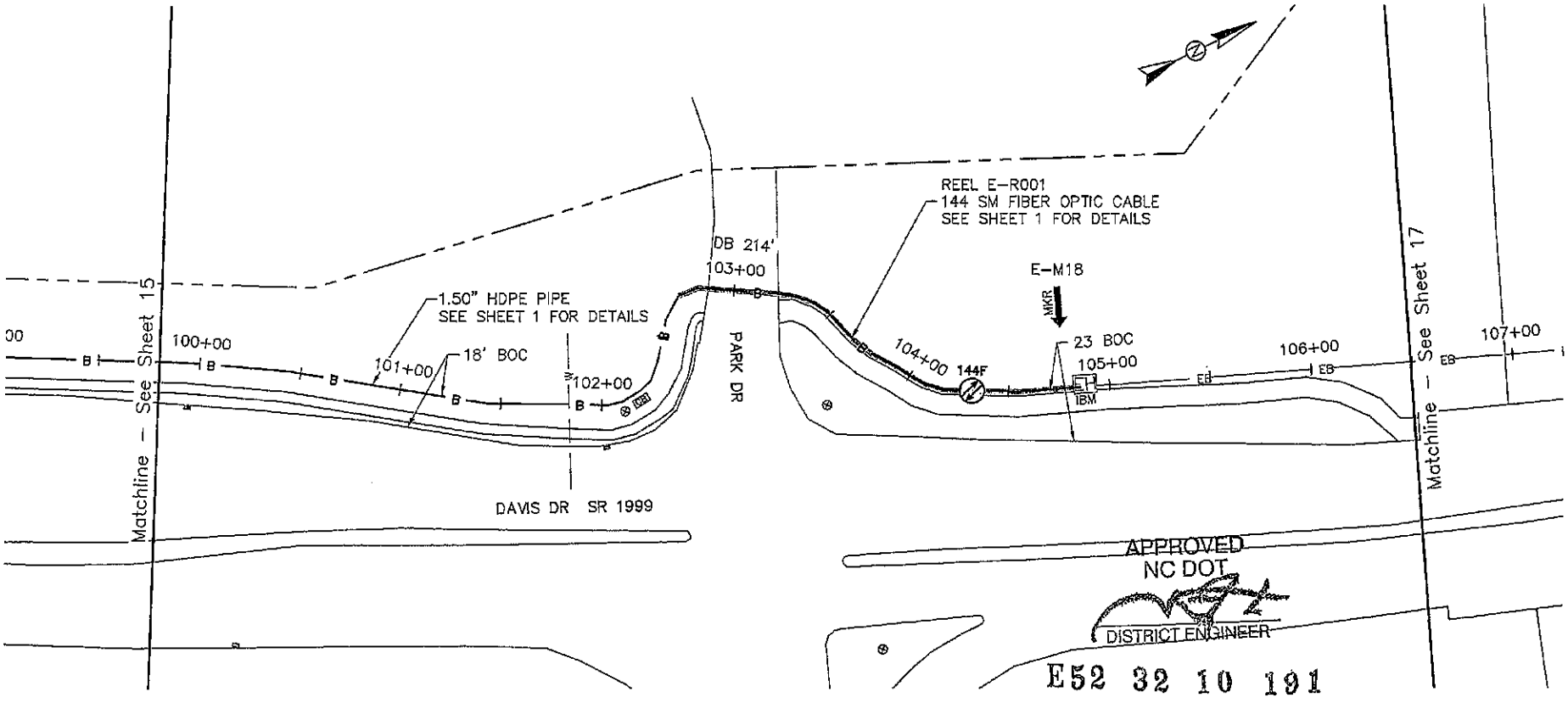
Designed for:
FREUDENBERG IT
FIT
BE&K Building Group
A KBR Company

PROJECT #:	OCI-12755
DATE:	12/16/2010
SCALE:	1" = 50'
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME:
FREUDENBERG DATA CENTER

SHEET NAME:
EAST FIBER ROUTE

SHEET
15



NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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BE&K Building Group
A KBR Company

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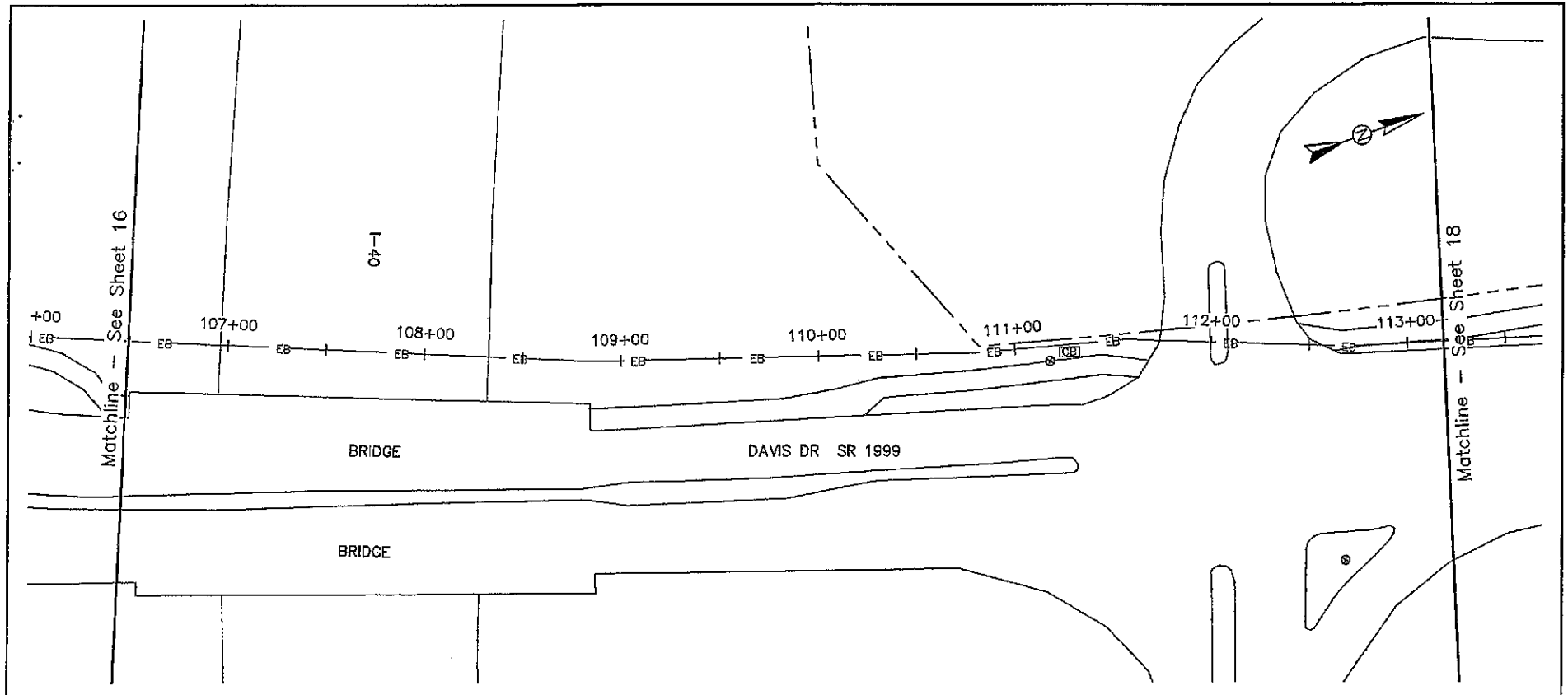
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 16



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North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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FREUDENBERG IT FIT
B&K Building Group
A KBR Company

PROJECT #:	OCI–12755
DATE:	12/16/2010
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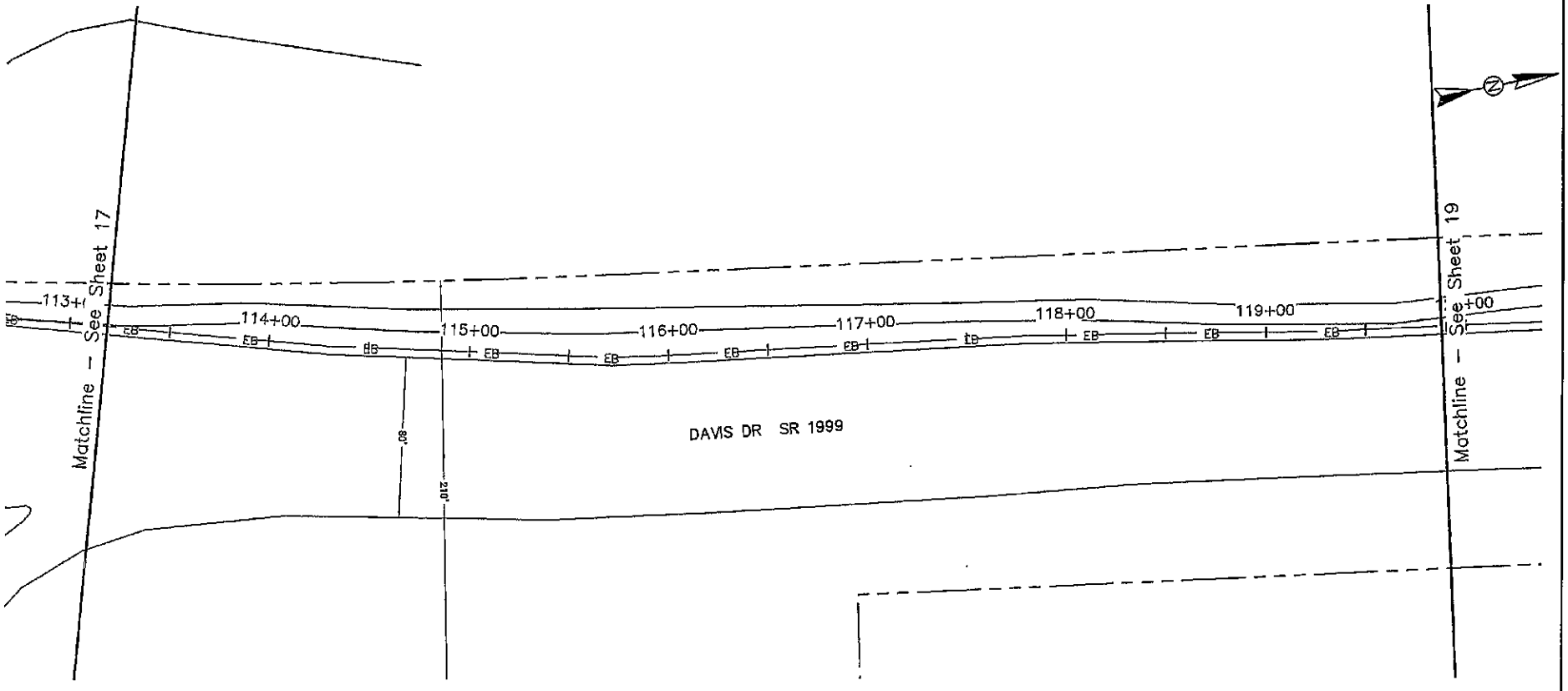
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 17



NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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DE&K Building Group
A KBR Company

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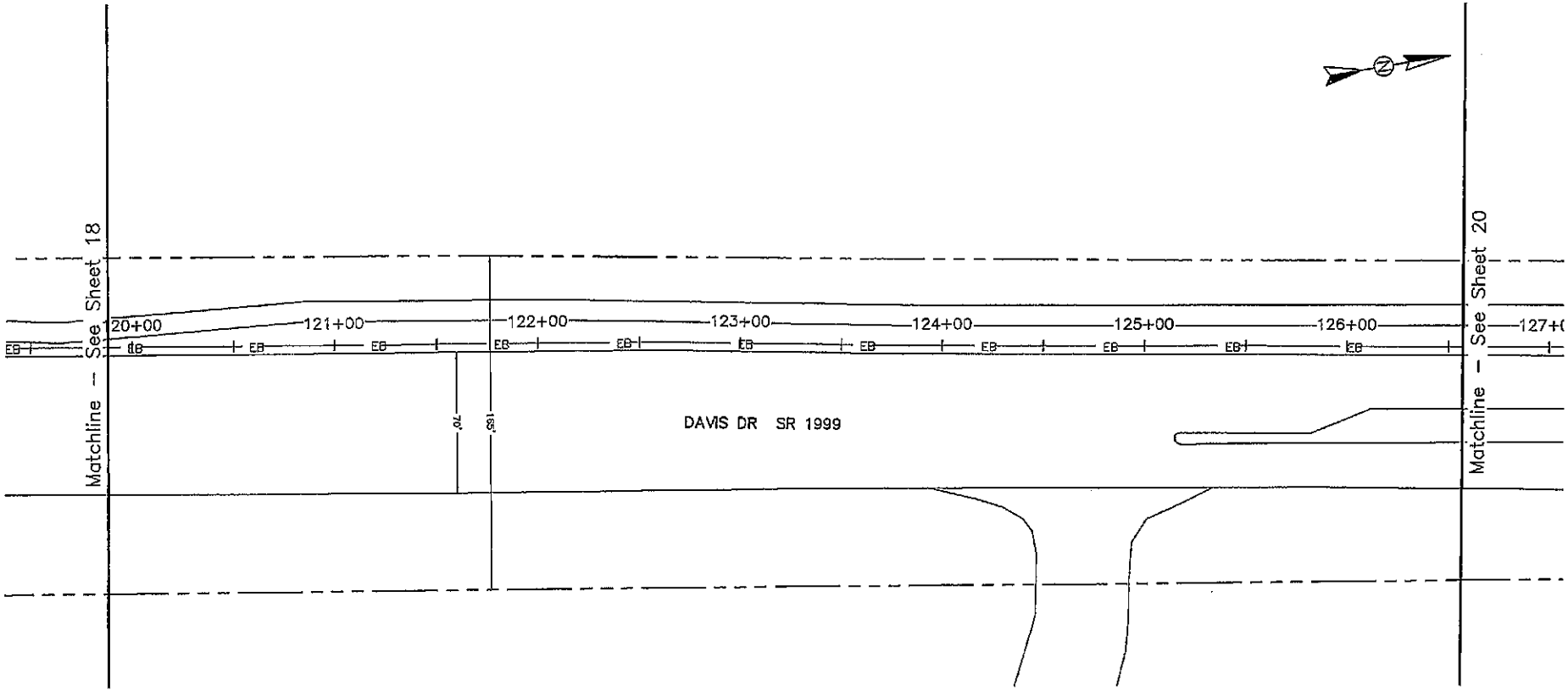
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 18



NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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REVISIONS		

Designed for:
FREUDENBERG IT FIT
DC&K Building Group
A KBR Company

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DESIGNED BY:	LGD
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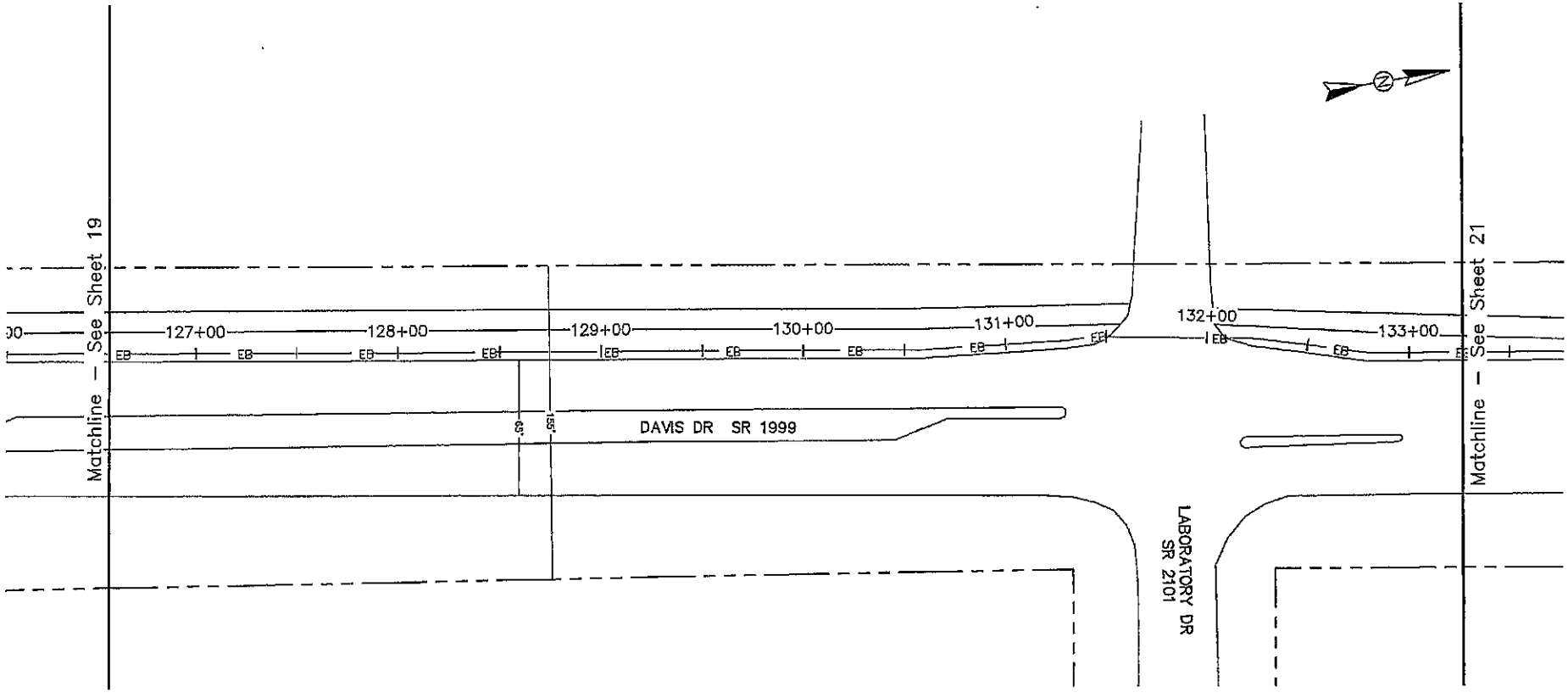
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 19



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North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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REVISIONS

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FREUDENBERG IT FIT
BE&K Building Group
A KBR Company

PROJECT #:	OCI–12755
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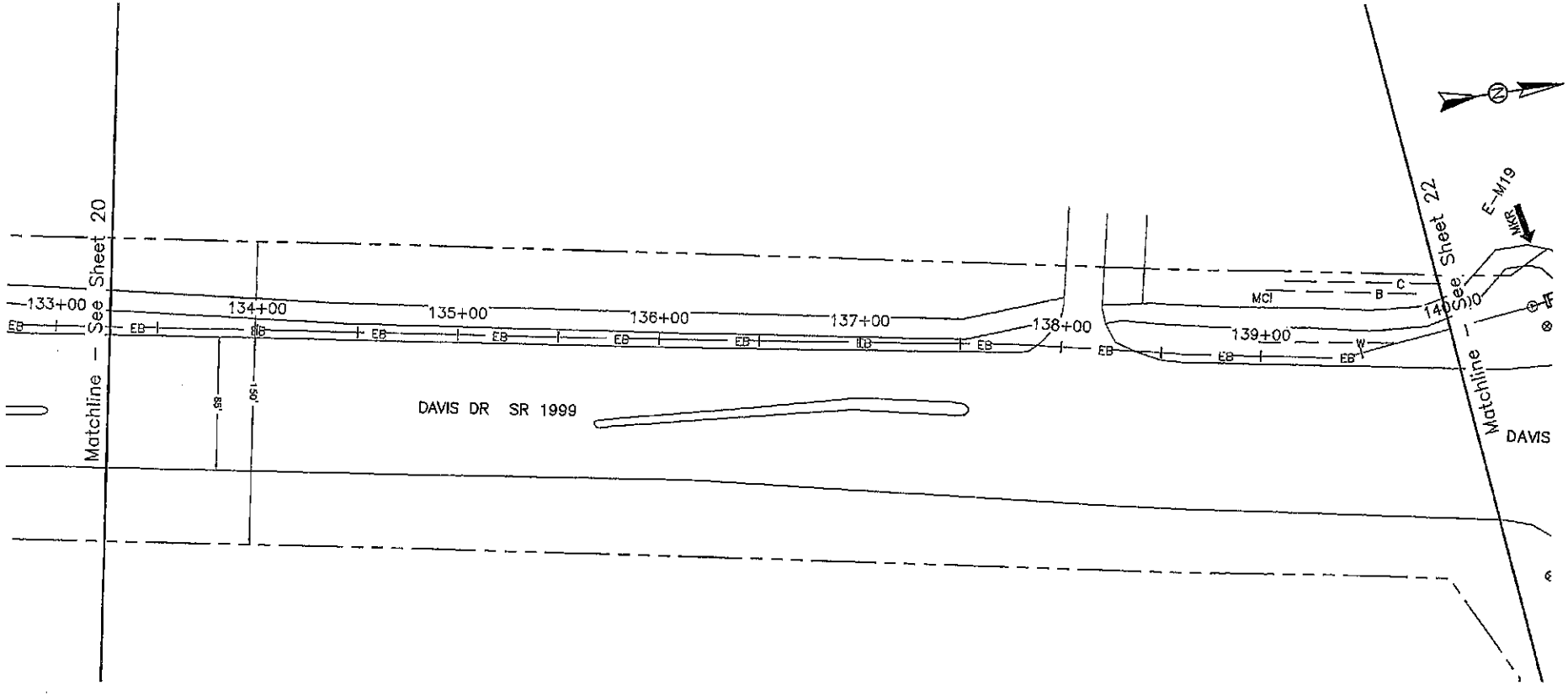
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 20



0 50 100
HORIZONTAL SCALE: 1" = 50'

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North Carolina One-Call Center

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REVISIONS		

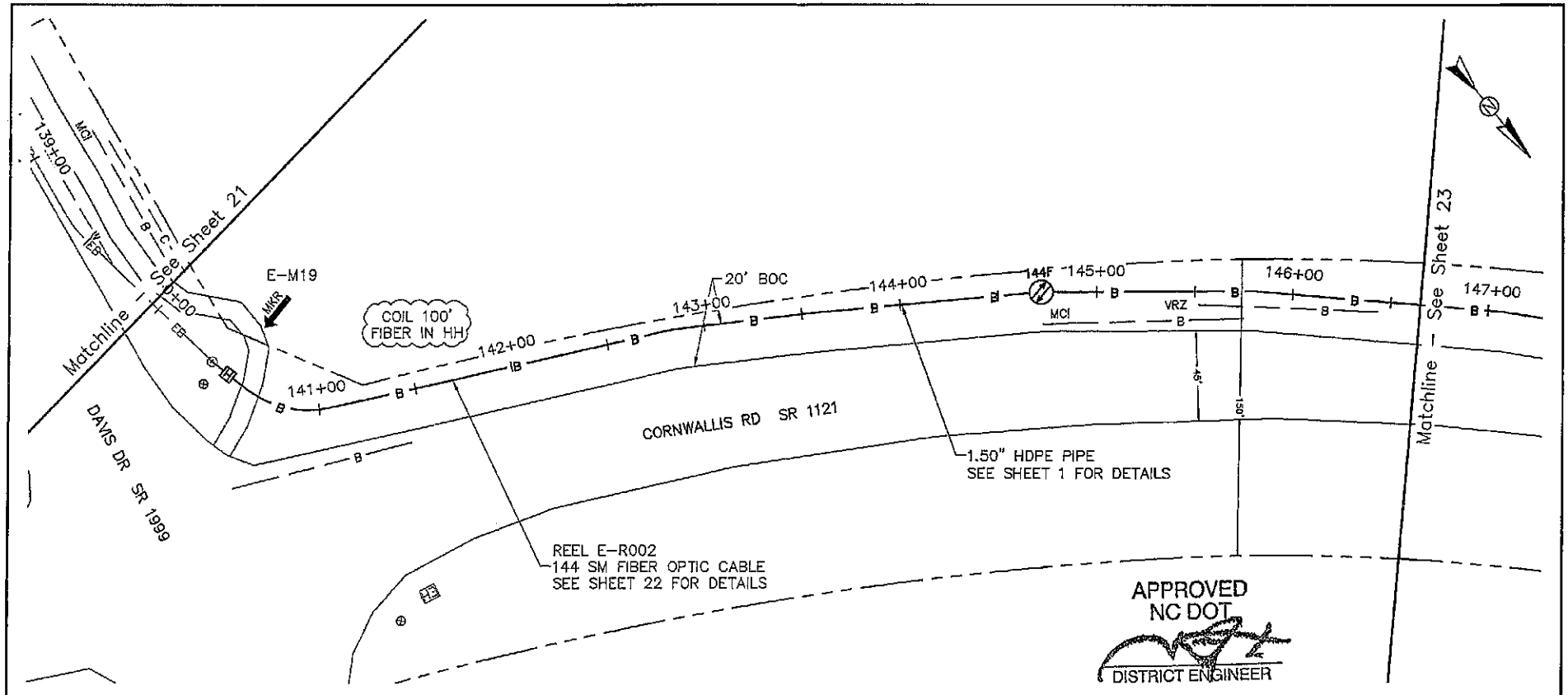
Designed for:
FREUDENBERG IT FIT
DBH Building Group
A KBR Company

PROJECT #:	OCI-12755
DATE:	12/16/2010
SCALE:	1" = 50'
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 21



E52 32 10 191

NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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REVISIONS		

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BE&K Building Group
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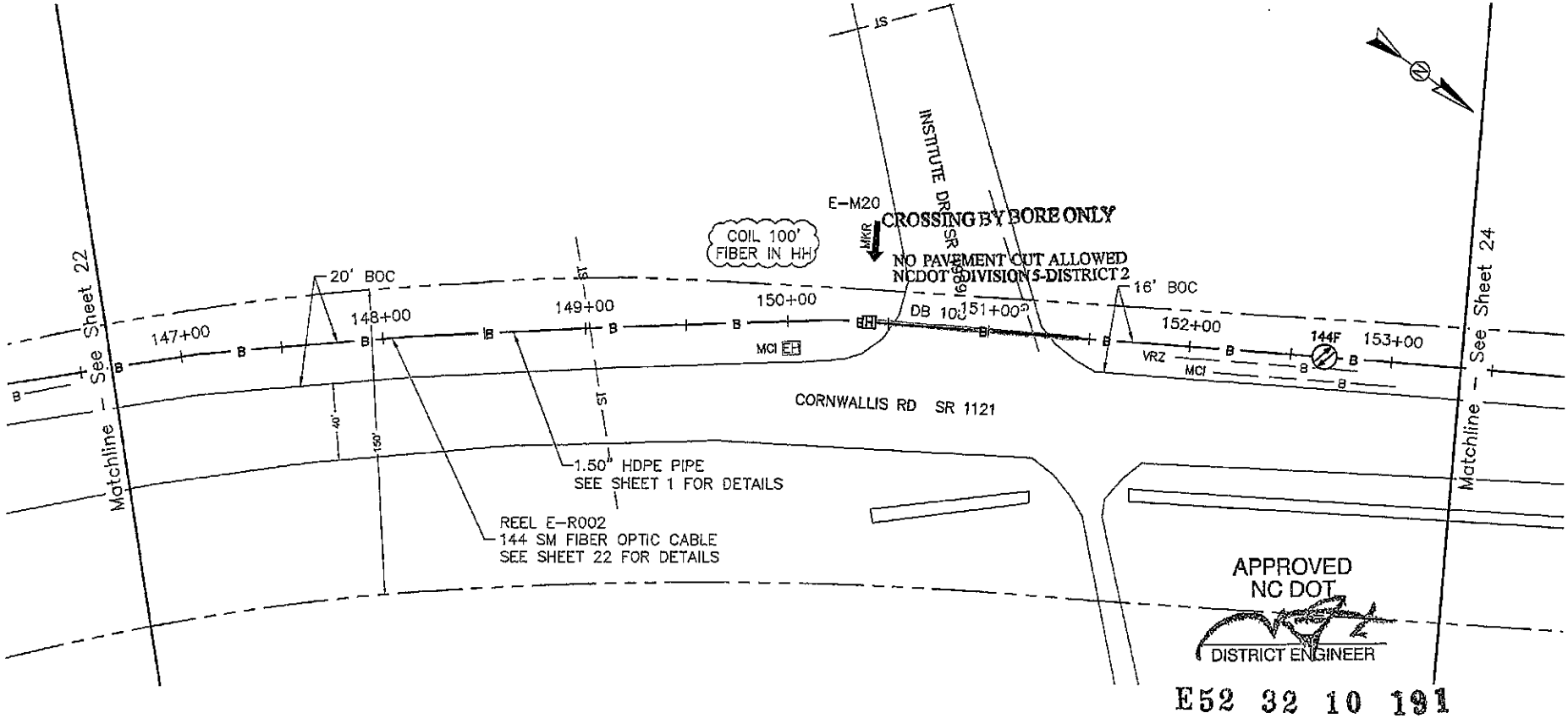
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 22



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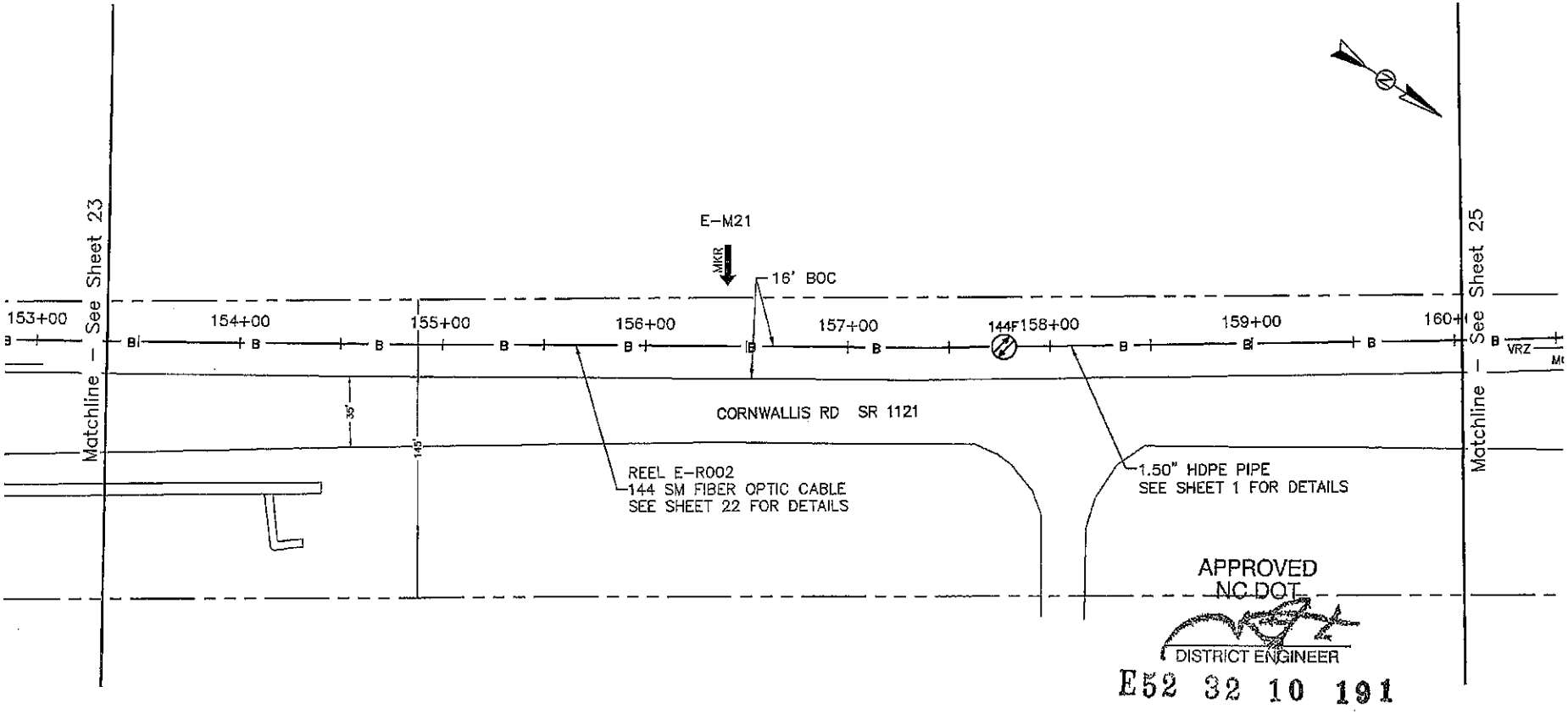
PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EAST FIBER ROUTE

SHEET 23



NORTH CAROLINA 811
North Carolina One-Call Center

0 50 100
HORIZONTAL SCALE: 1" = 50'

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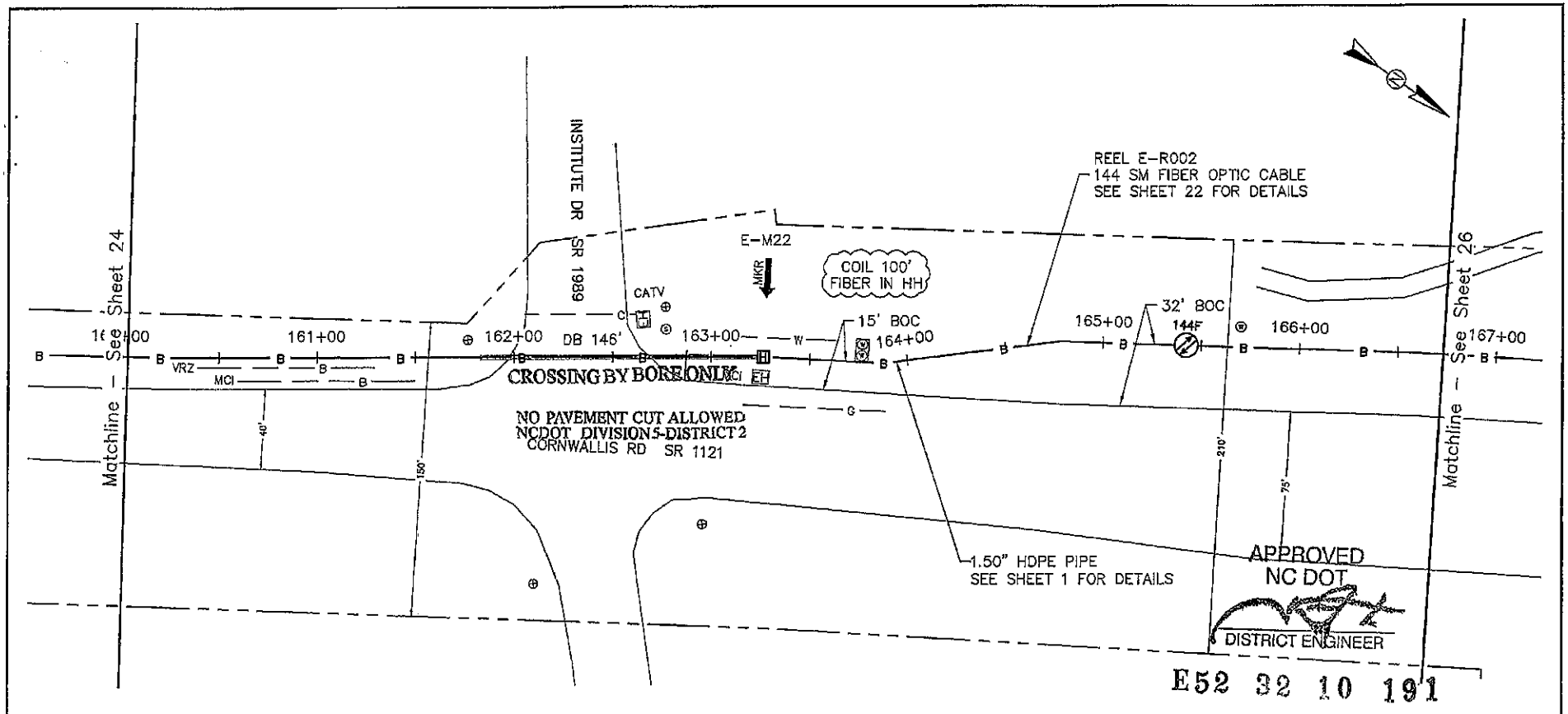
PROJECT NAME:
FREUDENBERG DATA CENTER

SHEET NAME:
EAST FIBER ROUTE

SHEET
24



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North Carolina One-Call Center

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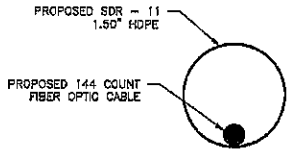
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

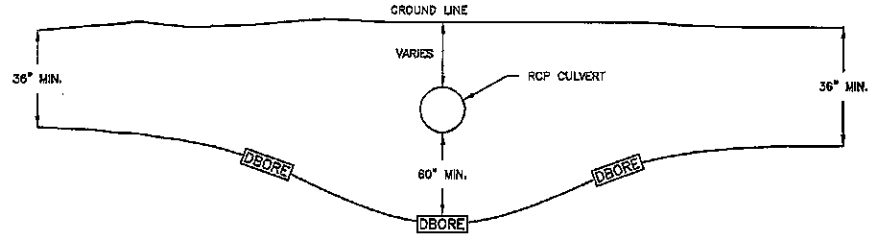
SHEET NAME: EAST FIBER ROUTE

SHEET 25



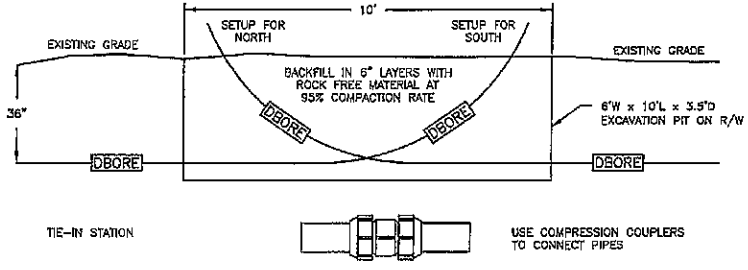
DETAIL D1.1

CROSS SECTION OF PROPOSED HDPE — NOT TO SCALE



DETAIL D1.2

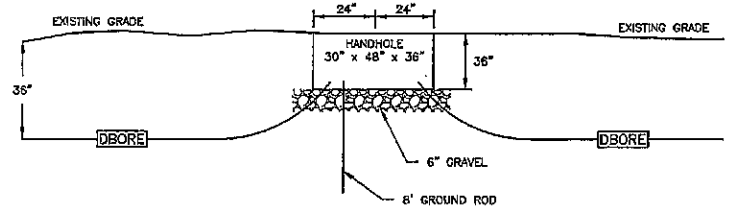
CULVERT CROSSING DETAIL — NOT TO SCALE



- BORE FROM EACH DIRECTION IS RUN AT DESIGN DEPTH TO SOME POINT PAST THE INTENDED TIE-IN, THEN TURNED UP TO DAYLIGHT.
- THE TIE-IN POINT IS EXCAVATED, PIPES CUT OFF WHERE THEY CROSS EACH OTHER AT DESIGN DEPTH, AND A HIGH PRESSURE COUPLER IS INSTALLED TO CONNECT THE TWO PIPES AT THE DESIGN DEPTH.
- ALL EXCAVATIONS OR TRENCHES 4 FEET OR GREATER IN DEPTH SHALL BE APPROPRIATELY BENCHED, SHORED, OR SLOPED ACCORDING TO THE PROCEDURES AND REQUIREMENTS SET FORTH IN OSHA'S EXCAVATION STANDARD, 29 CFR 1926.650, .651, AND .652.

DETAIL D1.3

DIRECTION BORE TIE-IN DETAIL — NOT TO SCALE



ALL EXCAVATIONS OR TRENCHES 4 FEET OR GREATER IN DEPTH SHALL BE APPROPRIATELY BENCHED, SHORED, OR SLOPED ACCORDING TO THE PROCEDURES AND REQUIREMENTS SET FORTH IN OSHA'S EXCAVATION STANDARD, 29 CFR 1926.650, .651, AND .652.

DETAIL D1.4

HANDHOLE CONSTRUCTION
DETAILS CONDUIT TO HANDHOLE
PROFILE FOR R/W
CONSTRUCTION — NOT TO SCALE

ONUG DESIGN CORPORATION
3315 Atlantic Avenue •Raleigh, NC 27604
(919) 876-5455

REVISIONS		

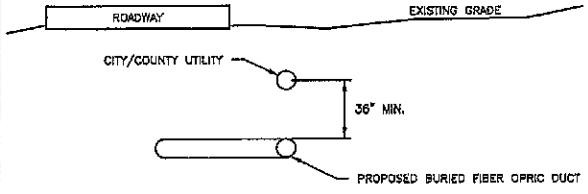
Designed for:
FREUDENBERG IT
FIT
DGS&K Building Group
A KBR Company

PROJECT #:	OCI–12755
DATE:	DATE
SCALE:	SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

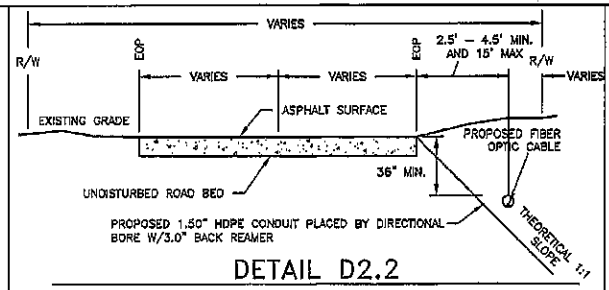
SHEET NAME: DETAILS-1

SHEET: D1



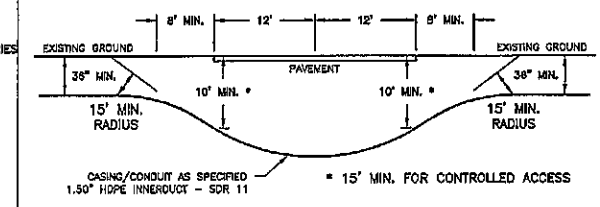
DETAIL D2.1

BURIED CABLE COVER PROFILE RELATIONSHIP TO CITY/COUNTY UTILITIES — NOT TO SCALE



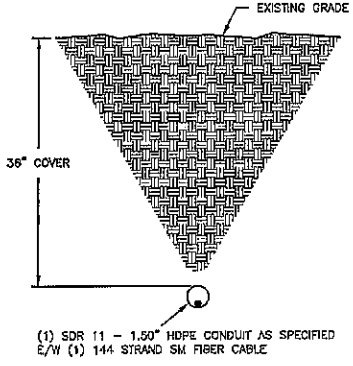
DETAIL D2.2

PARALLEL CONDUIT DETAIL FOR NCDOT RIGHT-OF-WAY — NOT TO SCALE



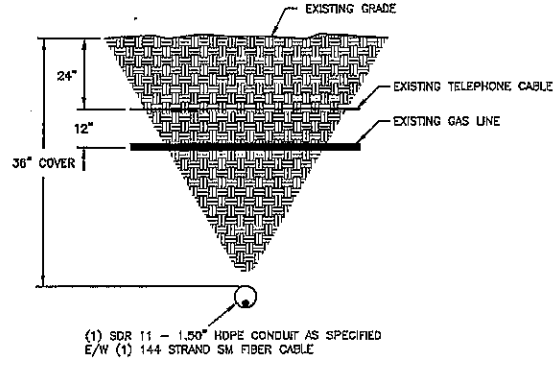
DETAIL D2.3

DIRECTIONAL BORE UNDER ROADWAY — NOT TO SCALE



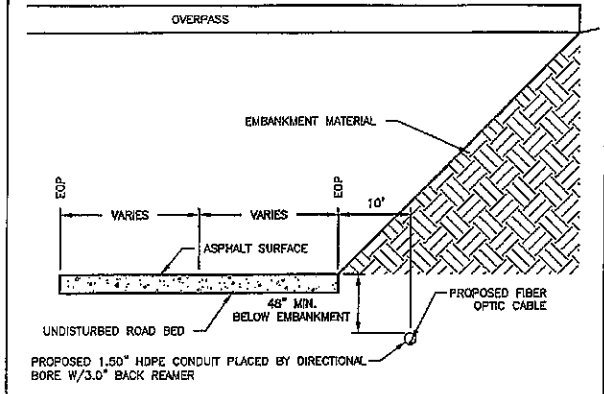
DETAIL D2.4

DIRECTIONAL BORE CROSS SECTION FOR CONDUIT — NOT TO SCALE



DETAIL D2.5

DIRECTIONAL BORE CROSS SECTION FOR CONDUIT PLACED BENEATH/PERPENDICULAR TO EXISTING TELCOM UTILITIES — NOT TO SCALE



DETAIL D2.6

PLACEMENT OF CONDUIT ALONG HIGHWAY UNDER BRIDGE — NOT TO SCALE

ONUG DESIGN CORPORATION
3315 Atlantic Avenue • Raleigh, NC 27604
(919) 876-5455

REVISIONS

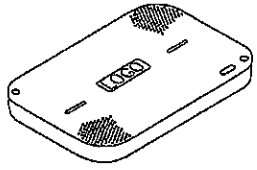
Designed for: FREUDENBERG IT FIT DC&H Building Group A KBR Company

PROJECT #:	OCI-12755
DATE:	DATE
SCALE:	SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

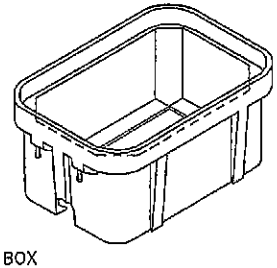
PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: DETAILS-2

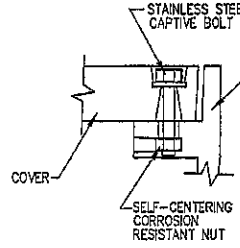
SHEET D2



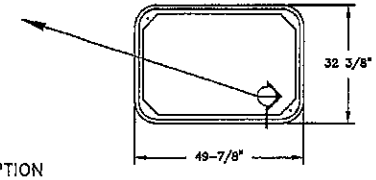
COVER



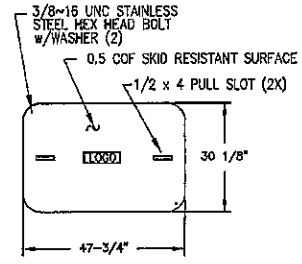
PG BOX



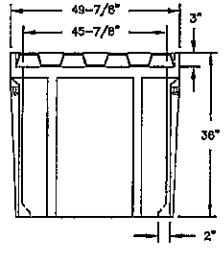
COVER BOLTDOWN OPTION



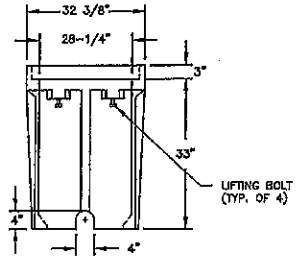
TOP VIEW



COVER
TWO PIECE COVER ALSO AVAILABLE
OPTIONAL CAST IRON READER LIDS AVAILABLE



BOX & COVER SECTION



END

NOTES:

1. VOID IN EXCAVATED AREAS TO BE BACK FILLED WITH SELECT MATERIAL.
2. BOTTOM OF EXCAVATED PIT TO BE BACK FILLED WITH 6" OF GRAVEL. (.75" GRADE)
3. SHORING WILL BE REQUIRED.
4. ALL HANDHOLES SHALL BE PLACED BELOW EXISTING GRADE.
5. THIS HANDHOLE IS OF FIBERGLASS MATERIAL. APPROXIMATELY _____ POUNDS IN WEIGHT. THE LIDS ARE POLYMER CONCRETE MATERIAL. APPROXIMATELY _____ POUNDS IN WEIGHT.

DETAIL D3.1

TYPICAL HANDHOLE DETAIL — NOT TO SCALE

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3315 Atlantic Avenue •Raleigh, NC 27604
(919) 876-5455

REVISIONS

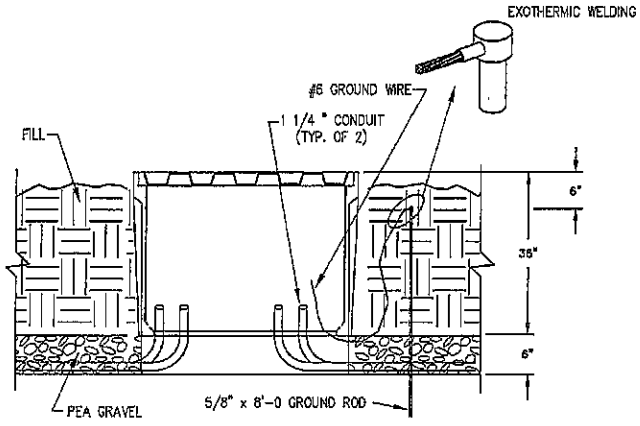
Designed for:
FREUDENBERG IT FIT
DE&K Building Group
A KBR Company

PROJECT #:	OCI-12755
DATE:	DATE
SCALE:	SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: DETAILS-3

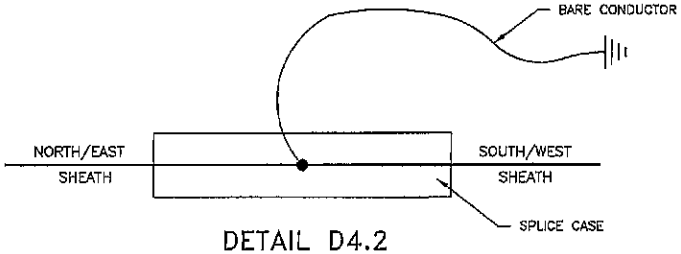
SHEET: D3



DETAIL D4.1

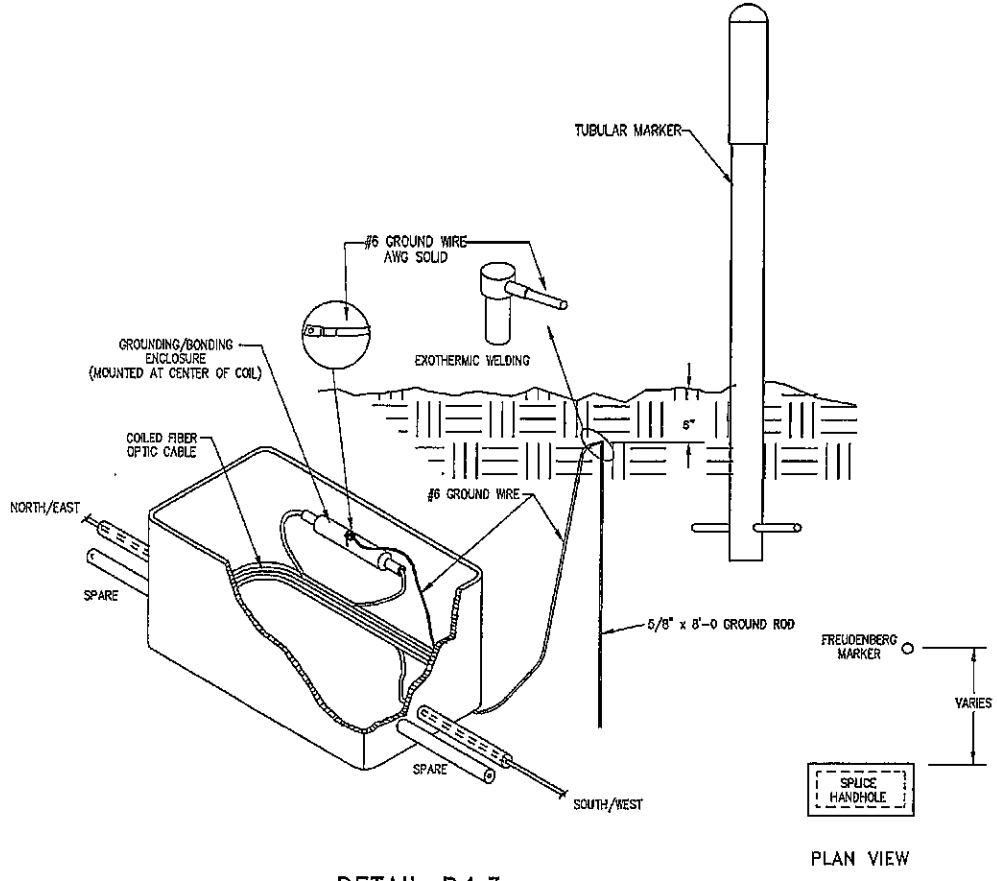
HANDHOLE PLACEMENT DETAIL — NOT TO SCALE

GROUND ROD SHALL BE USED WHEN CALLED OUT ON CONSTRUCTION DRAWINGS



DETAIL D4.2

GROUNDING DIAGRAM – SHEATH — NOT TO SCALE



DETAIL D4.3

SHEATH GROUNDING DETAIL — NOT TO SCALE

GROUND ROD SHALL BE USED WHEN CALLED OUT ON CONSTRUCTION DRAWINGS

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REVISIONS		

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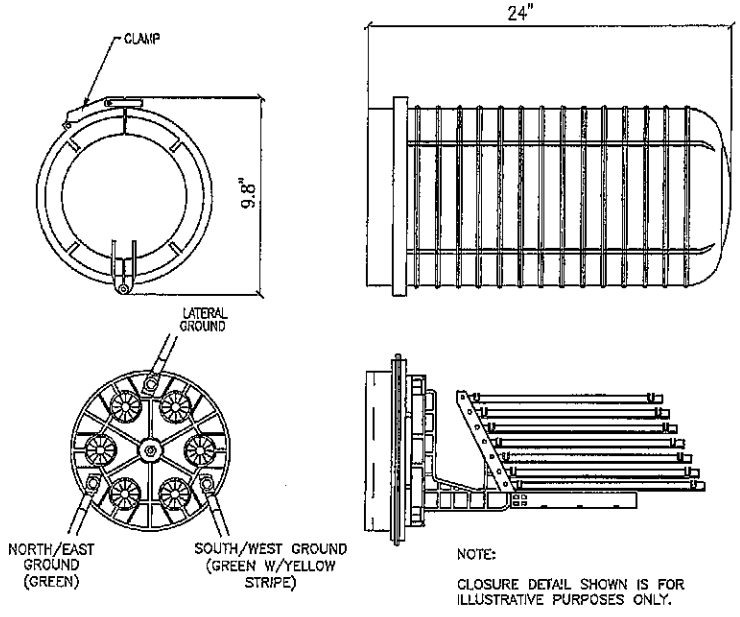
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

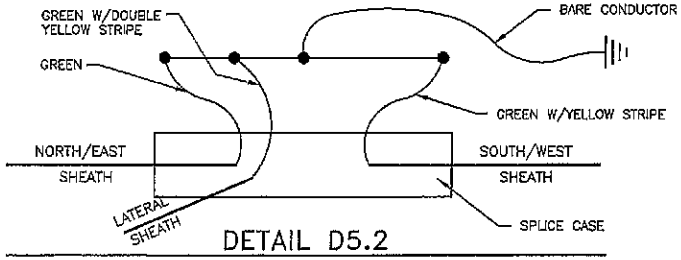
SHEET NAME: DETAILS-4

SHEET: D4



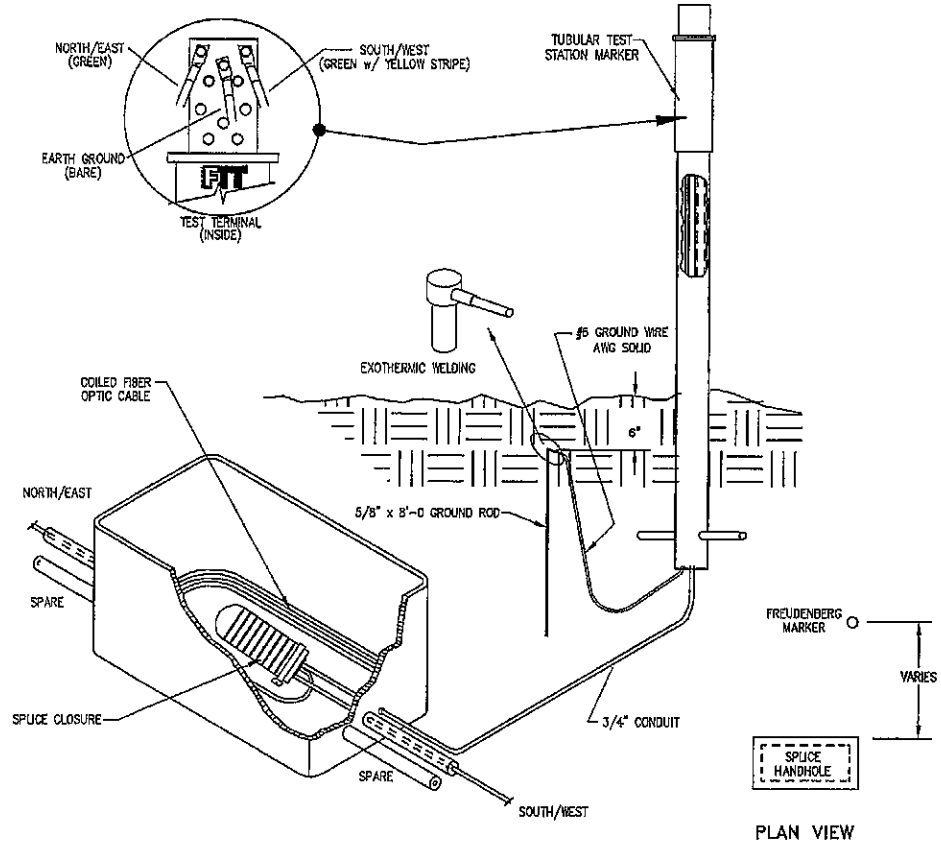
DETAIL D5.1

SPLICE CLOSURE DETAIL — NOT TO SCALE



DETAIL D5.2

GROUNDING DIAGRAM – SPLICING — NOT TO SCALE



DETAIL D5.3

SPLICE CASE GROUND DETAIL — NOT TO SCALE

GROUND ROD SHALL BE USED WHEN CALLED OUT ON CONSTRUCTION DRAWINGS

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REVISIONS		

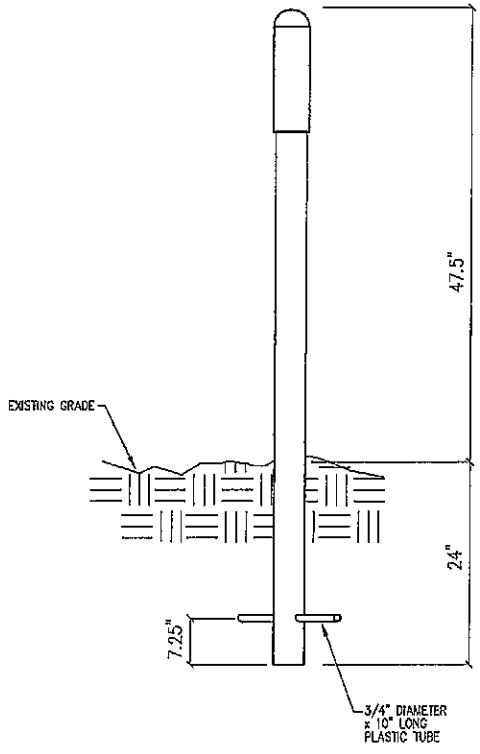
Designed for: FREUDENBERG IT FIT — DE&K Building Group, A K&R Company

PROJECT #:	OCI–12755
DATE:	DATE
SCALE:	SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

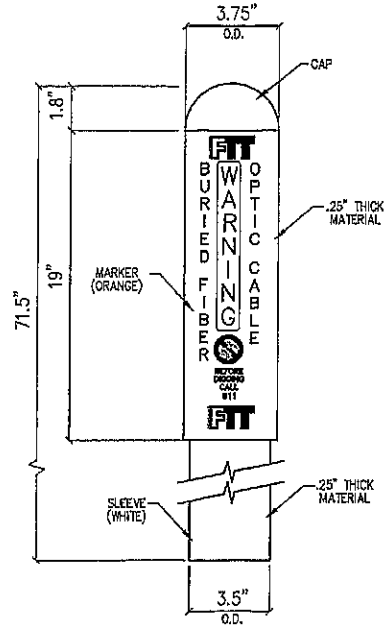
PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: DETAILS-5

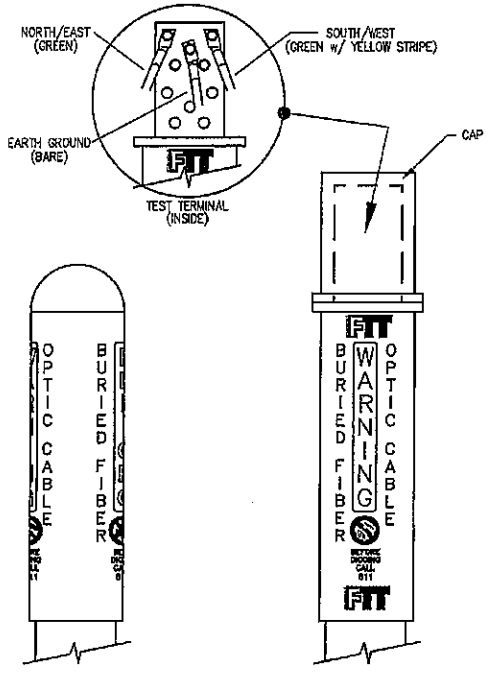
SHEET: D5



INSTALLATION VIEW
LEXAN POLYCARBONATE HIGH IMPACT PLASTIC



DETAIL "B"
FRONT & REAR VIEW



DETAIL "C"
SIDE VIEW

DETAIL "D"
TEST STATION

DETAIL D6.1

MARKER POST DETAIL NOT TO SCALE

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				SHEET NAME: DETAILS-6	SHEET D6

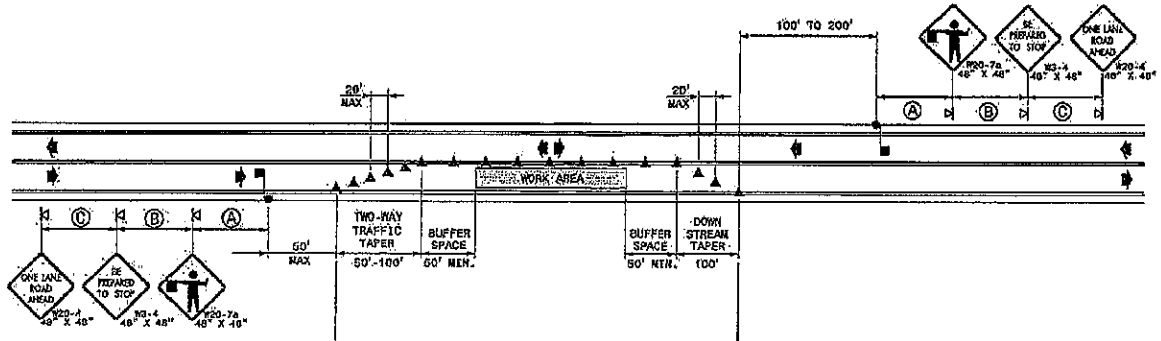
TRAFFIC CONTROL

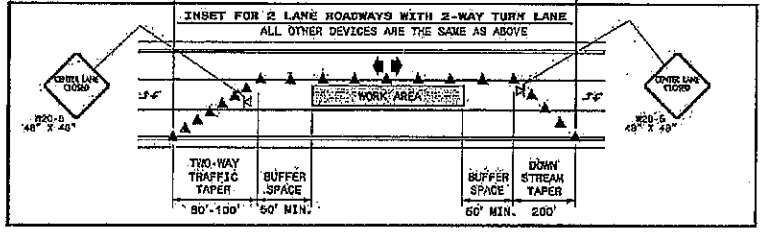
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
TEMPORARY LANE CLOSURES
2-LANE, 2-WAY ROADWAY-1 LANE CLOSED

SHEET 1 OF 9
1101.02





GENERAL NOTES FOR FLAGGER OPERATIONS

1- REFER TO STD. 1101.11 SHEET 4 FOR SIGN SPACING.
2- INSTALL LANE CLOSURES WITH THE TRAFFIC FLOW, BEGINNING WITH DEVICES ON THE UPSTREAM SIDE OF TRAFFIC.
3- REMOVE LANE CLOSURES AGAINST THE TRAFFIC FLOW, BEGINNING WITH DEVICES ON THE DOWNSTREAM SIDE OF TRAFFIC.
4- PLACE CONES THRU THE WORK AREA AT THE MAXIMUM SPACING EQUAL IN FEET TO 2 TIMES THE POSTED SPEED LIMIT.
5- EXTEND LANE CLOSURES AT THE BUFFER SPACE SUCH THAT STOPPING SIGHT DISTANCE IS PROVIDED TO THE FLAGGER. (REFER TO STD. 1101.11 SHEET 2)
6- DO NOT STOP TRAFFIC IN ANY ONE DIRECTION FOR MORE THAN 8 MINUTES AT A TIME.
7- DRUMS OR SKINNY DRUMS MAY BE USED IN LIEU OF CONES.
8- USE FLAGGERS TO CONTROL TRAFFIC AT INTERSECTIONS AFFECTED BY THE LANE CLOSURE. SUPPLEMENT FLAGGERS LOCATED AT INTERSECTIONS WITH FLAGGER AHEAD SIGNS (W20-7a) PLACED APPROXIMATELY 250 FT. IN ADVANCE OF THE FLAGGER WHERE INTERSECTIONS ARE SIGNALIZED AND PLACE SIGNALS IN THE FLASH MODE.
9- FLAGGERS SHALL NOT STAND IN THE ROADWAY.

GENERAL NOTES FOR PILOT CAR OPERATIONS

1- USE PILOT CARS WHEN DIRECTED BY THE ENGINEER.
2- IF ROADWAY WIDTH IS LESS THAN 22 FEET (EOP TO EOP), CONES MAY NOT BE REQUIRED ALONG WORK AREA, AND AT THE DISCRESSION OF THE ENGINEER, CONES MAY BE OMITTED ALONG THE WORK AREA IF USING A PILOT CAR. (NOTE: CONES ARE ALWAYS REQUIRED IN THE UPSTREAM AND DOWNSTREAM TAPERS).
3- MOUNT SIGN G20-4 "PILOT CAR FOLLOW ME" AT A VISIBLE LOCATION ON THE REAR OF THE PILOT VEHICLE.
4- DO NOT INSTALL MORE THAN ONE (1) MILE OF LANE CLOSURE, MEASURED FROM THE BEGINNING OF THE MERGE TAPER TO THE END OF THE LANE CLOSURE.
5- ADVISE RESIDENTS AND BUSINESSES WITHIN THE LANE CLOSURE LIMITS ABOUT METHODS OF SAFE EGRESS AND INGRESS FROM DRIVEWAYS DURING FLAGGING AND PILOT CAR OPERATIONS.

LEGEND

- CONE
- PORTABLE SIGN
- FLAGGER
- DIRECTION OF TRAFFIC FLOW

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

7-06

ENGLISH STANDARD DRAWING FOR
TEMPORARY LANE CLOSURES
2-LANE, 2-WAY ROADWAY-1 LANE CLOSED

SHEET 1 OF 9
1101.02

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(919) 876-5455

REVISIONS		

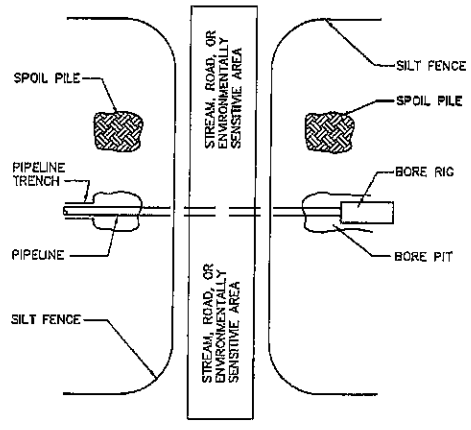
Designed for:
FREUDENBERG IT FIT
DC&K Building Group
A KBR Company

PROJECT #:	OCI-12755
DATE:	DATE
SCALE:	SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: DETAILS-7

SHEET: D7

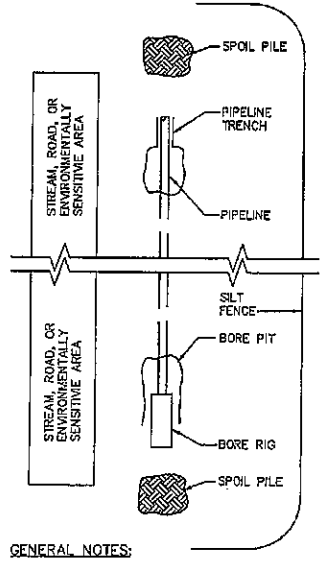


GENERAL NOTES:

BORE PITS AND SPOILS PILES SHALL BE ENCLOSED ON THREE SIDES AS SHOWN WITH SILT FENCE

DETAIL EC1.1

DIRECTIONAL BORE DETAIL (TRANSVERSE) NOT TO SCALE

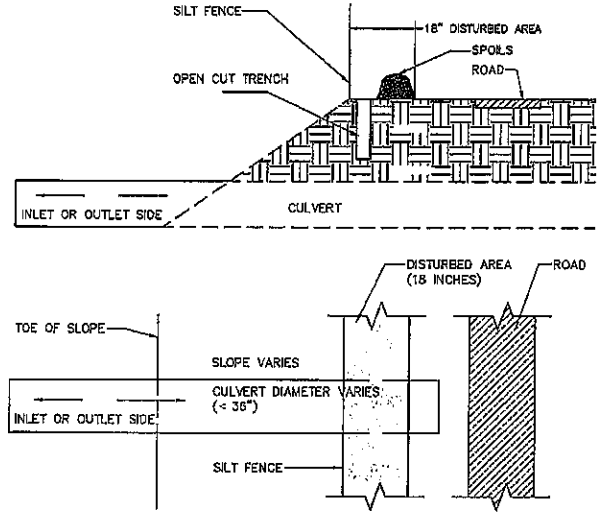


GENERAL NOTES:

BORE PITS AND SPOILS PILES SHALL BE ENCLOSED ON THREE SIDES AS SHOWN WITH SILT FENCE

DETAIL EC1.2

DIRECTIONAL BORE DETAIL (PARALLEL) NOT TO SCALE



DETAIL EC1.3

CULVERT CUT OVER ON ROADSIDE SHOULDER NOT TO SCALE

NOTES:
1. INSTALL SILT FENCE TO PROTECT DOWNSTREAM AREAS FROM SEDIMENTATION PRIOR TO CONSTRUCTION.
2. INSTALL SILT FENCE AS NEEDED TO PROTECT DRAINAGE FEATURES, BUT NO LESS THAN 10' ON EITHER SIDE OF THE CULVERT.

MAINTENANCE NOTES:

INSPECT CULVERT CROSSING STRUCTURES WEEKLY AND AFTER SIGNIFICANT (0.5"OR GREATER) RAINFALL EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE SILT FENCE HAS TAKEN PLACE. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

*REF: 6.41.5 NC Erosion and Sediment Control Planning and Design Manual, 2006

NOTE: THESE DETAILS ARE PROVIDED AS AN EXAMPLE AND ARE NOT INTENDED AS APPROVED DETAILS FOR A SEDIMENT AND EROSION CONTROL PLAN.

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REVISIONS

Designed for: FREUDENBERG IT FIT DC&K Building Group A KBR Company

PROJECT #:	OCI-12755
DATE:	DATE
SCALE:	SCALE
DESIGNED BY:	LGD
DRAWN BY:	RAC
CHECKED BY:	LGD
APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EROSION CONTROL DETAILS-1

SHEET EC1

GENERAL SEEDING SPECIFICATIONS

DEFINITION
Controlling runoff and erosion on disturbed areas by establishing perennial vegetative : cover with seed.

PURPOSE
To reduce erosion and decrease sediment yield from disturbed areas, and to permanently stabilize such areas in a manner that is economical, adapts to site conditions, and allows selection of the most appropriate plant materials.

SPECIFICATIONS

SEEDBED REQUIREMENTS
Establishment of vegetation should not be attempted on sites that are unsuitable due to excessive soil compaction, inappropriate soil texture, poor drainage, concentrated overland flow, or steepness of slope until measures have been taken to correct these problems.

To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. The existing soil should have these criteria:

- Enough fine-grained (silt and clay) material to maintain adequate moisture and nutrient supply (available water capacity of at least .05 inches water to 1 inch of soil).
- Sufficient pore space to permit root penetration.
- Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans should be 12 inches or more, except on slopes steeper than 2:1 where the addition of soil is not feasible.
- A favorable pH range for plant growth, usually 6.0 – 6.5.
- Free from large roots, branches, stones, large clods of earth, or trash of any kind. Clods and stones may be left on slopes steeper than 3:1 if they are to be hydro seeded.

If any of the above criteria are not met – i.e., if existing soil is too coarse, dense, shallow or acidic to foster vegetation – special amendments are required. The soil conditioners described below may be beneficial or, preferably, topsoil may be applied.

SEEDBED PREPARATION
Install necessary mechanical erosion and sedimentation control practices before seeding, and complete grading according to the approved plan.

Lime and fertilizer needs should be determined by soil tests. Directions, sample cartons, and information sheets are available through county Agricultural Extension offices. Testing is also done by commercial laboratories.

When soil tests results are not available, follow rates suggested in the seeding specifications shown at right. Application rates usually fall into the following ranges:

- Ground agricultural limestone:
  Light-textured, sandy soils: 1 to 1-1/2 tons/acre
  Heavy-textured, clayey soils: 2-3 tons/acre
- Fertilizer:
  Grasses: 800-1200 lb/acre of 10-10-10 (or the equivalent)
  Grass-legume mixtures: 600-1200 lb/acre of 5-10-10 (or the equivalent)

Apply lime and fertilizer evenly and incorporate into the top 4-6 inches of soil by disking or other suitable means. Operate machinery on the contour. When using a hydro seeder, apply lime and fertilizer to a rough, loose surface.

Roughen surfaces prior to seeding.

Complete seedbed preparation by breaking up large clods and raking into a smooth, uniform surface (slopes less than 3:1). Fill in or level depressions that can collect water. Broadcast seed into a freshly loosened seedbed that has not been sealed by rainfall.

SEEDING
Seeding dates given in the seeding mixture specifications are designated as "best" or "possible". Seedings properly carried out within the "best" dates have a high probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as you deviate from them, the probability of failure increases rapidly. Seeding on the last date shown under "possible" may reduce changes of success by 30-50%. Always take this into account in scheduling land-disturbing activities.

Use certified seed for permanent seeding whenever possible.

Labeling of non-certified seed is also required by law. Labels contain important information on seed purity, germination, and presence of weed seeds. Seeds must meet State standards for content of noxious weeds. Do no accept seed containing "prohibited" noxious weed seed.

Inoculate legume seed with the Rhizobium bacteria appropriate to the species of legume. Apply seed uniformly with a cyclone seeder, drop-type spreader, drill, cultipacker seeder, or hydro seeder on a firm, friable seedbed.

When using a drill or cultipacker seeder, plant small grains no more than 1 inch deep, grasses and legumes no more than 1/2 inch. Equipment should be calibrated in the field for the desired seeding rate.

When using broadcast-seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one-half the seed while moving back and forth across the area, making a uniform pattern; then apply the second half in the same way, but moving at right angles to the first pass.

Mulch all plantings immediately after seeding.

HYDRO SEEDING
Surface roughening is particularly important when hydro seeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydro seeding operations: large clods, stones, and irregularities provide cavities in which seeds can lodge.

Rate of wood fiber (cellulose) application should be at least 2,000 lb/acre.

Apply legume inoculants at four times the recommended rate when adding inoculant to a hydro seeder slurry.

If a machinery breakdown of 1/2 to 2 hours occurs, add 50% more seed to the tank, based on the proportion of the slurry remaining. This should compensate for damage to seed. Beyond 2 hours, a full rate of new seed may be necessary.

Lime is not normally applied with a hydraulic seeder because it is abrasive. It can be blown onto steep slopes in dry form.

MAINTENANCE
Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting. Inspect seeded areas for failure and make necessary repairs and reseedings within the same season, if possible.

Reseeding---If a stand has inadequate cover, re-evaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand after seedbed preparation or over-seed the stand. Consider seeding temporary, annual species if the time of year is not appropriate for permanent seeding.

If vegetation fails to grow, soil must be tested to determine if acidity or nutrient imbalance is responsible.

Fertilization---On the typical disturbed site, full establishment usually requires re-fertilization in the second growing season. Fine turf requires annual maintenance fertilization. Use soil tests if possible or follow the guidelines given for the specific seeding mixture.

TEMPORARY SEEDING SPECIFICATIONS

Seeding mixture (fall)

Species*	Rate (lb/acre)
Rye Grain (*Secale cereale*)	120

Seeding Mixture (late winter early spring)

Species*	Rate (lb/acre)
Rye Grain (*Secale cereale*)	120
Annual (Korean) Lespedeza (*Kummerowia stipulacea*)	50

Seeding mixture (summer)

Species*	Rate (lb/acre)
German Millet (*Setaria italica*)	40

Seeding dates (Piedmont)

Fall:	Aug. 15 – Dec. 30
Late winter (early spring):	Jan. 1 – May 1 Late
Summer:	May 1 – Aug. 15

Soil amendments
Follow recommendations of soil tests or apply 2,000 lb/acre ground agricultural limestone and 750 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000 lb/acre straw. Anchor mulch by tacking with asphalt, roving or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Maintenance
Re-fertilize if growth is not fully adequate. Reseed, re-fertilize and mulch immediately following erosion or other damage.

Pursuant to G.S. 113A-57(2), the angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion-control devices or structures. In any event, slopes left exposed will, within 21 calendar days of completion of any phase of grading, be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion.

Pursuant to G.S. 113A-57(3), provisions for permanent groundcover sufficient to restrain erosion must be accomplished for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction or development.

*REF: 6.10 A,B and C, NC Erosion and Sediment Control Planning and Design Manual, 2006

PERMANENT SEEDING SPECIFICATIONS

Seeding mixture

Species*		Rate (lb/acre)
Tall fescue (*Festuca arundinacea*)	(Grass lined Channels)	200
Tall fescue (*Festuca arundinacea*)	(Other Areas)	100

Nurse plants
Between May 1 and Aug. 15, add 10 lb/acre German millet (*Setaria italica*) or 15 lb/acre Sudan grass. Prior to May 1 or after Aug. 15, add 40 lb/acre Rye Grain (*Festuca arundinacea*).

Seeding dates

	Best	Possible
Fall:	Aug. 25 – Sept. 15	Aug. 20 – Oct.25
Late winter:	Feb. 15 – Mar. 21	Feb. 1 –Apr. 15

Soil amendments
Apply lime and fertilizer according to soil tests, or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000-5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, roving, or netting. Netting is the preferred anchoring method on steep slopes.

Maintenance
Re-fertilize in the second year unless growth is fully adequate. May be mowed once or twice a year, but mowing is not necessary. Reseed, fertilize, and mulch damaged areas immediately.

Pursuant to G.S. 113A-57(3), provisions for permanent groundcover sufficient to restrain erosion must be accomplished for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction or development.

*REF: 6.11L NC Erosion and Sediment Control Planning and Design Manual, 2006

ODC DESIGN CORPORATION
3315 Atlantic Avenue •Raleigh, NC 27604
(919) 876-5455

REVISIONS

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APPROVED BY:	DBH

PROJECT NAME: FREUDENBERG DATA CENTER

SHEET NAME: EROSION CONTROL DETAILS-4

SHEET EC4