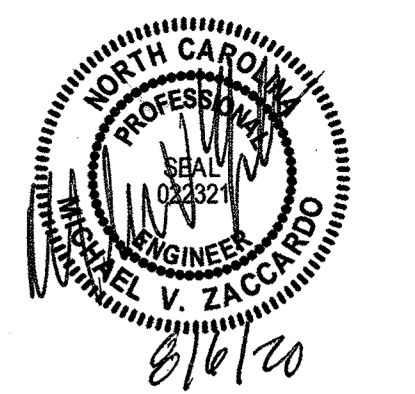


# SILVERSTONE - HARDIN HILL SPINE ROAD EXTENSION

## CONSTRUCTION DOCUMENTS

### PROJECT #: S-8-16

TOWN OF KNIGHTDALE, ST. MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA



THIS DRAWING PREPARED AT THE  
RALEIGH OFFICE  
5410 Trinity Road, Suite 102 | Raleigh, NC 27607  
TEL 919.886.4951 FAX 919.833.8124 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION	DATE
	08/06/2020

DRAWN BY  
JD. MACMILLAN

DESIGNED BY  
JD. MACMILLAN

CHECKED BY  
M. ZACCARDO

SCALE  
AS SHOWN

**TIMMONS GROUP**

NORTH CAROLINA LICENSE NO. C-1652

HARDIN HILL SPINE ROAD EXTENSION  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

COVER SHEET

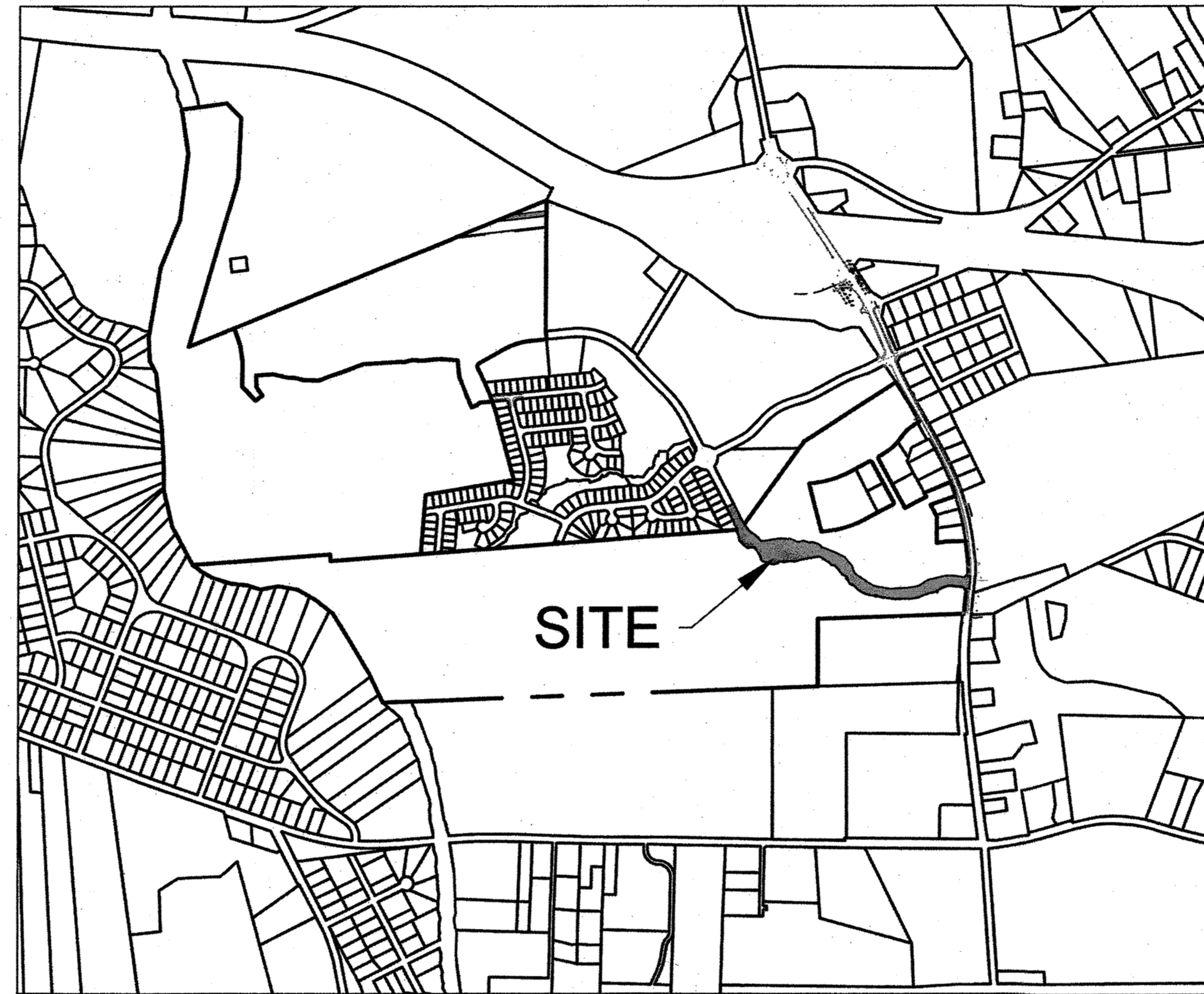
JOB NO.  
44872

SHEET NO.  
C0.0

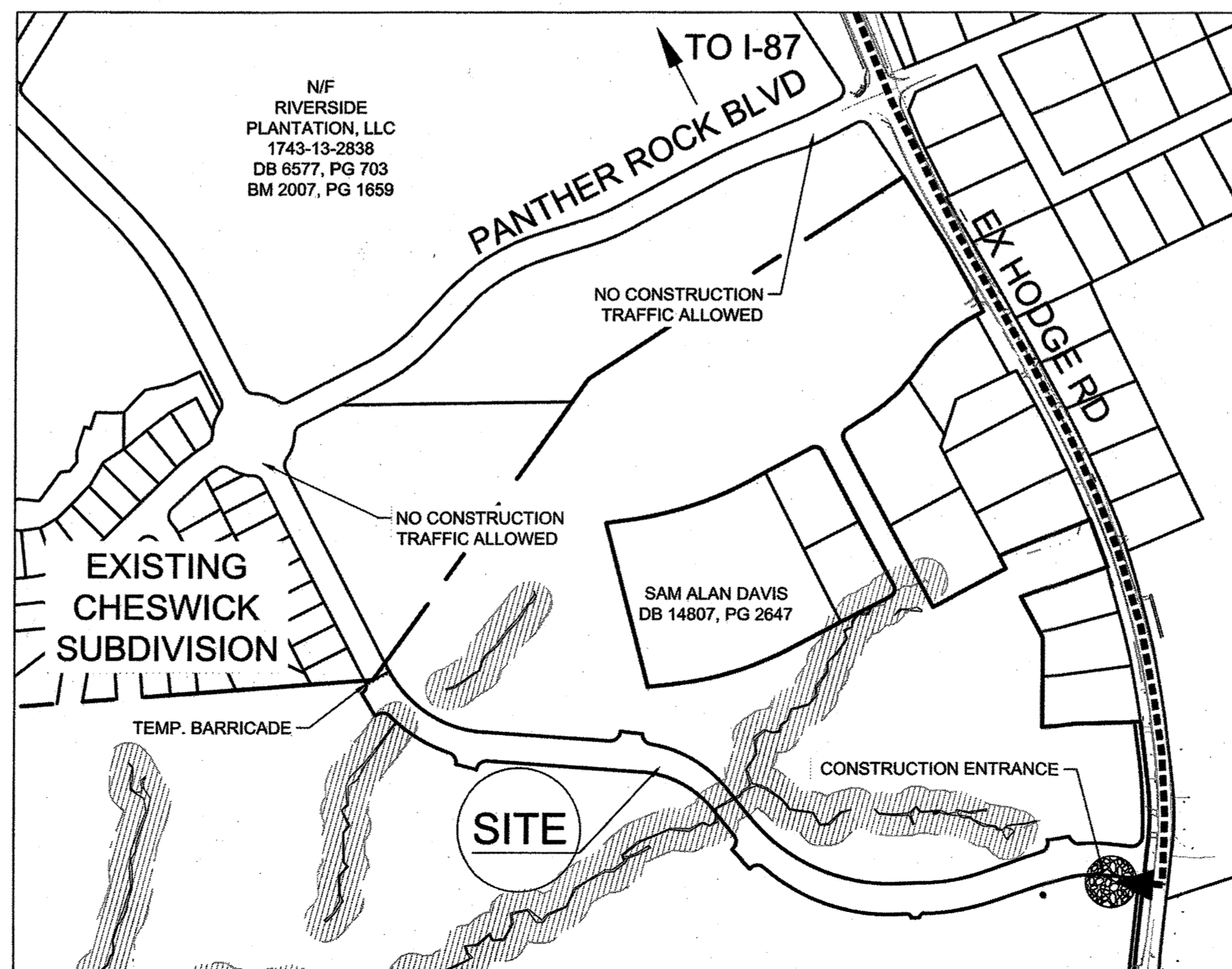
RELEASED FOR CONSTRUCTION

#### Sheet List Table

Sheet Number	Sheet Title
C0.0	COVER SHEET
C1.0	EXISTING CONDITIONS
C2.0	SITE PLAN
C3.0	UTILITY PLAN
C4.0	OVERALL GRADING & DRAINAGE PLAN
C4.1	GRADING & DRAINAGE PLAN - SHEET 1 OF 2
C4.2	GRADING & DRAINAGE PLAN - SHEET 2 OF 2
C5.1	HARDIN HILL LANE PLAN & PROFILE
C5.2	HARDIN HILL LANE PLAN & PROFILE
C5.3	STUB ROAD PLAN & PROFILES
C6.1	EROSION CONTROL PLAN PHASE 1
C6.2	EROSION CONTROL PLAN PHASE 2
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C7.3	WATER AND SANITARY SEWER DETAILS
C7.4	STORM DETAILS
C7.5	EROSION AND SEDIMENT CONTROL DETAILS
C7.6	EROSION AND SEDIMENT CONTROL DETAILS
C7.7	EROSION AND SEDIMENT CONTROL DETAILS
C7.8	EROSION AND SEDIMENT CONTROL DETAILS
C8.0	LANDSCAPE PLAN
C9.0	STREET LIGHTING PLAN
C10.0	SIGNAGE AND MARKING PLAN
C11.0	HODGE ROAD IMPROVEMENT PLAN
C11.1	ROAD IMPROVEMENT DETAILS



VICINITY MAP



SITE ACCESS EXHIBIT

#### SITE DATA

**OWNERS/SUBDIVIDER/DEVELOPER:**  
GLOBAL CITY DEVELOPMENT  
CASSA KNIGHTDALE, LLC  
801 BRICKELL AVE, STE 2360  
MIAMI, FL 33131-4943  
PHONE: 786-577-4113

**ENGINEER:**  
TIMMONS GROUP  
MIKE ZACCARDO, PE  
5410 TRINITY ROAD, STE. 102  
RALEIGH, NC 27607  
PHONE: 919-824-4927

PIN = 1733-91-9712  
DB = 17614 PG = 1463

FIRM MAP# = 3720173300J, 3720174300J

TOTAL EXISTING TRACT ACREAGE = 112.93 acres  
PROPOSED RIGHT OF WAY DEDICATION = 153,193 SF (3.52 AC)

ZONING = GR8  
(GENERAL RESIDENTIAL)

TOTAL LENGTH OF PUBLIC STREET = 2,121 LF  
TOTAL LENGTH OF CURB AND GUTTER = 6,326 LF  
TOTAL LENGTH OF SIDEWALK = 4,157 LF  
TOTAL LENGTH OF PUBLIC WATER LINE  
6" = 122 LF  
8" = 109 LF  
12" = 2,190 LF  
TOTAL LENGTH OF PUBLIC SEWER LINE  
8" PVC = 1,237 LF 8" DIP = 472 LF  
TOTAL LENGTH OF PUBLIC STORMWATER LINE  
15" RCP = 903 LF TEMP. 18" HDPE = 316 LF  
18" RCP = 559 LF TEMP. 24" HDPE = 60 LF  
24" RCP = 316 LF  
WATER SERVICE STUBS = 31  
SEWER SERVICE STUBS = 30  
TOTAL WASTEWATER FLOW = 0 GPD

#### EROSION AND SEDIMENT CONTROL

**APPROVED PLAN**  
DATE 8/14/2020  
PERMIT NO. 866-040625-2020  
Wake County Environmental Services  
Sedimentation & Erosion Control  
919-856-7400

#### ATTENTION CONTRACTORS

The Construction Contractor responsible for the extension of water, sewer, and/or reuse, as approved in these plans, is responsible for contacting the Public Works Department at (919) 996-2409, and the Public Utilities Department at (919) 996-4540 at least twenty four hours prior to beginning any of their construction.

Failure to notify both City Departments in advance of beginning construction, will result in the issuance of monetary fines, and require reinstallation of any water or sewer facilities not inspected as a result of this notification failure.

Failure to call for Inspection, Install a Downstream Plug, have Permitted Plans on the Jobsite, or any other Violation of City of Raleigh Standards will result in a Fine and Possible Exclusion from future work in the City of Raleigh.

- Town Approved Standards Shall Control.** In the event of a conflict or inconsistency between these construction drawings and the Town of Knightdale's Approved Standards for this project, the Approved Standards shall control. Town of Knightdale Approved Standards shall mean all development documents necessary for approval for the Property including, but not limited to, any special use permit, subdivision plan, site plan, subdivision plat(s), phasing schedule, Development Agreement, Utility Allocation Agreement, Annexation Agreement, the Town of Knightdale Standard Specification and Details Manual and applicable provisions of the North Carolina State Building Code.
- Professional Design Engineer Certification.** These improvements shall be constructed in accordance with the following drawings and with the Standard Specifications of the Town of Knightdale.  
I, \_\_\_\_\_ PE, certify that the Standard Specifications of the Town of Knightdale have been thoroughly checked and found to be applicable to this project. All exceptions to the applicable Town standards have been previously approved by the Town of Knightdale and said exceptions are shown on Sheet(s) \_\_\_\_\_ of these drawings.  
Seal: \_\_\_\_\_ PE  
Date: \_\_\_\_\_

#### TOWN CERTIFICATION

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: \_\_\_\_\_ DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: \_\_\_\_\_ DATE: 8-19-2020  
ADMINISTRATOR

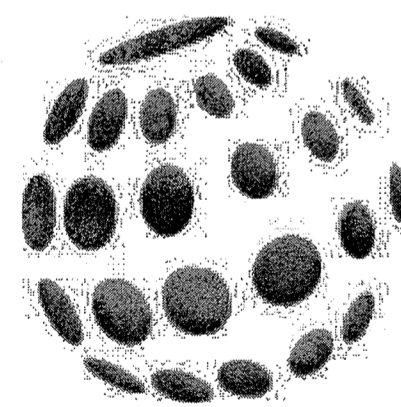
#### Water and Sewer Permits (if applicable)

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-4617

The City of Raleigh consents to the connection and extension of the City's Public Water System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # W-5707

The City of Raleigh consents to the connection to its public sewer system and extension of the private sewer collection system as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

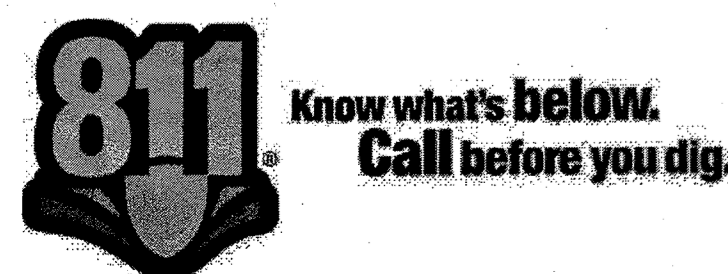
City of Raleigh Public Utilities Department Permit # \_\_\_\_\_



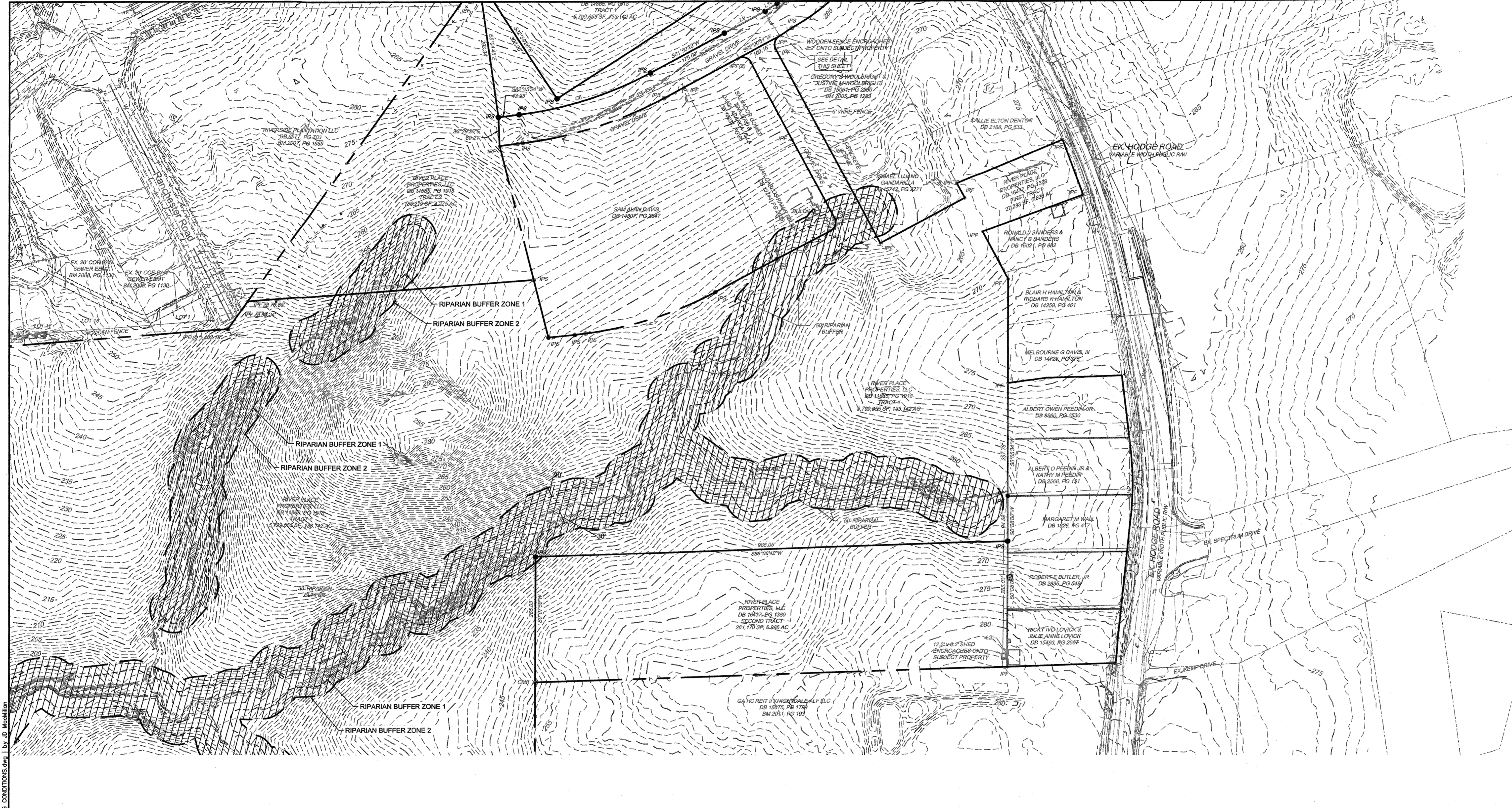
**GLOBAL CITY  
DEVELOPMENT**

CITY OF RALEIGH - PLANS AUTHORIZED FOR CONSTRUCTION  
Electronic Approval: This approval is being issued electronically. This approval is valid only upon the signature of a City of Raleigh Review Officer below. The City will retain a copy of the approved plans. Any work authorized by this approval must proceed in accordance with the plans kept on file with the City. This electronic approval may not be edited once issued. Any modification to this approval once issued will invalidate this approval.

City of Raleigh Development Approval  
Lorea M Sample  
Raleigh Water Review Officer



E:\331\44872-stone-silverstone\DWG\Sheet\C0 COVER.dwg | by: JD Macmillan



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YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION	DATE

DATE: 08/06/2020  
 DRAWN BY: J.D. MACMILLAN  
 DESIGNED BY: J.D. MACMILLAN  
 CHECKED BY: M. ZACCARDO  
 SCALE: 1" = 100'

**TOWN CERTIFICATION**

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PERMITS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-19-2020  
 ADMINISTRATOR

**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
 HARDIN HILL SPINE ROAD EXTENSION  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**EXISTING CONDITIONS**

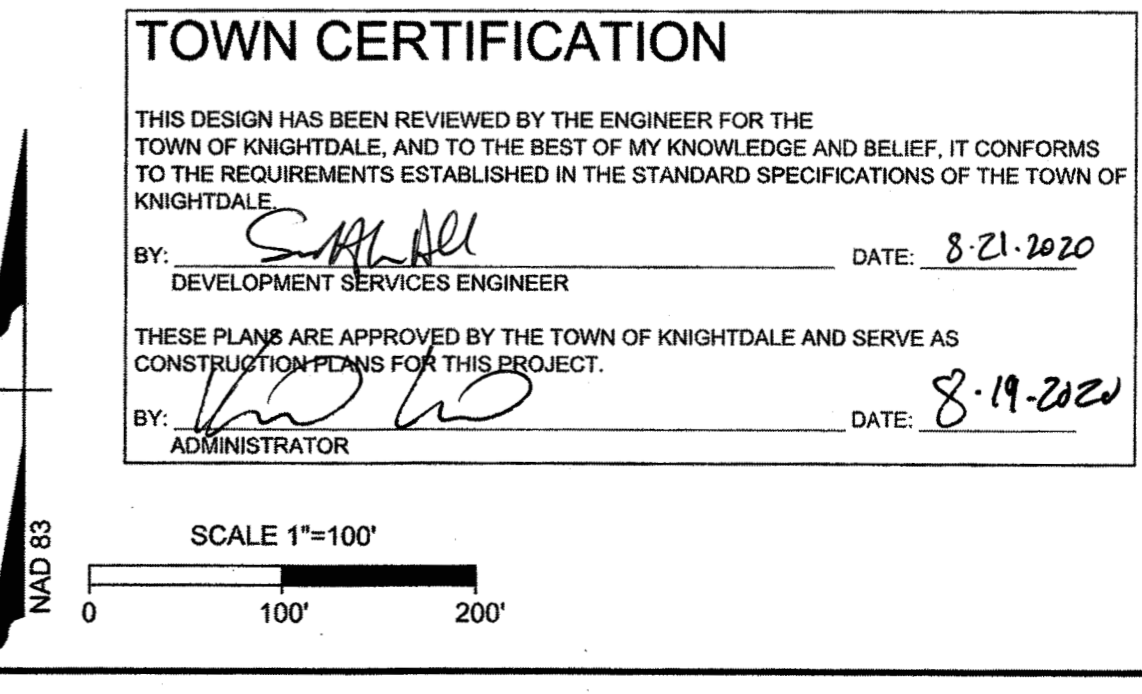
JOB NO.: 44872  
 SHEET NO.: C1.0

RELEASED FOR CONSTRUCTION

**LEGEND**

<ul style="list-style-type: none"> <li>IPF - IRON PIPE FOUND</li> <li>IRF - IRON ROD FOUND</li> <li>IRS - IRON PIPE SET</li> <li>CP - COMPUTED EASEMENT POINT</li> <li>CMF - CONCRETE MONUMENT</li> <li>MNF - MAG NAIL FOUND</li> <li>CP - COMPUTED POINT</li> <li>CSF - COTTON SPINDLE FOUND</li> <li>BP - BACKFLOW PREVENTER</li> <li>WV - WATER VALVE</li> <li>TV - TELEPHONE VALVE</li> <li>TCB - TRAFFIC CONTROL BOX</li> <li>PP - POWER VALVE</li> <li>UV - UTILITY VALVE</li> <li>WF - WETLAND FLAG</li> <li>RCP - REINFORCED CONCRETE PIPE</li> <li>CMF - CORRUGATED METAL PIPE</li> <li>VCP - VITRIFIED CLAY PIPE</li> <li>DIP - DUCTILE IRON PIPE</li> <li>HDP - HIGH DENSITY POLYETHYLENE PIPE</li> <li>FES - FLARED END SECTION</li> <li>MFP - FIBER OPTIC MARKER</li> <li>TYP - TELEVISION PEDESTAL</li> <li>SIP - SIGNAL POLE</li> <li>HVC - HEATING VENTILATION AND AIR CONDITIONING</li> <li>LSA - LANDSCAPED AREA</li> <li>R/W - RIGHT-OF-WAY</li> <li>P/L - PROCKERY LINE</li> <li>C/L - CENTERLINE</li> <li>NTS - NOT TO SCALE</li> <li>OV - GAS VALVE</li> <li>CB - CATCH BASIN</li> <li>GI - GRATE INLET</li> <li>YI - YARD INLET</li> <li>CI - CURB INLET</li> <li>EP - EDGE OF PAVING</li> <li>TBC - TOP BACK OF CURB</li> <li>CC - CHATHAM COUNTY RECORD</li> <li>WCL - WAKE COUNTY RECORD</li> <li>SB - SEED BOX</li> <li>RF - FLOODPLAIN</li> <li>SP - SQUARE FEET</li> <li>SA - SITE ADDRESS</li> </ul>	<ul style="list-style-type: none"> <li>MH DRAINAGE</li> <li>MH SANITARY</li> <li>MH ELECTRIC</li> <li>MH TELEPHONE</li> <li>MH WATER</li> <li>STORM INLET</li> <li>ELECTRIC BOX</li> <li>TELEPHONE PEDESTAL</li> <li>SIGN</li> <li>ELECTRIC METER</li> <li>WATER METER</li> <li>WATER VALVE</li> <li>FIRE HYDRANT</li> <li>POWER POLE</li> <li>LIGHT POLE</li> <li>YARD LIGHT</li> <li>GROUND LAMP</li> <li>WELL</li> <li>MONITORING WELL</li> <li>ROOF DRAIN</li> <li>WATER SPLIT</li> <li>CEED LINE</li> <li>LINE NOT SURVEYED</li> <li>STORM LINE</li> <li>SAN - SANITARY LINE</li> <li>PAINTED WATER LINE</li> <li>W - WETLAND BUFFER ZONE</li> <li>PAINTED STORM LINE</li> <li>CREEK TOP OF BANK</li> <li>50' CREEK BUFFER (ZONE 1)</li> <li>50' CREEK BUFFER (ZONE 2)</li> <li>FLOODPLAIN</li> <li>FEMA 100-YEAR FLOODPLAIN</li> <li>FEMA 500-YEAR FLOODPLAIN</li> </ul>	<ul style="list-style-type: none"> <li>SPRINKLER BOX</li> <li>SPRINKLER HEAD</li> <li>SPRINKLER VALVE</li> <li>GAS TEST LOCATION</li> <li>GAS METER</li> <li>GAS VALVE</li> <li>FLAG POLE</li> <li>TREE</li> <li>BOLLARD</li> <li>BOREHOLE</li> <li>AC UNIT</li> <li>MAILBOX</li> <li>CLEAN OUT</li> <li>GUY</li> <li>HC - HANDICAP PARKING</li> </ul>
--	--	--

- WETLANDS**
- NEUSE RIVER BUFFER**
- NOTES:**
- THIS SURVEY WAS PREPARED WITH THE BENEFIT OF A TITLE COMMITMENT NUMBER 14623, REVISED 11-26-2014 AT 3:06PM, BY OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY.
  - AREAS COMPUTED BY COORDINATE METHOD.
  - PROPERTY SHOWN HEREON IS SUBJECT TO ALL RIGHTS-OF-WAY, EASEMENTS AND RESTRICTIONS OF RECORD.
  - ALL DISTANCES SHOWN ON SURVEY ARE HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED.
  - THIS SURVEY DOES NOT REPRESENT A TITLE SEARCH BY THIS FIRM.
  - RIGHTS-OF-WAY INFORMATION IS BASED ON DEEDS AND MAPS OF RECORD.
  - BASIS OF BEARING SHOWN HEREON IS NC GRID NAD 83 (NRSR 2007).
  - VERTICAL DATUM SHOWN HEREON IS NAVD83.
  - WETLAND DELINEATION PROVIDED BY SOIL & ENVIRONMENTAL CONSULTANTS, P.A. AND DOES NOT REPRESENT A WETLAND STUDY OR DELINEATION BY TIMMONS GROUP.
  - ALL PROPERTY SHOWN IS INSIDE OF THE KNIGHTDALE E.T.A.
  - THIS PROPERTY OR A PORTION OF PROPERTIES SHOWN ON THIS MAP LIE WITHIN A FEMA MAPPED ZONE PER FEMA FLOOD PANEL 1733J AND 1734J. FLOOD HAZARD LINES ARE BASED ON PRELIMINARY DFIRM DATA AVAILABLE FROM NCFLOODMAPS.COM.



A:\331\4872-stone-shed\DWG\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CD-EXISTING CONDITIONS.dwg | by: J.D. Macmillan



THIS DRAWING PREPARED AT THE  
5410 Trinity Road, Suite 102, Raleigh, NC 27607  
TEL 919.866.4951 FAX 919.833.8124 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

DATE	REVISION DESCRIPTION
08/06/2020	

DRAWN BY  
JD. MACMILLAN

DESIGNED BY  
JD. MACMILLAN

CHECKED BY  
M. ZACCARDO

SCALE  
1" = 80'

**TIMMONS GROUP**

NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**

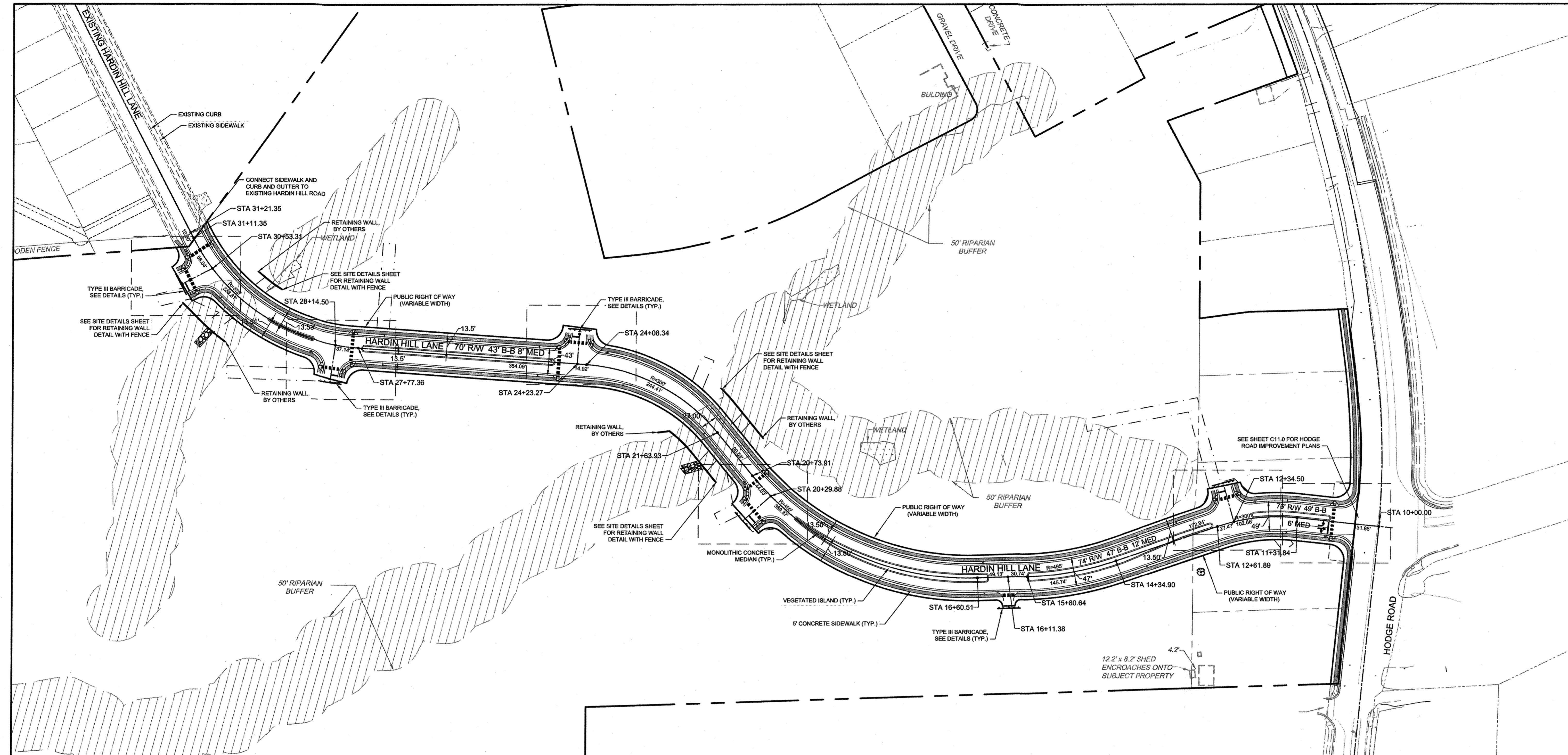
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**SITE PLAN**

JOB NO.  
44872

SHEET NO.  
C2.0

RELEASED FOR CONSTRUCTION



**LEGEND**

EXISTING WETLANDS	
PROPOSED SIDEWALK	
DRAINAGE EASEMENT	
50' NEUSE RIPARIAN BUFFER	
PROPERTY LINE	

STREET NAME	STREET TYPE	LENGTH (LF)	ROW (FT)
HARDIN HILL LANE	PUBLIC STREET	2142	VARIABLE
<b>STREET TOTAL</b>		<b>2142</b>	

- NOTES:**
- BOUNDARY INFORMATION TAKEN FROM SURVEY BY TIMMONS GROUP.
  - TOPOGRAPHIC INFORMATION TAKEN FROM SURVEY BY TIMMONS GROUP.
  - CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR ANY DAMAGE RESULTING FROM SAID ACTIVITIES. CALL UTILITY LOCATOR SERVICE BEFORE DIGGING.
  - ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE AND NCDOT STANDARDS AND SPECIFICATIONS.
  - WETLAND AND RIPARIAN BUFFER DELINEATION BY S&EC DATED SEPTEMBER 24, 2014.
  - ALL STREETS EXCEPT ALLEYS SHALL BE PUBLIC.
  - ALL UTILITIES SHALL BE UNDERGROUND.
  - EACH LOT WILL BE SERVED BY CITY OF RALEIGH PUBLIC WATER SYSTEM.
  - EACH LOT WILL BE SERVED BY CITY OF RALEIGH PUBLIC SEWER SYSTEM.
  - WAKE COUNTY EROSION CONTROL AND TOWN OF KNIGHTDALE STORMWATER PERMITS WILL BE REQUIRED.
  - WAKE COUNTY EROSION CONTROL REGULATIONS SHALL BE COMPLIED WITH.
  - CONSTRUCTION DRAWINGS MUST BE APPROVED PRIOR TO ANY WORK BEGINNING.
  - SIGNAGE SHALL BE APPROVED PRIOR TO ANY INSTALLATION WORK.
  - NCDOT DRIVEWAY PERMIT WILL BE REQUIRED PRIOR TO FINAL PLAT APPROVAL.
  - STREET NAMES MUST BE APPROVED BY WAKE COUNTY GIS PRIOR TO FINAL PLAT.
  - DEDICATED OPEN SPACE AREAS WILL BE OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION
  - OPEN SPACE SHALL BE DEDICATED FOR PROVISION OF ACTIVE AND/OR PASSIVE OUTDOOR RECREATION OPPORTUNITIES FOR THE SUBDIVISION'S RESIDENTS AND THEIR GUESTS.
  - VERTICAL CLEARANCE OF 13 FEET 6 INCHES REQUIRED FOR ALL ROADWAYS.
  - AREAS OF DISCONNECTED IMPERVIOUS SHALL BE SHOWN ON THE RECORDED PLAT.
  - A FINANCIAL GUARANTEE FOR INCOMPLETE PUBLIC IMPROVEMENTS REQUIRED PRIOR TO FINAL PLAT.

**SITE DATA**

**OWNERS/SUBDIVIDER/DEVELOPER:**  
GLOBAL CITY DEVELOPMENT  
CASSA KNIGHTDALE, LLC  
801 BRICKELL AVE, STE 2360  
MIAMI, FL 33131-4943  
PHONE: 786-577-4113

**ENGINEER:**  
TIMMONS GROUP  
MIKE ZACCARDO, PE  
5410 TRINITY ROAD, STE. 102  
RALEIGH, NC 27607  
PHONE: 919-624-4927

PIN = 1733-91-9712  
DB = 17614 PG = 1463

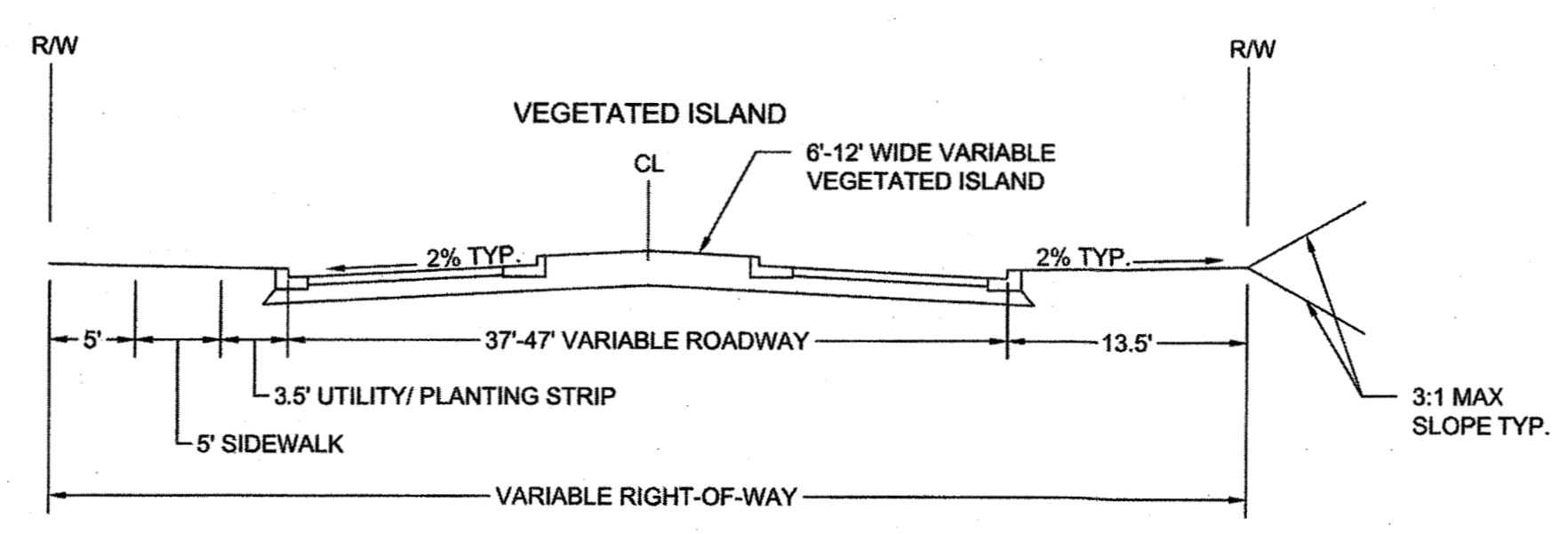
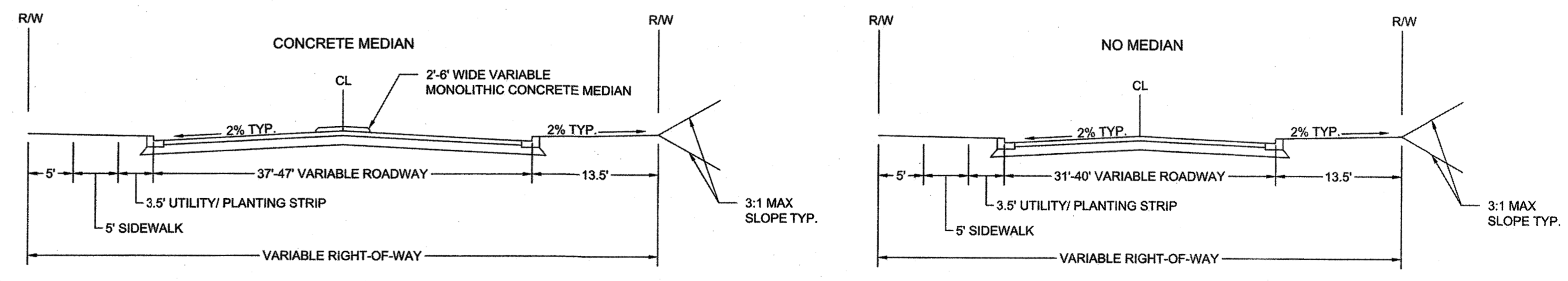
FIRM MAP# = 3720173300J, 3720174300J

TOTAL EXISTING TRACT ACREAGE = 112.93 acres  
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WATER SERVICE STUBS = 31  
SEWER SERVICE STUBS = 30  
TOTAL WASTEWATER FLOW = 0 GPD

**TYPICAL ROAD CROSS SECTIONS**



**TOWN CERTIFICATION**

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: DATE: 8-18-2020  
ADMINISTRATOR

SCALE 1"=80'

6:\351\44872-stone-silver\DWG\Sheet\GD SITE PLAN.dwg | by JD Macmillan



THIS DRAWING PREPARED AT THE  
**RALEIGH OFFICE**  
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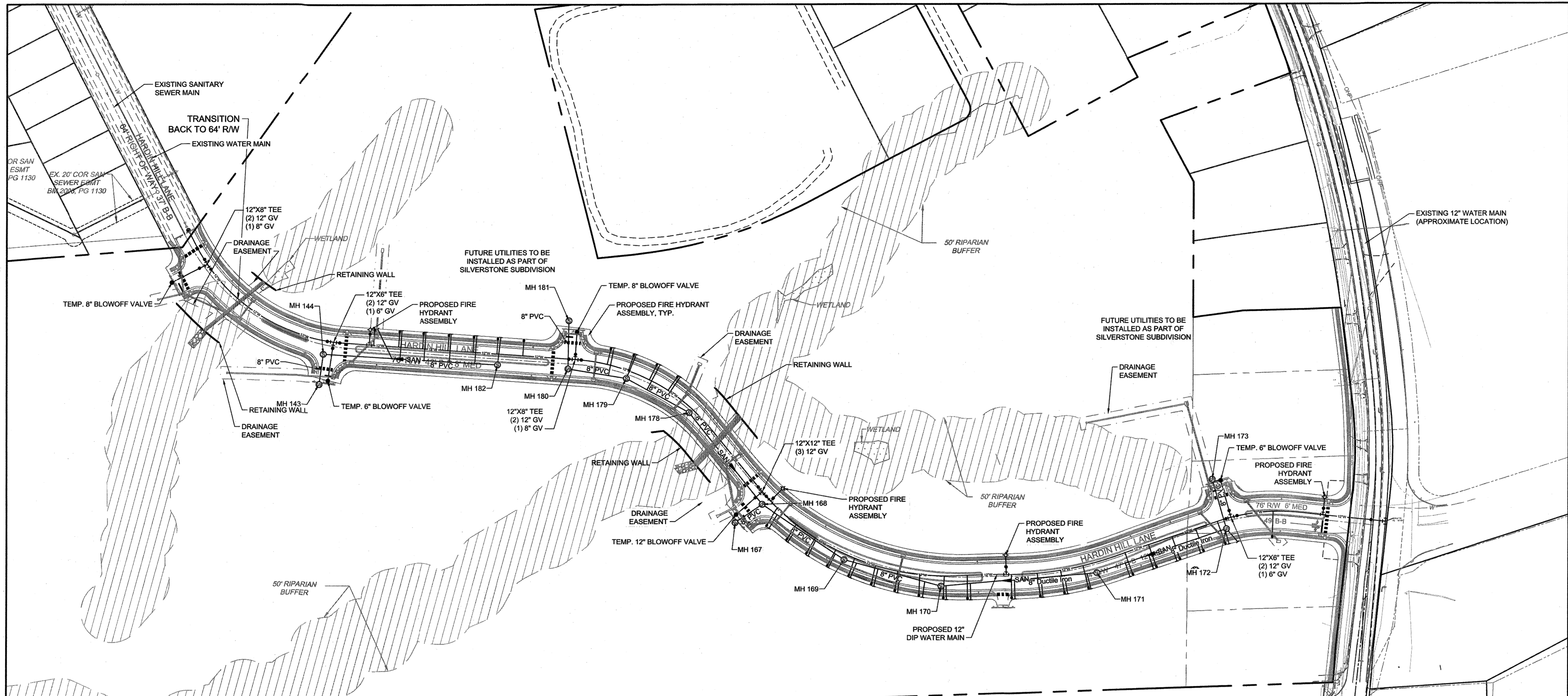
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DATE  
 08/06/2020  
 DRAWN BY  
 J.D. MACMILLAN  
 DESIGNED BY  
 J.D. MACMILLAN  
 CHECKED BY  
 M. ZACCARDO  
 SCALE  
 1" = 80'

**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
 HARDIN HILL SPINE ROAD EXTENSION  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
 UTILITY PLAN

JOB NO.  
**44872**  
 SHEET NO.  
**C3.0**

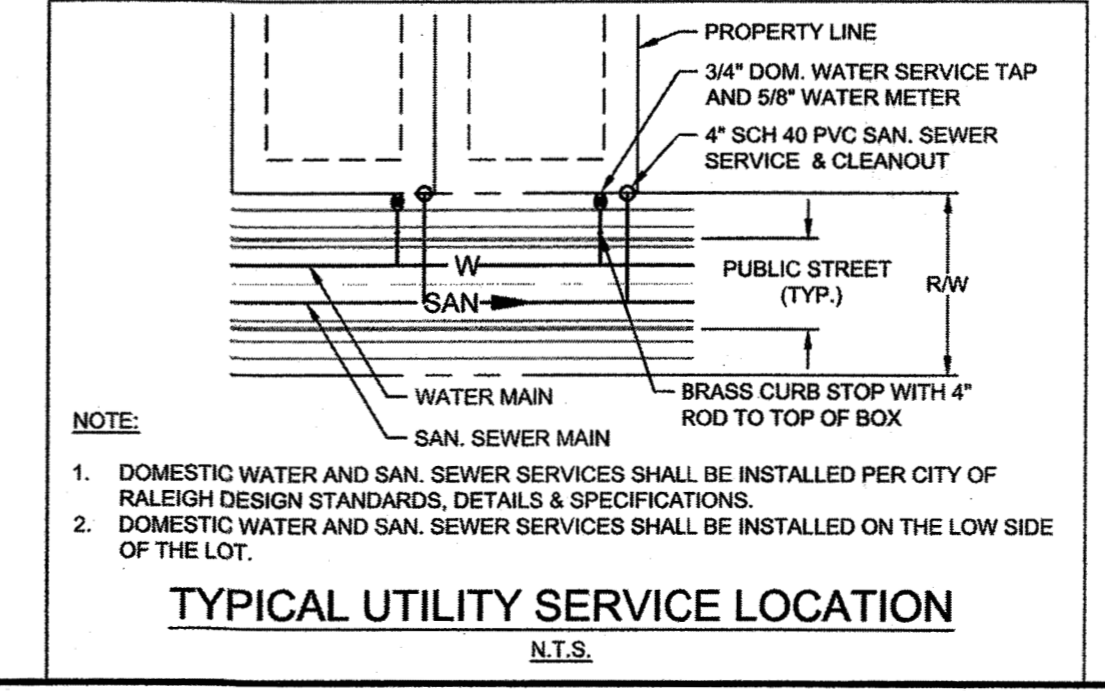
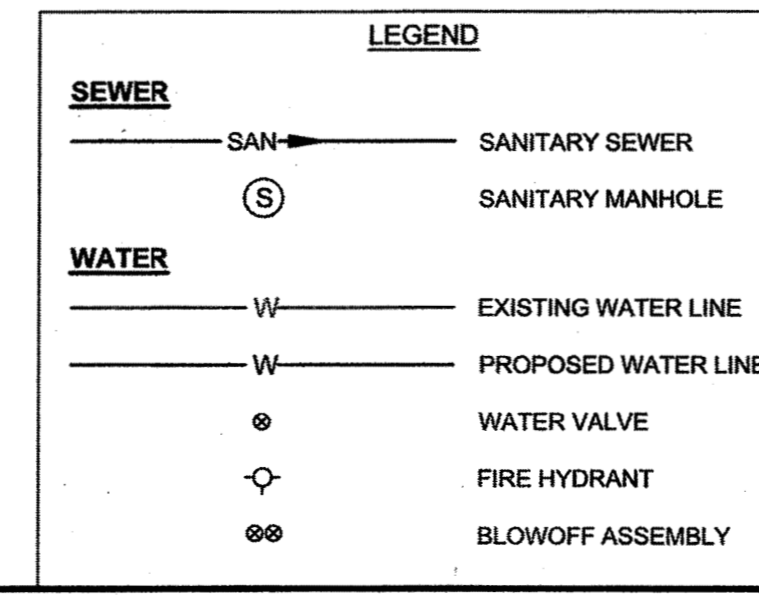
RELEASED FOR CONSTRUCTION



**CORPUS STANDARD UTILITY NOTES:**

- ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS (REFERENCE: CORPUS HANDBOOK, CURRENT EDITION).
- CONTRACTOR SHALL LOCATE AND PROTECT ALL EXISTING PUBLIC AND PRIVATE UTILITIES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.
- UTILITY SEPARATION REQUIREMENTS:
  - A DISTANCE OF 10' SHALL BE MAINTAINED BETWEEN SANITARY SEWER & ANY PRIVATE OR PUBLIC WATER SUPPLY SOURCE SUCH AS AN IMPOUNDED RESERVOIR USED AS A SOURCE OF DRINKING WATER. IF ADEQUATE LATERAL SEPARATION CANNOT BE ACHIEVED, FERROUS SANITARY SEWER PIPE SHALL BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS. HOWEVER, THE MINIMUM SEPARATION SHALL NOT BE LESS THAN 2' FROM A PRIVATE WELL OR 50' FROM A PUBLIC WELL.
  - WHEN INSTALLING WATER AND/OR SEWER MAINS, THE HORIZONTAL SEPARATION BETWEEN UTILITIES SHALL BE 10'. IF THIS SEPARATION CANNOT BE MAINTAINED DUE TO EXISTING CONDITIONS, THE VARIATION ALLOWED IS THE WATER MAIN IN A SEPARATE TRENCH WITH THE ELEVATION OF THE WATER MAIN AT LEAST 18" ABOVE THE TOP OF THE SEWER & MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR. ALL DISTANCES ARE MEASURED FROM OUTSIDE DIAMETER TO OUTSIDE DIAMETER.
  - WHERE IT IS IMPOSSIBLE TO OBTAIN PROPER SEPARATION, OR ANYTIME A SANITARY SEWER PASSES OVER A WATER MAIN, DIP MATERIALS OR STEEL ENCASUREMENT EXTENDED 10' ON EACH SIDE OF CROSSING MUST BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS.
  - 5' MINIMUM HORIZONTAL SEPARATION IS REQUIRED BETWEEN ALL SANITARY SEWER & STORM SEWER FACILITIES, UNLESS DIP MATERIAL IS SPECIFIED FOR SANITARY SEWER.
  - MAINTAIN 18" MIN. VERTICAL SEPARATION AT ALL WATER MAIN & RCP STORM DRAIN CROSSINGS; MAINTAIN 24" MIN. VERTICAL SEPARATION AT ALL SANITARY SEWER & RCP STORM DRAIN CROSSINGS. WHERE ADEQUATE SEPARATIONS CANNOT BE ACHIEVED, SPECIFY DIP MATERIALS & A CONCRETE CRADLE HAVING 6" MIN. CLEARANCE (PER CORPUS DETAILS W-41 & S-49).
  - ALL OTHER UNDERGROUND UTILITIES SHALL CROSS WATER & SEWER FACILITIES WITH 18" MIN. VERTICAL SEPARATION REQUIRED.
- ANY NECESSARY FIELD REVISIONS ARE SUBJECT TO REVIEW & APPROVAL OF AN AMENDED PLAN &/OR PROFILE BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT PRIOR TO CONSTRUCTION.
- CONTRACTOR SHALL MAINTAIN CONTINUOUS WATER & SEWER SERVICE TO EXISTING RESIDENCES & BUSINESSES THROUGHOUT CONSTRUCTION OF PROJECT. ANY NECESSARY SERVICE INTERRUPTIONS SHALL BE PRECEDED BY A 24-HOUR ADVANCE NOTICE TO THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT.
- 3.0' MINIMUM COVER IS REQUIRED ON ALL WATER MAINS & SEWER FORCE MAINS.
- IT IS THE DEVELOPER'S RESPONSIBILITY TO ABANDON OR REMOVE EXISTING WATER & SEWER SERVICES NOT BEING USED IN REDEVELOPMENT OF A SITE UNLESS OTHERWISE DIRECTED BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT. THIS INCLUDES ABANDONING TAP AT MAIN & REMOVAL OF SERVICE FROM ROW OR EASEMENT PER CORPUS HANDBOOK PROCEDURE.
- INSTALL 1" TYPE "K" COPPER WATER SERVICES WITH METERS LOCATED AT ROW OR WITHIN A 2X2' WATERLINE EASEMENT IMMEDIATELY ADJACENT.
- INSTALL 4" SCHEDULE 40 PVC SEWER SERVICES @ 1.0% MINIMUM GRADE WITH CLEANOUTS LOCATED AT ROW OR EASEMENT LINE & SPACED EVERY 75' LINEAR FEET MAXIMUM.
- PRESSURE REDUCING VALVES ARE REQUIRED ON ALL WATER SERVICES EXCEEDING 80 PSI. BACKWATER VALVES ARE REQUIRED ON ALL SANITARY SEWER SERVICES HAVING BUILDING DRAINS LOWER THAN 1.0' ABOVE THE NEXT UPSTREAM MANHOLE.
- ALL ENVIRONMENTAL PERMITS APPLICABLE TO THE PROJECT MUST BE OBTAINED FROM NCDWQ, USACE AND/OR FEMA FOR ANY RIPARIAN BUFFER, WETLAND &/OR FLOODPLAIN IMPACTS (RESPECTIVELY) PRIOR TO CONSTRUCTION.
- NCDOT / RAILROAD ENCROACHMENT AGREEMENTS ARE REQUIRED FOR ANY UTILITY WORK (INCLUDING MAIN EXTENSIONS & SERVICE TAPS) WITHIN STATE OR RAILROAD ROW PRIOR TO CONSTRUCTION.
- CROSS-CONNECTION CONTROL PROTECTION DEVICES ARE REQUIRED BASED ON DEGREE OF HEALTH HAZARD INVOLVED AS LISTED IN APPENDIX-B OF THE RULES GOVERNING PUBLIC WATER SYSTEMS IN NORTH CAROLINA. THESE GUIDELINES ARE THE MINIMUM REQUIREMENTS. THE DEVICES SHALL MEET AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) STANDARDS OR BE ON THE UNIVERSITY OF SOUTHERN CALIFORNIA APPROVAL LIST. THE DEVICES SHALL BE INSTALLED AND TESTED (BOTH INITIAL AND PERIODIC TESTING THEREAFTER) IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS OR THE LOCAL CROSS-CONNECTION CONTROL PROGRAM, WHICHEVER IS MORE STRINGENT. CONTACT JOANIE HARTLEY AT (919) 998-5923 OR JOANIE.HARTLEY@RALEIGH.NC.GOV FOR MORE INFORMATION.
- ALL PROPOSED WATER PIPES SHALL HAVE MECHANICAL RESTRAINED JOINTS. THESE RESTRAINTS SHALL NOT BE IN LIEU OF BUT IN ADDITION TO CONCRETE THRUST RESTRAINT BLOCKS REQUIRED BY COR STANDARD DETAILS.

PIPE TABLE					
PIPE NAME	SIZE	MATERIAL	LENGTH	SLOPE	BEARING
183-181	8"	PVC	78.03 LF	0.64%	S1° 08' 51"W
144-143	8"	PVC	49.65 LF	1.61%	S7° 51' 52"W
181-180	8"	PVC	95.64 LF	4.80%	S80° 45' 55"E
180-179	8"	PVC	114.71 LF	6.40%	S61° 10' 16"E
179-178	8"	PVC	189.38 LF	0.50%	S38° 31' 39"E
168-167	8"	PVC	52.72 LF	0.50%	S55° 54' 27"W
182-144	8"	PVC	281.91 LF	5.68%	N86° 27' 36"W
173-172	8"	PVC	83.19 LF	0.50%	S16° 02' 53"E
172-171	8"	Ductile Iron	220.83 LF	0.50%	S71° 14' 34"W
171-170	8"	Ductile Iron	251.59 LF	0.50%	S84° 55' 27"W
170-169	8"	PVC	162.46 LF	4.88%	N74° 30' 10"W
169-168	8"	PVC	159.95 LF	5.54%	N55° 50' 09"W



**Water and Sewer Permits (if applicable)**

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-4617

The City of Raleigh consents to the connection and extension of the City's Public Water System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # W-3707

The City of Raleigh consents to the connection to its public sewer system and extension of the private sewer collection system as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh Public Utilities Department Permit #

Lorea M Sample  
 City Engineer

**TOWN CERTIFICATION**

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

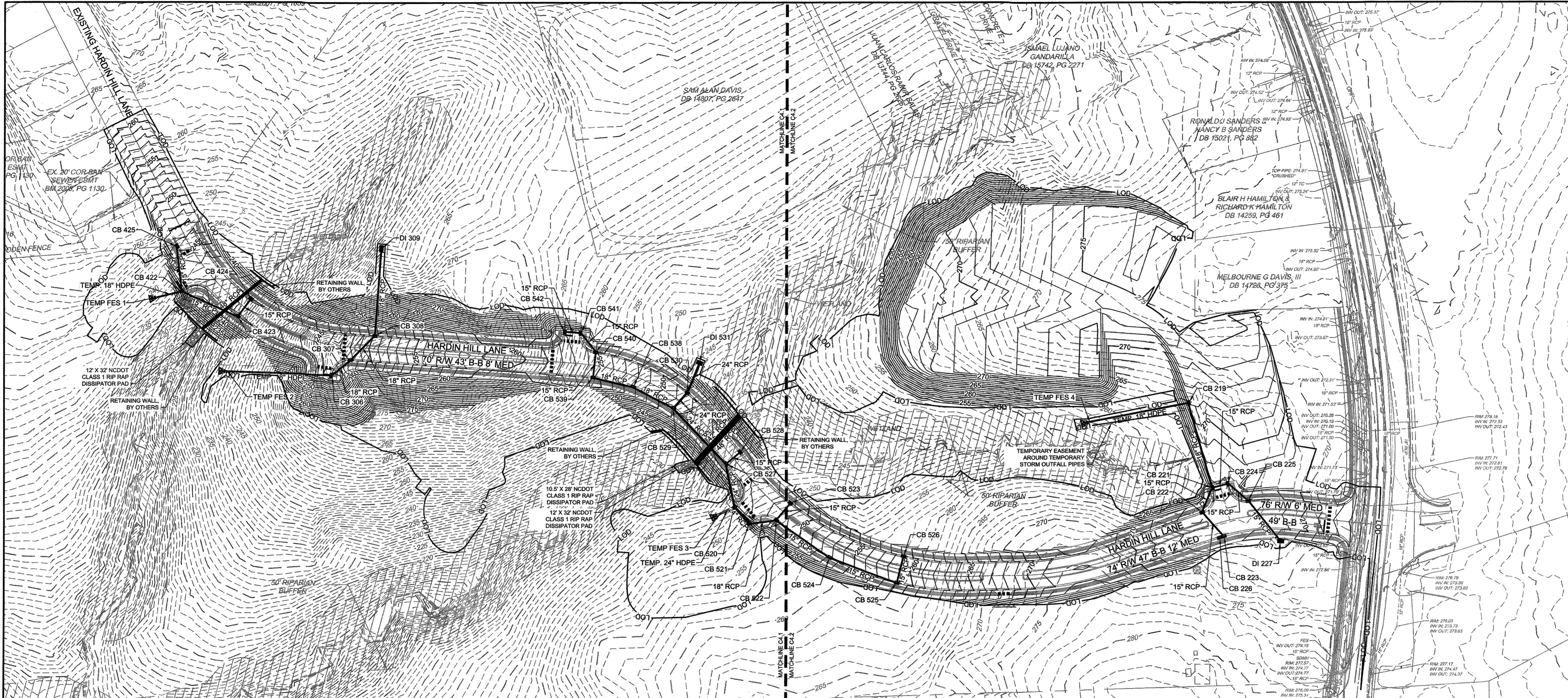
BY: *[Signature]* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-18-2020  
 ADMINISTRATOR

SCALE 1"=80'  
 0 80' 160'

E:\331\44872-stone-alter\DWG\Sheet\C3.0-UTIL.dwg | by JD Macmillan



**STORM DRAINAGE TABLE (HARDIN HILL STORM)**

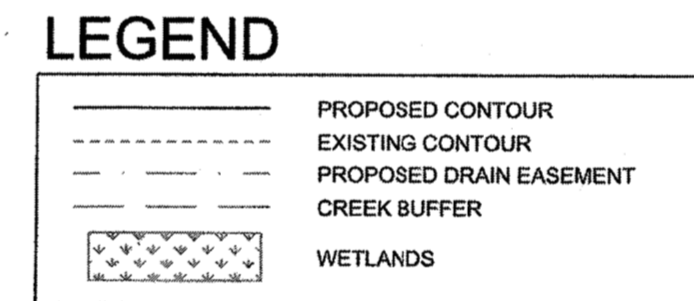
STRUCTURE UP	HEIGHT	TOP	INV IN	INV OUT	OUTLET PIPE	STRUCTURE DOWN
CB 219	12.18'	271.53	259.35' (18" RCP) CB 221	259.35' (18" RCP)	161' @ 0.84%	TEMP FES 4
CB 221	7.01'	267.07	260.31' (15" RCP) CB 222 263.32' (15" RCP) CB 224	260.06' (18" RCP)	142' @ 0.50%	CB 219
CB 222	5.14'	267.61	262.57' (15" RCP) CB 223	262.47' (15" RCP)	42' @ 5.15%	CB 221
CB 223	4.75'	267.58	262.83' (15" RCP) CB 226	262.83' (15" RCP)	53' @ 0.49%	CB 222
CB 224	5.45'	267.06	263.56' (15" RCP) CB 225	263.46' (15" RCP)	27' @ 0.50%	CB 221
CB 225	4.10'	267.87	263.87' (15" RCP) DI 227	263.77' (15" RCP)	42' @ 0.50%	CB 224
CB 226	4.75'	267.58		262.83' (15" RCP)	7' @ 0.00%	CB 223
CB 306	4.61'	245.22	240.71' (18" RCP) CB 307	240.61' (18" RCP)	167' @ 0.96%	TEMP FES 2
CB 307	4.59'	248.01	243.52' (18" RCP) CB 308	243.42' (18" RCP)	38' @ 7.06%	CB 306
CB 308	4.60'	250.61	248.11' (18" RCP) DI 309	246.01' (18" RCP)	56' @ 4.41%	CB 307
CB 422	6.29'	242.76	236.57' (15" RCP) CB 423 236.57' (15" RCP) CB 425	236.47' (18" RCP)	39' @ 1.20%	TEMP FES 1
CB 423	5.32'	242.38	237.16' (15" RCP) CB 424	237.06' (15" RCP)	99' @ 0.50%	CB 422
CB 424	4.53'	241.87		237.34' (15" RCP)	37' @ 0.49%	CB 423
CB 425	5.08'	245.65		240.57' (15" RCP)	73' @ 5.47%	CB 422
CB 520	6.70'	246.81	240.11' (24" RCP) CB 521 240.11' (24" RCP) CB 527	240.11' (24" RCP)	25' @ 4.40%	TEMP FES 3
CB 521	5.43'	246.80	241.87' (18" RCP) CB 522	241.37' (24" RCP)	37' @ 3.41%	CB 520
CB 522	4.45'	248.72	244.52' (15" RCP) CB 524 244.52' (15" RCP) CB 523	244.27' (18" RCP)	44' @ 5.51%	CB 521
CB 523	4.00'	248.71		244.71' (15" RCP)	37' @ 0.51%	CB 522
CB 524	4.10'	253.21	249.21' (15" RCP) CB 525	249.11' (15" RCP)	105' @ 4.38%	CB 522
CB 525	4.31'	259.11	254.90' (15" RCP) CB 526	254.80' (15" RCP)	116' @ 4.82%	CB 524

**STORM DRAINAGE TABLE (HARDIN HILL STORM)**

STRUCTURE UP	HEIGHT	TOP	INV IN	INV OUT	OUTLET PIPE	STRUCTURE DOWN
CB 526	4.00'	259.13		255.13' (15" RCP)	46' @ 0.50%	CB 525
CB 527	6.37'	246.83	240.56' (24" RCP) CB 529 241.31' (15" RCP) CB 528	240.46' (24" RCP)	70' @ 0.50%	CB 520
CB 528	4.00'	246.83		242.83' (15" RCP)	31' @ 4.90%	CB 527
CB 529	7.56'	248.74	241.68' (18" RCP) CB 538 241.18' (24" RCP) CB 530	241.18' (24" RCP)	123' @ 0.50%	CB 527
CB 530	7.45'	248.81	241.46' (24" RCP) DI 531	241.36' (24" RCP)	35' @ 0.51%	CB 529
CB 538	4.60'	251.95	247.45' (18" RCP) CB 539	247.35' (18" RCP)	72' @ 7.84%	CB 529
CB 539	4.36'	255.57	251.47' (15" RCP) CB 540	251.21' (18" RCP)	66' @ 5.67%	CB 538
CB 540	4.10'	255.78	251.78' (15" RCP) CB 541	251.68' (15" RCP)	43' @ 0.49%	CB 539
CB 541	4.10'	256.85	252.85' (15" RCP) CB 542	252.75' (15" RCP)	38' @ 2.54%	CB 540
CB 542	4.00'	257.13		253.13' (15" RCP)	27' @ 1.04%	CB 541
DI 227	2.94'	268.43		265.49' (15" RCP)	83' @ 1.94%	CB 225
DI 309	5.39'	256.07		250.68' (18" RCP)	140' @ 3.25%	CB 308
DI 531	3.75'	245.46		241.71' (24" RCP)	51' @ 0.49%	CB 530
TEMP FES 1	N/A	237.67	236.00' (18" HDPE) CB 422			
TEMP FES 2	N/A	240.71	239.00' (18" HDPE) CB 306			
TEMP FES 3	N/A	240.17	239.00' (24" HDPE) CB 520			
TEMP FES 4	N/A	259.71	258.00' (18" HDPE) CB 219			

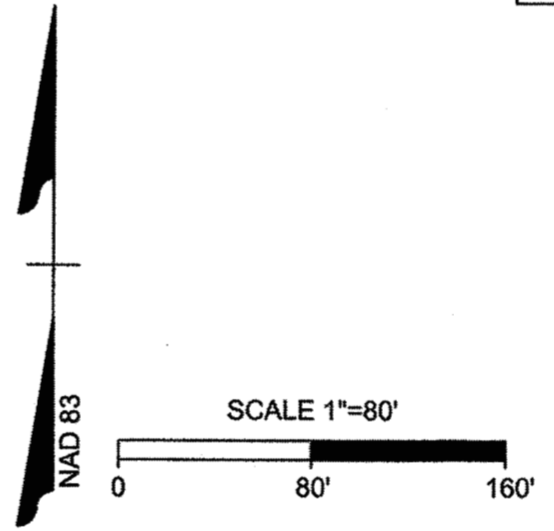
**CULVERT PIPE TABLE**

PIPE #	DIA	UPSTREAM INVERT	DOWNSTREAM INVERT	SLOPE	LENGTH	DESCRIPTION
CULVERT 1	48"	230.49	228.25	2.10%	106.62 LF	48 inch RCP
CULVERT 2	42"	230.99	228.75	2.10%	106.65 LF	42 inch RCP
CULVERT 3	48"	231.14	219.87	8.99%	125.33 LF	48 inch RCP



**NOTE:**  
RETAINING WALLS AND ASSOCIATED DRAINAGE TO BE DESIGNED BY OTHERS. CONTRACTOR SHALL COORDINATE DESIGN AND SUBMIT SEALED PLAN FOR REVIEW AND APPROVAL BY THE TOWN INSPECTIONS DEPARTMENT.

**NOTE:**  
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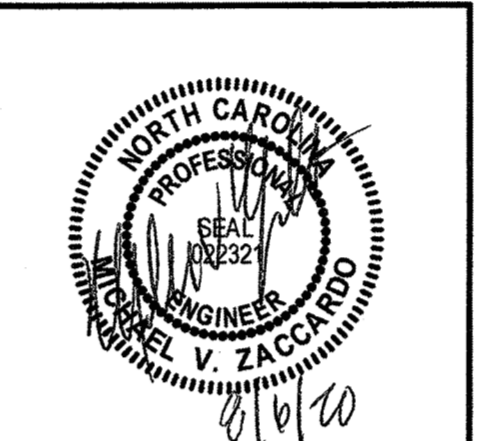
**TOWN CERTIFICATION**

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 8/21/2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8/18/2020  
ADMINISTRATOR



THIS DRAWING PREPARED AT THE  
**RALEIGH OFFICE**  
5410 Trinity Road, Suite 102 | Raleigh, NC 27607  
TEL 919.866.4951 FAX 919.833.8124 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION

DATE	DESCRIPTION
08/06/2020	

DRAWN BY: J.D. MACMILLAN  
DESIGNED BY: J.D. MACMILLAN  
CHECKED BY: M. ZACCARDO  
SCALE: 1" = 80'

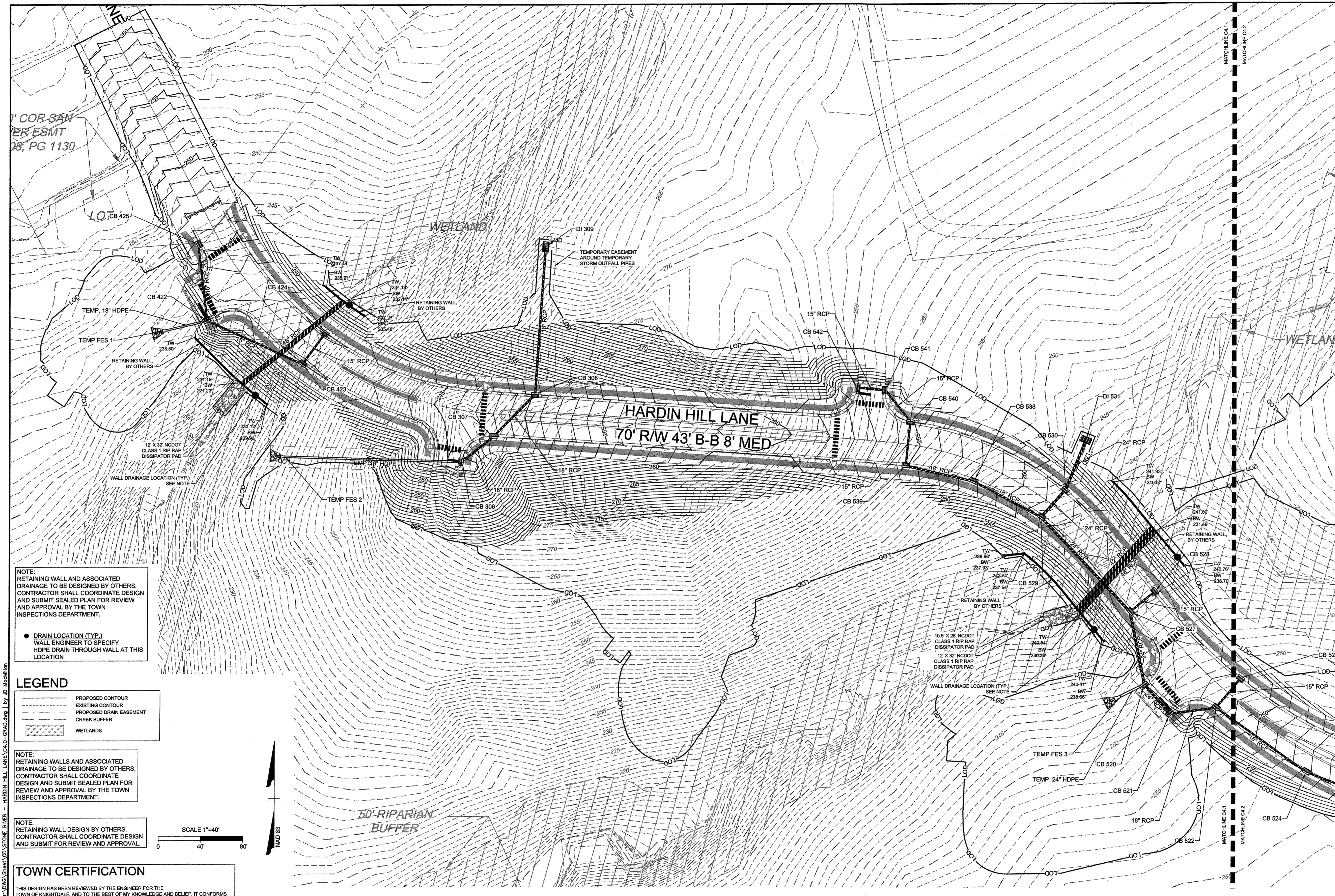
**TIMMONS GROUP**

HARDIN HILL SPINE ROAD EXTENSION  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
OVERALL GRADING & DRAINAGE PLAN

JOB NO. 44872  
SHEET NO. C4.0

RELEASED FOR CONSTRUCTION





COR SAN  
PER ESMT  
08, PG 1130

NOTE:  
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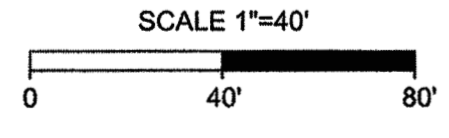
● DRAIN LOCATION (TYP.)  
WALL ENGINEER TO SPECIFY HDPE DRAIN THROUGH WALL AT THIS LOCATION

**LEGEND**

- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROPOSED DRAIN EASEMENT
- CREEK BUFFER
- WETLANDS

NOTE:  
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BY: *S.M.M.* DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-18-2020  
ADMINISTRATOR



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DATE: 08/06/2020  
DRAWN BY: J.D. MACMILLAN  
DESIGNED BY: J.D. MACMILLAN  
CHECKED BY: M. ZACCARDO  
SCALE: 1" = 40'

**TIMMONS GROUP**

NORTH CAROLINA LICENSE NO. C-1652  
**HARDIN HILL SPINE ROAD EXTENSION**  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
GRADING & DRAINAGE PLAN - SHEET 1 OF 2

JOB NO. 44872  
SHEET NO. C4.1

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DATE	REVISION DESCRIPTION
08/06/2020	

DRAWN BY  
 JD. MACMILLAN

DESIGNED BY  
 JD. MACMILLAN

CHECKED BY  
 M. ZACCARDO

SCALE  
 1" = 40'

# TIMMONS GROUP

NORTH CAROLINA LICENSE NO. C-1652

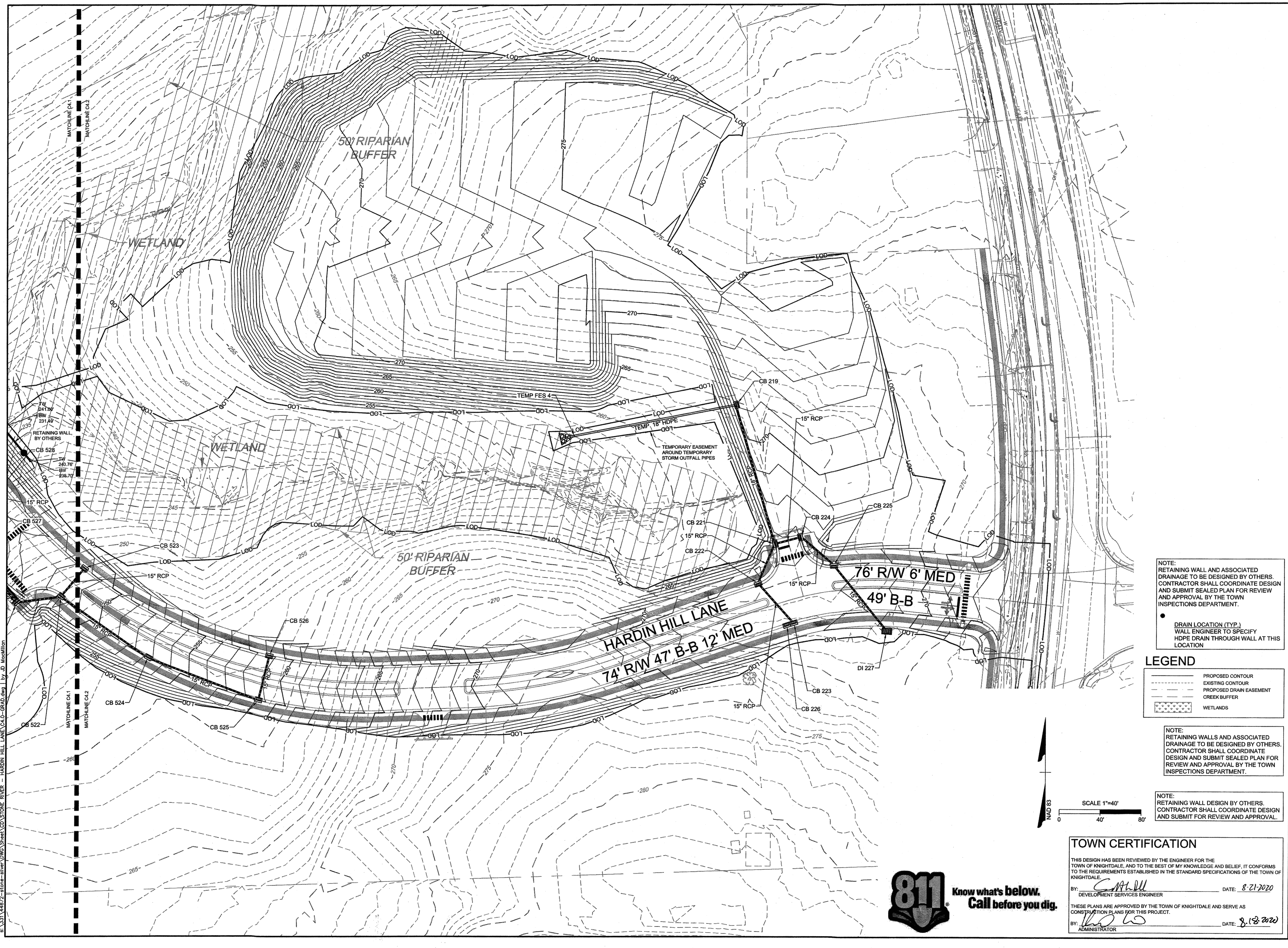
## HARDIN HILL SPINE ROAD EXTENSION

KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

### GRADING & DRAINAGE PLAN - SHEET 2 OF 2

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● DRAIN LOCATION (TYP.)  
 WALL ENGINEER TO SPECIFY HDPE DRAIN THROUGH WALL AT THIS LOCATION

**LEGEND**

	PROPOSED CONTOUR
	EXISTING CONTOUR
	PROPOSED DRAIN EASEMENT
	CREEK BUFFER
	WETLANDS

NOTE:  
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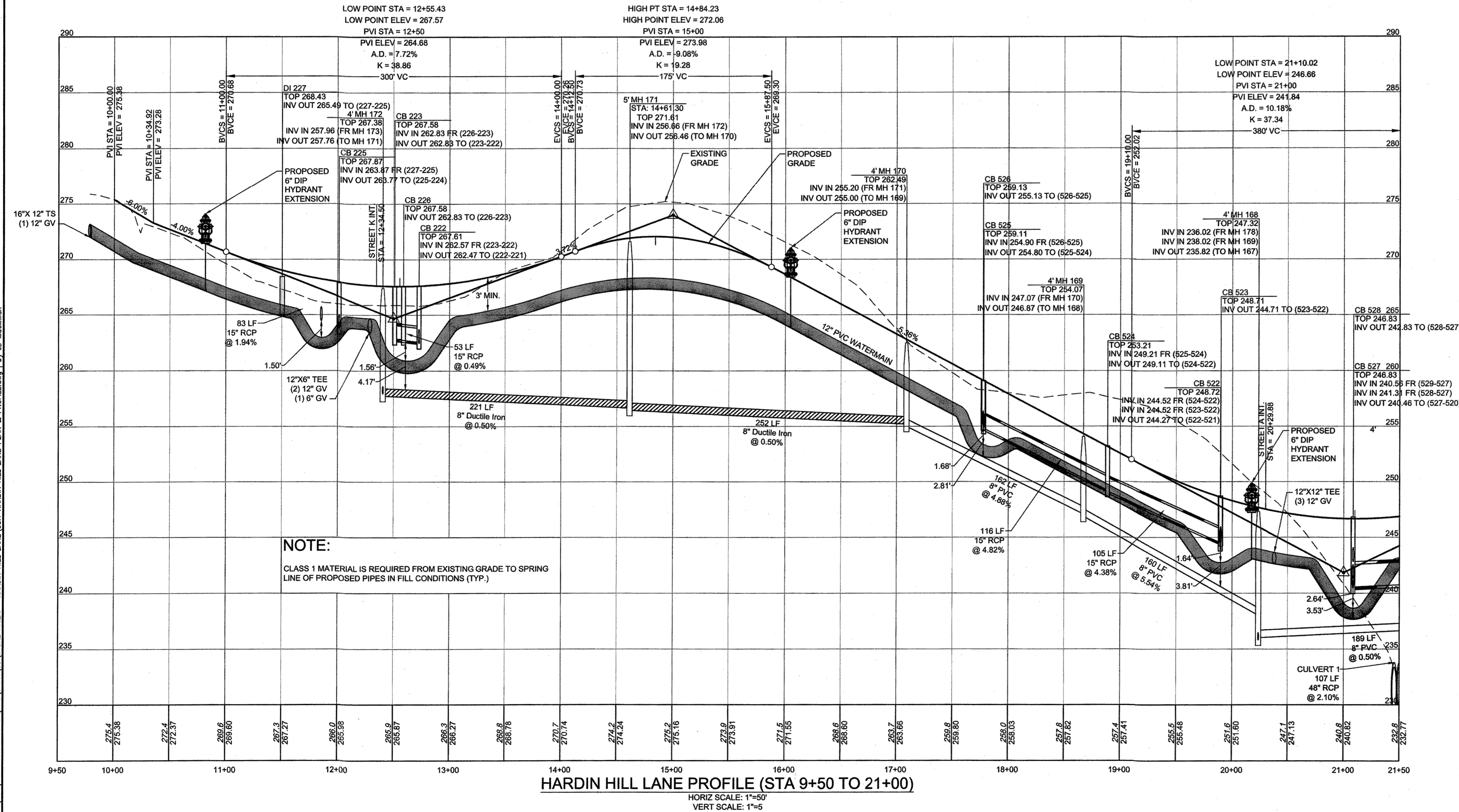
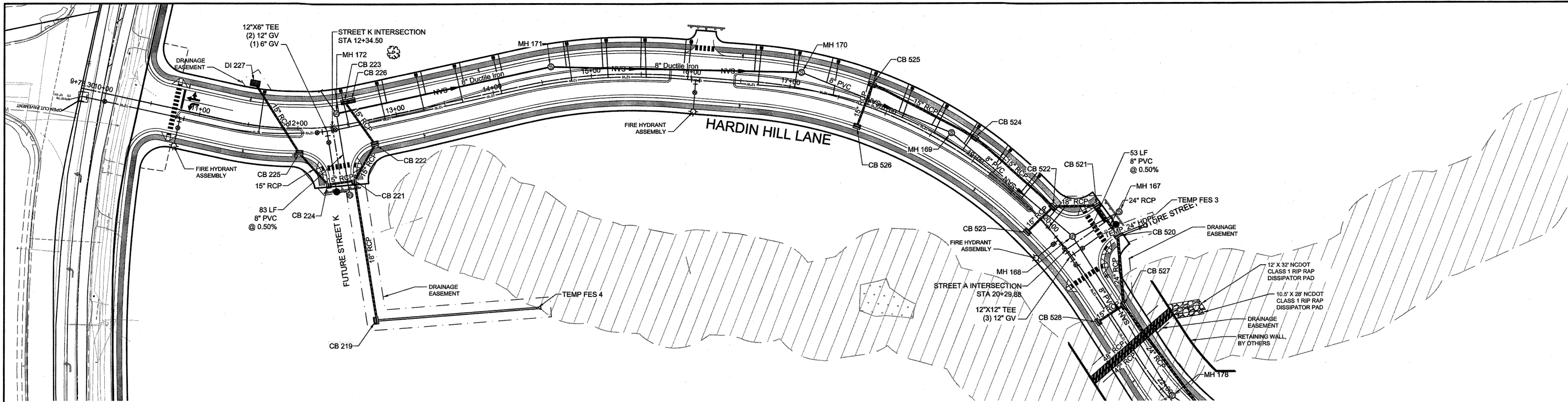
BY: *[Signature]* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-28-2020  
 ADMINISTRATOR



E:\3351\44872-stone-silver\DWG\Sheet\C4.2-GRAD.dwg | by: JD. MacMillan

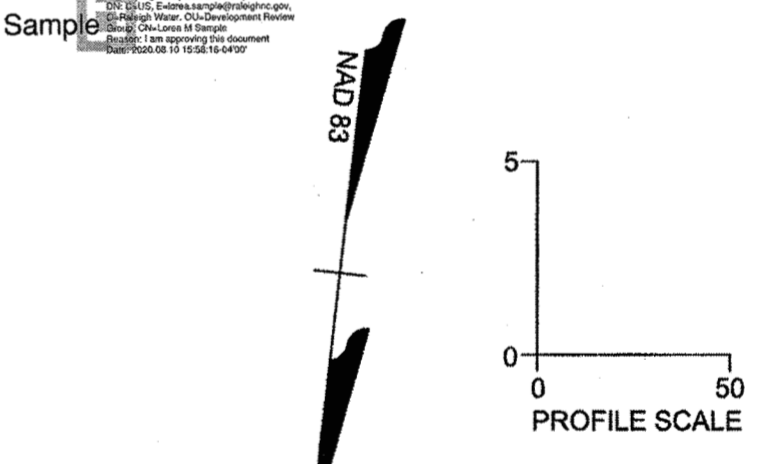


**Water and Sewer Permits (if applicable)**  
The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-4617

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City of Raleigh Public Utilities Department Permit #  
Lorea M Sample



**LEGEND**

- PROPERTY LINE
- EXISTING RIGHT-OF-WAY
- EXISTING ROAD CENTER
- ADJACENT PROPERTY LINE
- PROPOSED PERIMETER BUFFER
- PROPOSED DRAIN EASEMENT
- PROPOSED RIGHT-OF-WAY
- PROPOSED LOT LINE
- BUILDING SETBACK
- PROPOSED ROAD CENTER
- PROPOSED EOP
- FLOODPLAIN PER FLOOD STUDY

ALL SEWER SERVICES GREATER THAN 12' IN DEPTH TO USE DEEP SEWER SERVICE DETAIL



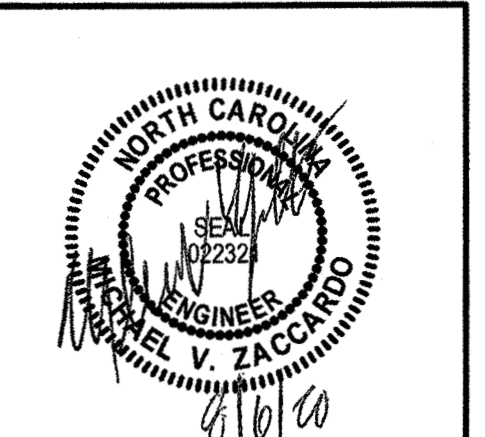
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BY: *[Signature]* DATE: 8/21/2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8/18/2020  
ADMINISTRATOR



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YOUR VISION ACHIEVED THROUGH OURS.

DATE	REVISION DESCRIPTION
08/06/2020	

DRAWN BY: J.D. MACMILLAN  
DESIGNED BY: J.D. MACMILLAN  
CHECKED BY: M. ZACCARDO

SCALE  
H: 1" = 50'  
V: 1" = 5'

**TIMMONS GROUP**  
NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**HARDIN HILL LANE PLAN & PROFILE**

JOB NO. 44872  
SHEET NO. C5.1

RELEASED FOR CONSTRUCTION





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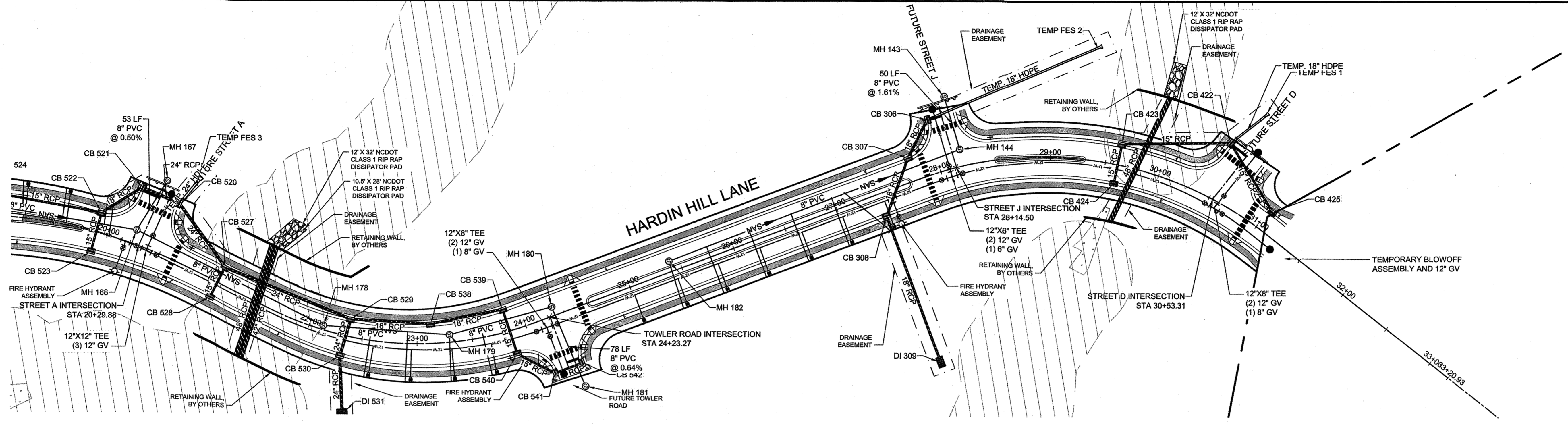
DATE: 08/06/2020  
DRAWN BY: J.D. MACMILLAN  
DESIGNED BY: J.D. MACMILLAN  
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SCALE:  
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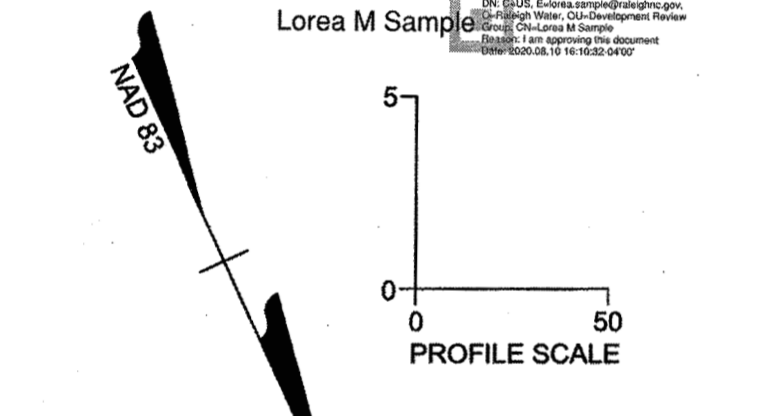
**TIMMONS GROUP**  
NORTH CAROLINA LICENSE NO. C-1652  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
HARDIN HILL LANE PLAN & PROFILE

JOB NO. 44872  
SHEET NO. C5.2

RELEASED FOR CONSTRUCTION



Water and Sewer Permits (if applicable)  
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City of Raleigh Public Utilities Department Permit #

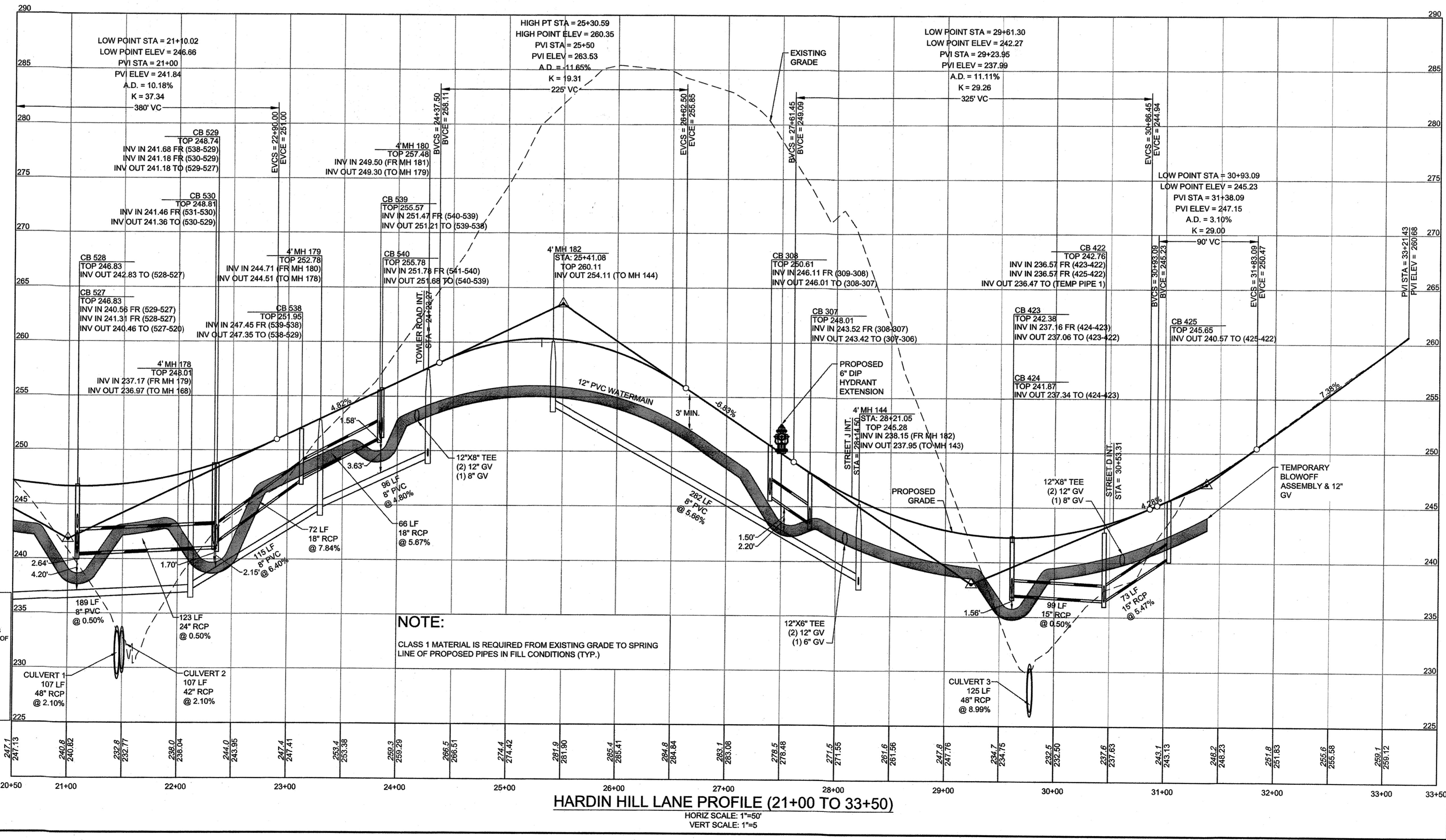


- PROPERTY LINE
- EXISTING RIGHT-OF-WAY
- EXISTING ROAD CENTER
- ADJACENT PROPERTY LINE
- PROPOSED PERIMETER BUFFER
- PROPOSED DRAIN EASEMENT
- PROPOSED RIGHT-OF-WAY
- PROPOSED LOT LINE
- BUILDING SETBACK
- PROPOSED ROAD CENTER
- PROPOSED EOP
- FLOODPLAIN PER FLOOD STUDY

ALL SEWER SERVICES GREATER THAN 12" IN DEPTH TO USE DEEP SEWER SERVICE DETAIL

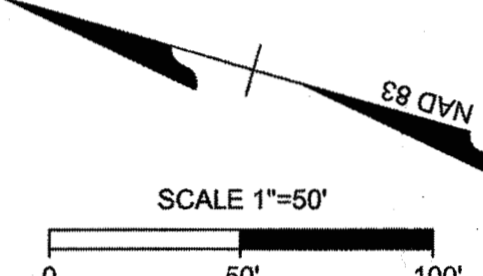
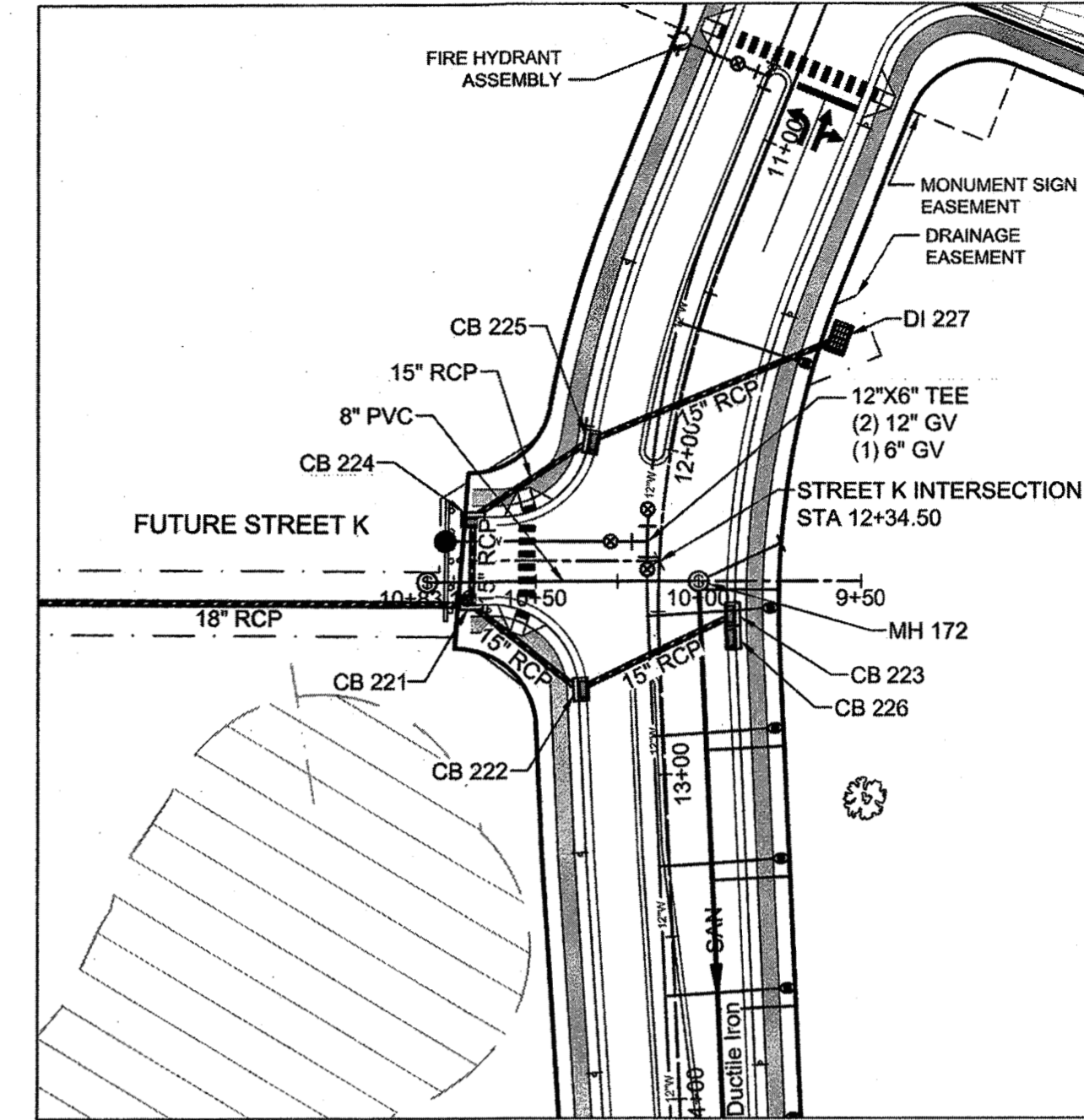
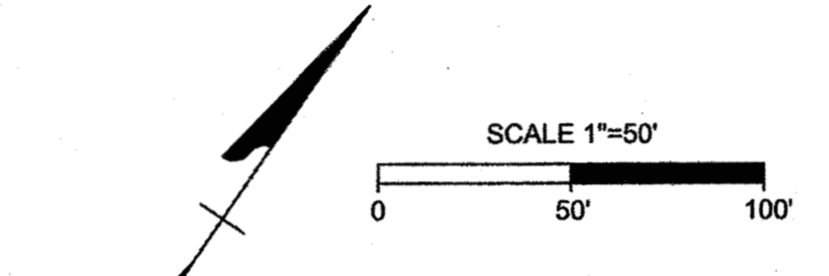
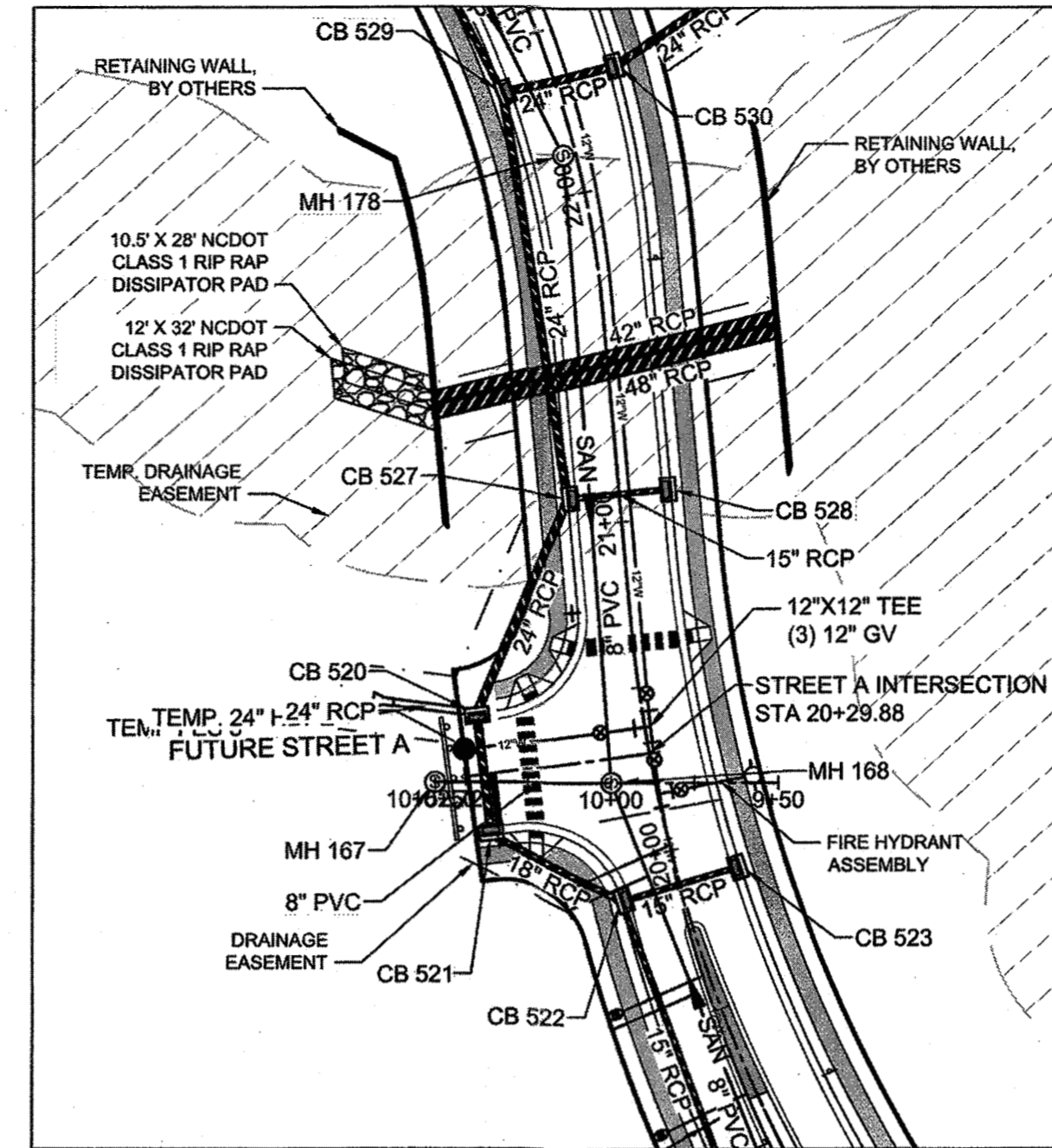
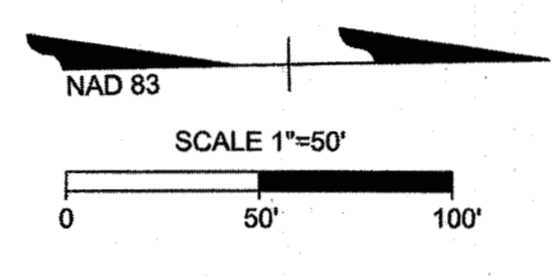
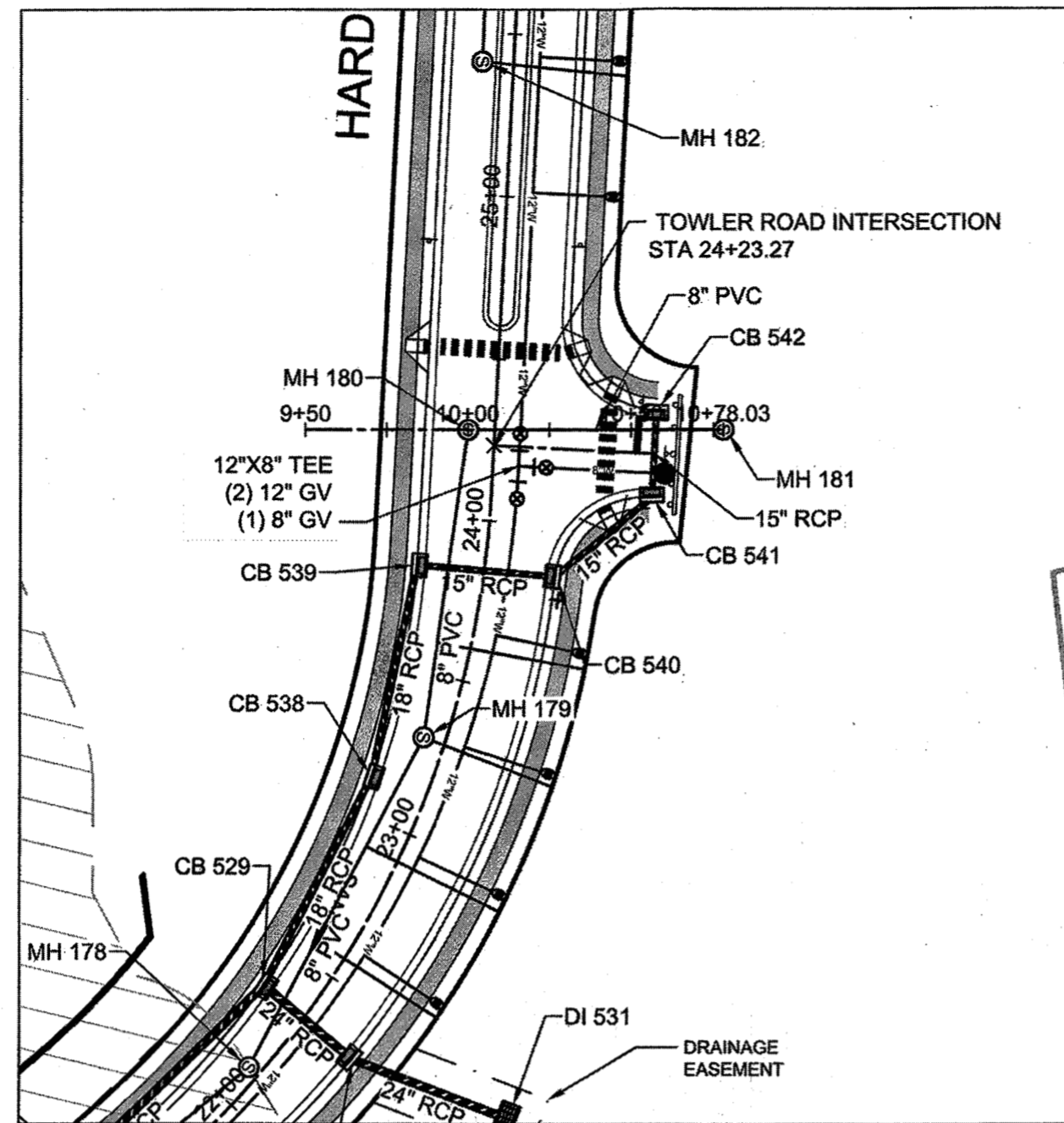
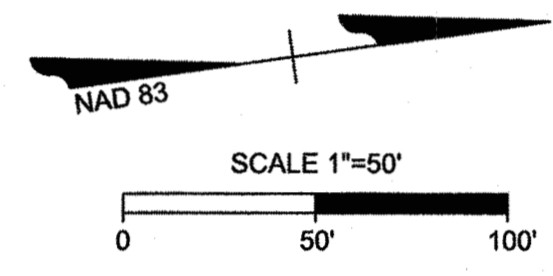
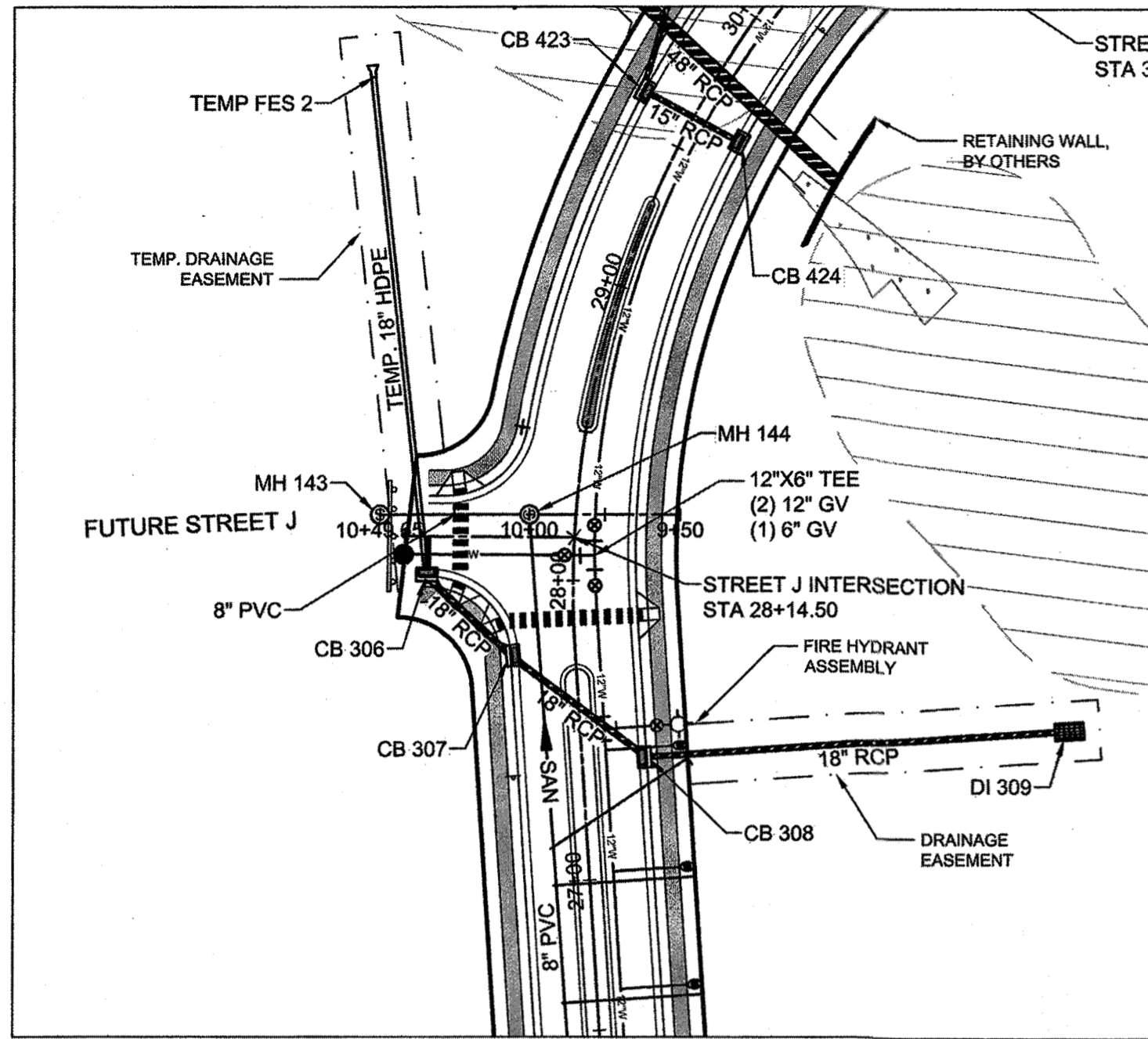


**TOWN CERTIFICATION**  
THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.  
BY: [Signature] DATE: 8/21/2020  
DEVELOPMENT SERVICES ENGINEER  
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
BY: [Signature] DATE: 8/13/2020  
ADMINISTRATOR



**NOTE:**  
CLASS 1 MATERIAL IS REQUIRED FROM EXISTING GRADE TO SPRING LINE OF PROPOSED PIPES IN FILL CONDITIONS (TYP.)

HARDIN HILL LANE PROFILE (21+00 TO 33+50)  
HORIZ SCALE: 1"=50'  
VERT SCALE: 1"=5'



**LEGEND**

- PROPERTY LINE
- EXISTING RIGHT-OF-WAY
- EXISTING ROAD CENTER
- ADJACENT PROPERTY LINE
- PROPOSED PERIMETER BUFFER
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ALL SEWER SERVICES GREATER THAN 12' IN DEPTH TO USE DEEP SEWER SERVICE DETAIL



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BY: *[Signature]* DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-18-2020  
ADMINISTRATOR

**Water and Sewer Permits (if applicable)**

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-4617

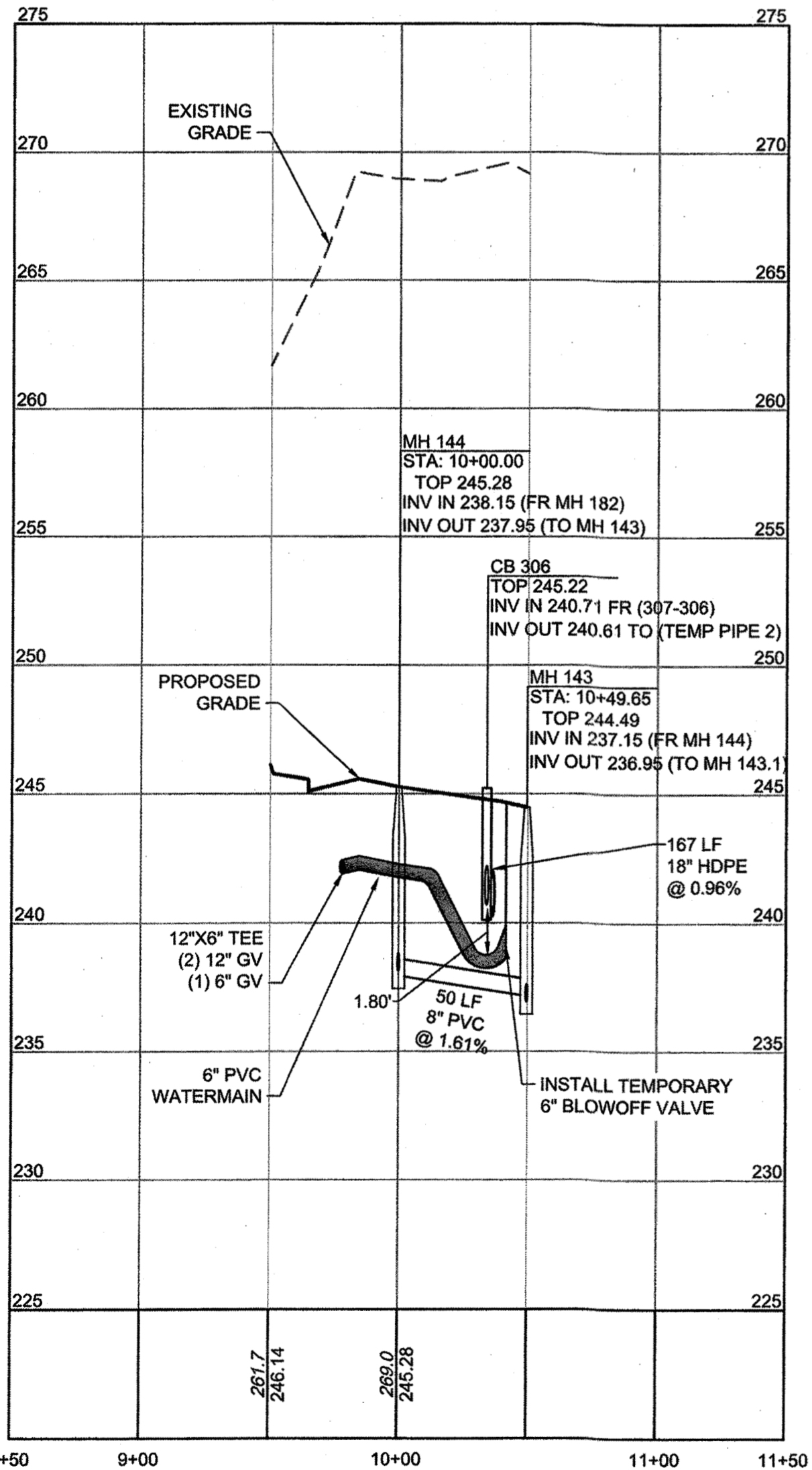
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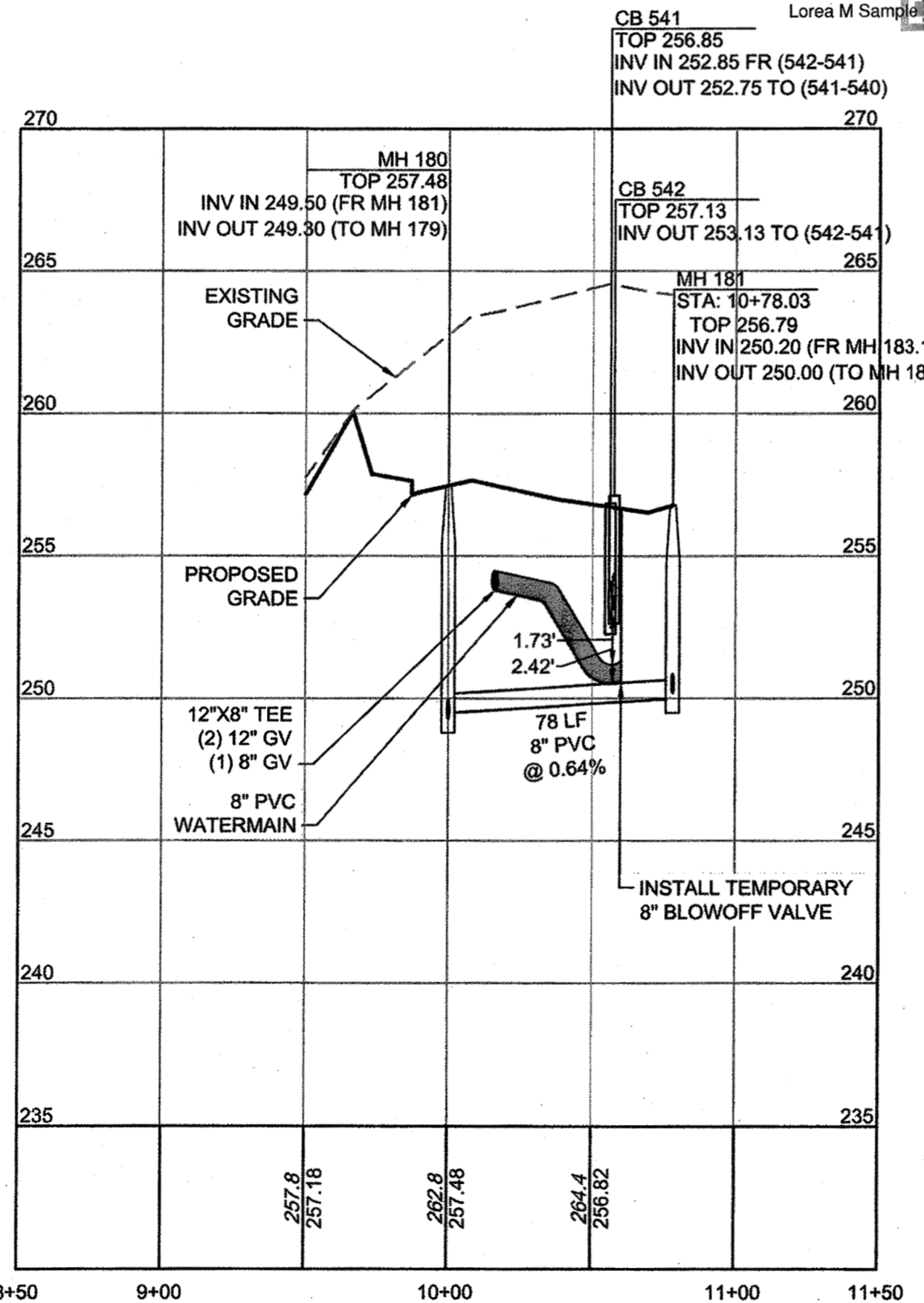
City of Raleigh Public Utilities Department Permit #

**NOTE:**

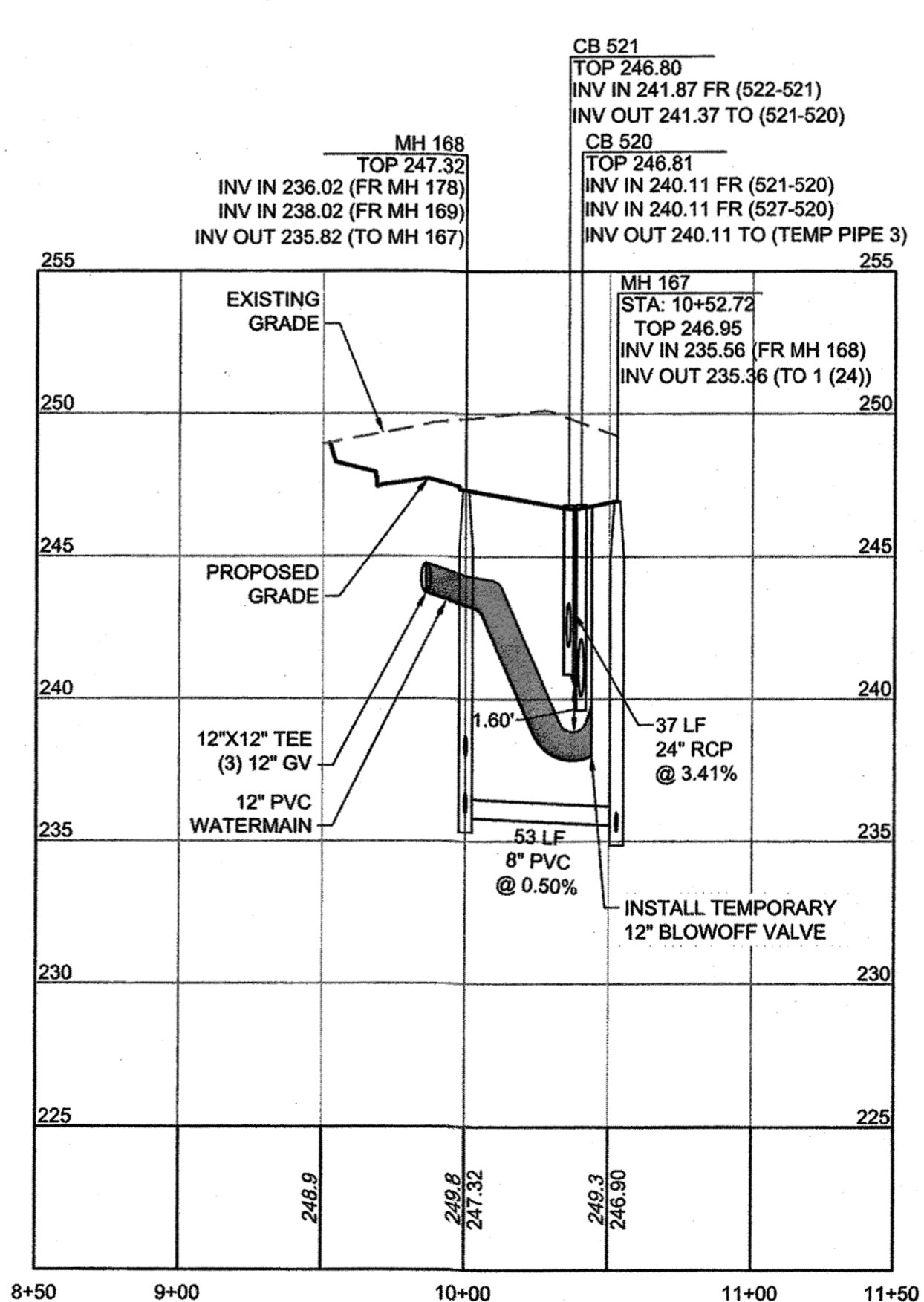
CLASS 1 MATERIAL IS REQUIRED FROM EXISTING GRADE TO SPRING LINE OF PROPOSED PIPES IN FILL CONDITIONS (TYP.)



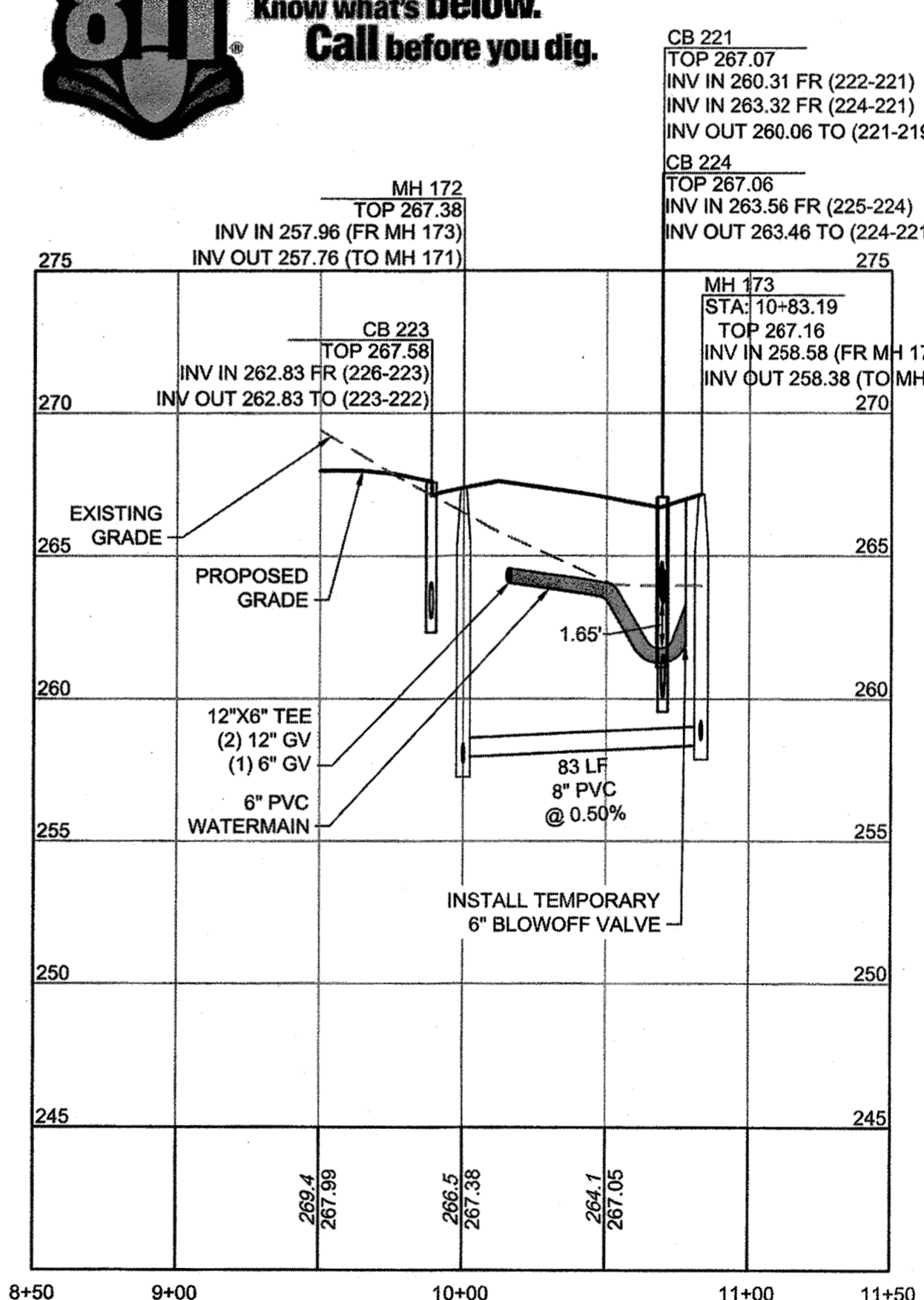
**SS OFFFALL 1 PROFILE**  
HORIZ SCALE: 1"=50'  
VERT SCALE: 1"=5'



**SS OFFFALL 2 PROFILE**  
HORIZ SCALE: 1"=50'  
VERT SCALE: 1"=5'



**SS OFFFALL 3 PROFILE**  
HORIZ SCALE: 1"=50'  
VERT SCALE: 1"=5'



**SS OFFFALL 4 PROFILE**  
HORIZ SCALE: 1"=50'  
VERT SCALE: 1"=5'



THIS DRAWING PREPARED AT THE  
RALEIGH OFFICE  
5410 Trinity Road, Suite 102 | Raleigh, NC 27607  
TEL 919.866.4951 FAX 919.853.8124 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION

DATE	DESCRIPTION
08/06/2020	DRAWN BY J.D. MACMILLAN
	DESIGNED BY J.D. MACMILLAN
	CHECKED BY M. ZACCARDO
	SCALE H: 1" = 50' V: 1" = 5'

**TIMMONS GROUP**

NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**

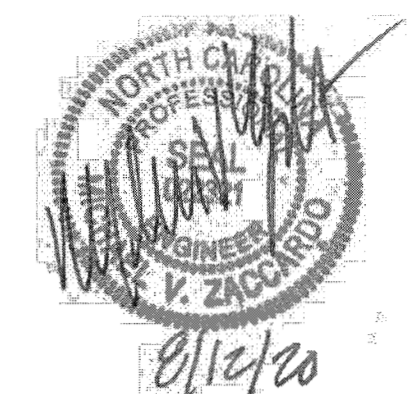
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**STUB ROAD PLAN & PROFILES**

JOB NO. 44872  
SHEET NO. CS.3

RELEASED FOR CONSTRUCTION

S:\331\44872-stone-silver\DWG\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CS.3 OUTFALL PROFILES.dwg | by JD Macmillan



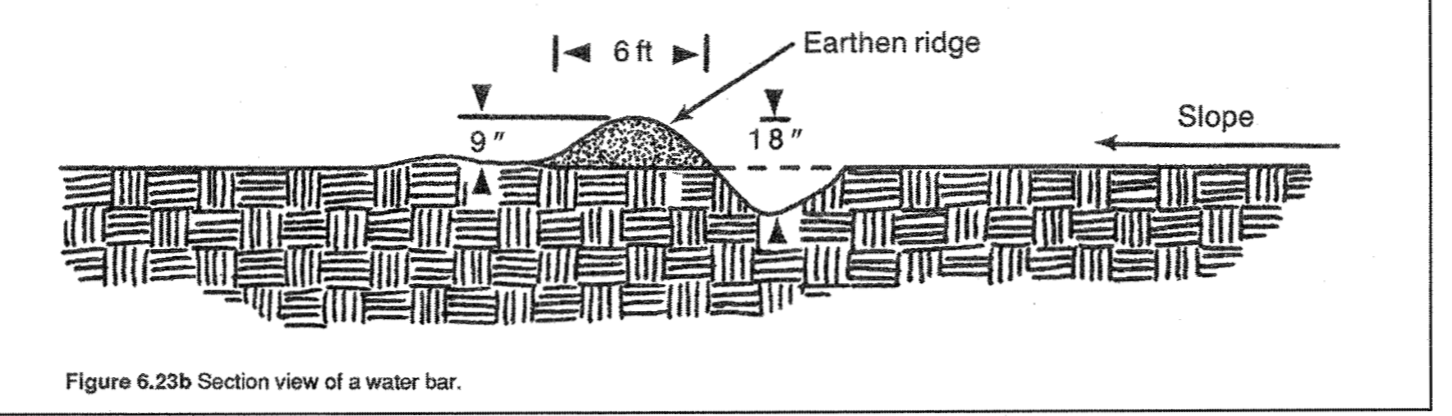
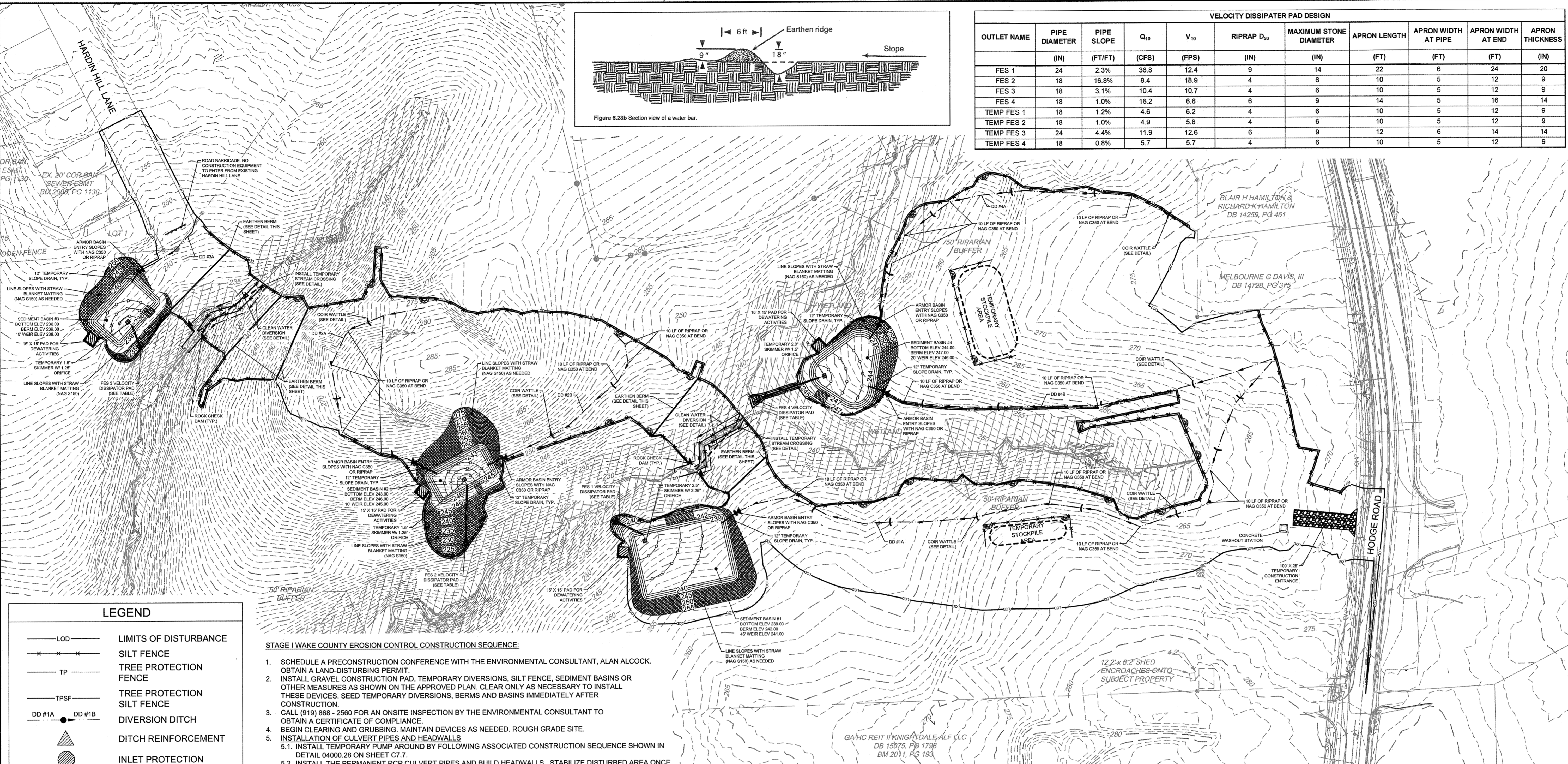
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YOUR VISION ACHIEVED THROUGH OURS.

DATE: 08/12/2020  
 DRAWN BY: JD. MACMILLAN  
 DESIGNED BY: JD. MACMILLAN  
 CHECKED BY: M. ZACCARDO  
 SCALE: 1" = 80'

**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
**HARDIN HILL SPINE ROAD EXTENSION**  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
**EROSION CONTROL PLAN PHASE 1**

RELEASED FOR CONSTRUCTION



VELOCITY DISSIPATER PAD DESIGN										
OUTLET NAME	PIPE DIAMETER (IN)	PIPE SLOPE (FT/FT)	Q <sub>10</sub> (CFS)	V <sub>10</sub> (FPS)	RIPRAP D <sub>50</sub> (IN)	MAXIMUM STONE DIAMETER (IN)	APRON LENGTH (FT)	APRON WIDTH AT PIPE (FT)	APRON WIDTH AT END (FT)	APRON THICKNESS (IN)
FES 1	24	2.3%	38.8	12.4	9	14	22	6	24	20
FES 2	18	16.8%	8.4	18.9	4	6	10	5	12	9
FES 3	18	3.1%	10.4	10.7	4	6	10	5	12	9
FES 4	18	1.0%	16.2	6.6	6	9	14	5	16	14
TEMP FES 1	18	1.2%	4.6	6.2	4	6	10	5	12	9
TEMP FES 2	18	1.0%	4.9	5.8	4	6	10	5	12	9
TEMP FES 3	24	4.4%	11.9	12.6	6	9	12	6	14	14
TEMP FES 4	18	0.8%	5.7	5.7	4	6	10	5	12	9

**LEGEND**

- LOD: LIMITS OF DISTURBANCE
- Silt Fence
- TP: TREE PROTECTION FENCE
- TPSF: TREE PROTECTION SILT FENCE
- DD #1A, DD #1B: DIVERSION DITCH
- Ditch Reinforcement
- Inlet Protection
- Sediment Basin
- Porous Baffles
- Silt Fence Outlet
- Skimmer
- Earthen Berm
- Coir Wattle
- Riprap Check Dam

Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones
(e) Areas with slopes flatter than 4:1	14	-10 days for Falls Lake Watershed -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

- STAGE I WAKE COUNTY EROSION CONTROL CONSTRUCTION SEQUENCE:**
- SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE ENVIRONMENTAL CONSULTANT, ALAN ALCOCK. OBTAIN A LAND-DISTURBING PERMIT.
  - INSTALL GRAVEL CONSTRUCTION PAD, TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS OR OTHER MEASURES AS SHOWN ON THE APPROVED PLAN. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. SEED TEMPORARY DIVERSIONS, BERMS AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
  - CALL (919) 868 - 2560 FOR AN ONSITE INSPECTION BY THE ENVIRONMENTAL CONSULTANT TO OBTAIN A CERTIFICATE OF COMPLIANCE.
  - BEGIN CLEARING AND GRUBBING. MAINTAIN DEVICES AS NEEDED. ROUGH GRADE SITE.
  - INSTALLATION OF CULVERT PIPES AND HEADWALLS.
    - INSTALL TEMPORARY PUMP AROUND BY FOLLOWING ASSOCIATED CONSTRUCTION SEQUENCE SHOWN IN DETAIL 04000.28 ON SHEET C7.7.
    - INSTALL THE PERMANENT RCP CULVERT PIPES AND BUILD HEADWALLS. STABILIZE DISTURBED AREA ONCE INSTALLATION IS COMPLETE.
    - OBTAIN CERTIFICATE OF COMPLIANCE THROUGH ON-SITE INSPECTION BY THE ENVIRONMENTAL CONSULTANT.
    - RE-GRADE THE STREAM CHANNEL TO RETURN TO ITS ORIGINAL FLOW PATTERN. STABILIZE THE DISTURBED STREAM CHANNEL BANK WITH NORTH AMERICAN GREENE (C350).
  - REMOVE THE TEMPORARY STREAM CROSSING CMP PIPES. BACKFILL & COMPACT PIPE TRENCH AND STABILIZED DISTURBED AREA.
  - INSTALL STORM SEWER, IF SHOWN, AND PROTECT INLETS WITH BLOCK AND GRAVEL INLET CONTROLS. SEDIMENT TRAPS OR OTHER APPROVED MEASURES AS SHOWN ON THE PLAN. BEGIN CONSTRUCTION, BUILDING, ETC.
  - STABILIZE SITE AS AREAS ARE BROUGHT UP TO FINISH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC. SEED AND MULCH DENUDEED AREAS PER GROUND STABILIZATION TIME FRAMES.
  - WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE STABILIZED COMPLETELY, CALL (919) 868 - 2560 FOR AN INSPECTION BY THE ENVIRONMENTAL CONSULTANT.
  - IF SITE IS APPROVED, REMOVE TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS, ETC., AND SEED OUT OR STABILIZE ANY RESULTING BARE AREAS. ALL REMAINING PERMANENT EROSION CONTROL DEVICES, SUCH AS VELOCITY DISSIPATORS, SHOULD NOW BE INSTALLED.
  - WHEN VEGETATION HAS BECOME ESTABLISHED, CALL FOR A FINAL SITE INSPECTION BY THE ENVIRONMENTAL CONSULTANT, ALAN ALCOCK. OBTAIN A CERTIFICATE OF COMPLETION.

- STOCKPILE AREA NOTES:**
- MAXIMUM SIDE SLOPES: 2:1
  - MAXIMUM HEIGHT SHALL NOT EXCEED 35 FEET.
  - ENSURE STOCKPILE AREAS ARE SUFFICIENTLY STABILIZED TO MINIMIZE SEDIMENT RUNOFF.
  - STOCKPILE AREAS SHALL BE KEPT WITHIN PROPOSED LIMITS SHOWN ON PLANS

- STOCKPILE MAINTENANCE:**
- SEEDING OR COVERING OF PILES WITH TARPS OR MULCH IS REQUIRED AND WILL REDUCE EROSION PROBLEMS. TARPS SHOULD BE KEPT IN AT THE TOP OF THE SLOPE TO KEEP WATER FROM RUNNING UNDERNEATH THE PLASTIC.
  - IF A STOCKPILE IS TO REMAIN FOR FUTURE USE AFTER THE PROJECT IS COMPLETE (BUILDERS, ETC), THE FINANCIAL RESPONSIBLE PARTY MUST NOTIFY THE TOWN OF KNIGHTDALE OF A NEW RESPONSIBLE PARTY FOR THAT STOCKPILE.
  - THE APPROVED PLAN SHALL PROVIDE FOR THE USE OF STAGED SEEDING AND MULCHING ON A CONTINUAL BASIS WHILE THE STOCKPILE IS IN USE.
  - ESTABLISH AND MAINTAIN A VEGETATIVE BUFFER AT THE TOE OF THE SLOPE (WHERE PRACTICAL).

- NOTES:**
- AREAS WILL BE STABILIZED PER THE GROUND STABILIZATION CHART AFTER ANY GRADING.
  - ALL BASINS SHOULD BE CLEANED AFTER ANY RAIN EVENT THAT EXCEEDS 1" IN 24 HOURS.
  - SEDIMENT BASINS WILL BE INSTALLED WHERE STORM DRAINAGE PIPE IS LOCATED. I.E. PIPES WILL BE LEFT SHORT AND EXTENDED THROUGH BASIN AREAS AFTER SITE HAS BEEN STABILIZED.
  - (LOD) INDICATES THE LIMITS OF ULTIMATE DISTURBANCE FOR RUTHERFORD.

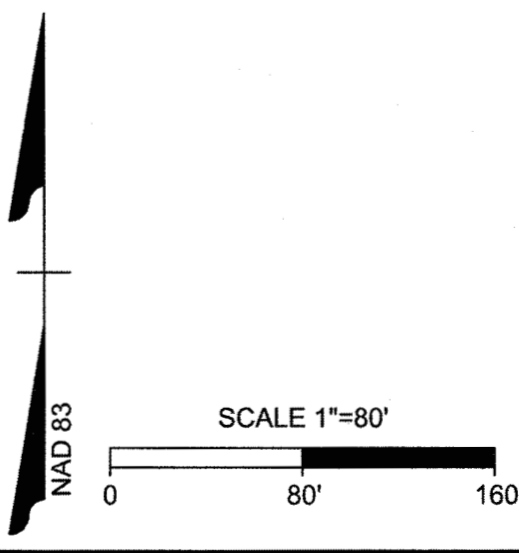
- SLOPE STABILIZATION REQUIREMENTS:**
- 3:1 AND FLATTER--GRASS  
 2:1 TO 3:1 SLOPE--ADAPTIVE PLANTS (SHRUBS AND VINES)  
 2:1 TO 1.5:1--RIP RAP  
 STEEPER THAN 1.5 TO 1--RETAINING WALL

- SEDIMENT BASIN REMOVAL:**
- REMOVE BASINS ONLY AFTER SITE IS STABILIZED AND WITH PERMISSION FROM TOWN OF KNIGHTDALE ENVIRONMENTAL CONSULTANT.
  - REMOVE TARP AND ALL NON DIRT AND/OR ROCK MATERIAL.
  - USE BACKHOE TO FILL IN AND LEVEL BACK TO NATURAL GROUND ELEVATION.
  - SEED AND STRAW APPROPRIATELY.
  - INSTALL CHANNELS AND EXTEND PIPE IF REQUIRED.

CHANNEL SCHEDULE												
NAME	LENGTH (FT)	DA (AC)	C	I <sub>10</sub> (IN/HR)	Q <sub>10</sub> (CFS)	SLOPE (FT/FT)	SIDE SLOPE (H:V)	DEPTH (FT)	VELOCITY (FT/S)	SHEAR STRESS (LBS/FT <sup>2</sup> )	TEMP. LINING	PERM. LINING
DD #1A	1035	8.77	0.50	7.28	31.92	2.2%	3:1, 3:1	1.24	6.92	1.48	NAG C125	N/A
DD #2A	410	0.83	0.50	7.28	3.02	3.9%	3:1, 3:1	0.46	4.76	0.58	NAG C125	N/A
DD #2B	315	0.99	0.50	7.28	3.60	1.6%	3:1, 3:1	0.58	3.57	0.62	NAG C125	N/A
DD #3A	130	2.48	0.50	7.28	9.03	1.5%	3:1, 3:1	0.83	4.37	0.90	NAG C125	N/A
DD #4A	640	1.85	0.50	7.28	6.73	3.0%	3:1, 3:1	0.65	5.31	0.80	NAG C125	N/A
DD #4B	630	2.04	0.50	7.28	7.43	2.9%	3:1, 3:1	0.68	5.36	0.83	NAG C125	N/A

SEDIMENT BASINS																						
BASIN ID	DRAINAGE AREA (AC)	DISTURBED AREA (AC)	I(10)	I(100)	C	Q10 (DRAN AREA) (CFS)	Q100 (DRAN AREA) (CFS)	REQUIRED VOLUME (CF)	PROVIDED VOLUME (CF)	BASIN LENGTH (FT)	BASIN WIDTH (FT)	BOTTOM DEPTH (FT)	SURFACE AREA (SF)	SURFACE AREA PROVIDED (SF)	WEIR LENGTH (FT)	WEIR ELEV. (FT)	FLOW DEPTH (FT)	BASIN TYPE	SKIMMER SIZE (IN)	SKIMMER ORIFICE DIA (IN)	DEWATER TIME (DAYS)	
Sediment Basin 1	10.10	3.97	7.28	9.23	0.50	36.76	46.61	18.180	49.500	150.00	110.00	3	239.00	15.992	16.500	45.00	241.00	0.49	SKIMMER	2.5	2.25	3.37
Sediment Basin 2	2.31	1.69	7.28	9.23	0.50	8.41	10.66	4.158	15.000	100.00	50.00	3	243.00	3.658	5.000	10.00	245.00	0.50	SKIMMER	1.5	1.25	3.35
Sediment Basin 3	2.87	0.87	7.28	9.23	0.50	10.45	13.25	5.166	17.460	97.00	60.00	3	236.00	4.544	5.820	15.00	238.00	0.44	SKIMMER	1.5	1.25	4.17
Sediment Basin 4	4.45	3.74	7.28	9.23	0.50	16.20	20.54	8.010	27.600	115.00	80.00	3	244.00	7.046	9.200	20.00	246.00	0.49	SKIMMER	2.0	1.50	4.10

TOTAL DISTURBED AREA STAGE 1 = 14.7 ACRES



**TOWN CERTIFICATION**

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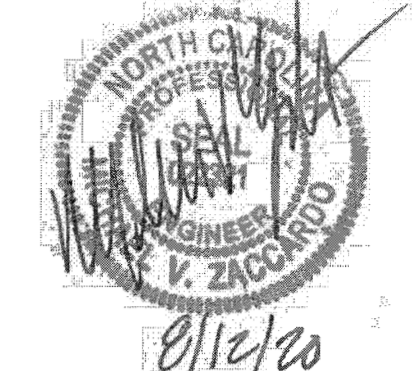
BY: *SARAH* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8/18/2020  
 ADMINISTRATOR



s:\351\44872-stone-silver-dms\Sheet\CD\STONE RIVER - HARDIN HILL LANE\EG-EGOS PH1.dwg | by: JD. Macmillan



THIS DRAWING PREPARED AT THE  
VALEIGH OFFICE  
5410 Trinity Road, Raleigh, NC 27607  
TEL 919.866.4951 FAX 919.833.8124 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

DATE: 08/12/2020  
DRAWN BY: J.D. MACMILLAN  
DESIGNED BY: J.D. MACMILLAN  
CHECKED BY: M. ZACCARDO

SCALE: 1" = 80'

REVISION DESCRIPTION

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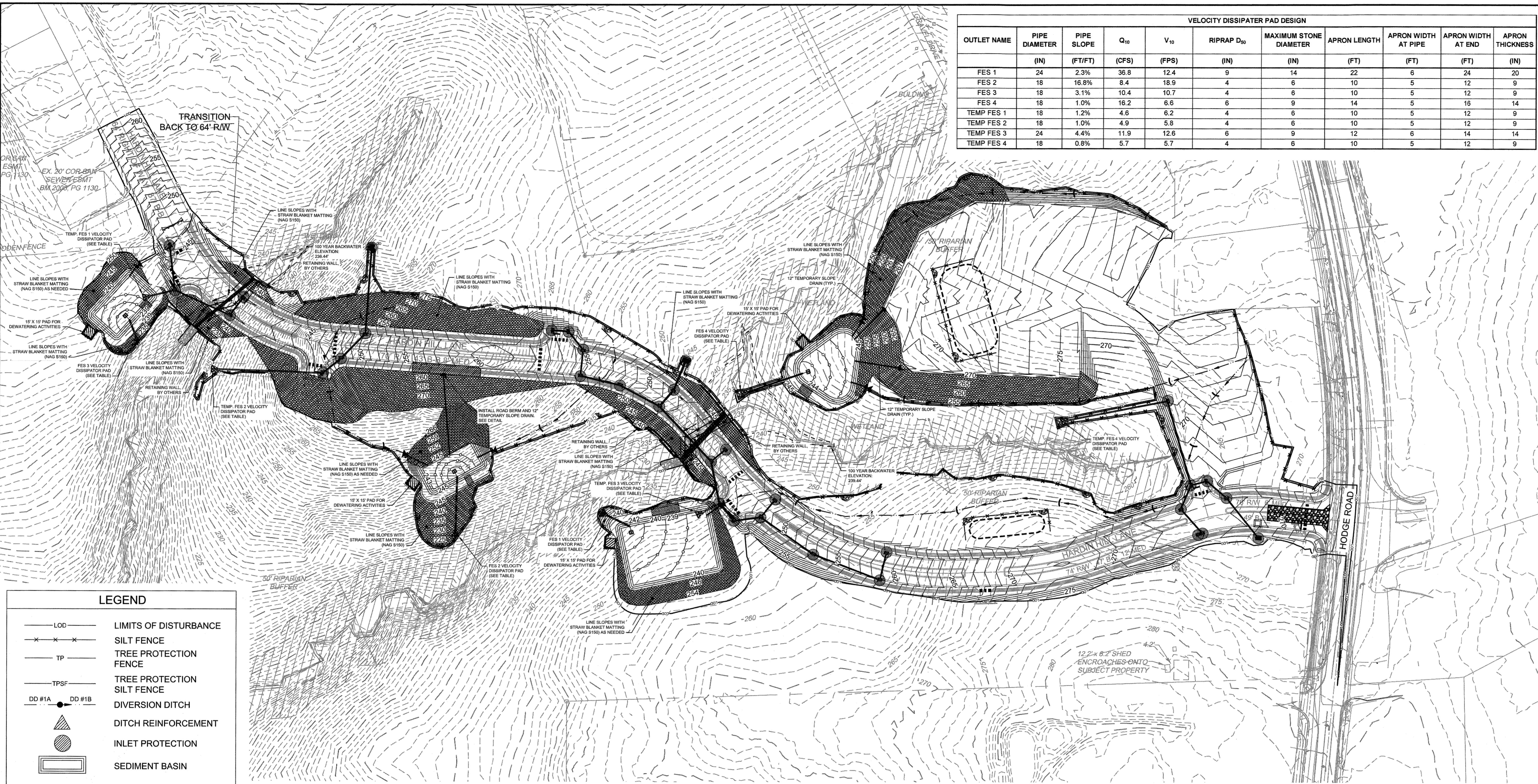
DATE

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DATE

RELEASED FOR CONSTRUCTION

VELOCITY DISSIPATER PAD DESIGN										
OUTLET NAME	PIPE DIAMETER (IN)	PIPE SLOPE (FT/FT)	Q <sub>10</sub> (CFS)	V <sub>10</sub> (FPS)	RIPRAP D <sub>50</sub> (IN)	MAXIMUM STONE DIAMETER (IN)	APRON LENGTH (FT)	APRON WIDTH AT PIPE (FT)	APRON WIDTH AT END (FT)	APRON THICKNESS (IN)
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TEMP FES 4	18	0.8%	5.7	5.7	4	6	10	5	12	9



**LEGEND**

- LOD — LIMITS OF DISTURBANCE
- x x x — SILT FENCE
- TP — TREE PROTECTION FENCE
- TPSF — TREE PROTECTION SILT FENCE
- DD #1A ● DD #1B ● DIVERSION DITCH
- ▲ DITCH REINFORCEMENT
- ▭ INLET PROTECTION
- ▭ SEDIMENT BASIN
- POROUS BAFFLES
- ▭ SILT FENCE OUTLET
- ▭ SKIMMER
- COIR WATTLE
- ▲ RIPRAP CHECK DAM

**STOCKPILE AREA NOTES:**

- MAXIMUM SIDE SLOPES: 2:1
- MAXIMUM HEIGHT SHALL NOT EXCEED 35 FEET.
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- IF A STOCKPILE IS TO REMAIN FOR FUTURE USE AFTER THE PROJECT IS COMPLETE (BUILDERS, ETC), THE FINANCIAL RESPONSIBLE PARTY MUST NOTIFY THE TOWN OF KNIGHTDALE OF A NEW RESPONSIBLE PARTY FOR THAT STOCKPILE.
- THE APPROVED PLAN SHALL PROVIDE FOR THE USE OF STAGED SEEDING AND MULCHING ON A CONTINUAL BASIS WHILE THE STOCKPILE IS IN USE.
- ESTABLISH AND MAINTAIN A VEGETATIVE BUFFER AT THE TOE OF THE SLOPE (WHERE PRACTICAL).

- PHASE II EROSION CONTROL CONSTRUCTION SEQUENCE:**
- MAINTAIN ALL EXISTING EROSION CONTROL FEATURES PREVIOUSLY CONSTRUCTED AND ASSOCIATED WITH PHASE 2 EROSION CONTROL.
  - CONTINUE BRINGING FILL INTO THE SITE. IMPORTED MATERIAL WILL REQUIRE A PERMITTED SITE APPROVAL BEFORE THIS PROCESS BEGINS. ALL FILL SHALL BE BROUGHT INTO THE SITE AND EVENLY SPREAD OUT THROUGHOUT THE SITE AS SHOWN IN LIFTS OF NO MORE THAN 1.0' AT A TIME. FILL SHALL BE ROLL COMPACTED BY A DOZER OR EQUIVALENT AS IT IS PLACED.
  - BEGIN INSTALLATION OF THE STORM PIPE SYSTEM AND INSTALL SKIMMER SEDIMENT BASINS.
  - AFTER THE SEDIMENT BASINS ARE CONSTRUCTED, CONTINUE INSTALLING STORM DRAINAGE SYSTEM FROM OUTLET POINT (LOW END) AND WORK UPSTREAM. PIPE INLET PROTECTION SHALL BE UTILIZED AT THE END OF EACH WORK DAY TO ASSURE PIPE NETWORK IS NOT INUNDATED WITH SEDIMENT.
  - INSTALL SITE IMPROVEMENTS, STORMWATER DRAINAGE SYSTEM, UTILITY SERVICES, SIDEWALKS AND DRIVES AS SHOWN ON THE APPROVED PLANS. ALL OPEN TRENCHES FOR UTILITY AND STORMWATER INSTALLATION SHALL BE PROTECTED FROM SEDIMENTATION BY PILING EXCAVATED MATERIAL ON THE UPHILL SIDE OF EXCAVATION.
  - INSTALL ADEQUATE EROSION AND SEDIMENT CONTROL MEASURES AND/OR INCREASE MAINTENANCE FREQUENCY WHERE APPROVED MEASURES FAIL TO PREVENT ACCELERATED EROSION, OFF-SITE SEDIMENTATION, OR REPETITIVE NON-COMPLIANCE ISSUES. ALL MEASURES MUST BE INSTALLED PER PLAN DETAIL. ENSURE CONSTRUCTION TRAFFIC IS LIMITED TO THE CONSTRUCTION ENTRANCE ONLY.
  - GROUND COVER SHALL BE PROVIDED AS FOLLOWS:
    - FOR ALL AREAS OF MODERATE AND/OR STEEP SLOPES, PROVIDE TEMPORARY GROUND COVER IF THE SLOPE HAS NOT BEEN DISTURBED FOR A PERIOD OF FOURTEEN (14) DAYS. SLOPES GREATER THAN 3:1 REQUIRE GROUND COVER IN 7 DAYS.
    - PROVIDE GROUND COVER SUFFICIENT TO RESTRAIN EROSION ON ANY PORTION OF THE SITE UPON WHICH FURTHER LAND-DISTURBING ACTIVITY IS NOT BEING UNDERTAKEN WITHIN FOURTEEN (14) CALENDAR DAYS OF TEMPORARILY OR PERMANENTLY SUSPENDING LAND DISTURBING ACTIVITY.
    - ESTABLISH PERMANENT GROUND COVER SUFFICIENT TO RESTRAIN EROSION WITHIN FOURTEEN (14) CALENDAR DAYS FOLLOWING COMPLETION OF CONSTRUCTION OR DEVELOPMENT AND/OR PRIOR TO FINAL INSPECTION.
  - INSTALL CURB & GUTTER AND GRAVEL BASE.
  - MODIFICATIONS TO THE APPROVED AND PERMITTED PLANS SHALL BE APPROVED BY EROSION CONTROL INSPECTIONS PRIOR TO REMOVAL OR INSTALLATION. CONTACT THE EROSION CONTROL INSPECTOR TO OBTAIN SIGN-OFF ON THE PLANS.
  - MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES IN GOOD WORKING ORDER. SILT FENCE, INLET PROTECTION, AND OTHER SIMILAR MEASURES MUST BE CLEANED OUT BEFORE THEY ARE HALF FULL. CLOGGED STONE FILTERS MUST BE REFRESHED/REPLACED. SILT FENCE CAN NOT HAVE HOLES OR TEARS.
  - ONCE GRADING IS COMPLETE, ALL UTILITIES, AND ALL STORM SYSTEMS ARE INSTALLED AND THE SITE IS COMPLETELY STABILIZED PER THE NPDES PLAN AND ABOVE, CONVERT THE SEDIMENT BASIN TO A STORMWATER INFILTRATION BASIN AS FOLLOWS:
    - CONSULT WITH THE EROSION AND SEDIMENT CONTROL INSPECTOR PRIOR TO BEGINNING THE CONVERSION FROM SEDIMENT BASIN TO INFILTRATION BASIN.
    - PUMP DOWN BASIN - USE APPROVED DEWATERING MEASURES. EFFLUENT MUST BE FILTERED.
    - REMOVE ACCUMULATED SEDIMENT (AS NEEDED) TO ESTABLISH THE FINAL GRADE OF THE POND. SEDIMENT MUST BE DISPOSED OF IN AN APPROVED AREA.
    - REMOVE TEMPORARY SKIMMER AND BAFFLES.
    - REMOVE TEMPORARY ORIFICE PLUGS FROM RISER AND CLOSE RISER DRAIN.
    - INSTALL PERFORATION IN DRAIN PIPE PER DETAIL.
    - ACCURATELY FINE GRADE BASIN TO DESIGN CONTOURS. CONTRACTOR TO SURVEY TO VERIFY ALL GRADES.
    - INSTALL SAND LAYER AND OBSERVATION PORT.
    - INSTALL FOREBAY BERMS AND RIPRAP.
    - INSTALL PLANTINGS, SOD, MULCH, ETC. AS SHOWN ON APPROVED PLAN.
  - CONTRACTOR TO HAVE A LICENSED SOIL SCIENTIST PERFORM AN INFILTRATION TEST AT THE BOTTOM ELEVATION OF THE SCM AND IMMEDIATELY REPORT THE INFILTRATION RATE TO THE ENGINEER.
  - AT A MINIMUM OF SEVEN (7) DAYS PRIOR TO SCHEDULING THE STORMWATER FINAL INSPECTION, SUBMIT ANY REQUIRED PAPERWORK TO THE EROSION CONTROL INSPECTORS FOR APPROVAL. FAILURE TO DO SO WILL PREVENT A CERTIFICATE OF OCCUPANCY FROM BEING ISSUED.
  - ONCE THE STORMWATER FINAL INSPECTION IS APPROVED, CLOSE THE GRADING PERMIT AND OBTAIN A CERTIFICATE OF COMPLETION.

- WAKE COUNTY BASIN REMOVAL SEQUENCE:**
- SCHEDULE A SITE MEETING WITH THE ENVIRONMENTAL ENGINEER/CONSULTANT TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
  - REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF CULVERT PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
  - PERFORM SEEDBED PREPARATION, SEED, MULCH AND ASPHALT TACK ANY RESULTING BARE AREAS IMMEDIATELY.
  - INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
  - WHEN SITE IS FULLY STABILIZED, CALL ENVIRONMENTAL ENGINEER/CONSULTANT FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVISE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION.
- NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE ENVIRONMENTAL ENGINEER/CONSULTANT TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE. SOME MUNICIPALITIES MAY ALSO REQUIRE THIS.



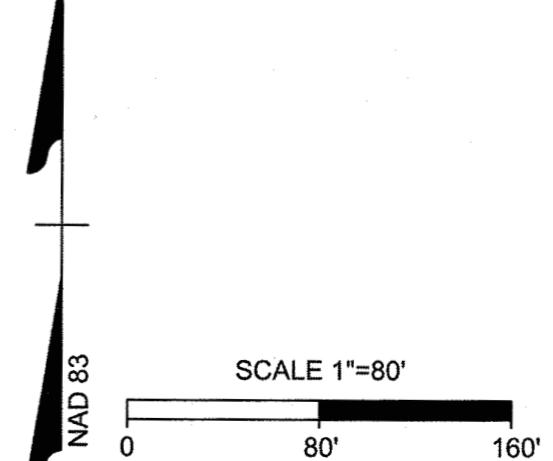
**TOWN CERTIFICATION**

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-18-2020  
ADMINISTRATOR



s:\331\44872-stone-silver\DWG\Sheet\CD\STONRIVER - HARDIN HILL LANE\CD-EROS PH2.dwg | by J.D. Macmillan

JOB NO. 44872  
SHEET NO. C6.2

TIMMONS GROUP  
NORTH CAROLINA LICENSE NO. C-1652  
HARDIN HILL SPINE ROAD EXTENSION  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
EROSION CONTROL PLAN PHASE 2

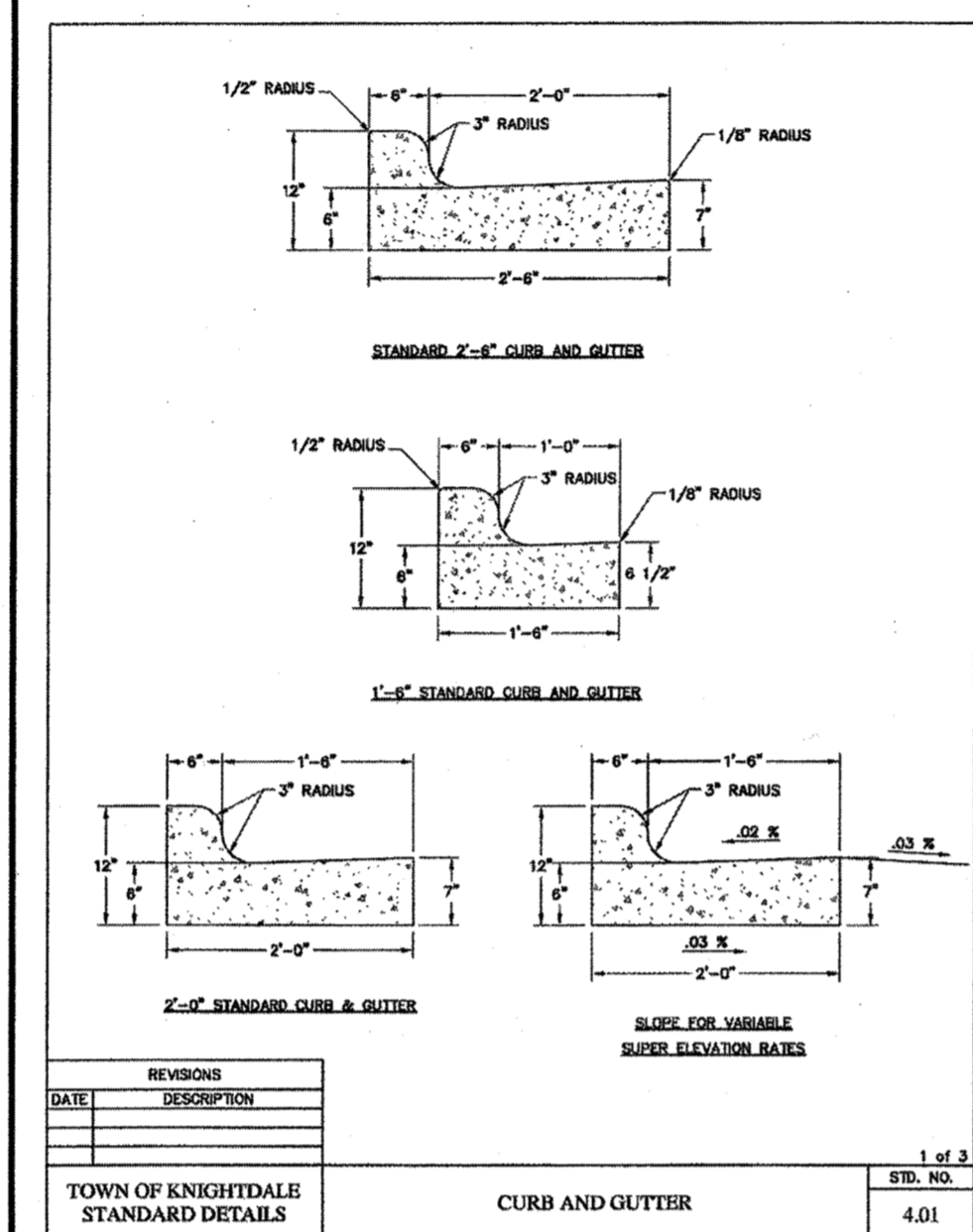
**TOWN CERTIFICATION**

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BY: *SAMM* DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *VA LO* DATE: 8-18-2020  
ADMINISTRATOR

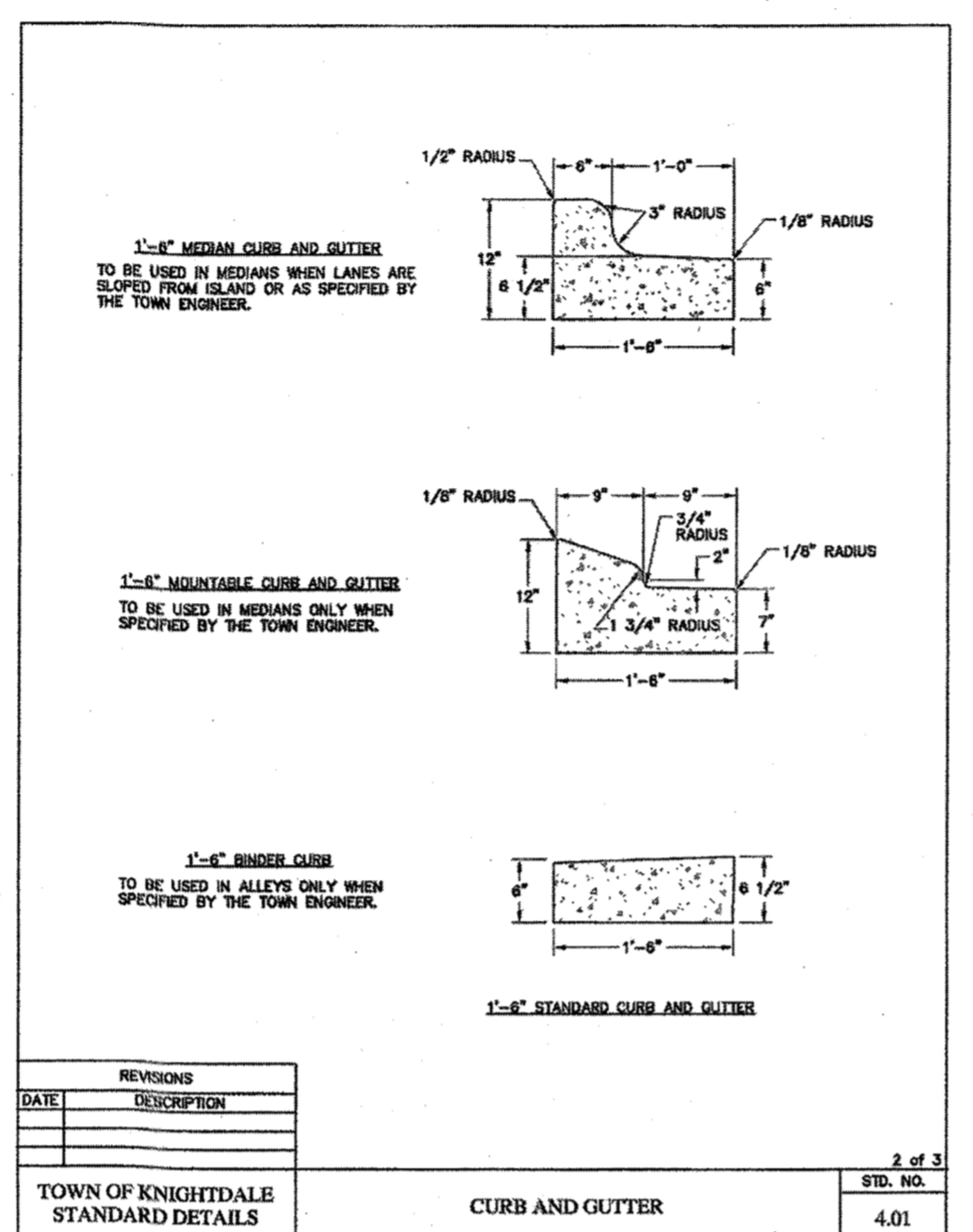


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

CURB AND GUTTER

STD. NO. 4.01

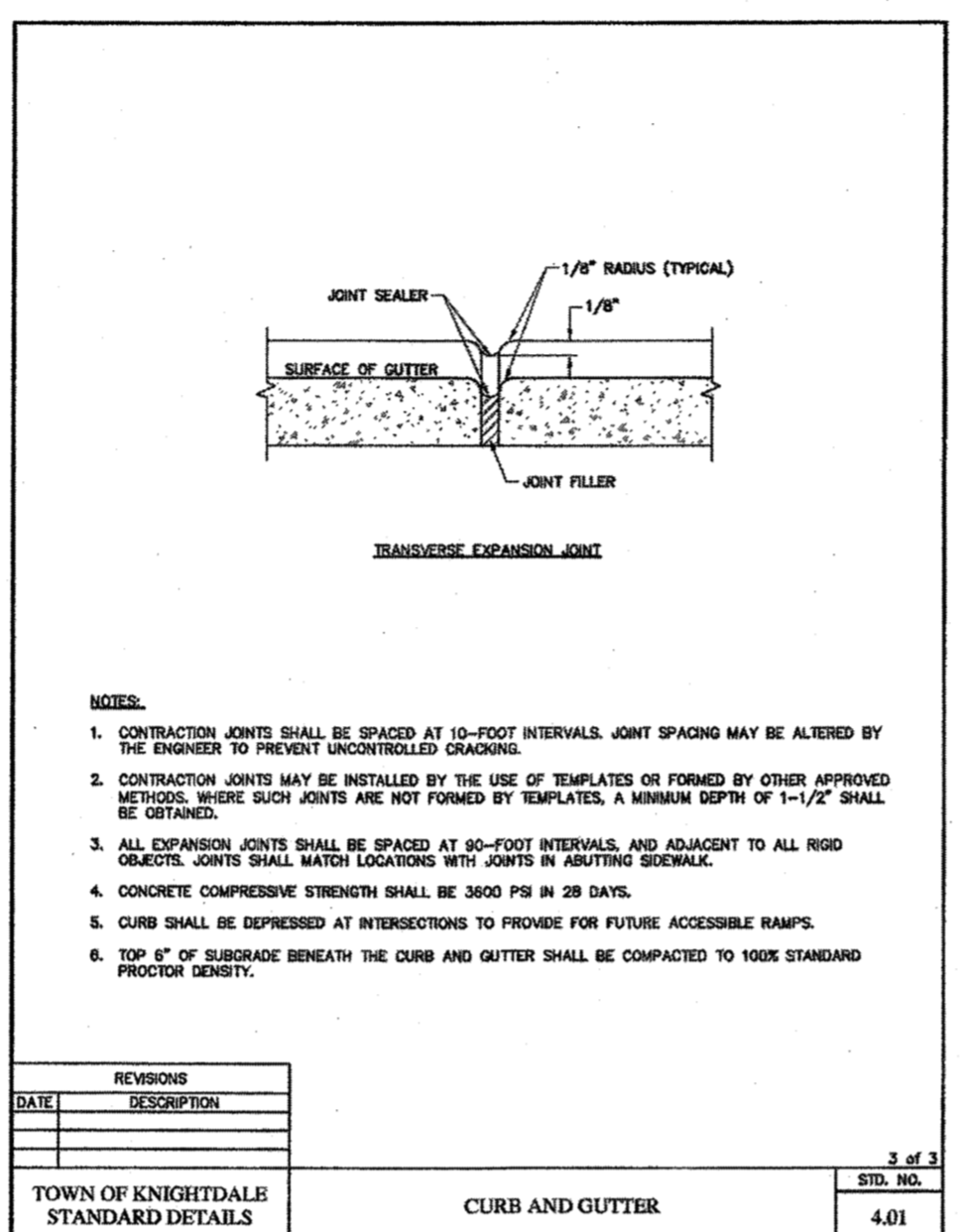


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

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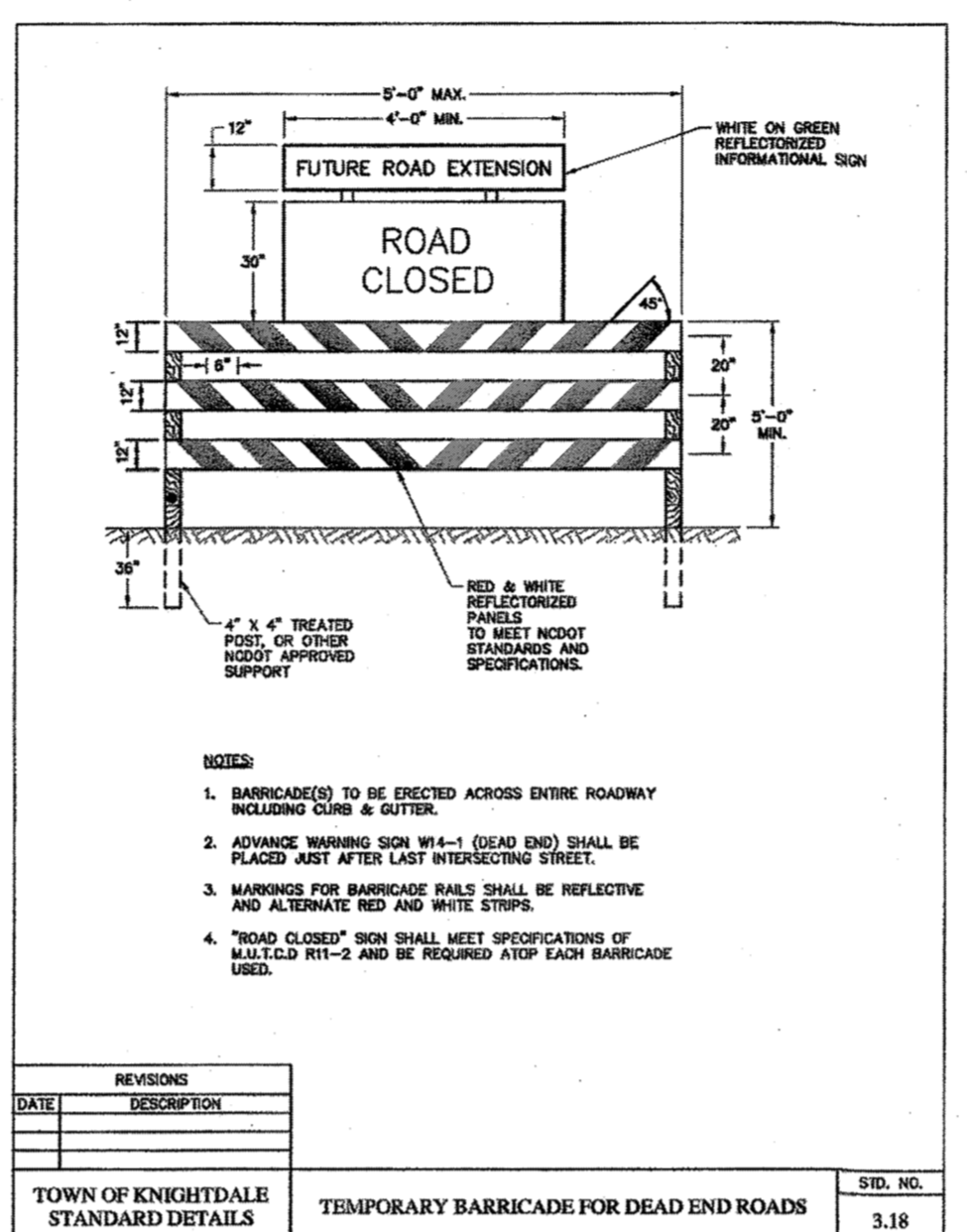


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

CURB AND GUTTER

STD. NO. 4.01

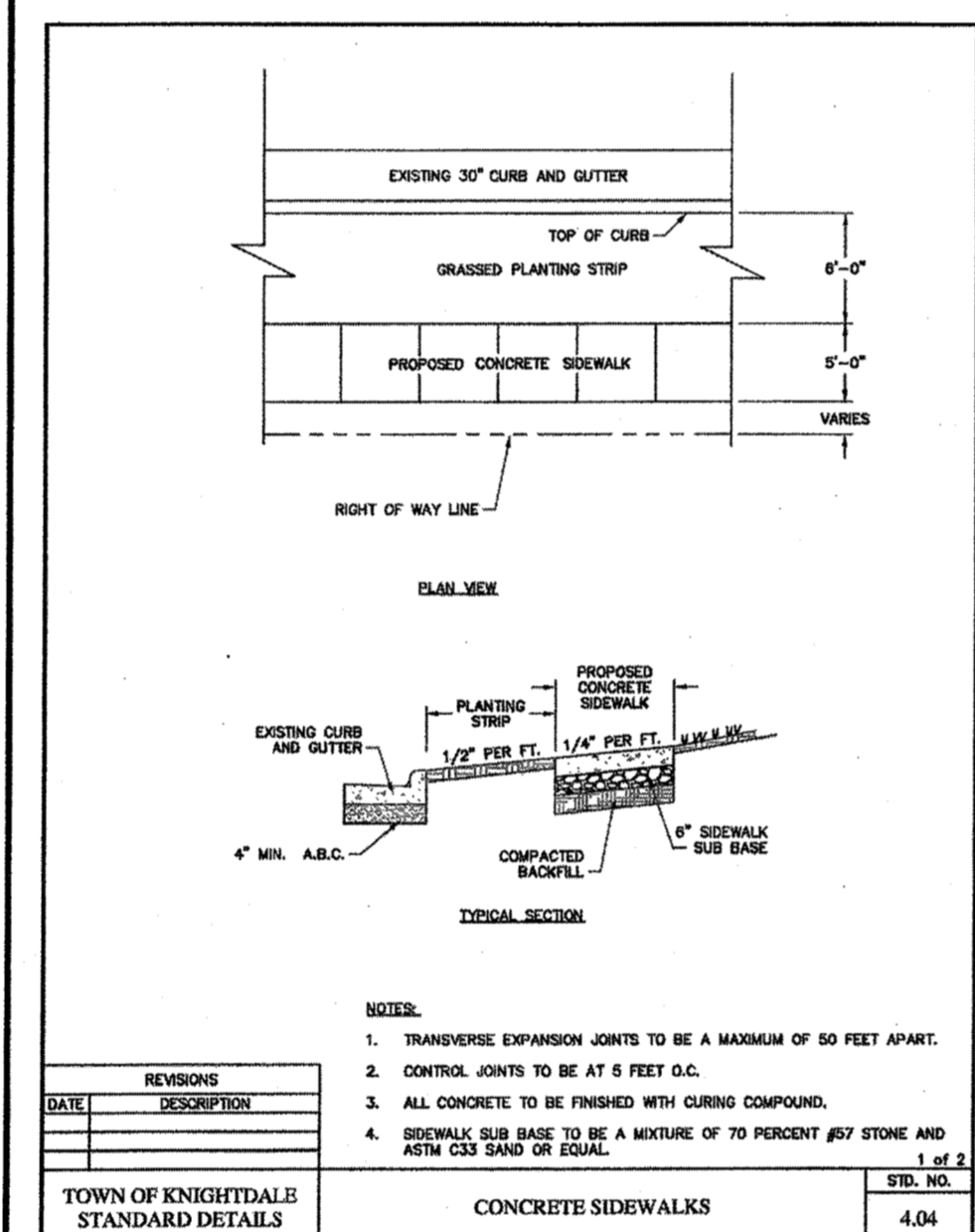


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

TEMPORARY BARRICADE FOR DEAD END ROADS

STD. NO. 3.18

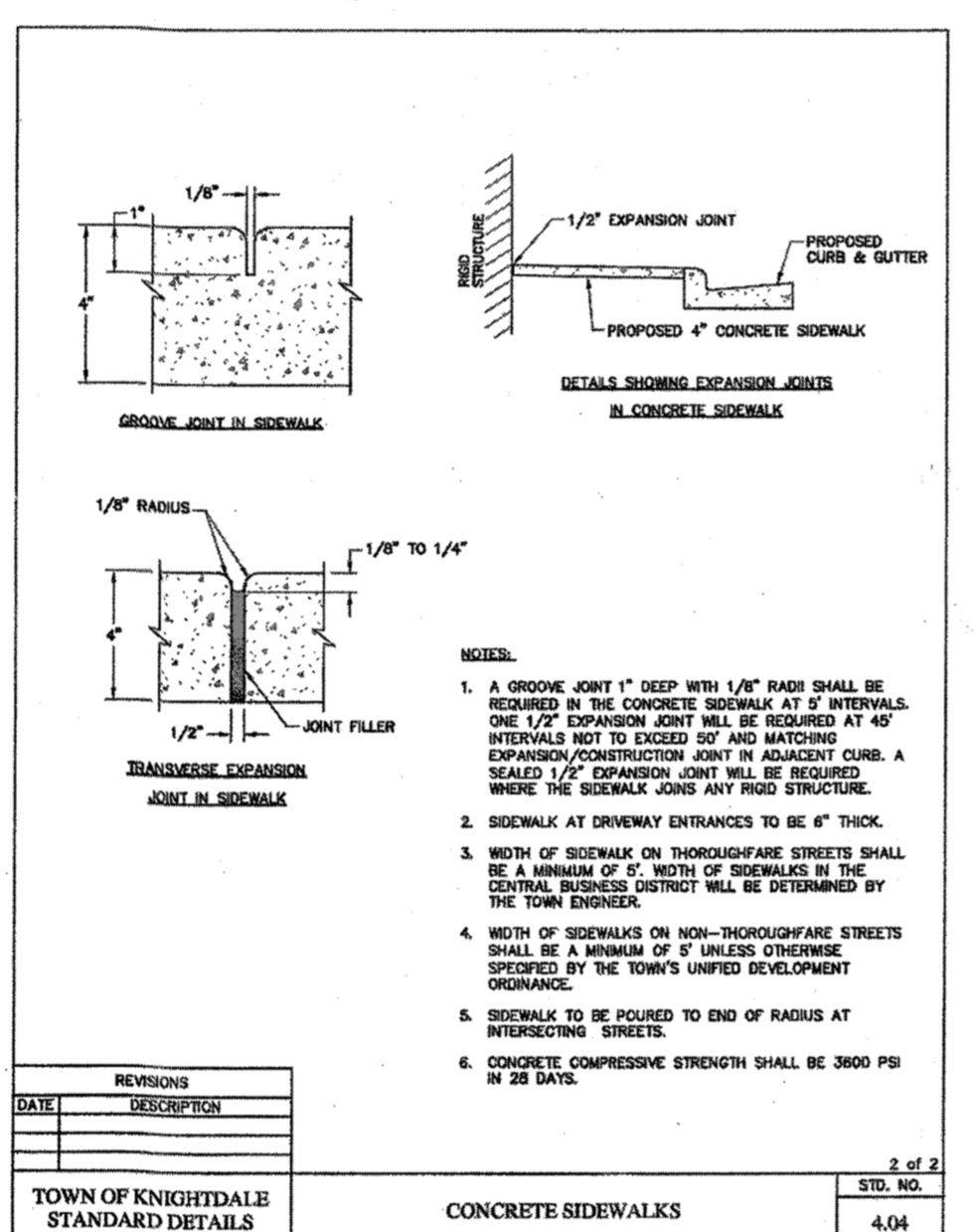


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TOWN OF KNIGHTDALE  
STANDARD DETAILS

CONCRETE SIDEWALKS

STD. NO. 4.04

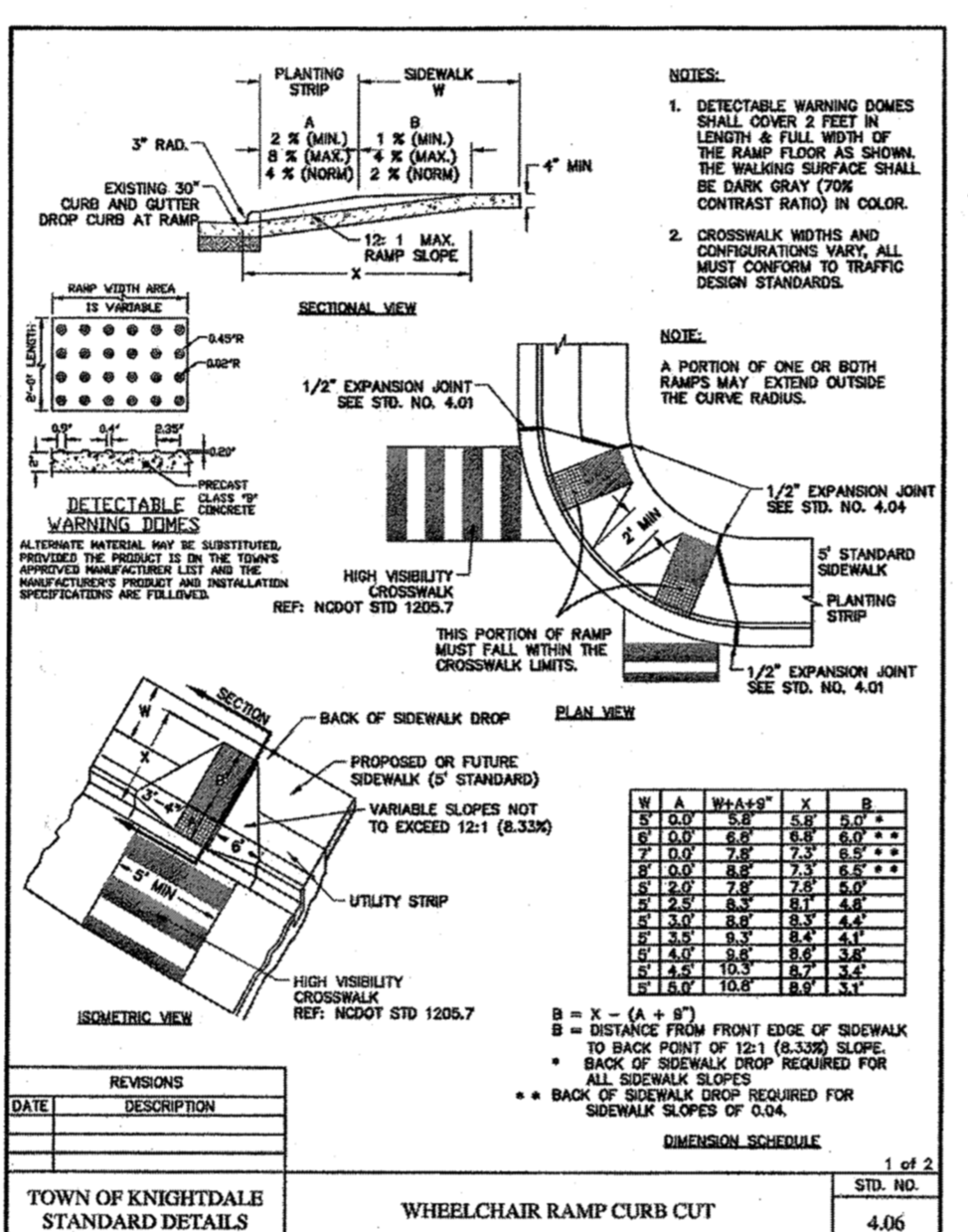


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

CONCRETE SIDEWALKS

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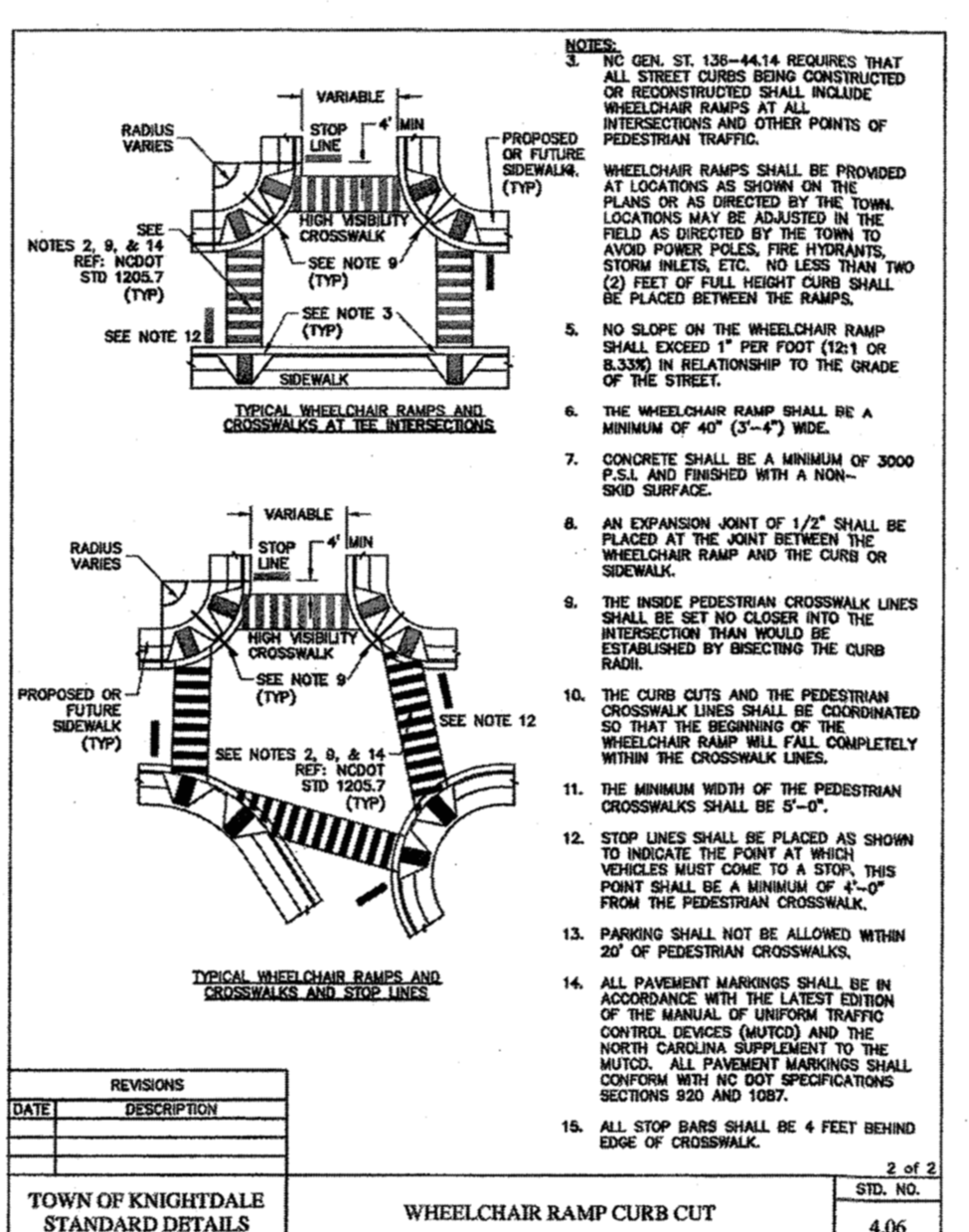


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

WHEELCHAIR RAMP CURB CUT

STD. NO. 4.06



REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

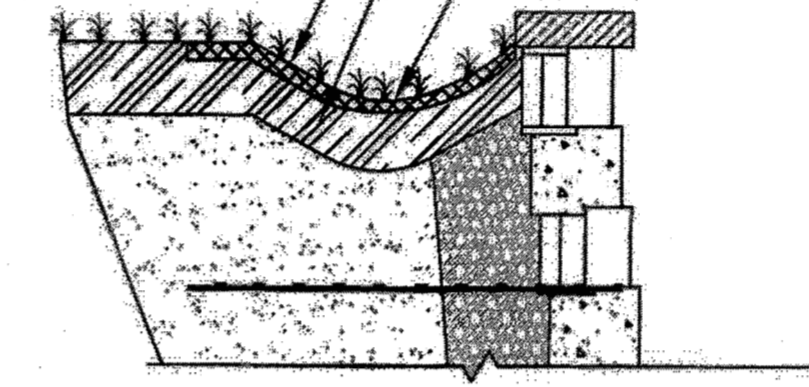
WHEELCHAIR RAMP CURB CUT

STD. NO. 4.06

SITE CONTRACTOR TO PLACE 8 INCH MIN. LOW PERMEABLE SOIL IMMEDIATELY AFTER WALL CONSTRUCTION

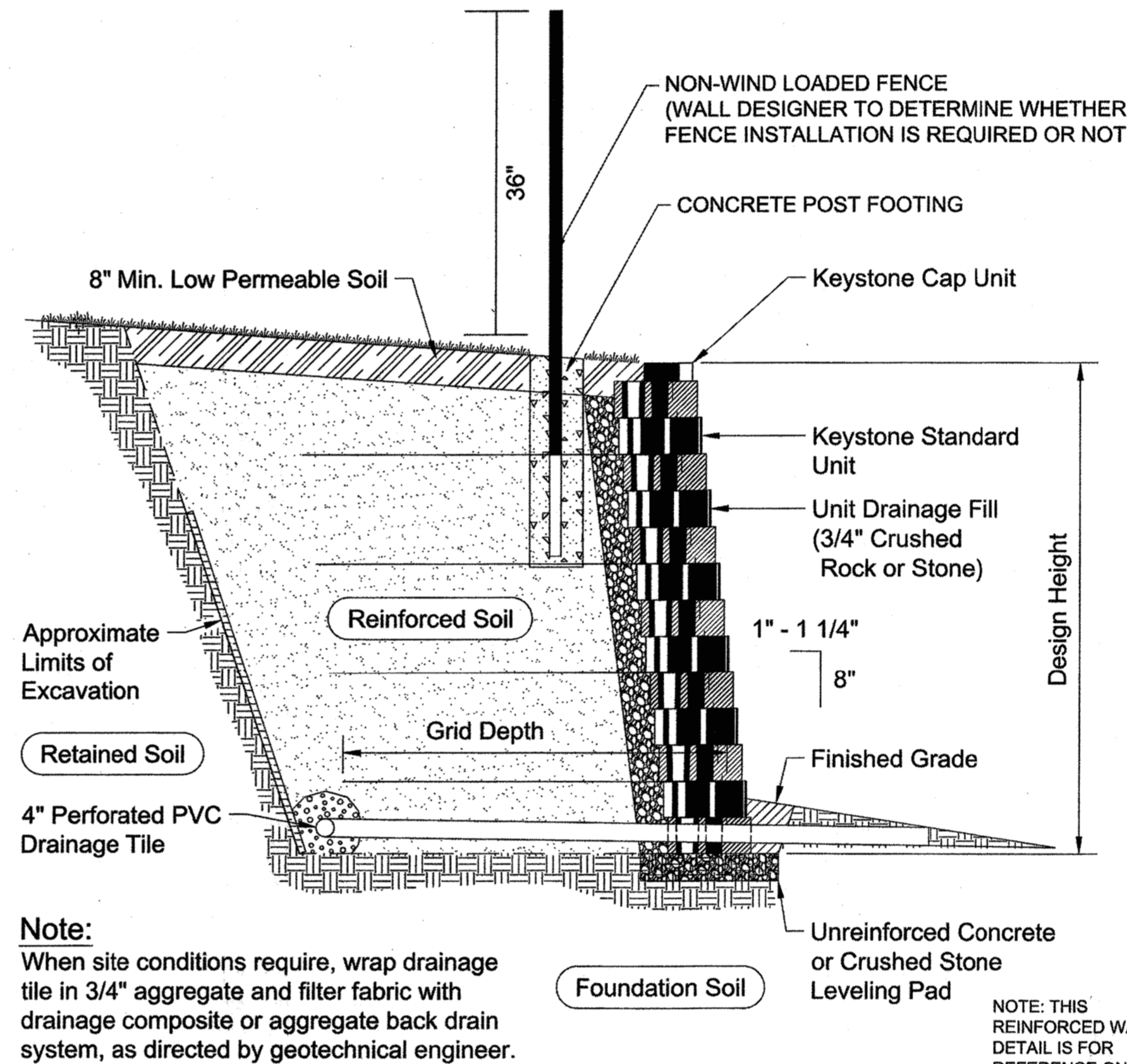
EROSION CONTROL MATTING TO BE DETERMINED AND INSTALLED BY SITE CONTRACTOR

SITE CONTRACTOR TO INSTALL 8 INCH DEEP MIN. GRASS DRAINAGE SWALE TO INTERCEPT AND DIVERT SURFACE WATER



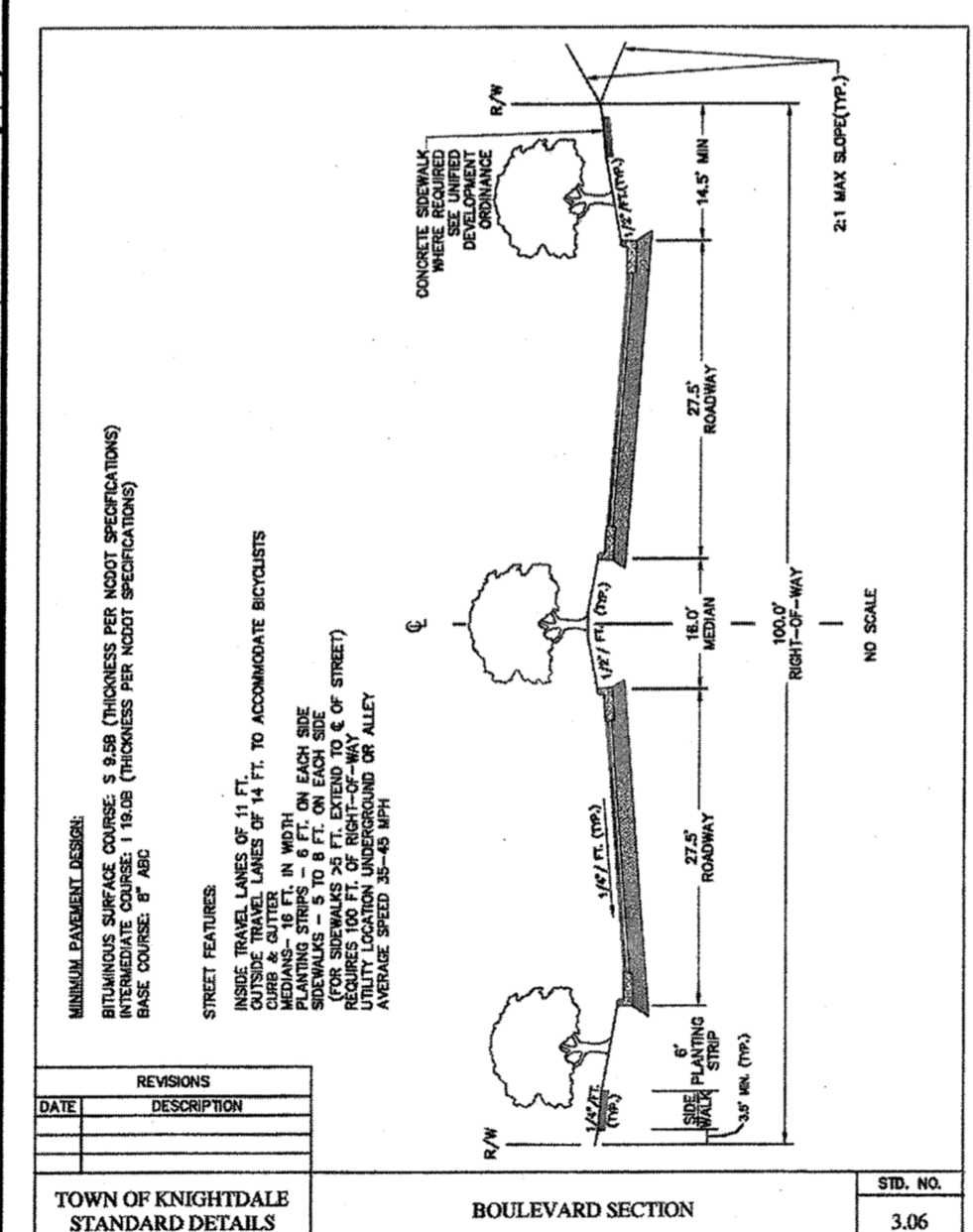
**DRAINAGE SWALE DETAIL**

SCALE: NONE



**Typical Reinforced Wall Section (Designed By Others)**

NOTE: THIS REINFORCED WALL DETAIL IS FOR REFERENCE ONLY. CONTRACTOR TO BUILD RETAINING WALLS FROM SPECIFIC DETAILED DESIGN PLANS BY OTHERS FOR THIS PROJECT

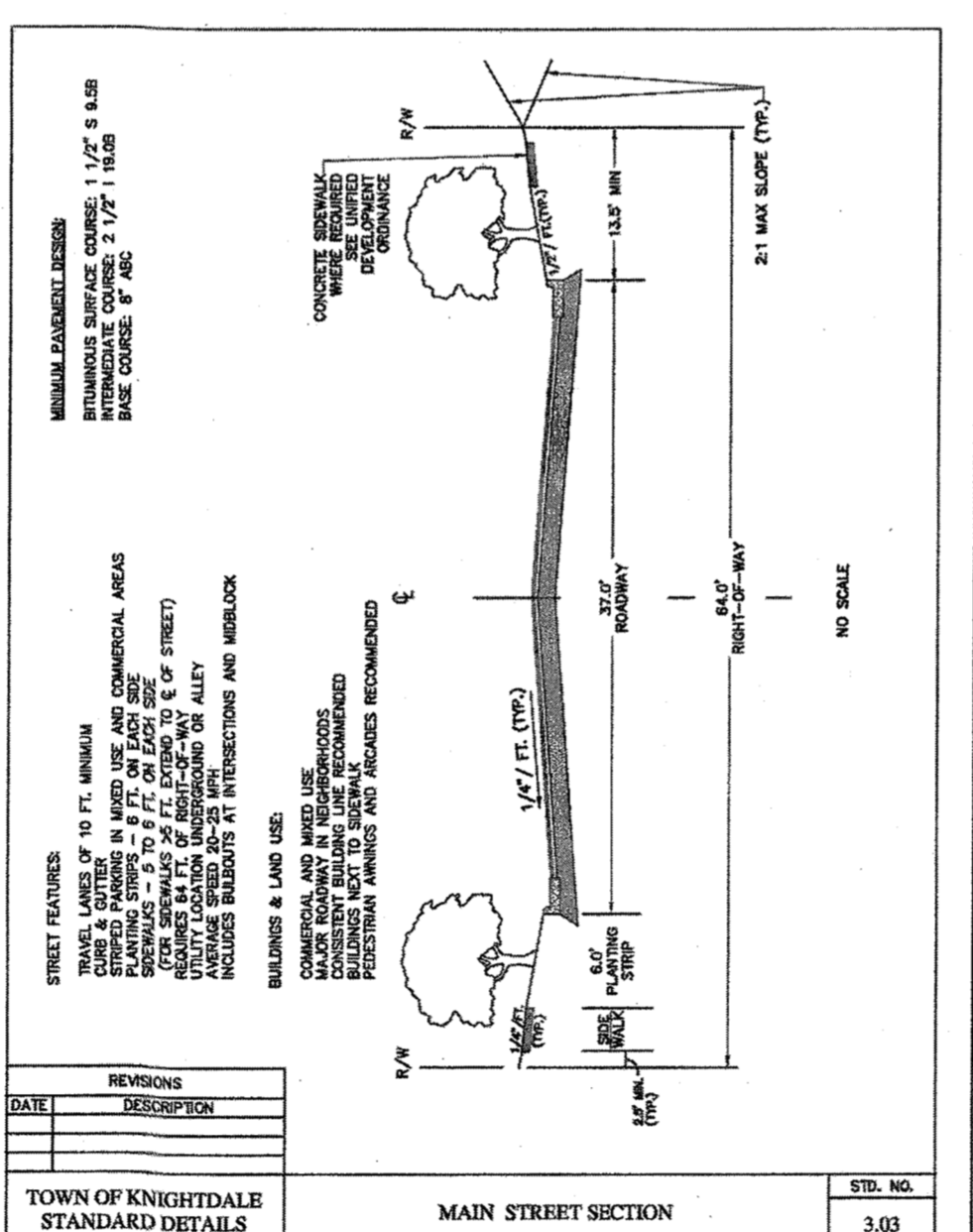


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

BOULEVARD SECTION

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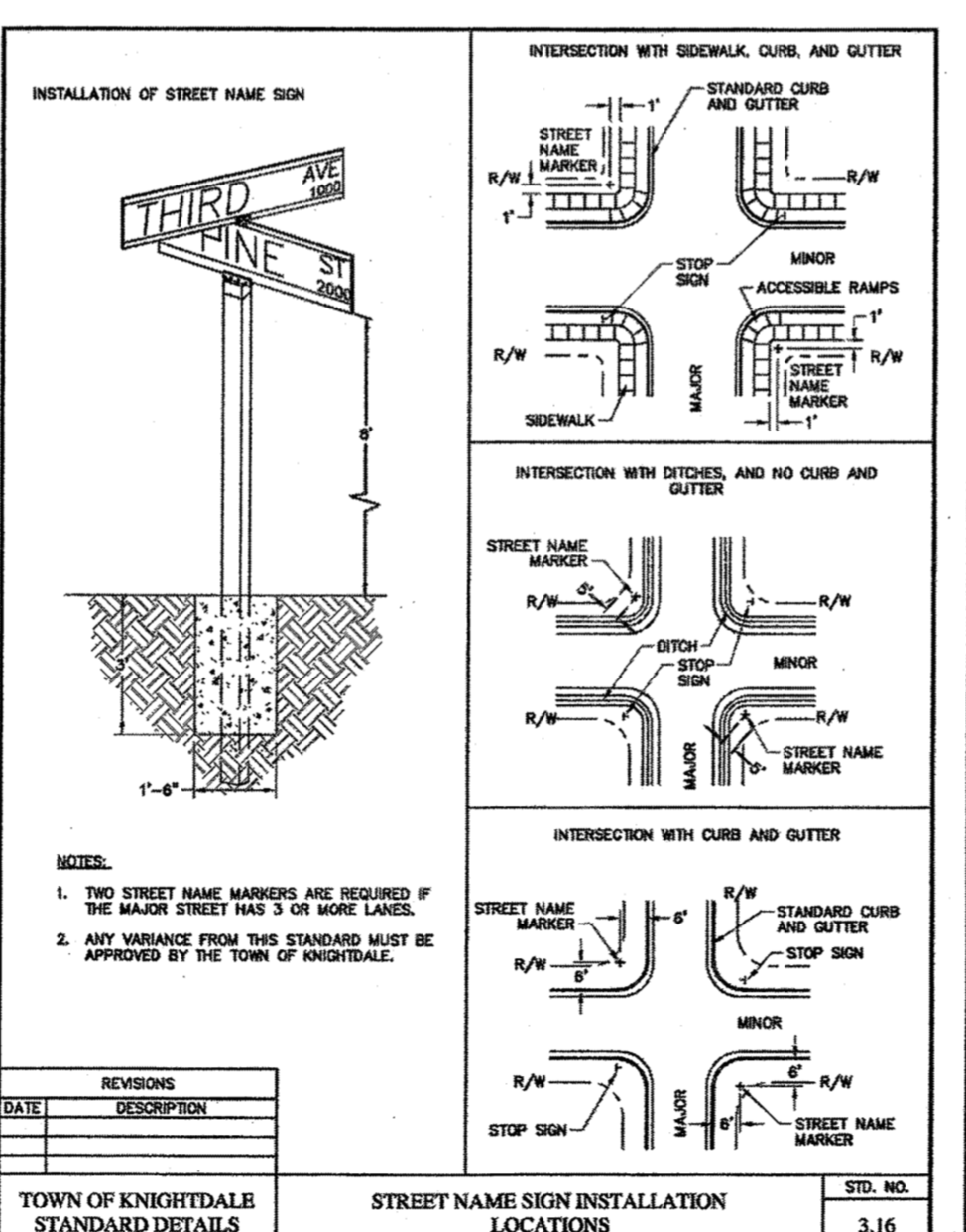


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

MAIN STREET SECTION

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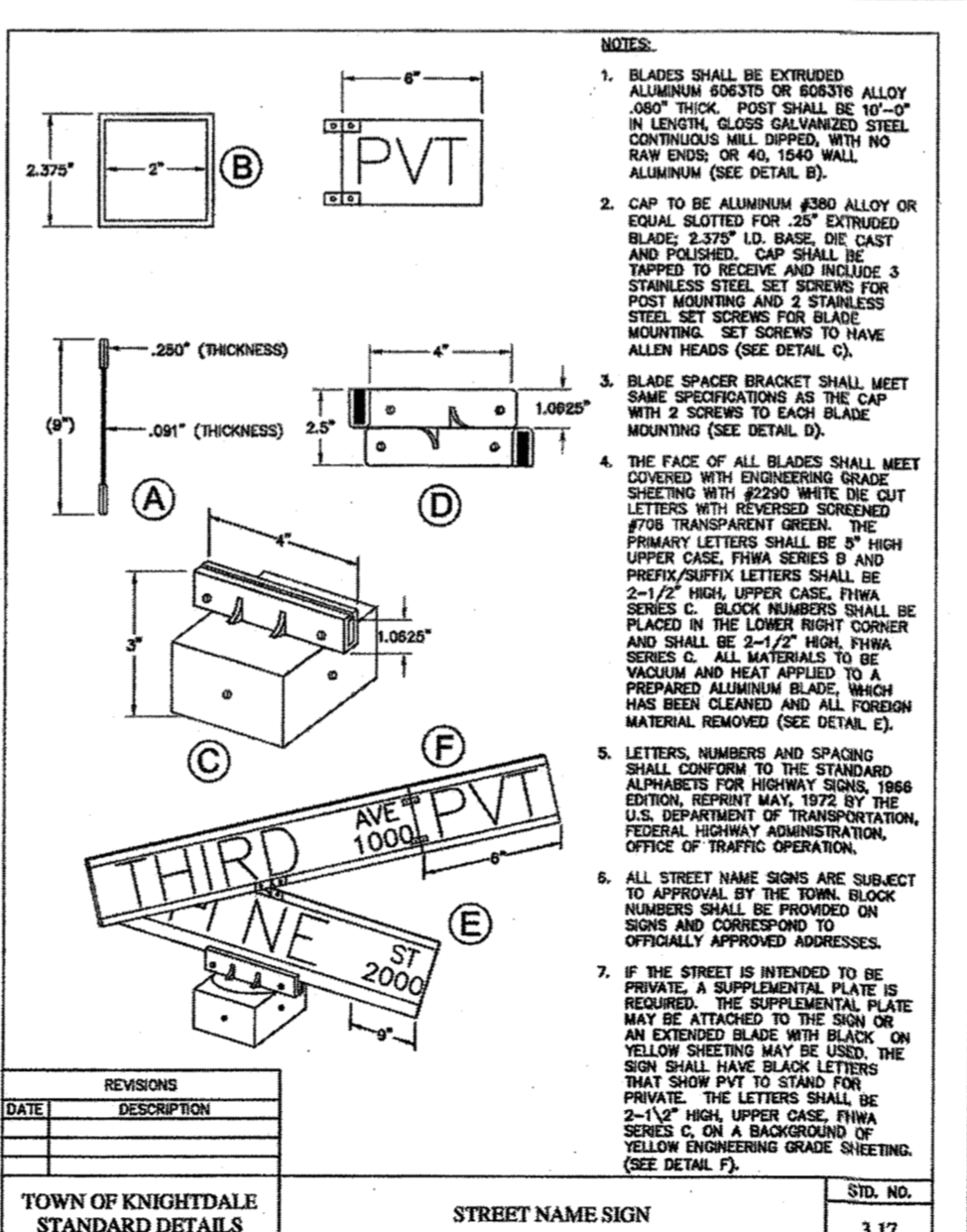


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

STREET NAME SIGN INSTALLATION LOCATIONS

STD. NO. 3.16

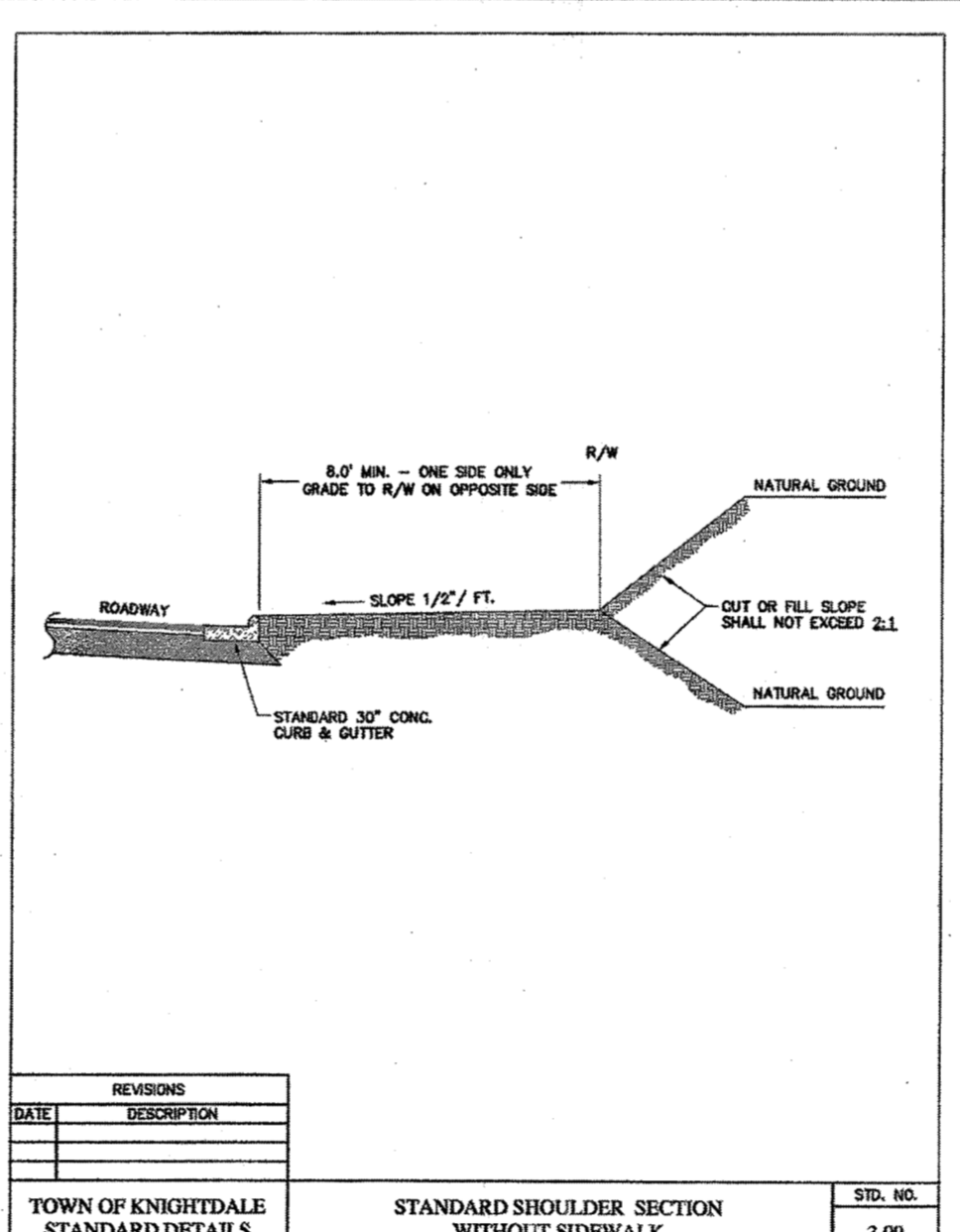


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

STREET NAME SIGN

STD. NO. 3.17

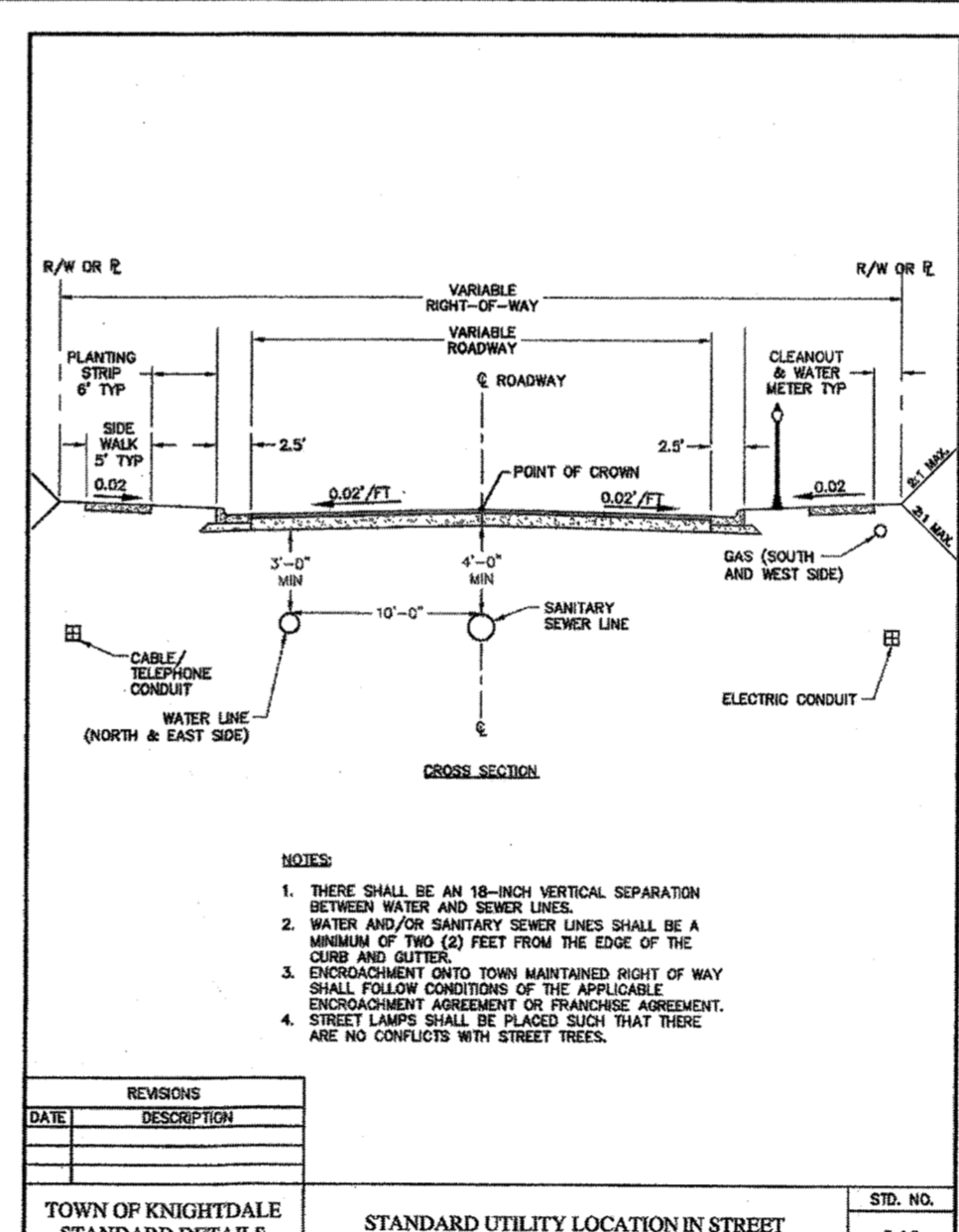


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

STANDARD SHOULDER SECTION WITHOUT SIDEWALK

STD. NO. 3.09

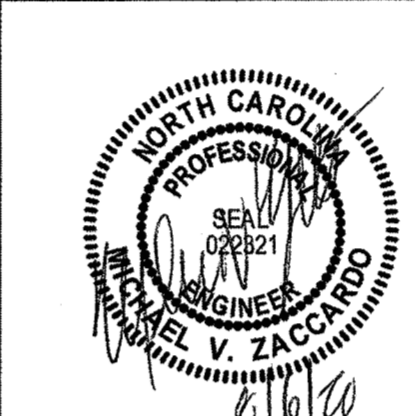


REVISIONS	DATE	DESCRIPTION

TOWN OF KNIGHTDALE  
STANDARD DETAILS

STANDARD UTILITY LOCATION IN STREET

STD. NO. 3.13



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DATE: 08/06/2020  
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DESIGNED BY: J.D. MACMILLAN  
CHECKED BY: M. ZACCARDO  
SCALE:

**TIMMONS GROUP**

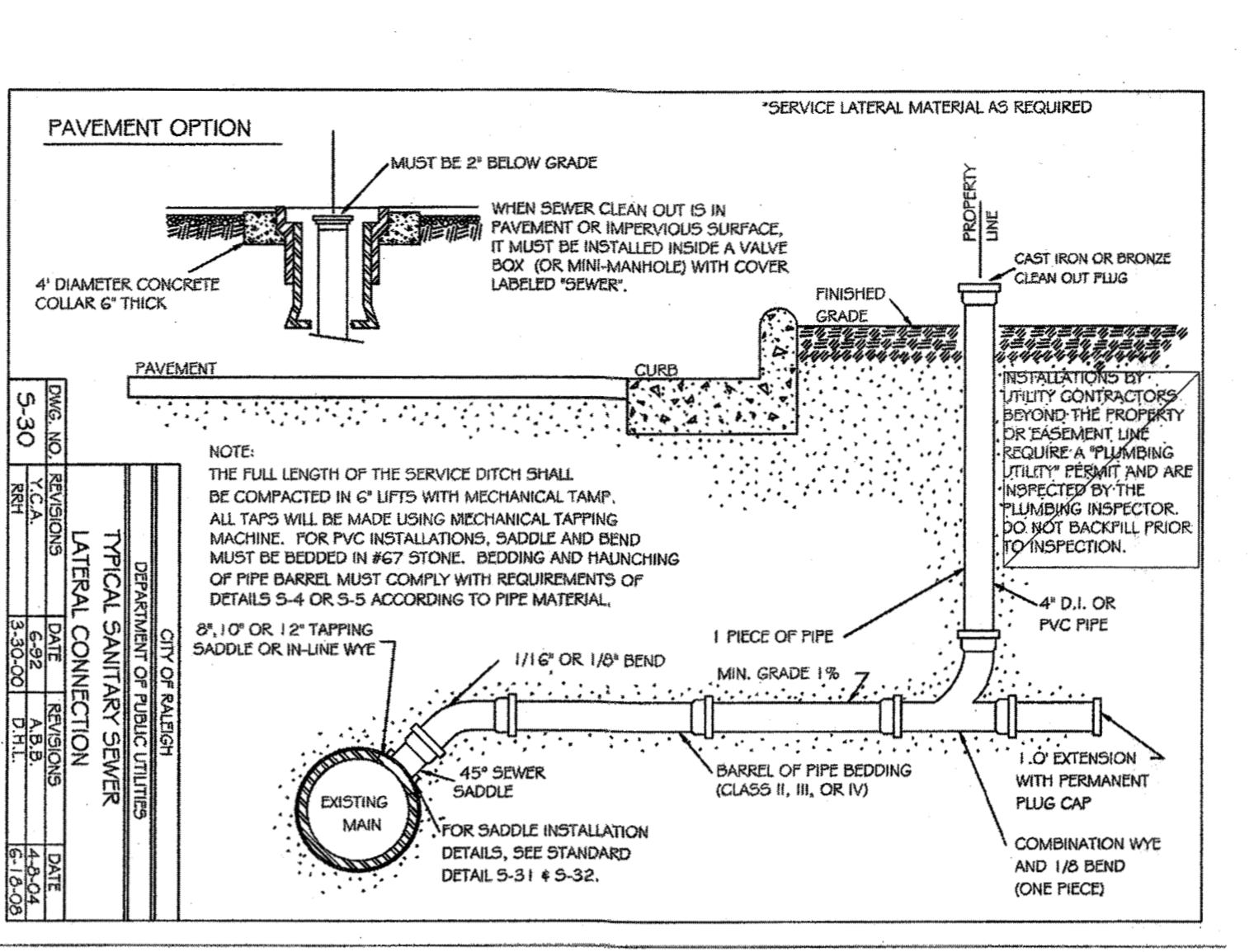
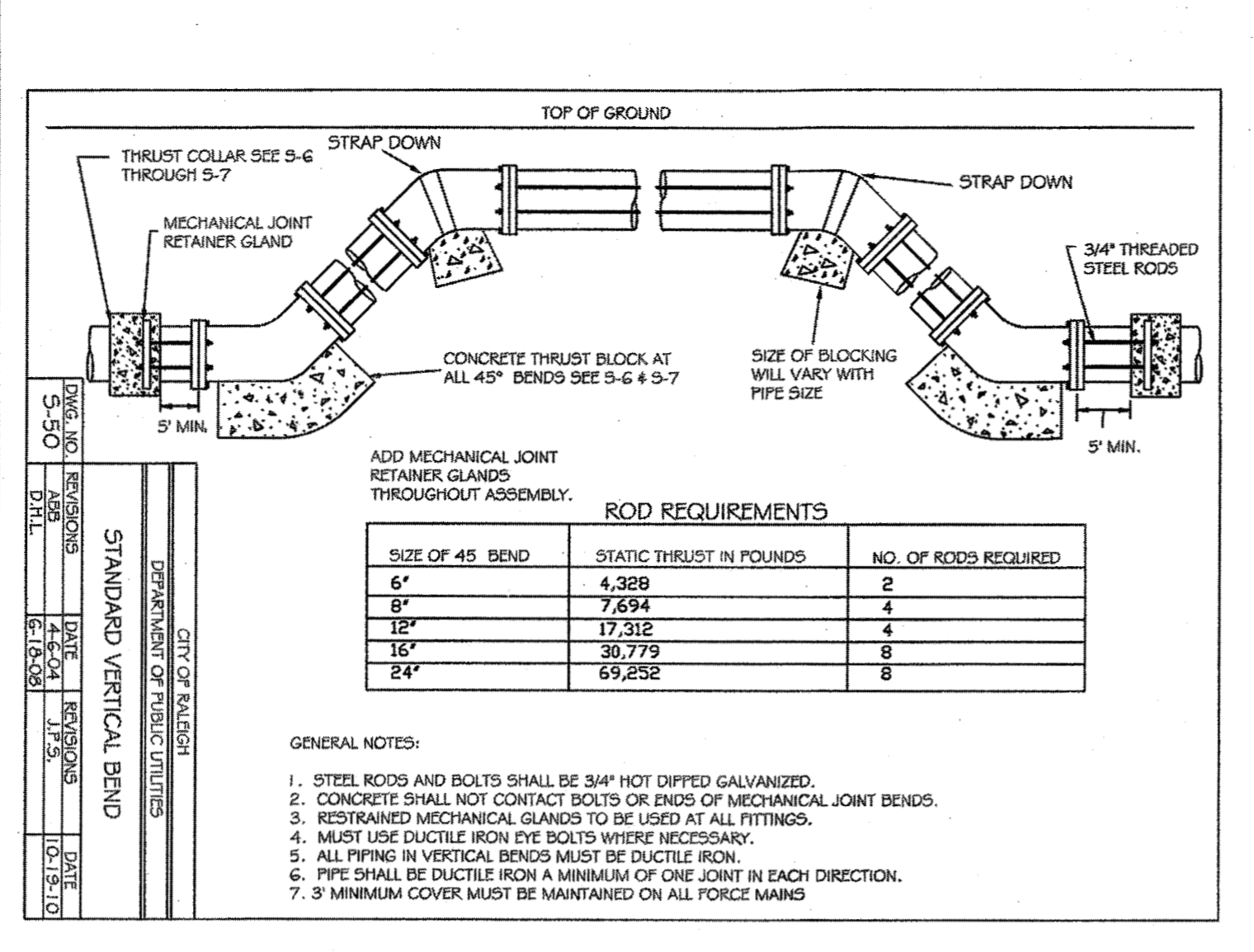
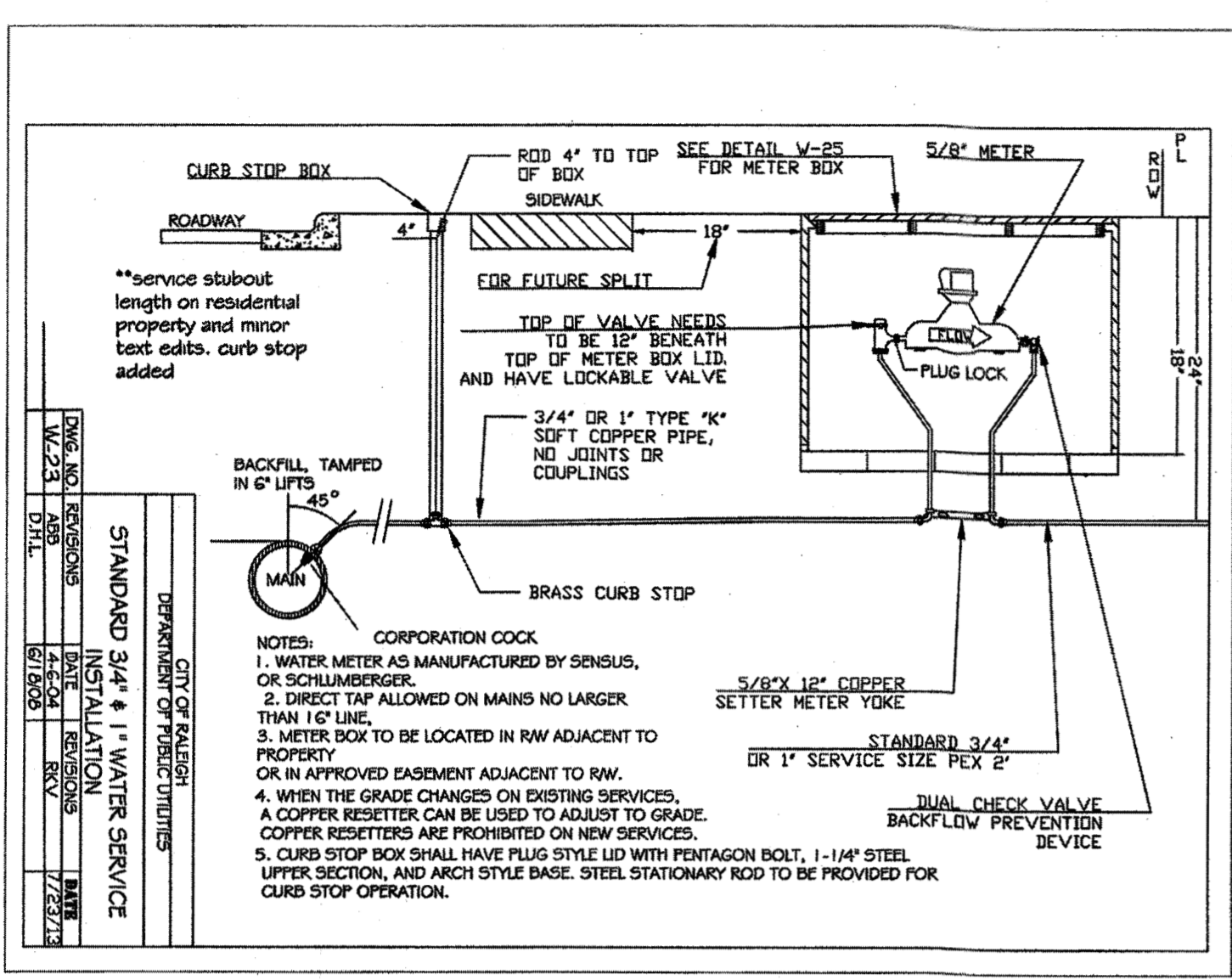
NORTH CAROLINA LICENSE NO. C-1652  
**HARDIN HILL SPINE ROAD EXTENSION**  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**SITE DETAILS**

JOB NO. 44872  
SHEET NO. C7.1

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BY: *S. Small* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *L. Sample* DATE: 8-21-2020  
 ADMINISTRATOR

Digitally signed by Lorea M Sample  
 DN: cn=L. Sample, o=Lorea M Sample, ou=City of Raleigh, email=L.Sample@raleighnc.gov, c=US

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 NORTH CAROLINA LICENSE NO. C-1652

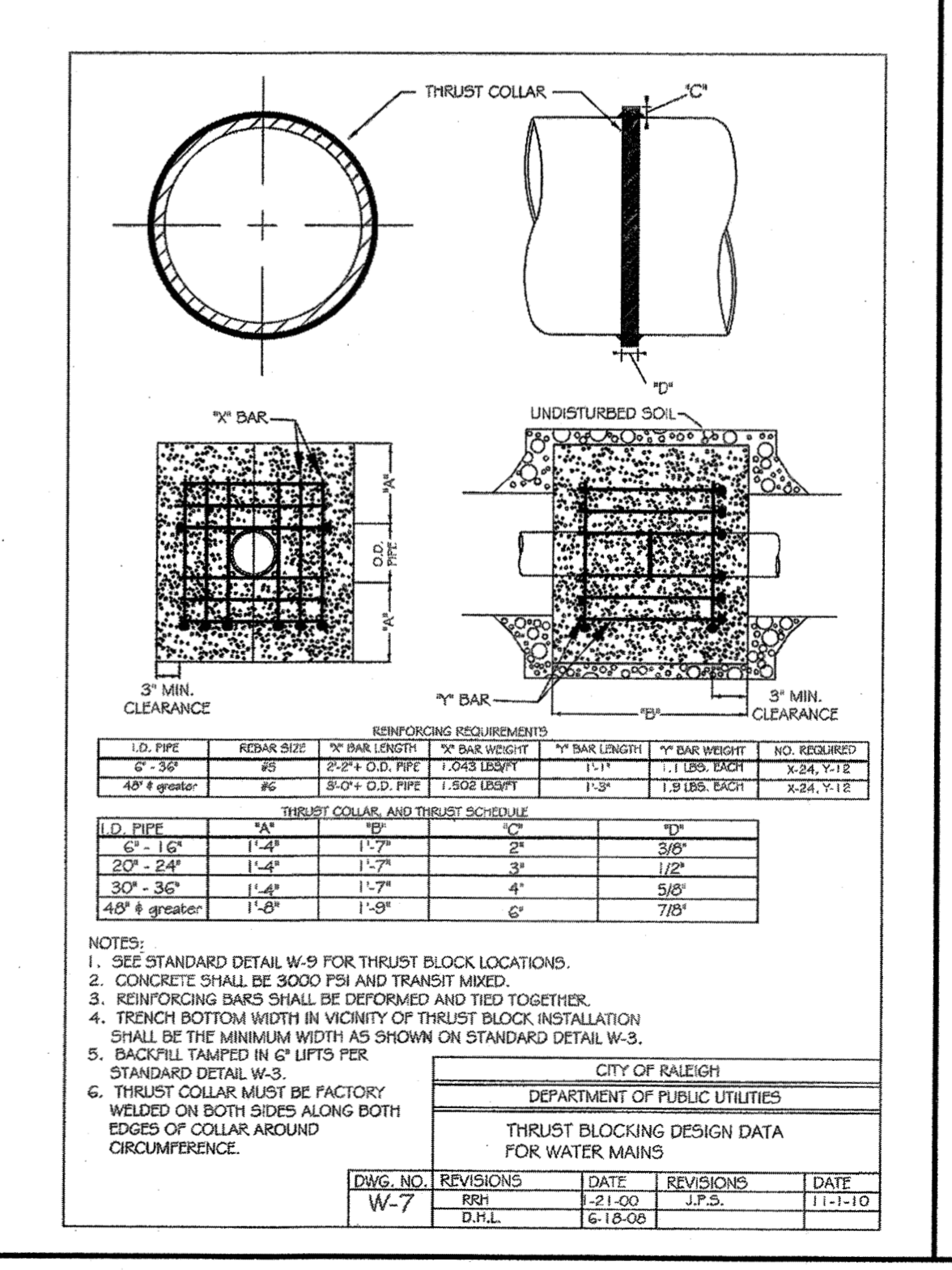
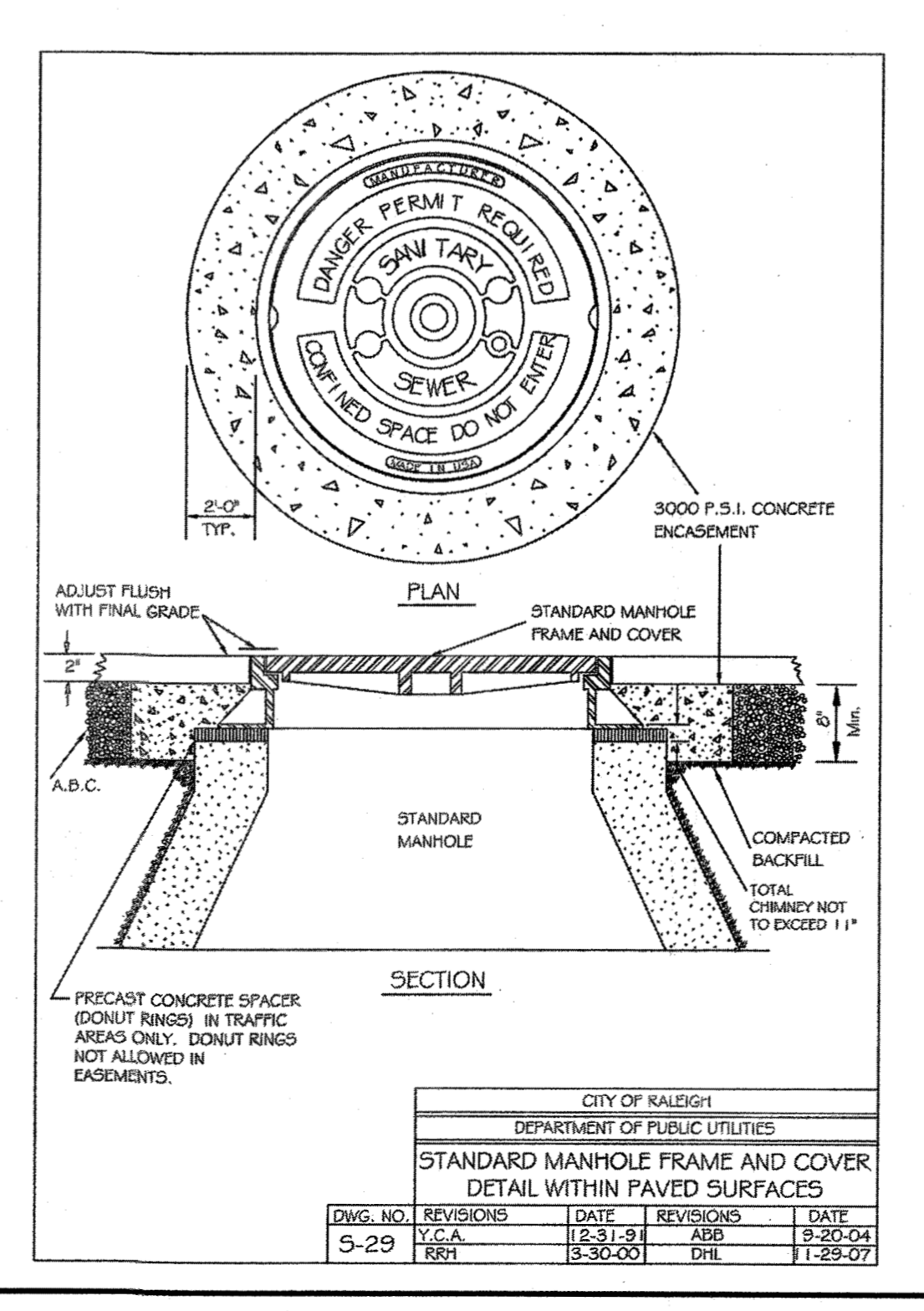
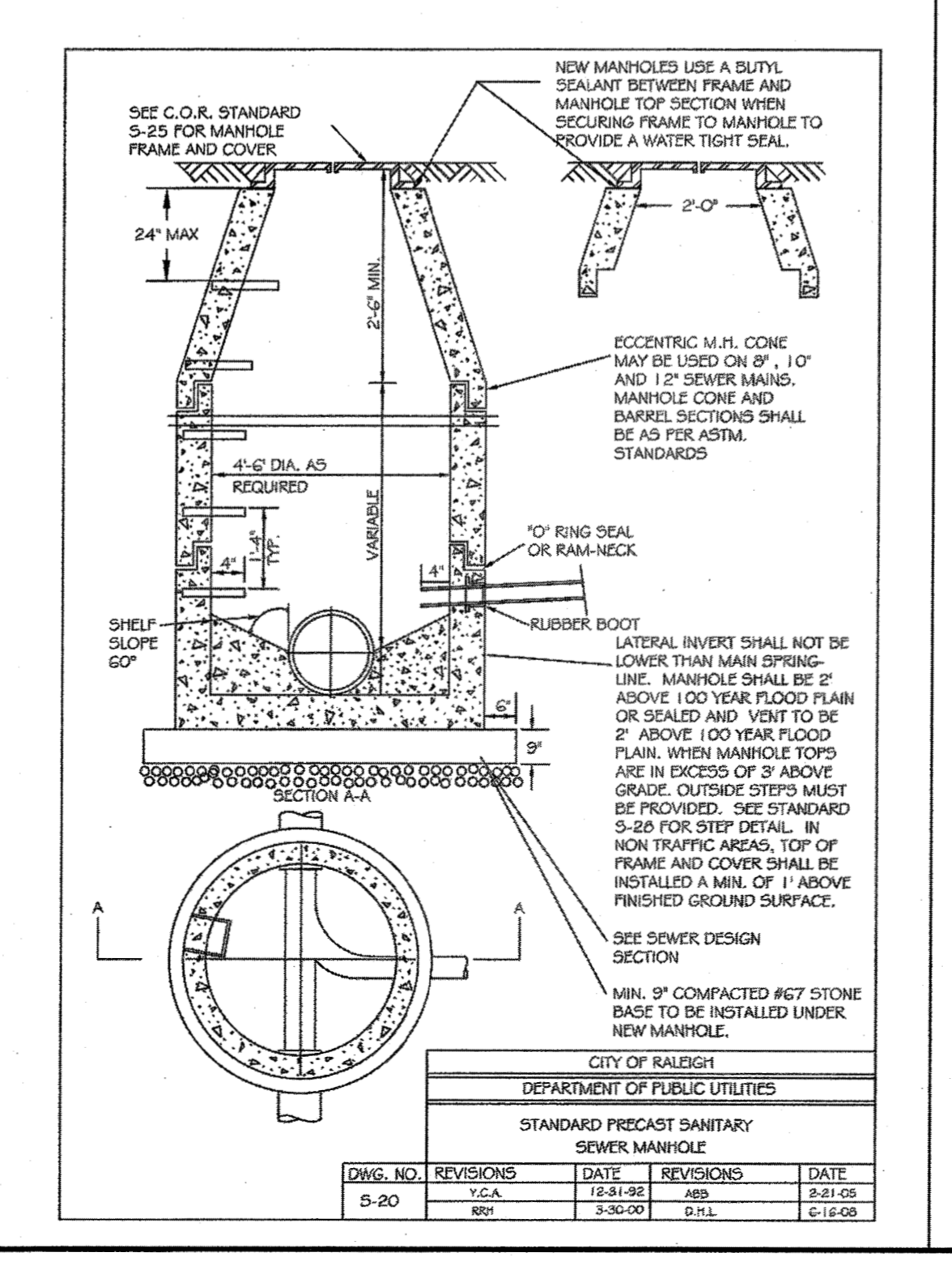
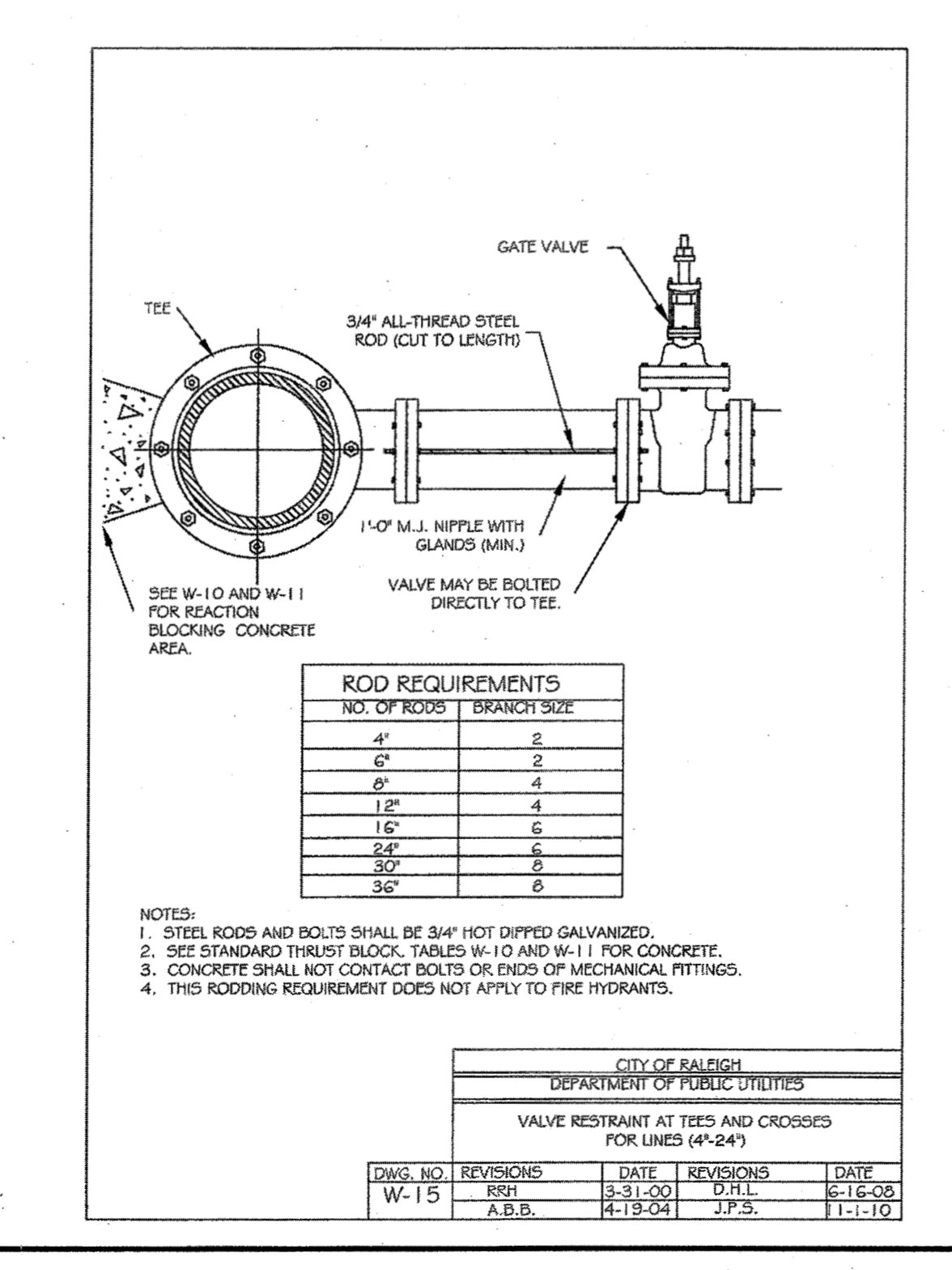
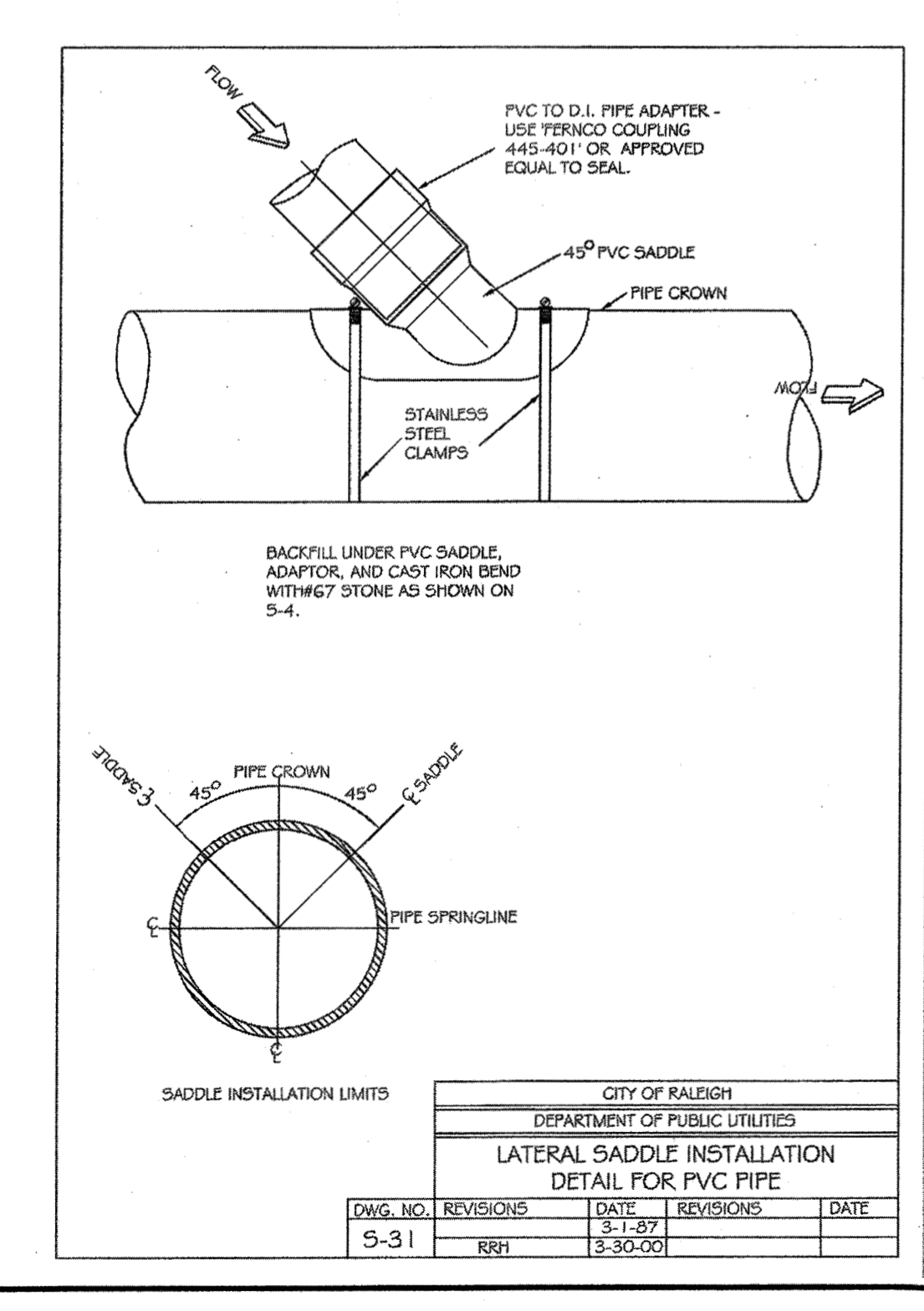
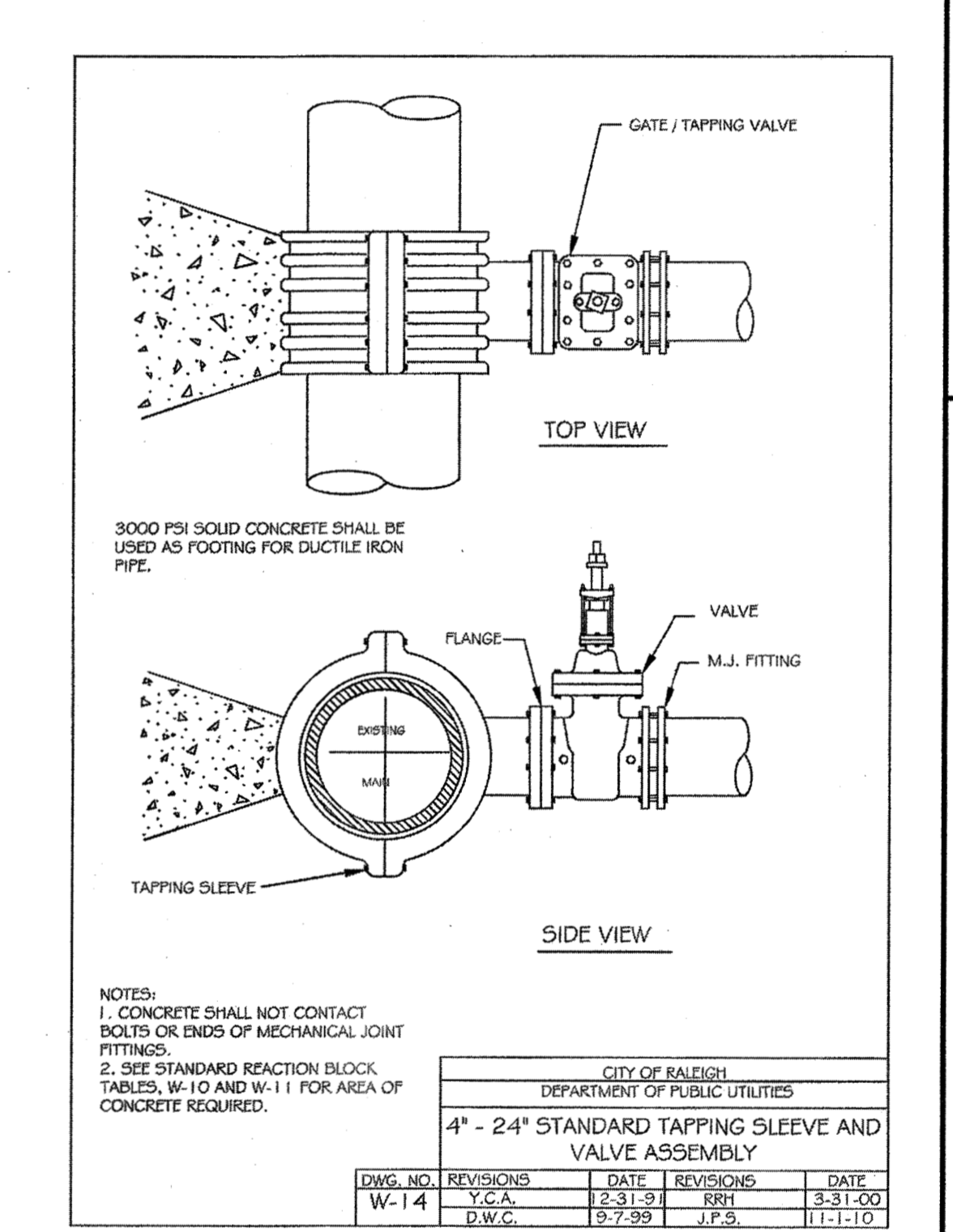
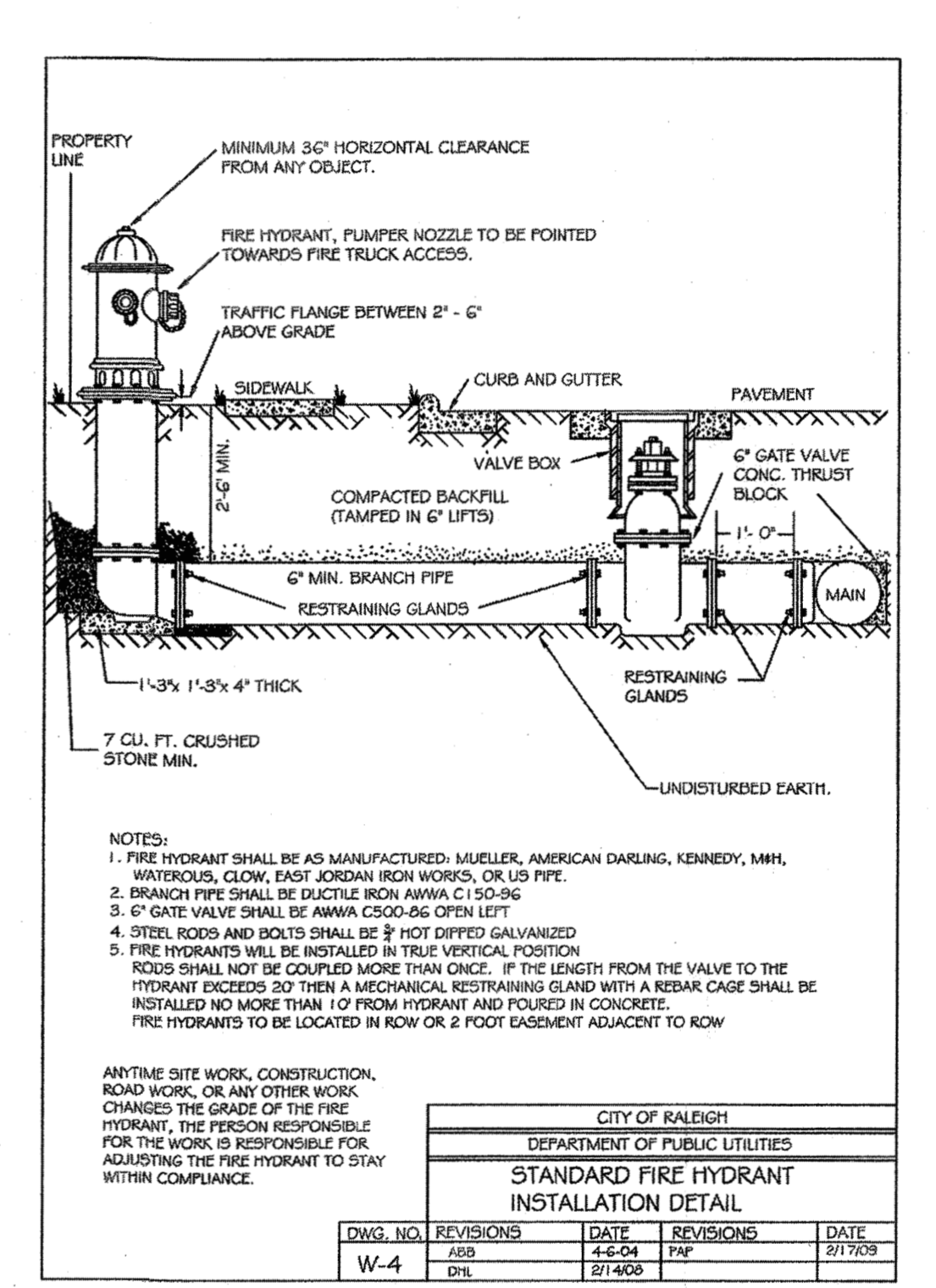
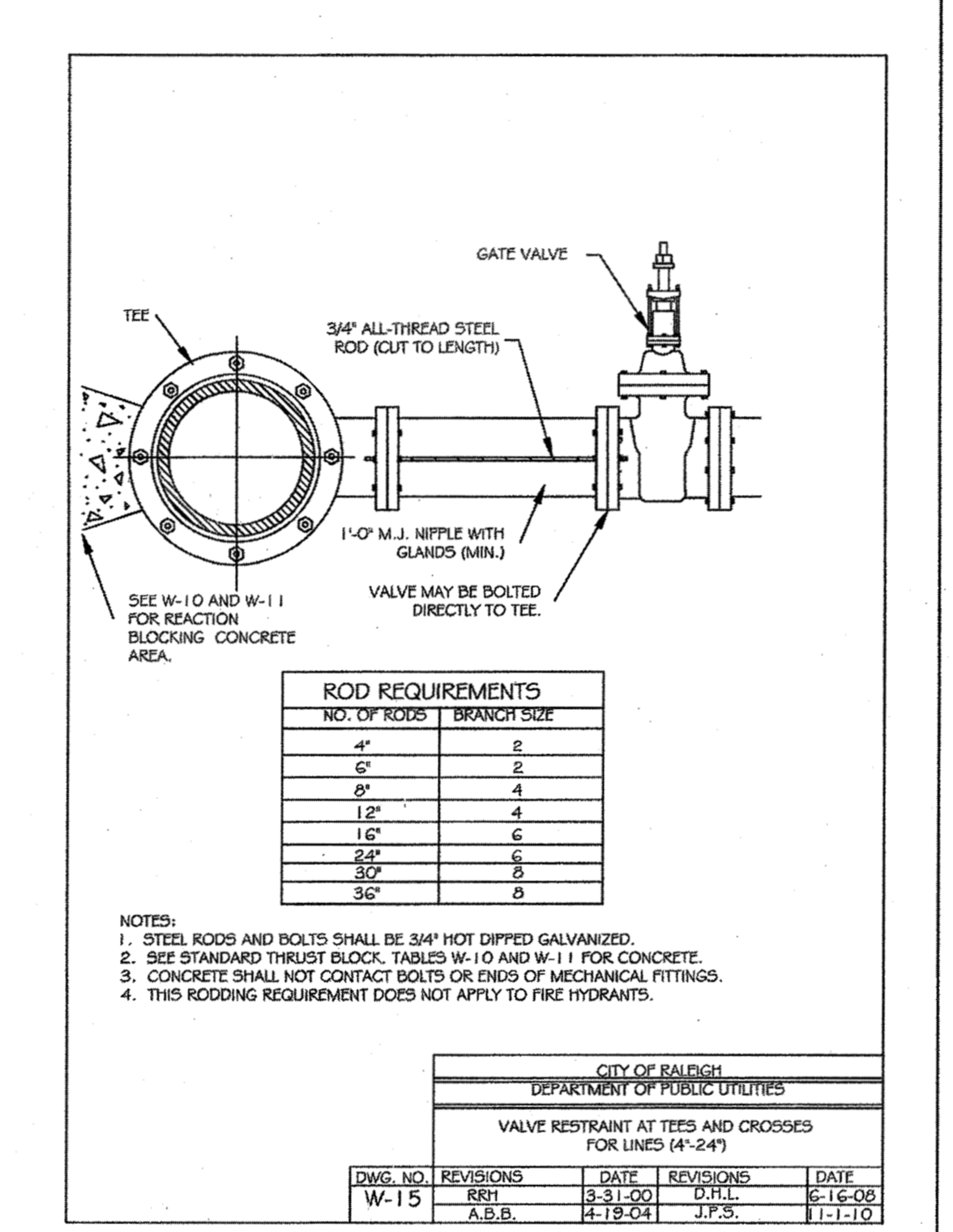
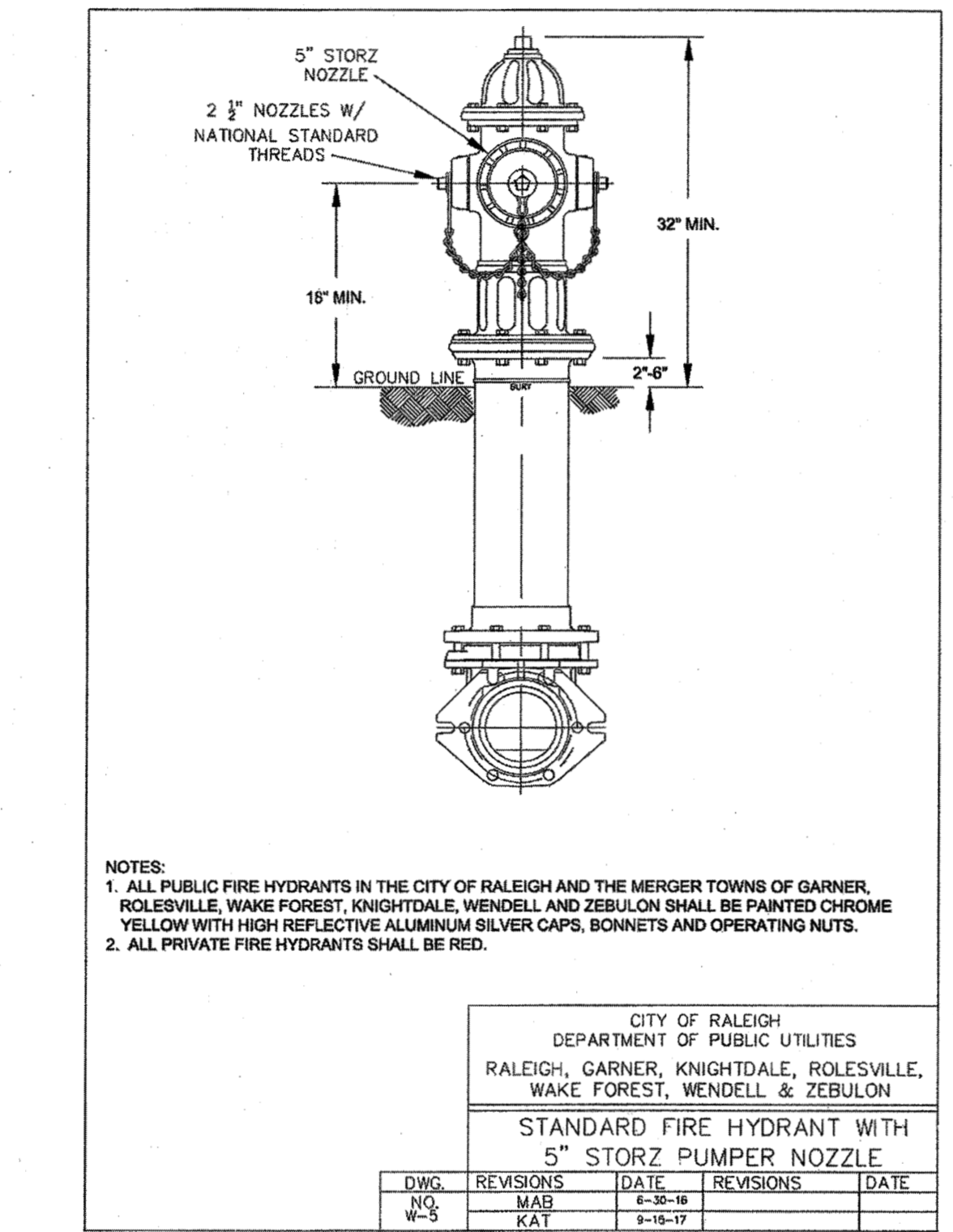
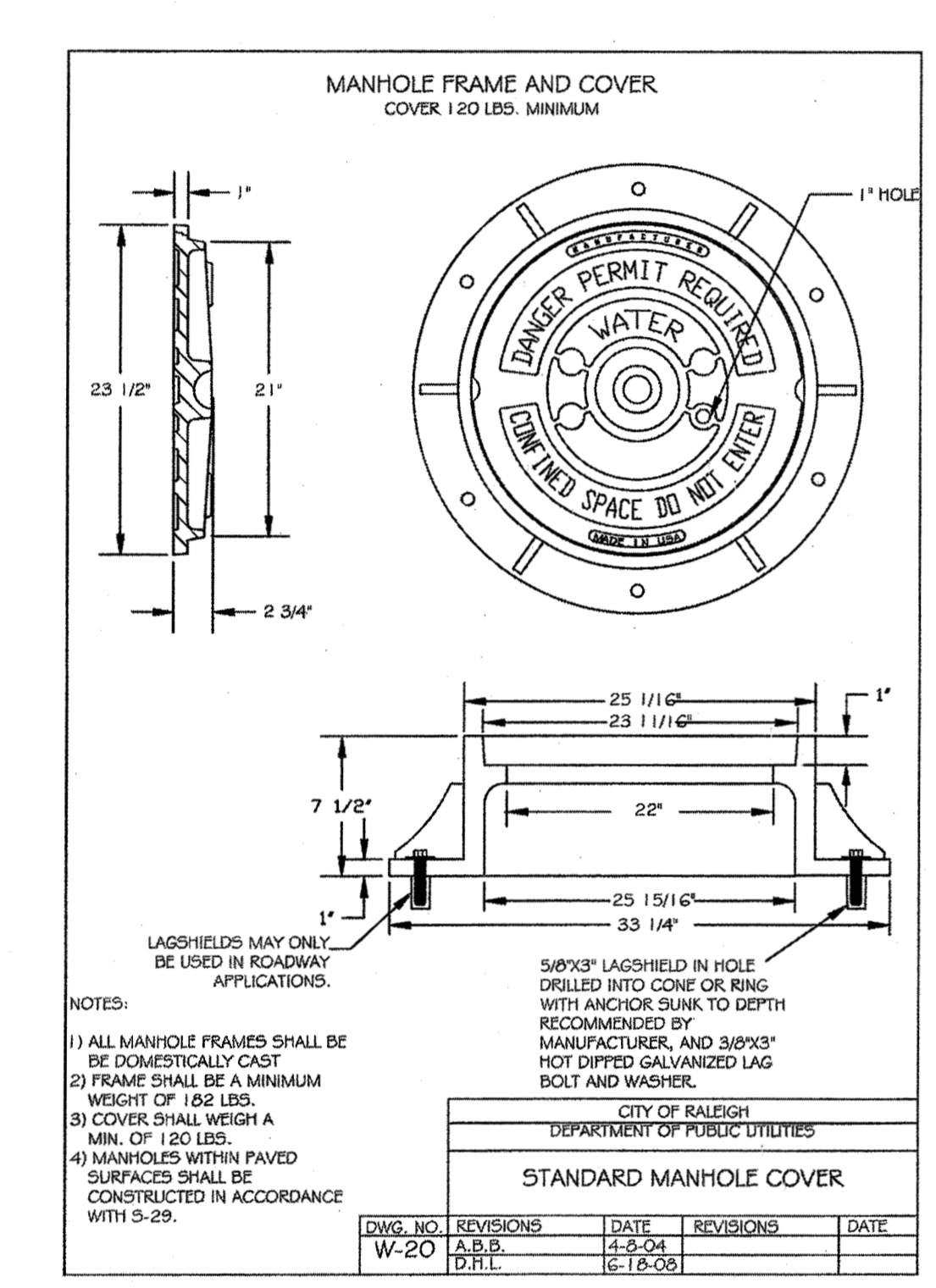
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 DESIGNED BY: J.D. MACMILLAN  
 CHECKED BY: M. ZACCARDO  
 SCALE:



**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**WATER AND SANITARY SEWER DETAILS**

JOB NO. 44872  
 SHEET NO. C7.2

P: 331-14872-stone-alter-DWG\_Sheet\_03-DTD.dwg | by: J.D. Macmillan

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s:\31\44872-stone-silver\DWG\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CD-INTL.dwg | by JD MacMillan

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 BY: *[Signature]* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER  
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
 BY: *[Signature]* DATE: 8-18-2020  
 ADMINISTRATOR



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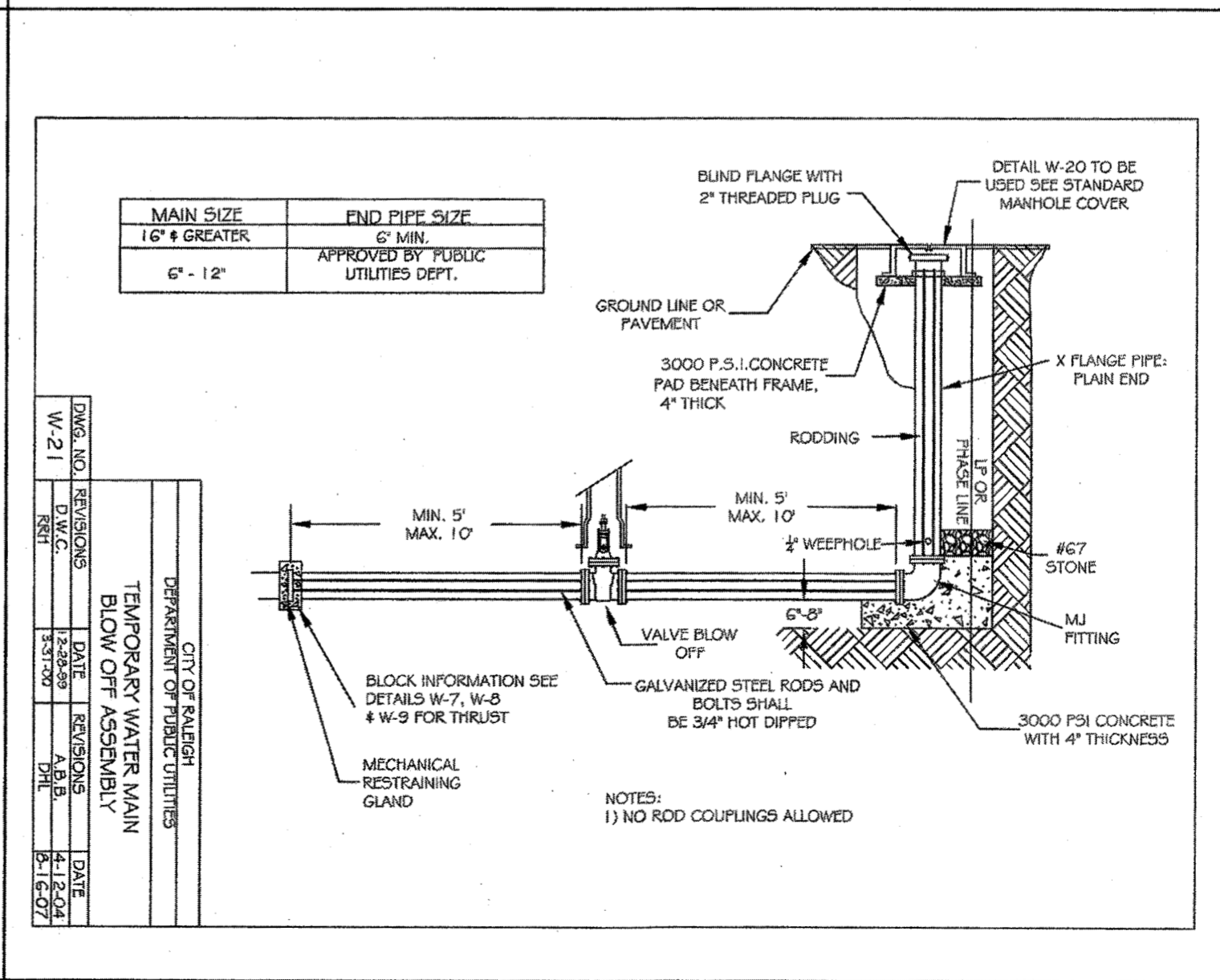
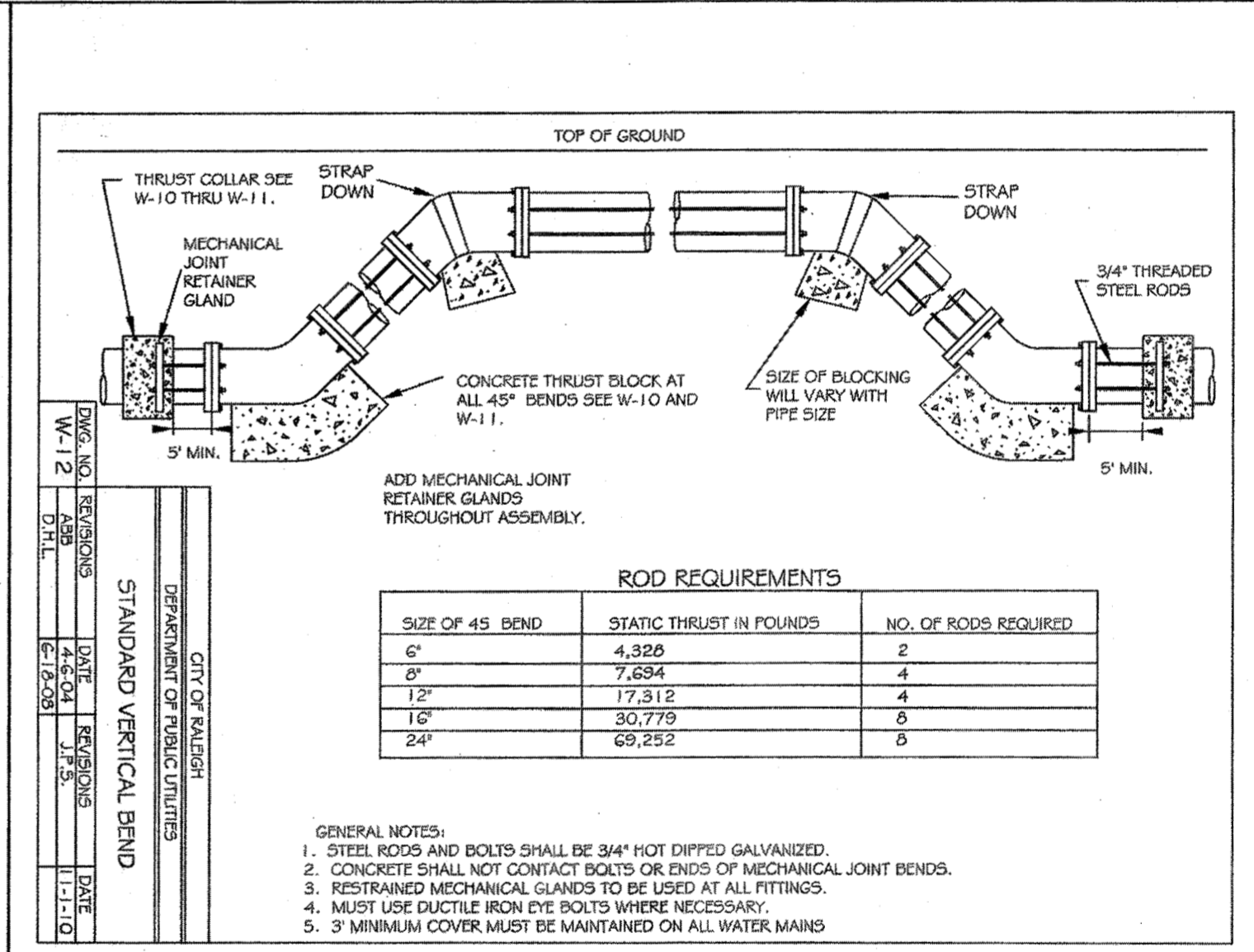
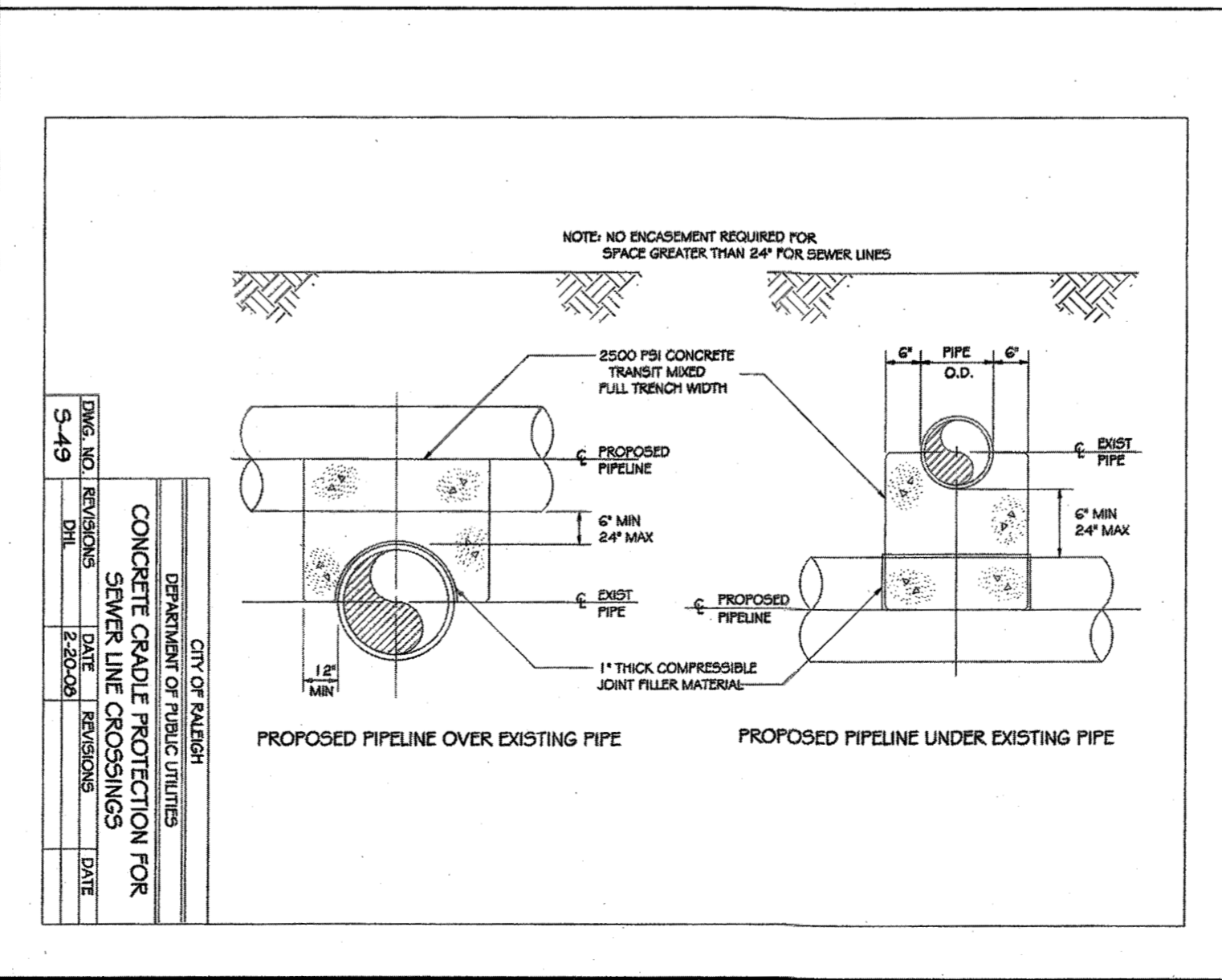
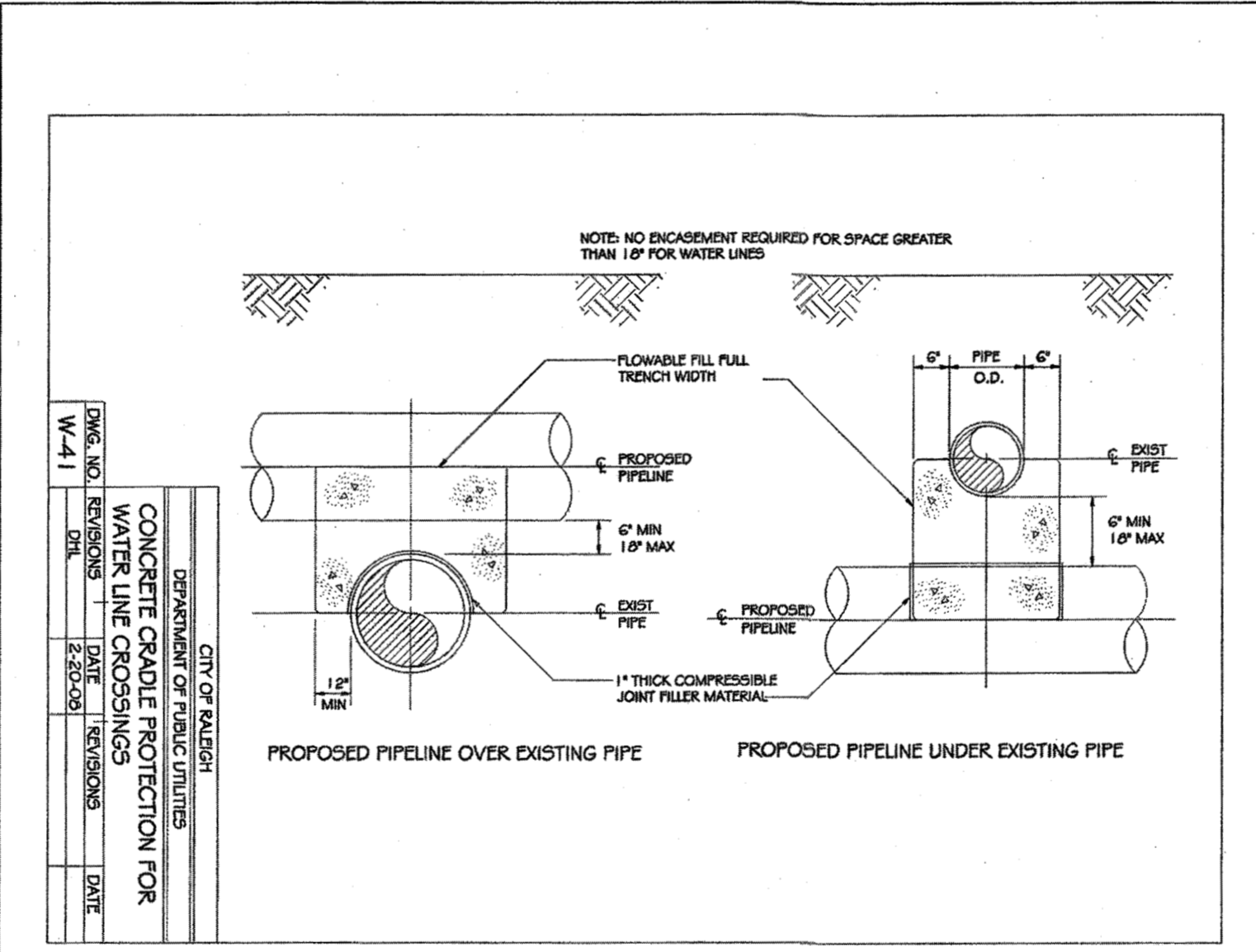
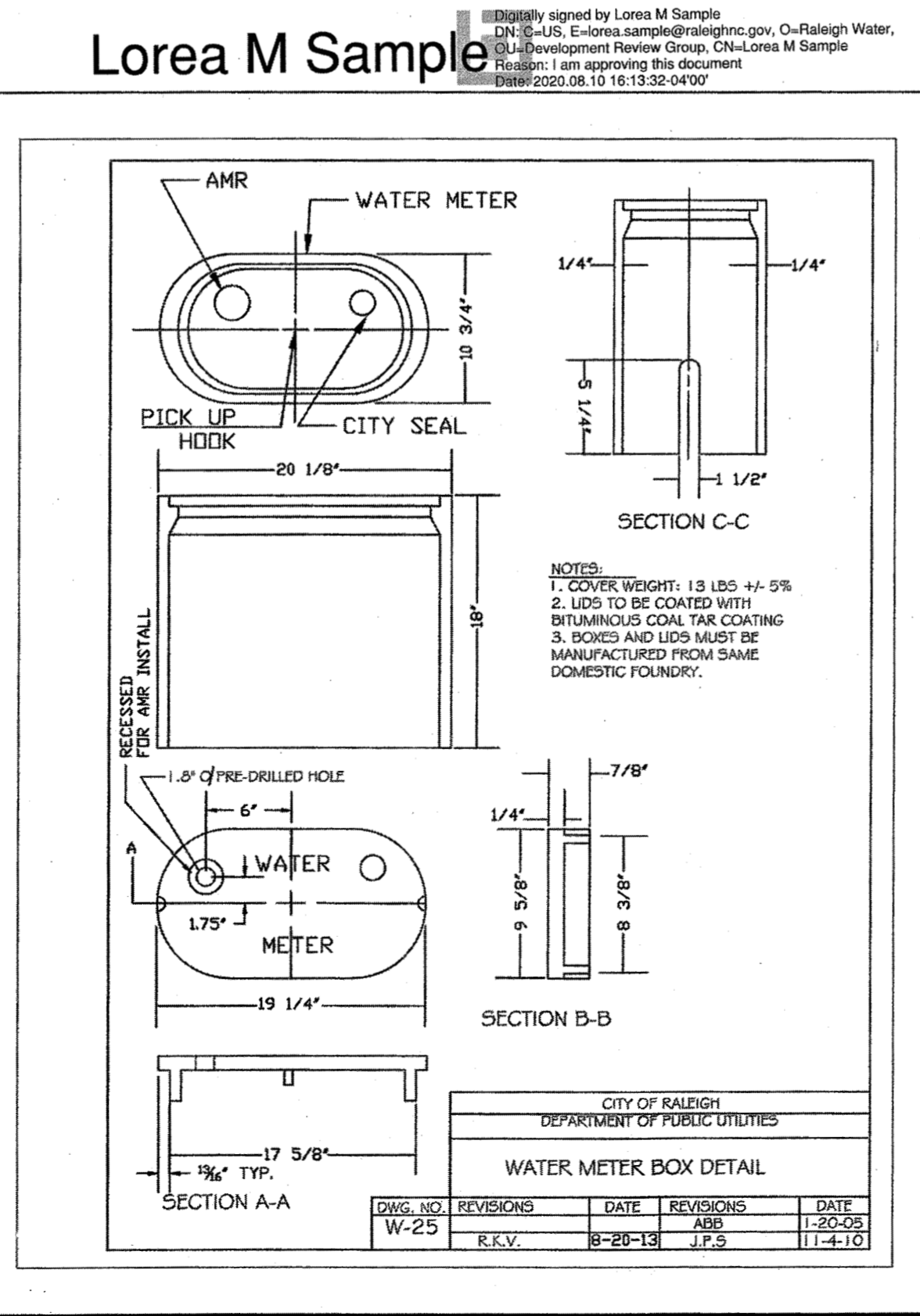
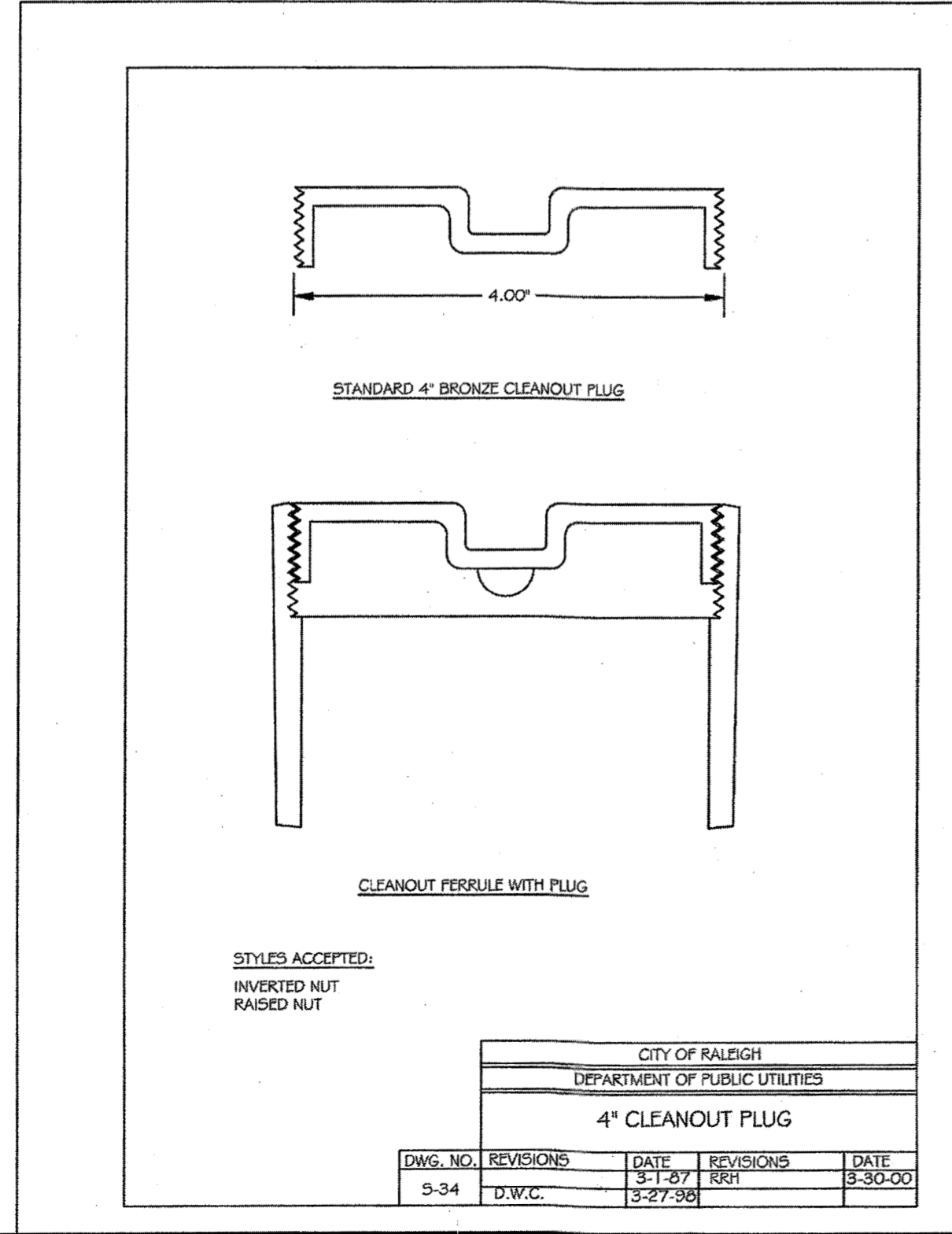
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08/06/2020	

DRAWN BY: JD. MACMILLAN  
 DESIGNED BY: JD. MACMILLAN  
 CHECKED BY: M. ZACCARO  
 SCALE:

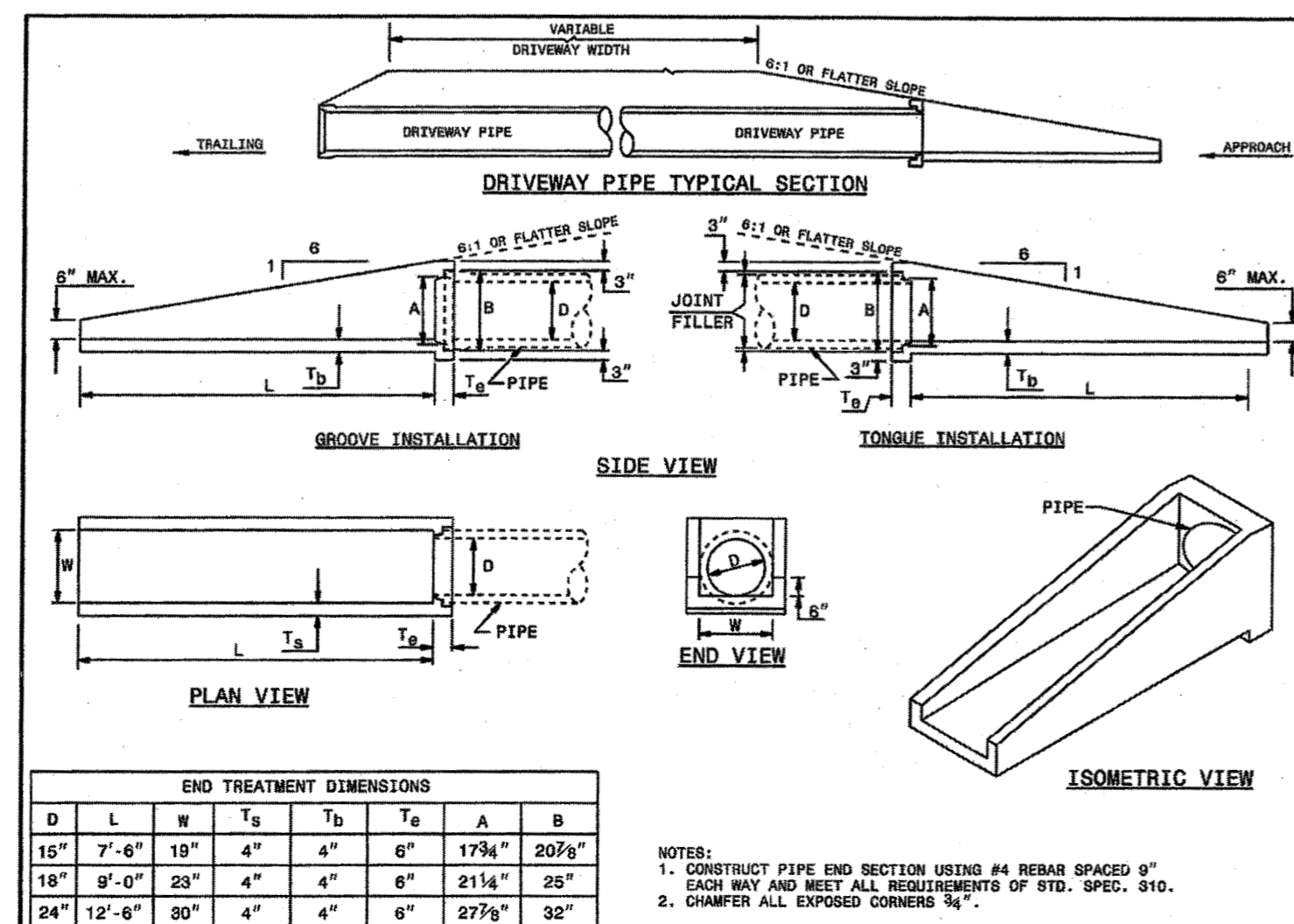
**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
**HARDIN HILL SPINE ROAD EXTENSION**  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
**WATER AND SANITARY SEWER DETAILS**

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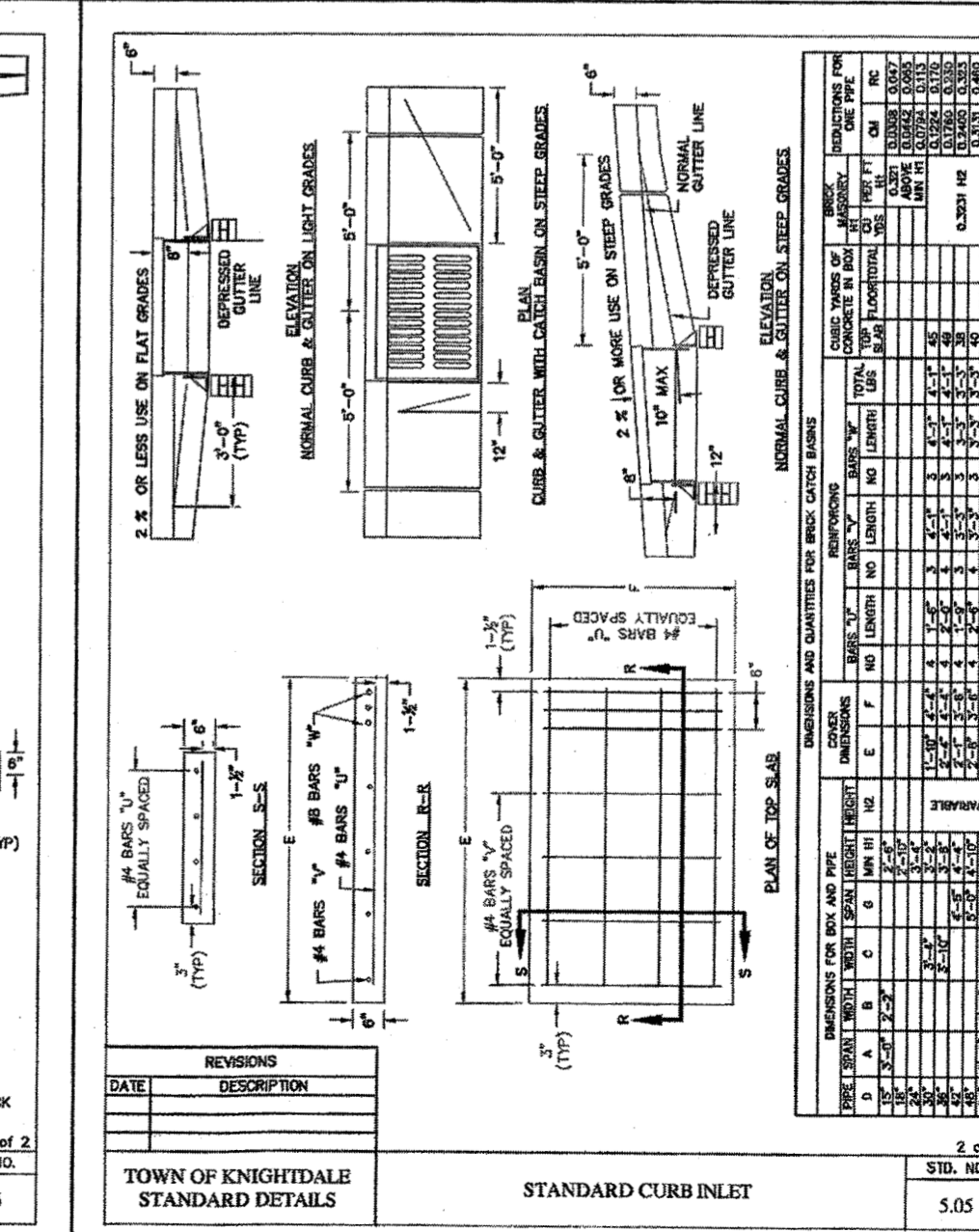
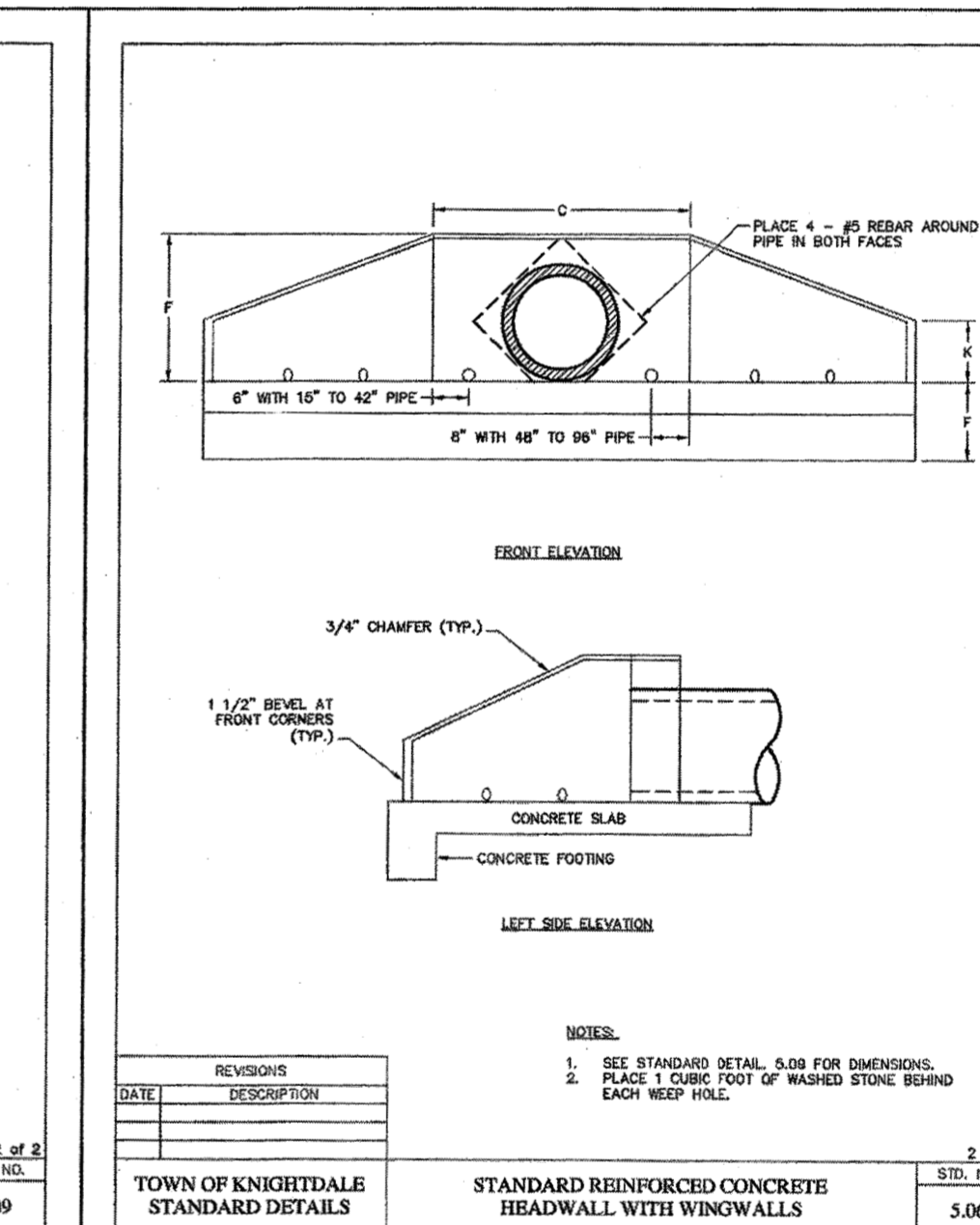
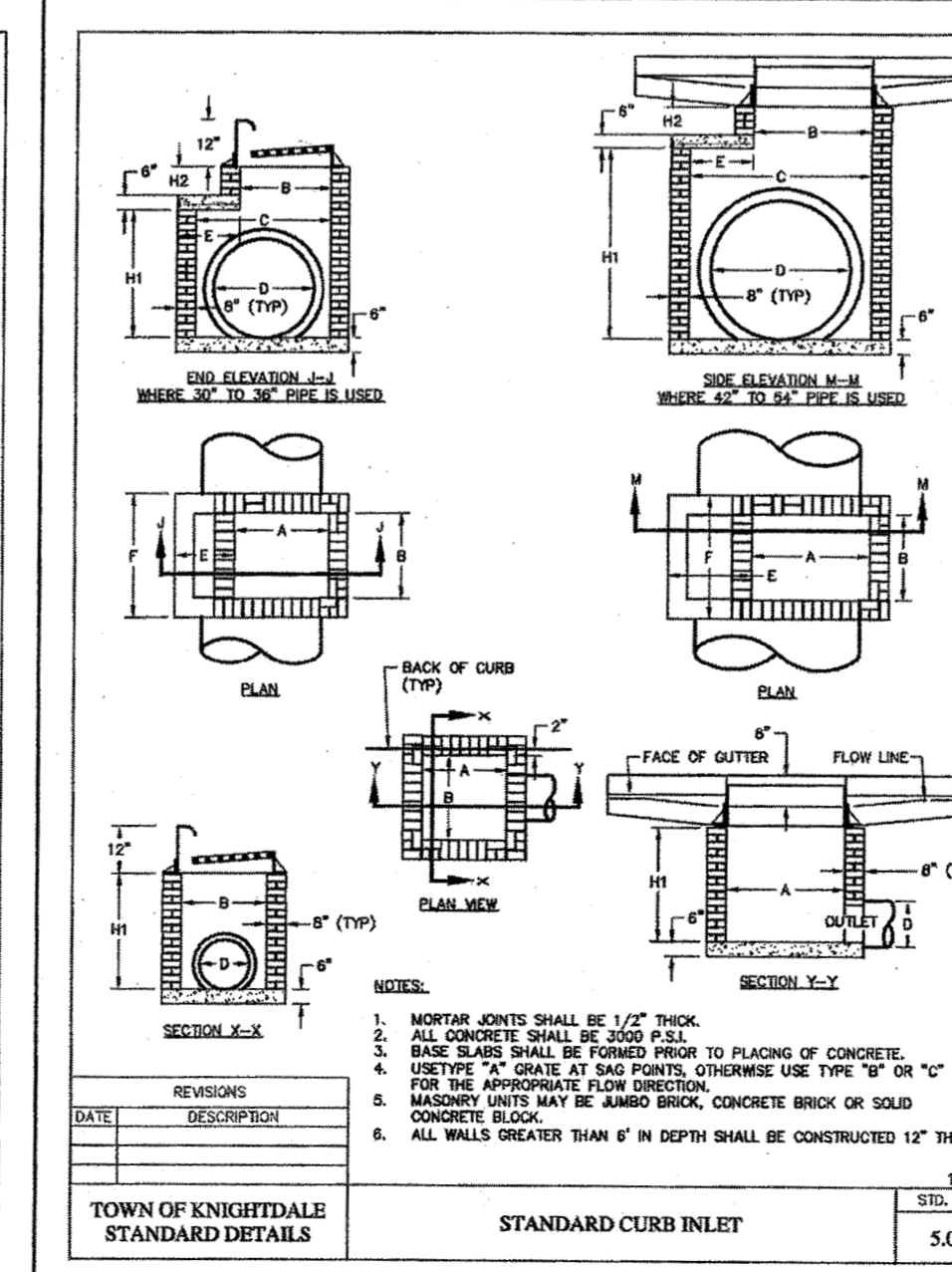
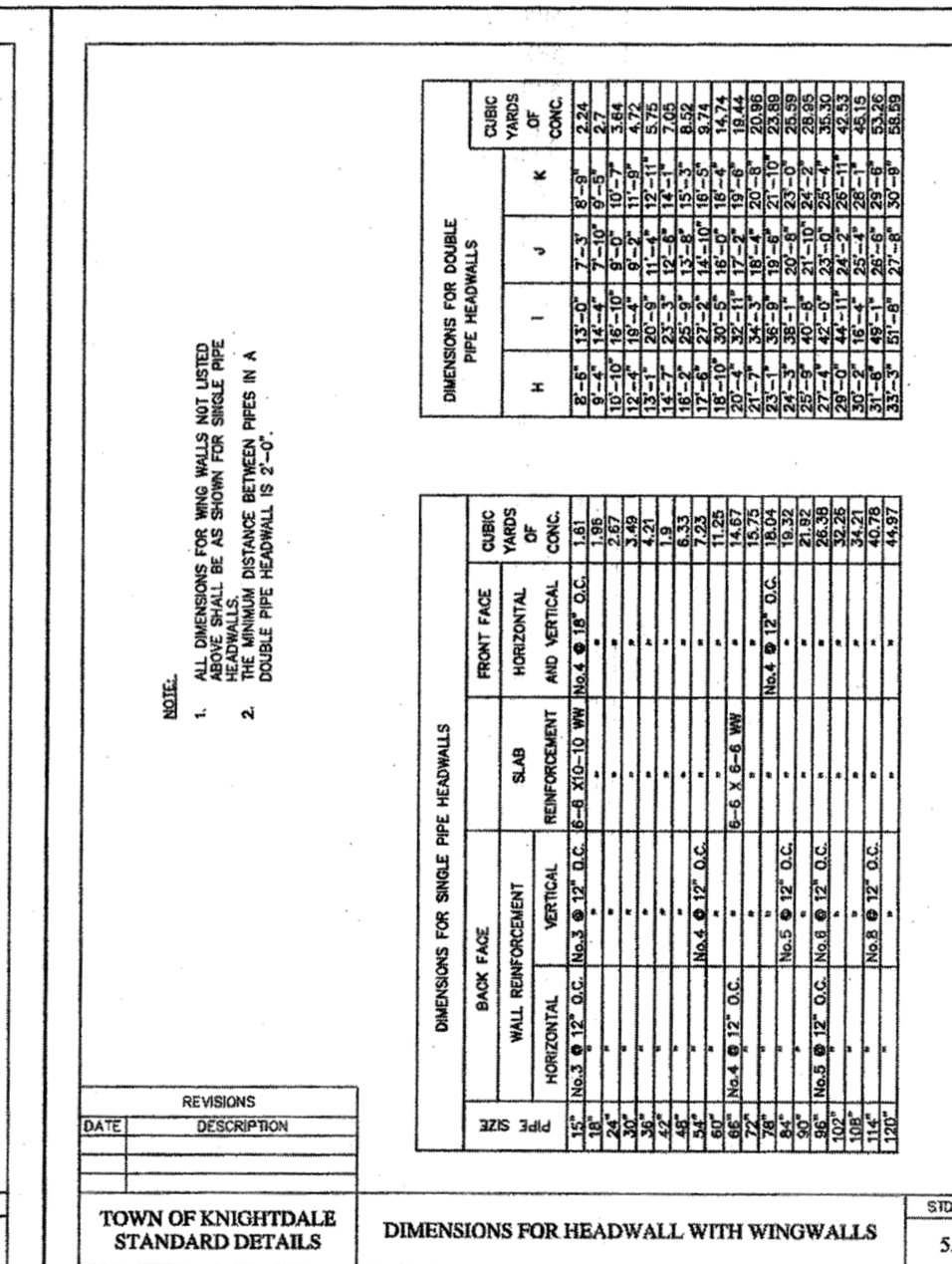
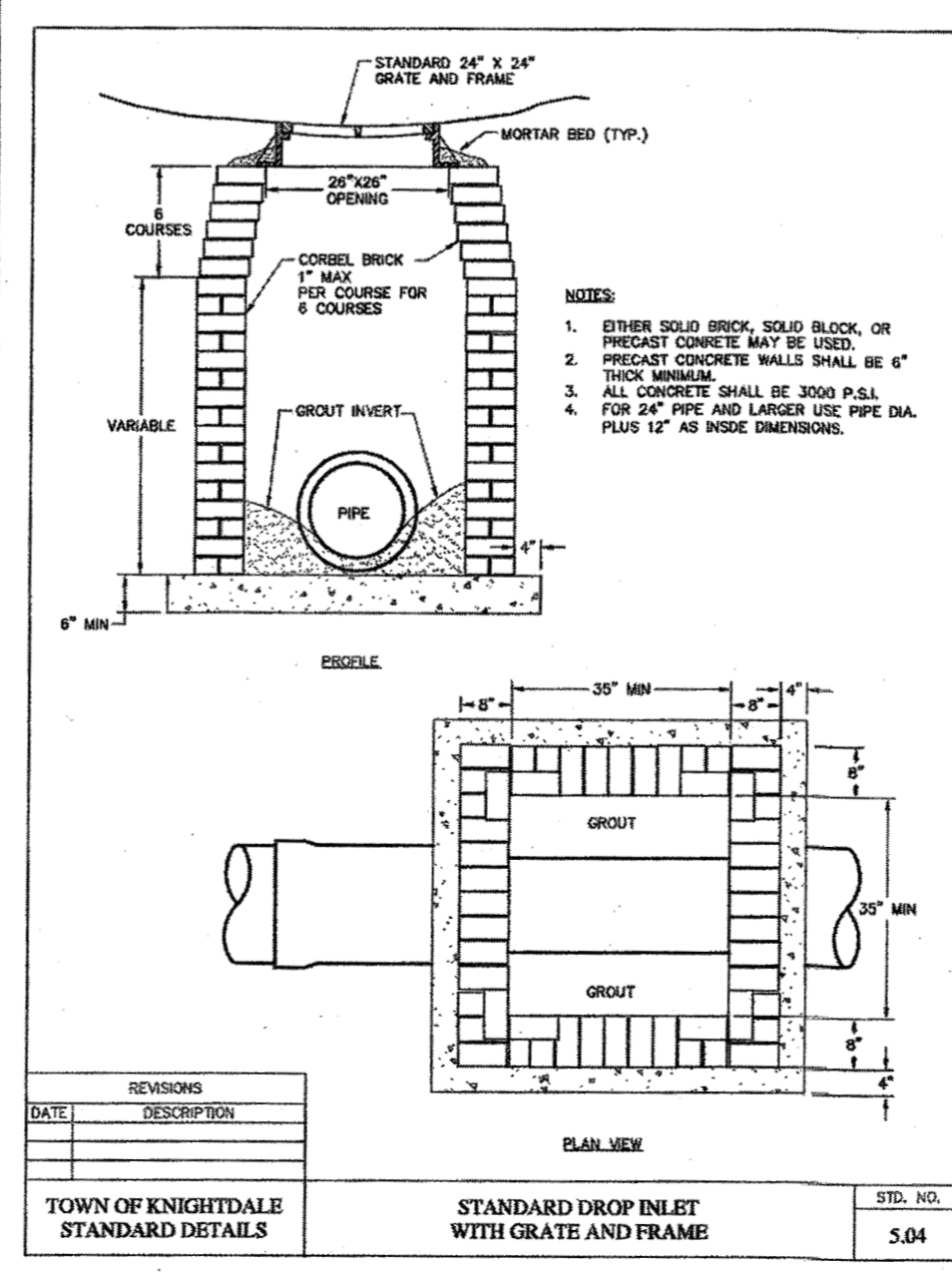
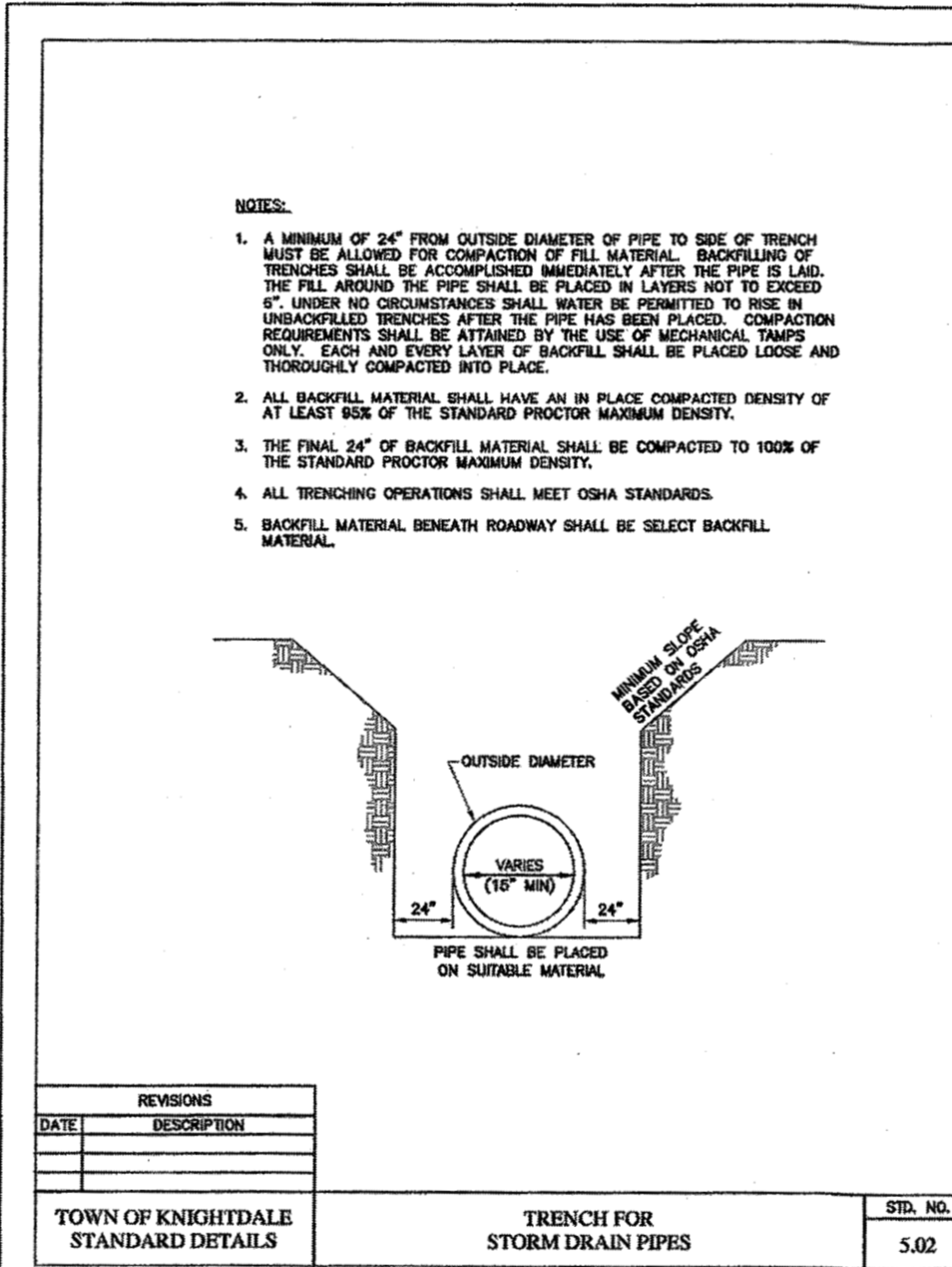
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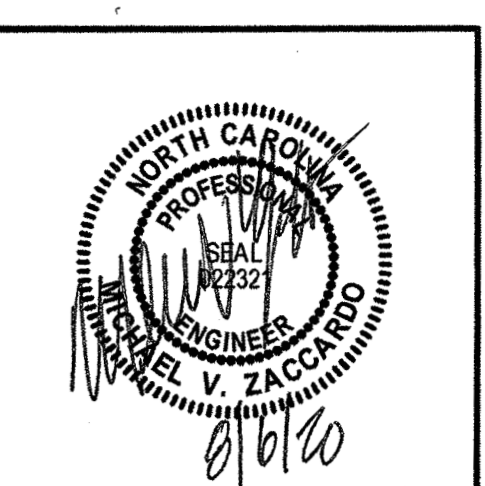
E:\331\44872-stone-silver\DWG\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CD-NTD1.dwg | by JD MacMillan



310.02



**TOWN CERTIFICATION**  
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 BY: *[Signature]* DATE: 8-21-2020  
 DEVELOPMENT SERVICES ENGINEER  
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
 BY: *[Signature]* DATE: 8/18/2020  
 ADMINISTRATOR



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 CHECKED BY: M. ZACCARDO  
 SCALE:

**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

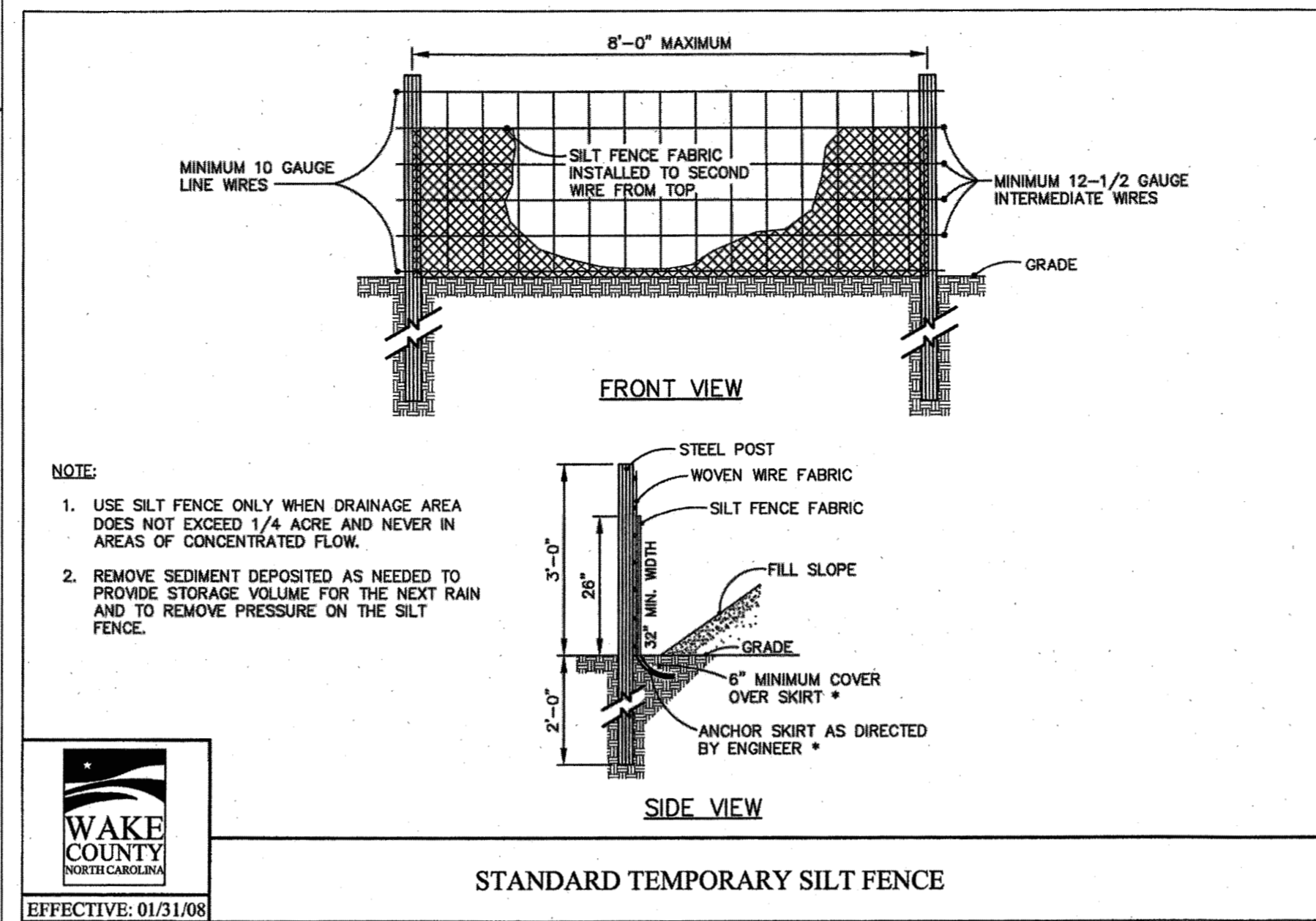
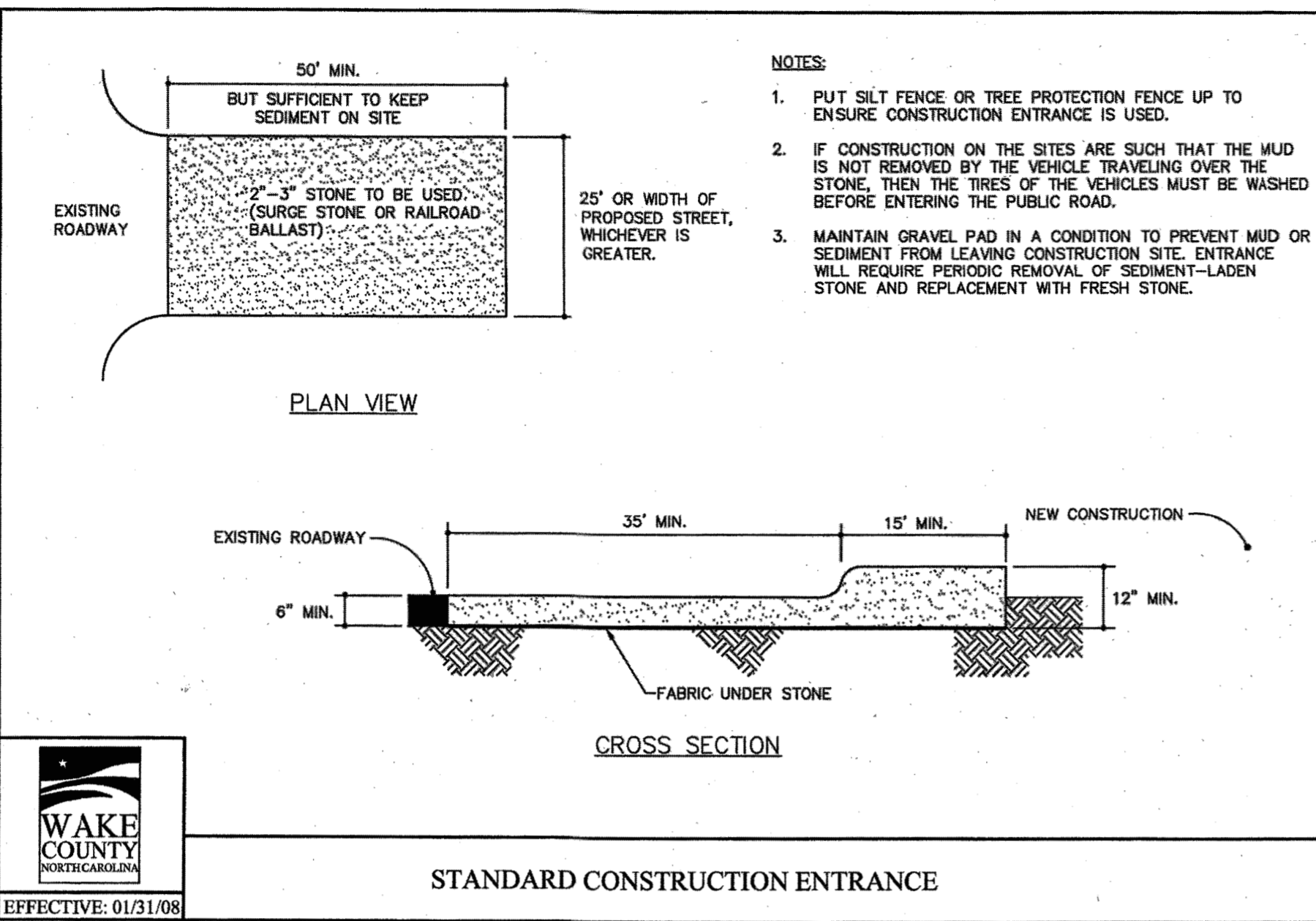
**STORM DETAILS**

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 SHEET NO. C7.4

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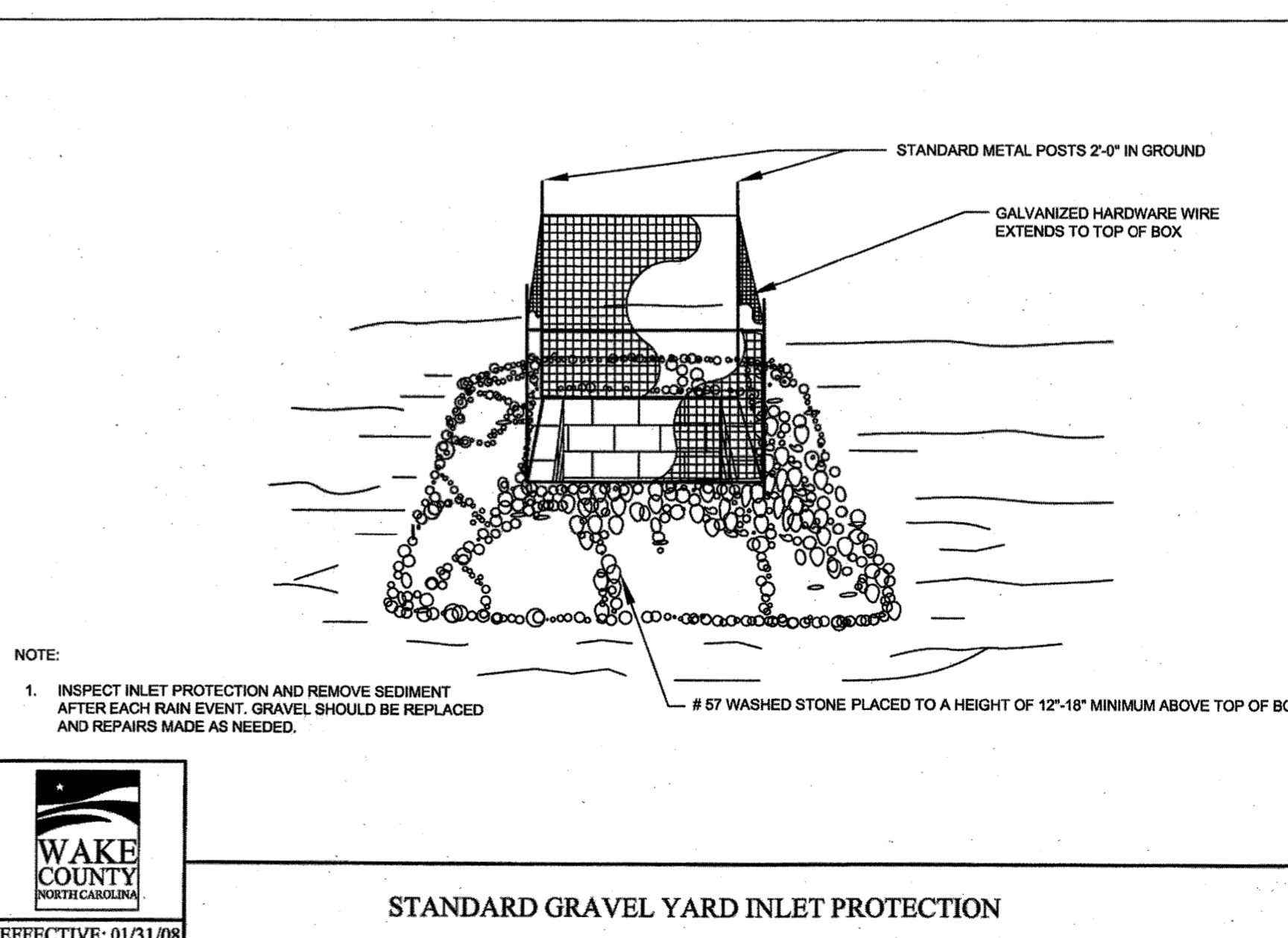
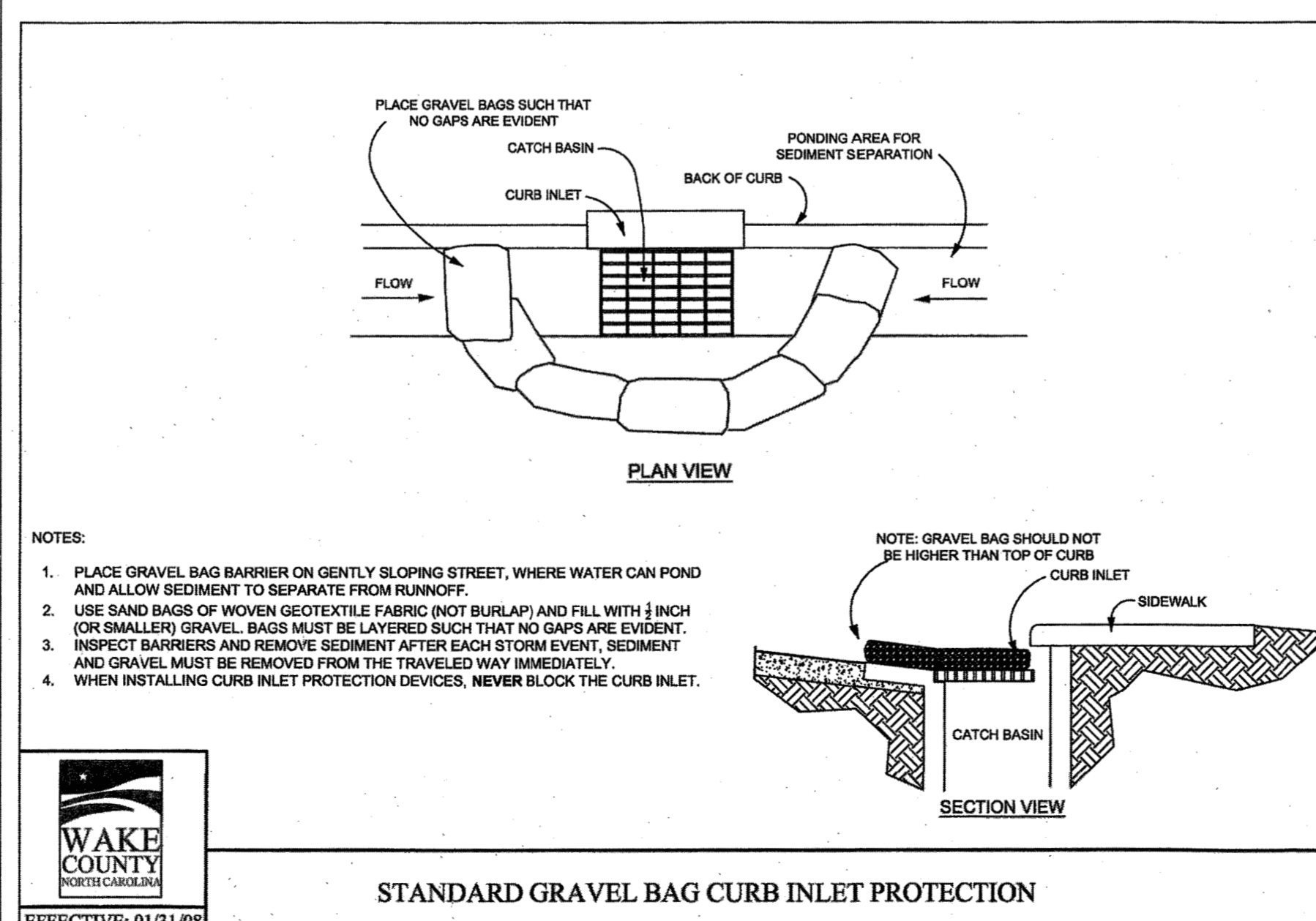
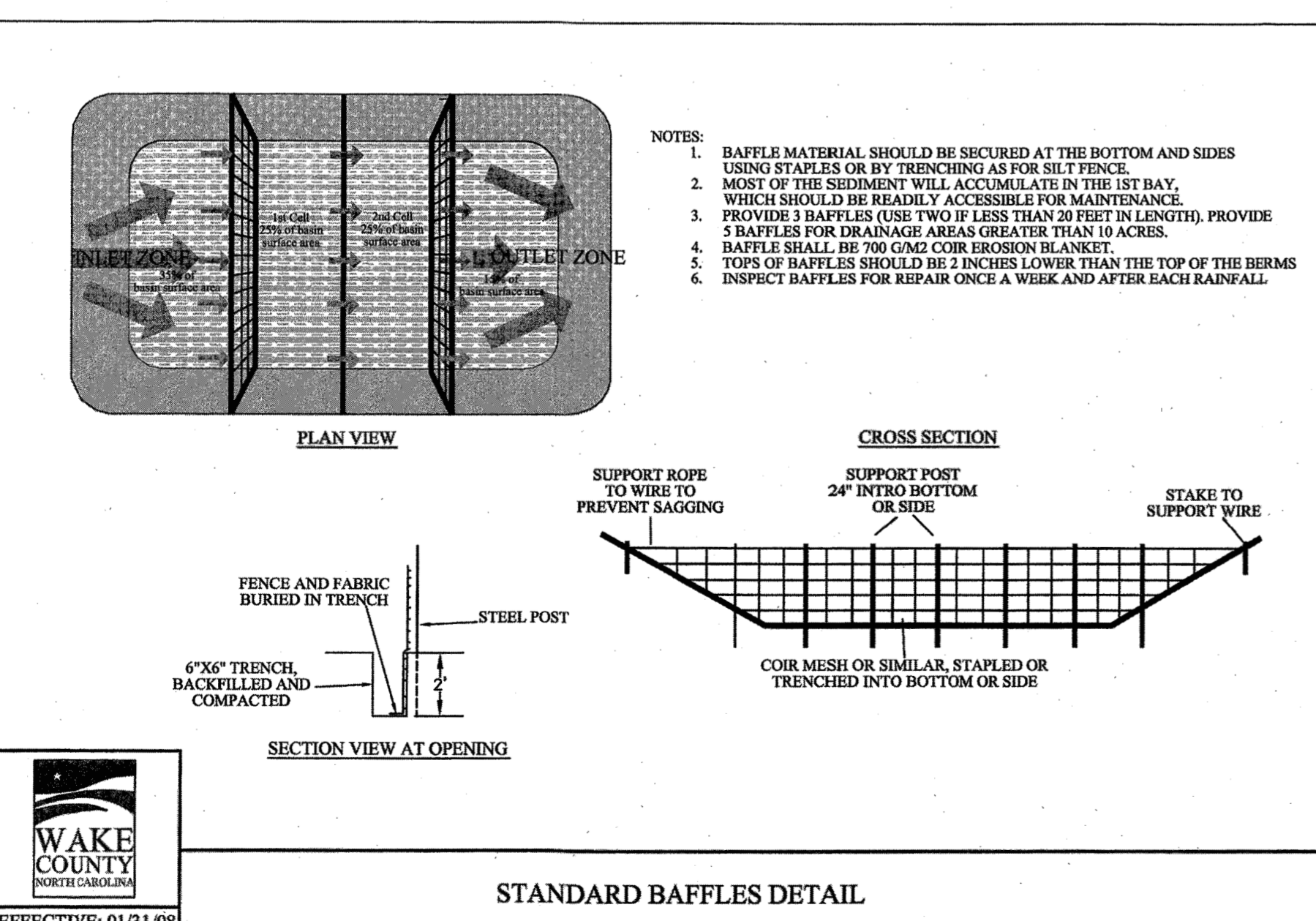
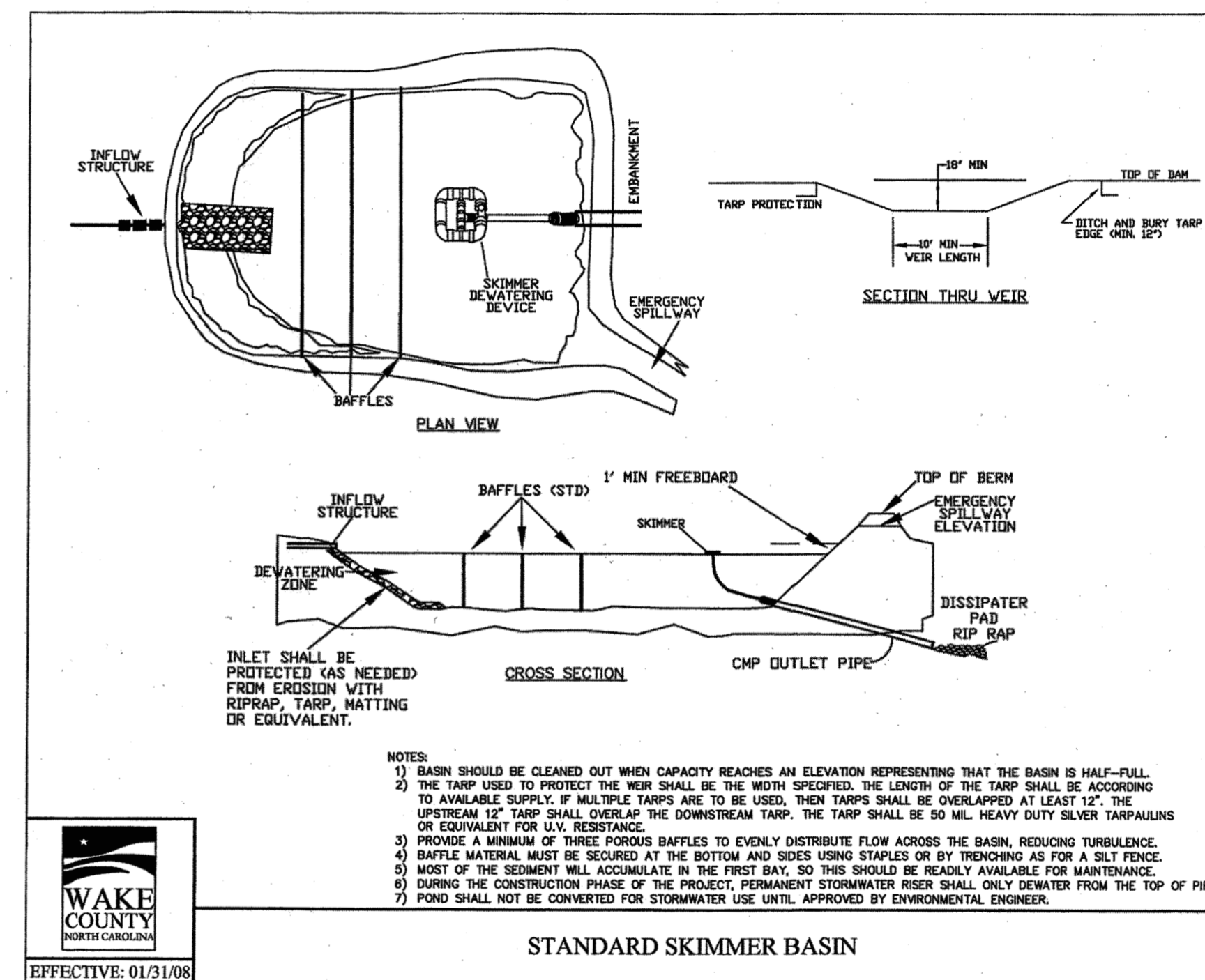
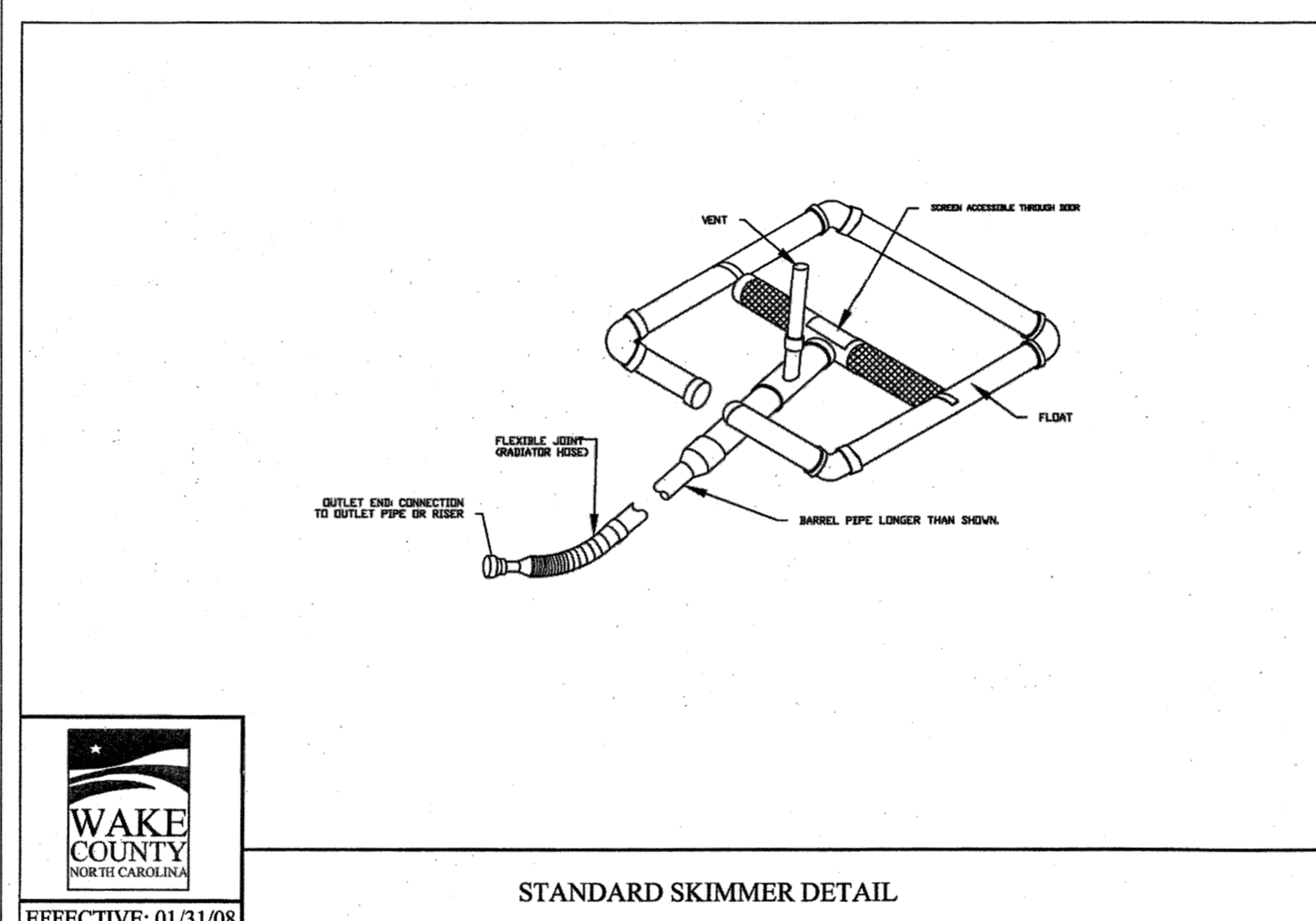
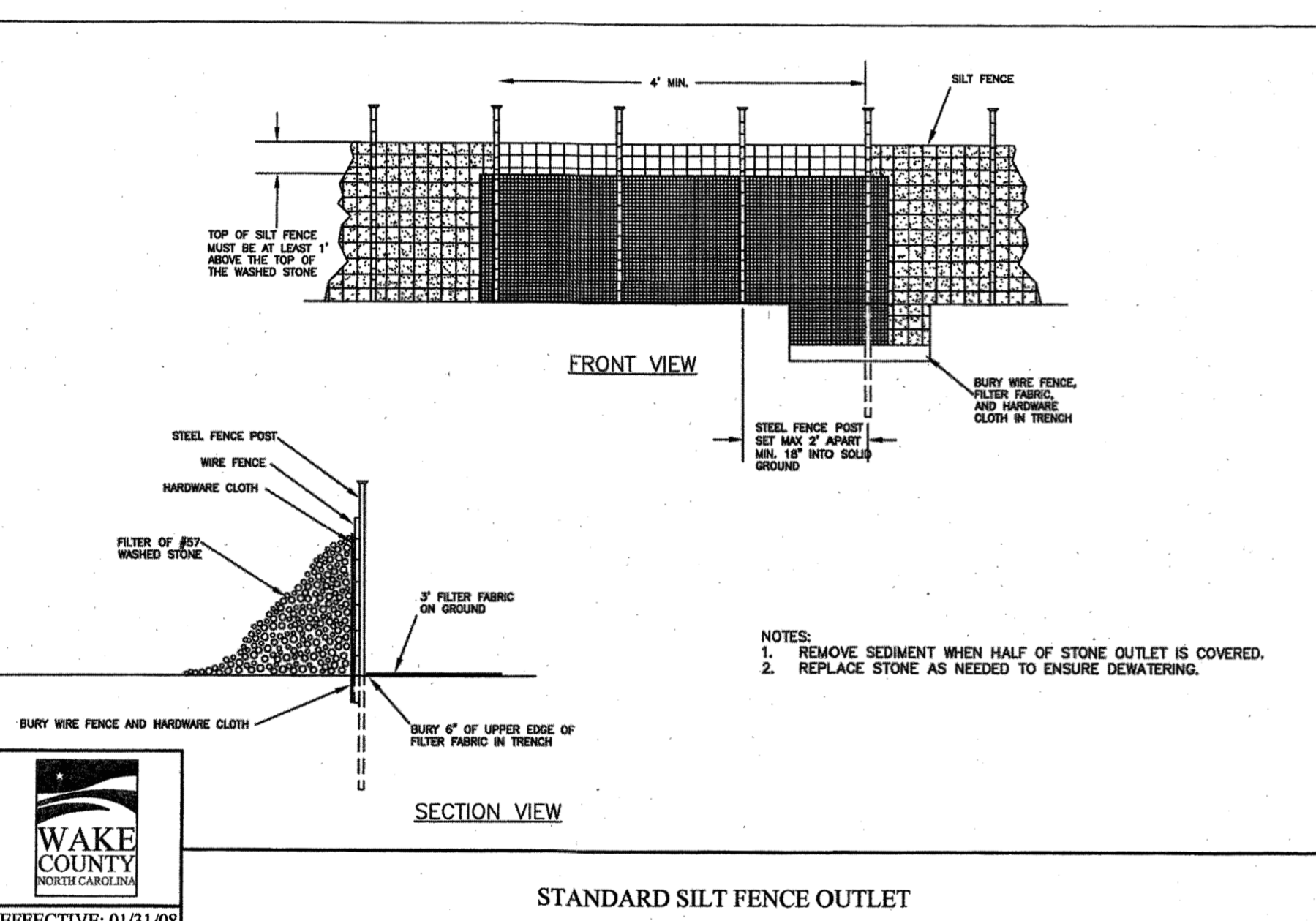
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BY: *[Signature]* DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8/18/2020  
ADMINISTRATOR



**TIMMONS GROUP**  
NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**EROSION AND SEDIMENT CONTROL DETAILS**

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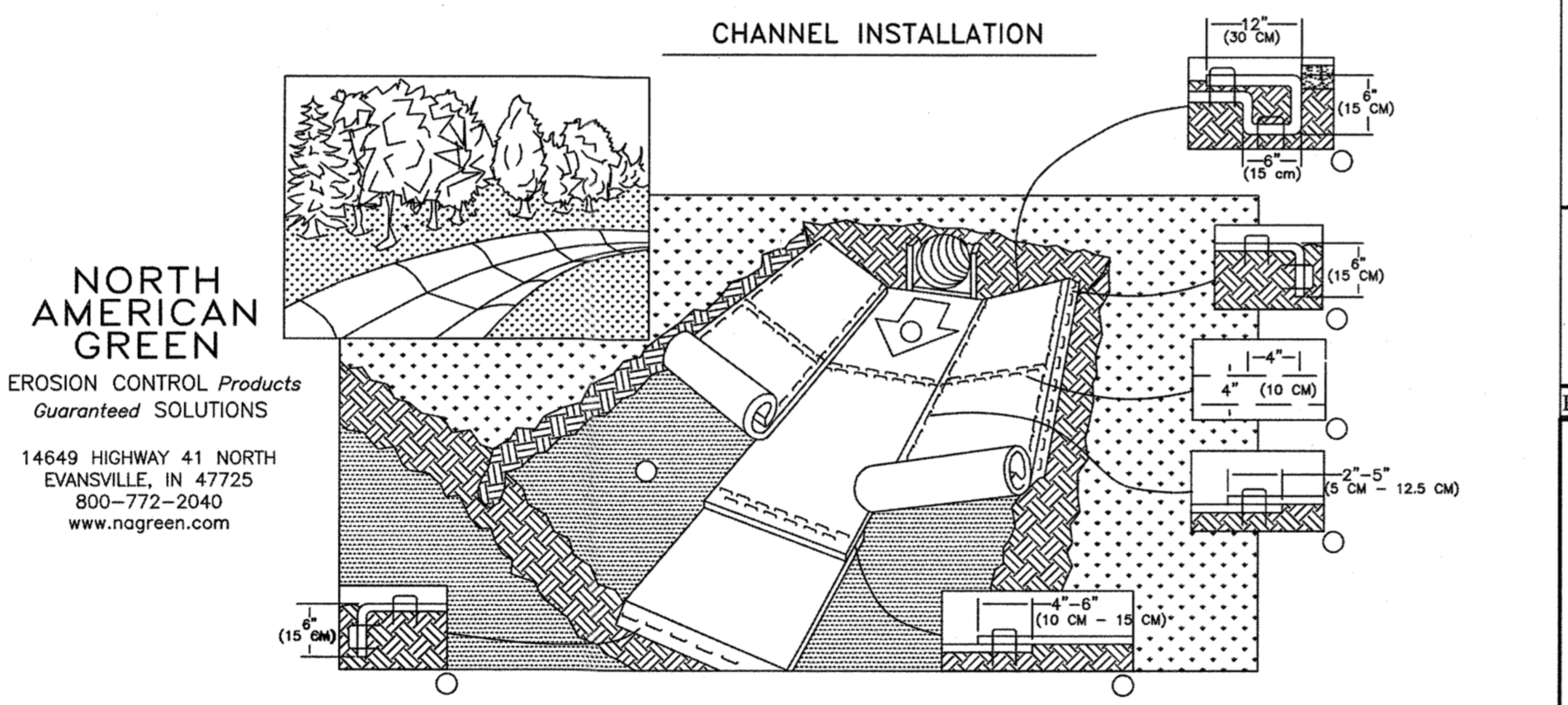
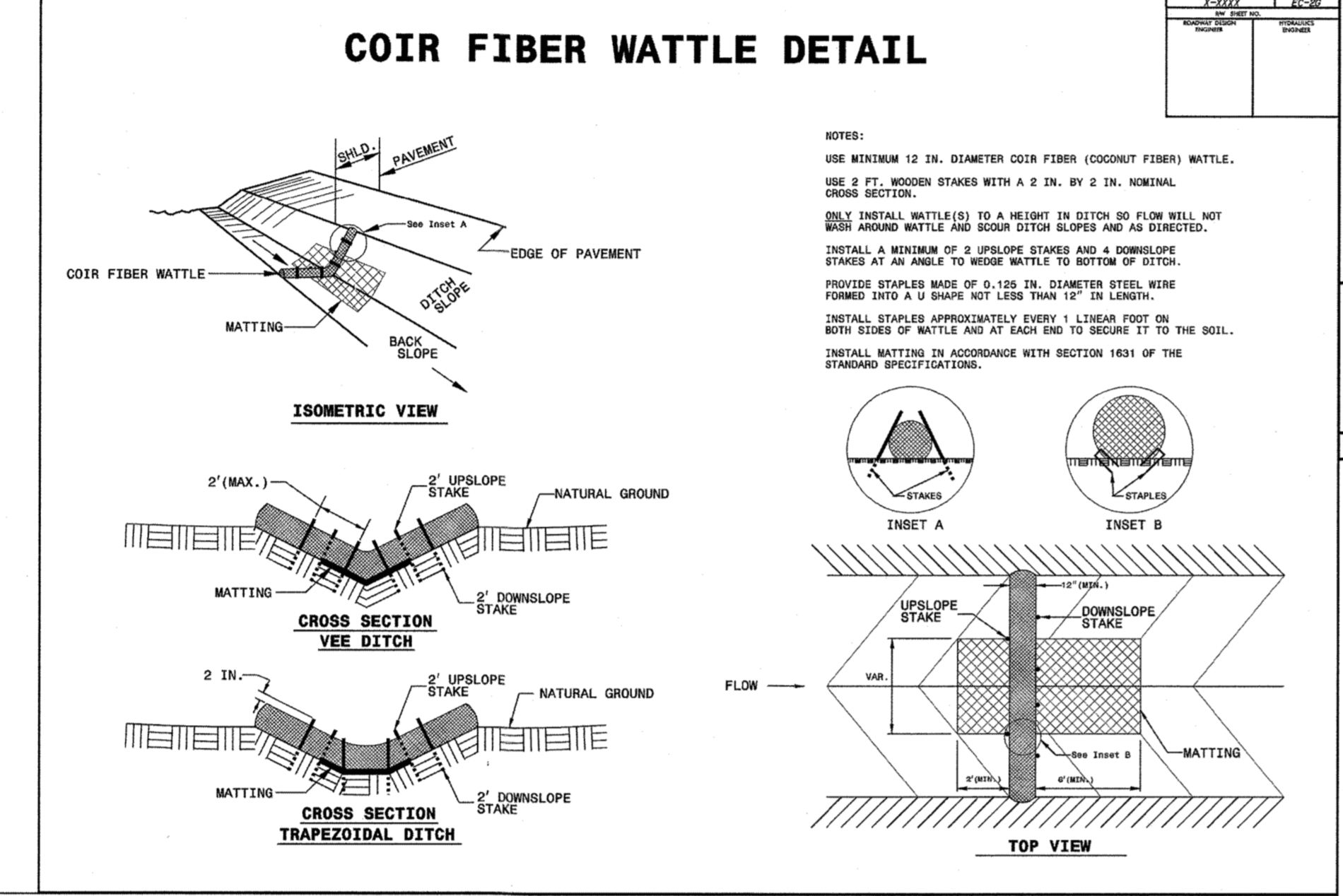
DRAWN BY: J.D. MACMILLAN  
DESIGNED BY: J.D. MACMILLAN  
CHECKED BY: M. ZACCARDO  
SCALE:

JOB NO. 44872  
SHEET NO. C7.5

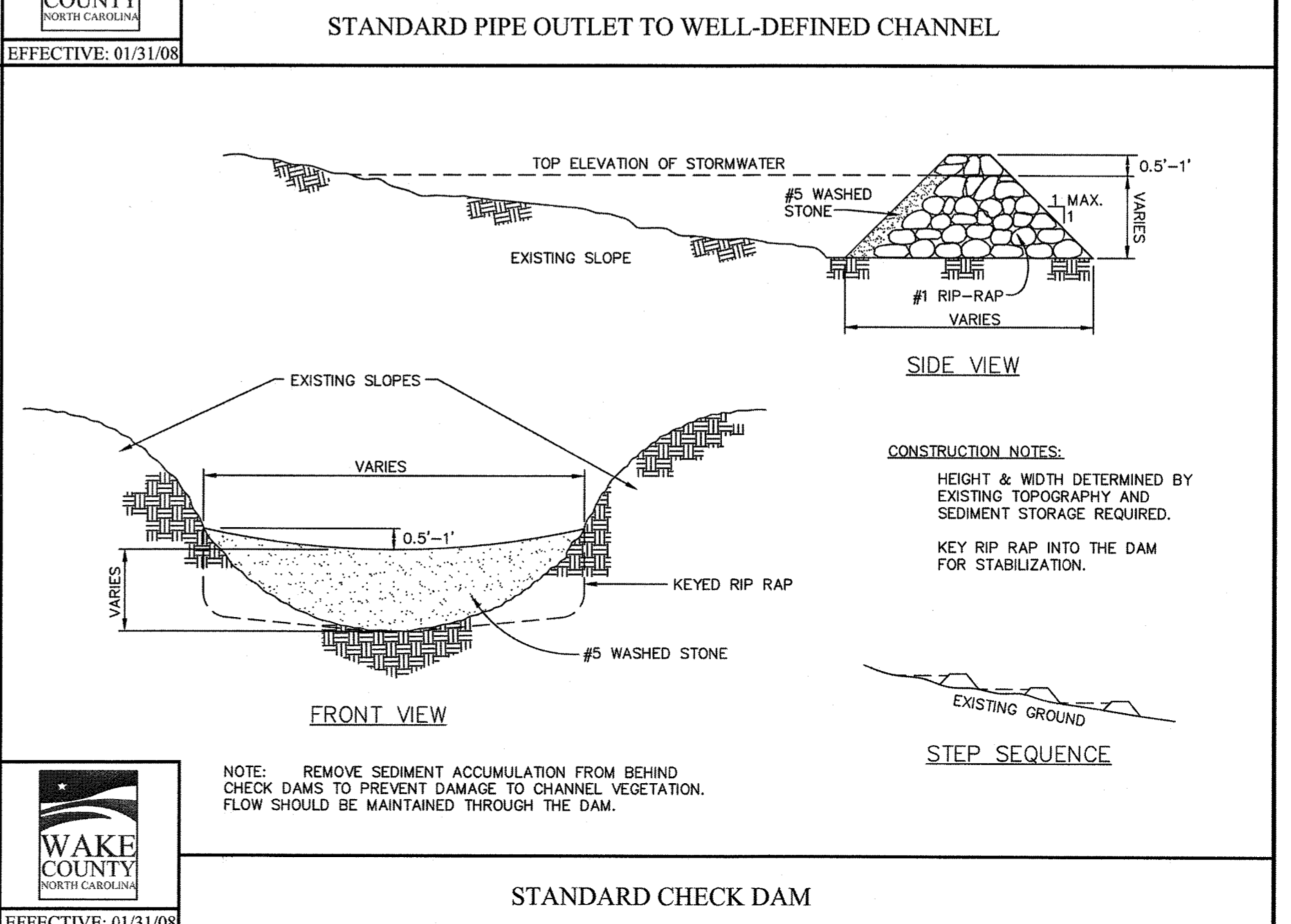
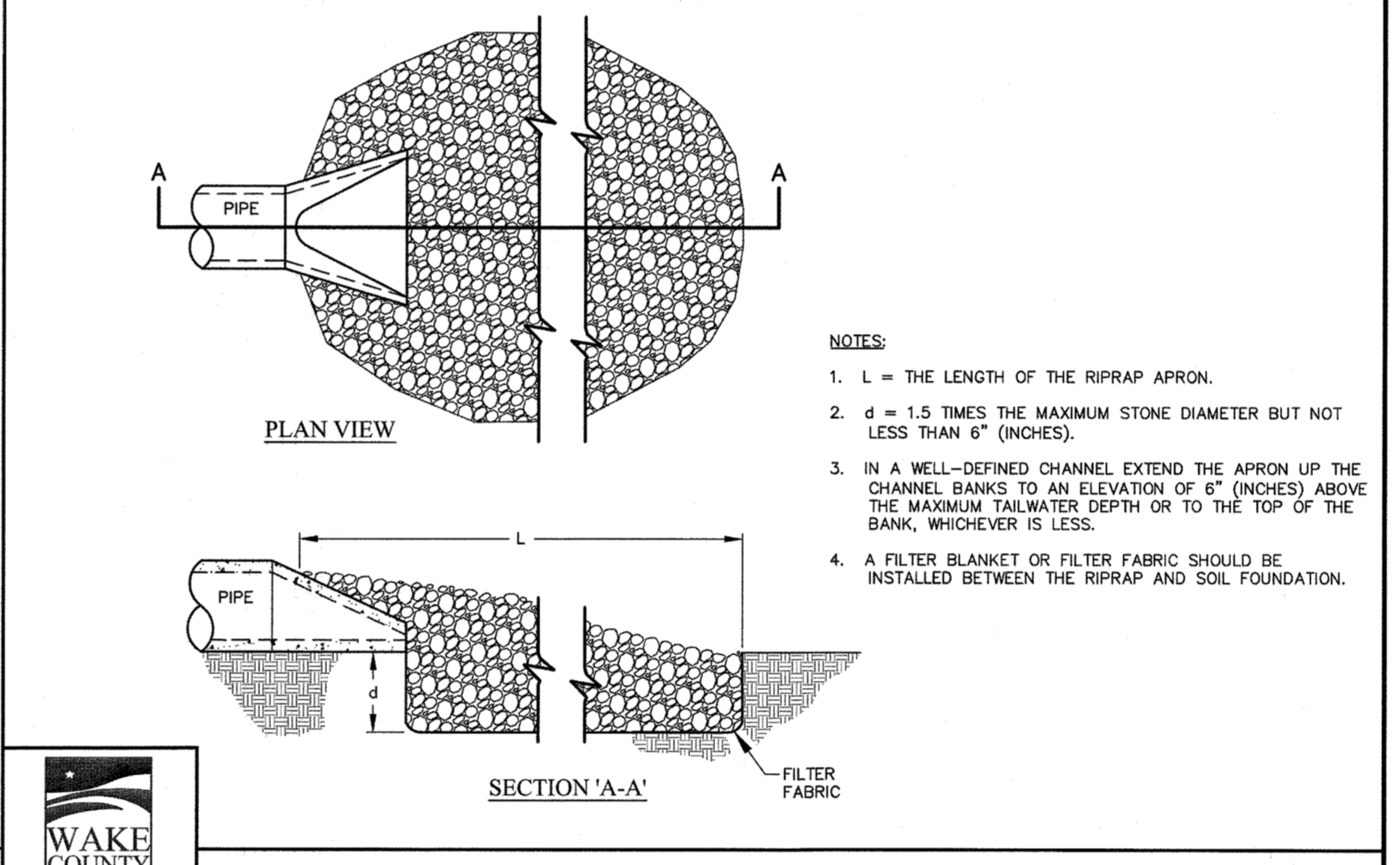
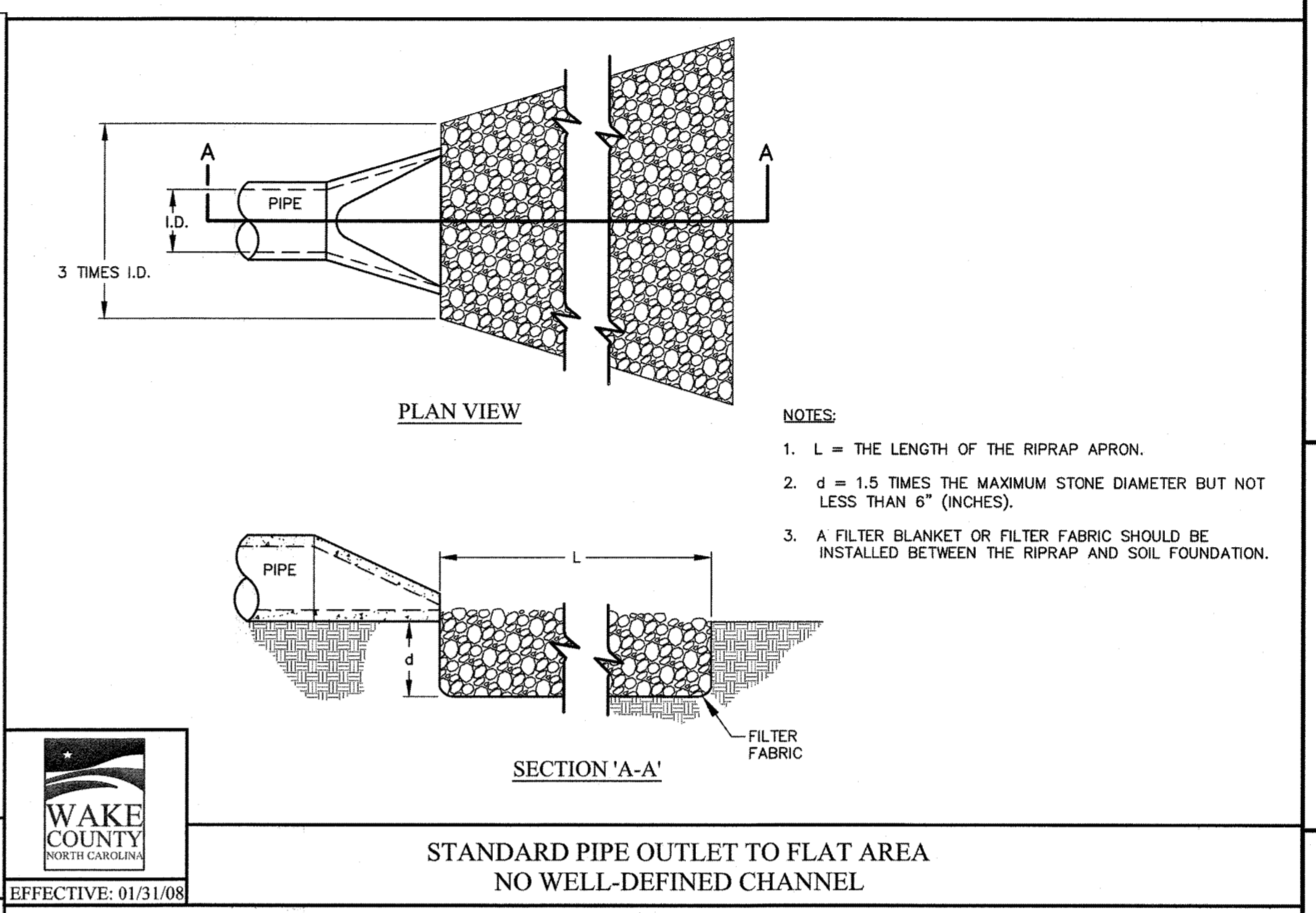
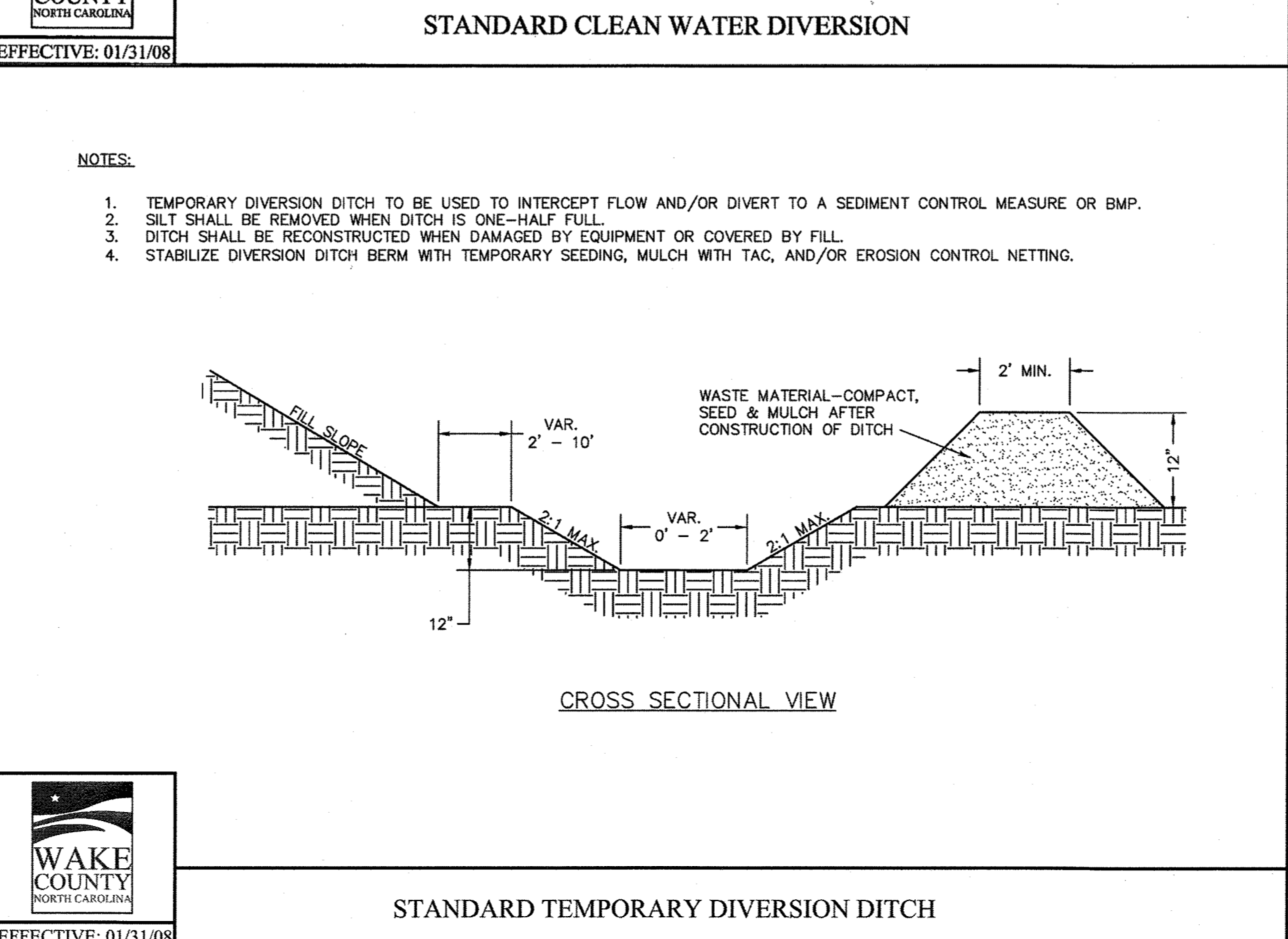
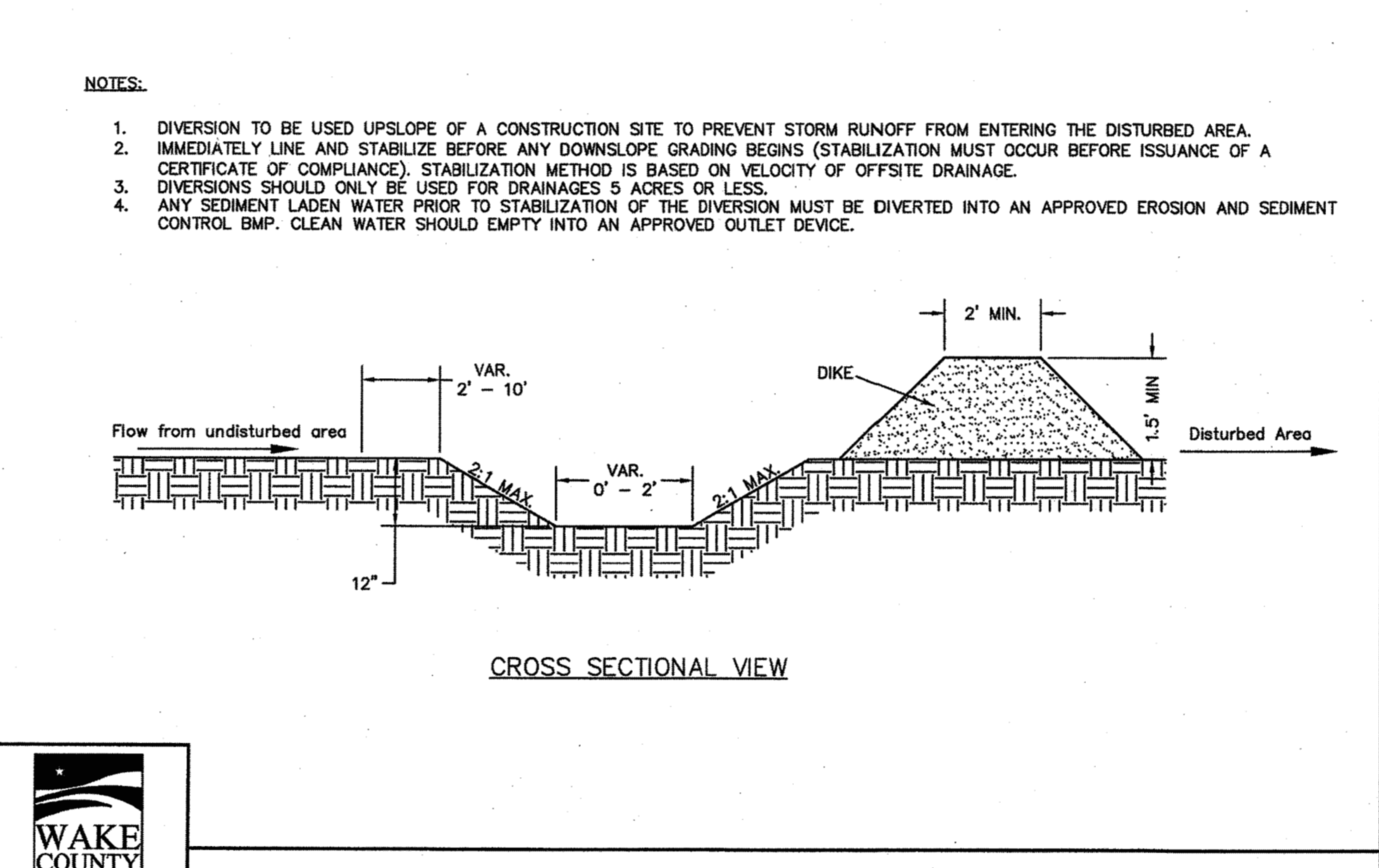
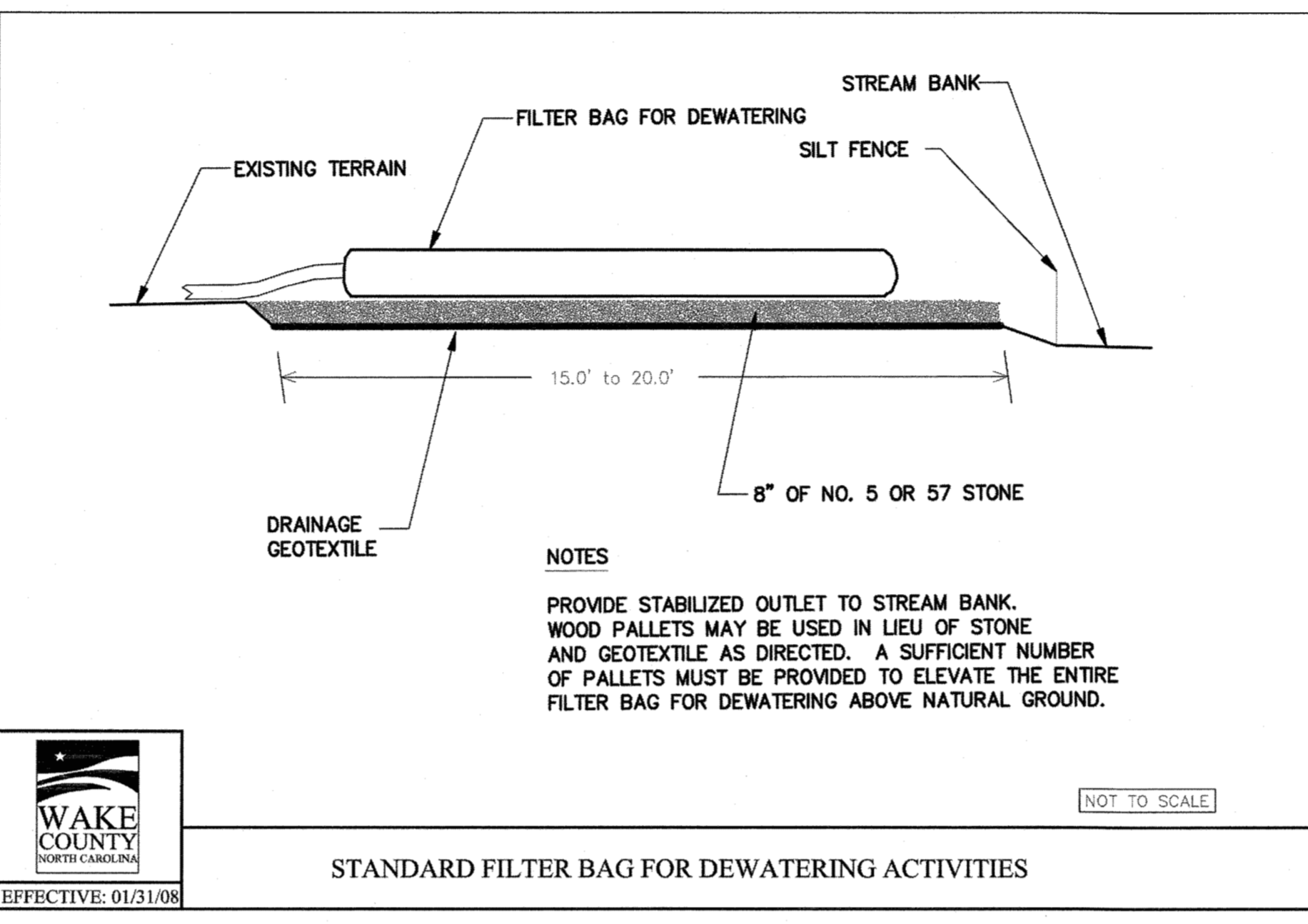
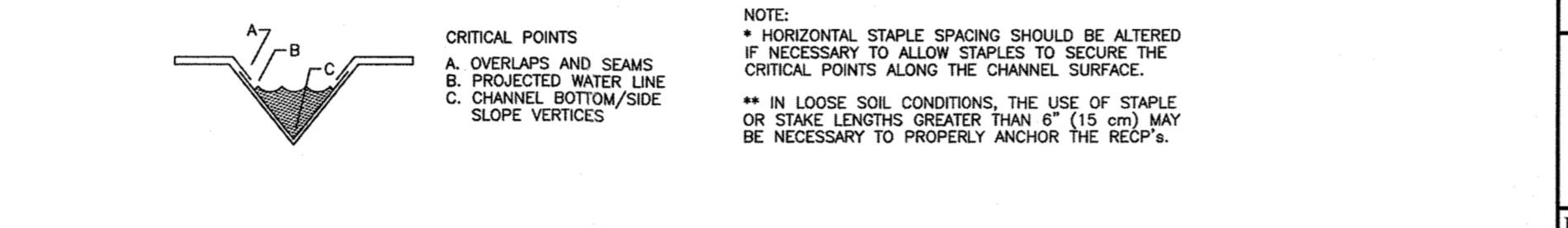
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s:\331\44872-stone-allver\DWG\Sheet\CAD\STONE RIVER - HARDIN HILL LANE\CD-NDT.dwg | by JD MacMillan



- PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP'S), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
  - BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP'S IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP'S EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP'S WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP'S BACK OVER SEED AND COMPACTED SOIL. SECURE RECP'S OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) ACROSS THE WIDTH OF THE RECP'S.
  - ROLL CENTER RECP'S IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP'S WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP'S MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
  - PLACE CONSECUTIVE RECP'S END OVER END (SHINGLE STYLE) WITH A 4" - 6" (10 CM - 15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER TO SECURE RECP'S.
  - FULL LENGTH EDGE OF RECP'S AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
  - ADJACENT RECP'S MUST BE OVERLAPPED APPROXIMATELY 2" - 5" (5 CM - 12.5 CM) (DEPENDING ON RECP'S TYPE) AND STAPLED.
  - IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 M - 12 M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
  - THE TERMINAL END OF THE RECP'S MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- NOTE:**  
\* IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE RECP'S.



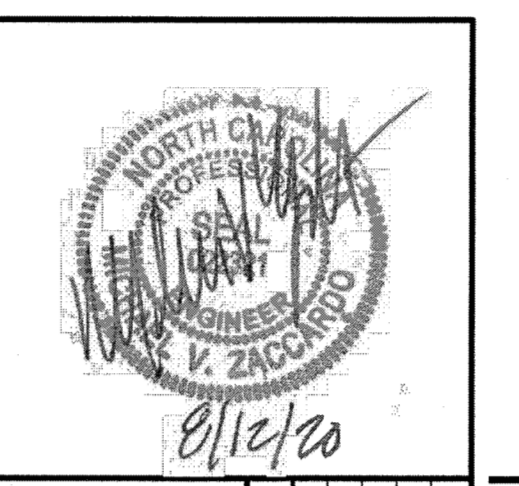
### TOWN CERTIFICATION

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BY: *[Signature]* DATE: 8-21-2020  
DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8-19-2020  
ADMINISTRATOR



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DRAWN BY: JD. MACMILLAN  
DESIGNED BY: JD. MACMILLAN  
CHECKED BY: M. ZACCARDO  
SCALE:

# TIMMONS GROUP

NORTH CAROLINA LICENSE NO. C-1652  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

## HARDIN HILL SPINE ROAD EXTENSION EROSION AND SEDIMENT CONTROL DETAILS

JOB NO. 44872  
SHEET NO. C7.6

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**SEEDBED PREPARATION**

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL THREE INCHES DEEP OVER ADVERSE SOIL CONDITIONS, IF AVAILABLE.
2. RIP THE ENTIRE AREA TO SIX INCHES DEEP.
3. REMOVE ALL LOOSE ROCK, ROOTS AND OTHER OBSTRUCTIONS, LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. APPLY AGRICULTURAL LIME, FERTILIZER AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL (SEE MIXTURE BELOW).
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM, REASONABLY UNIFORM SEEDBED IS PREPARED FOUR TO SIX INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER SEED LIGHTLY WITH SEEDING EQUIPMENT OR CULTIPACK AFTER SEEDING.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDING AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. IF STAND SHOULD BE MORE THAN 80% DAMAGED, RE-ESTABLISH FOLLOWING THE ORIGINAL LIME, FERTILIZER AND SEEDING RATES.
9. CONSULT SAEC ENVIRONMENTAL ENGINEERS ON MAINTENANCE TREATMENT AND FERTILIZATION AFTER PERMANENT COVER IS ESTABLISHED.

**MIXTURE**

AGRICULTURAL LIMESTONE	2 TONS/ACRE - SMALL GRAIN STRAW
FERTILIZER	1,000 LBS/ACRE - 10-10-10
SUPERPHOSPHATE	500 LBS/ACRE - 20% ANALYSIS
MULCH	2 TONS/ACRE - SMALL GRAIN STRAW
ANCHOR	2 TONS/ACRE - SMALL GRAIN STRAW

\*\*\*TEMPORARY, RESEED ACCORDING TO OPTIMUM SEASON FOR DESIRED PERMANENT VEGETATION. DO NOT ALLOW TEMPORARY COVER TO GROW MORE THAN 12" IN HEIGHT BEFORE MOWING; OTHERWISE, FESCUE MAY BE SHADED OUT.

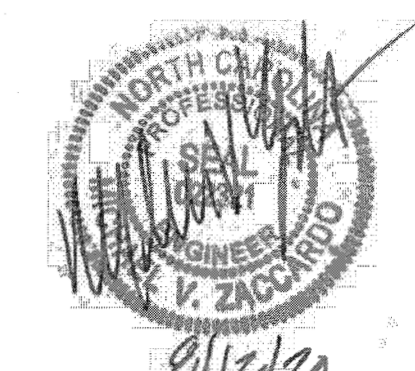
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BY: *S. J. MacMillan* DATE: 8/21/2020  
DEVELOPMENT SERVICES ENGINEER

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BY: *M. Zaccardo* DATE: 8/18/2020  
ADMINISTRATOR



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	CHECKED BY M. ZACCARDO
	SCALE

**TIMMONS GROUP**  
NORTH CAROLINA LICENSE NO. C-1652

**HARDIN HILL SPINE ROAD EXTENSION**  
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA

**EROSION AND SEDIMENT CONTROL DETAILS**

JOB NO. 44872  
SHEET NO. C7.7

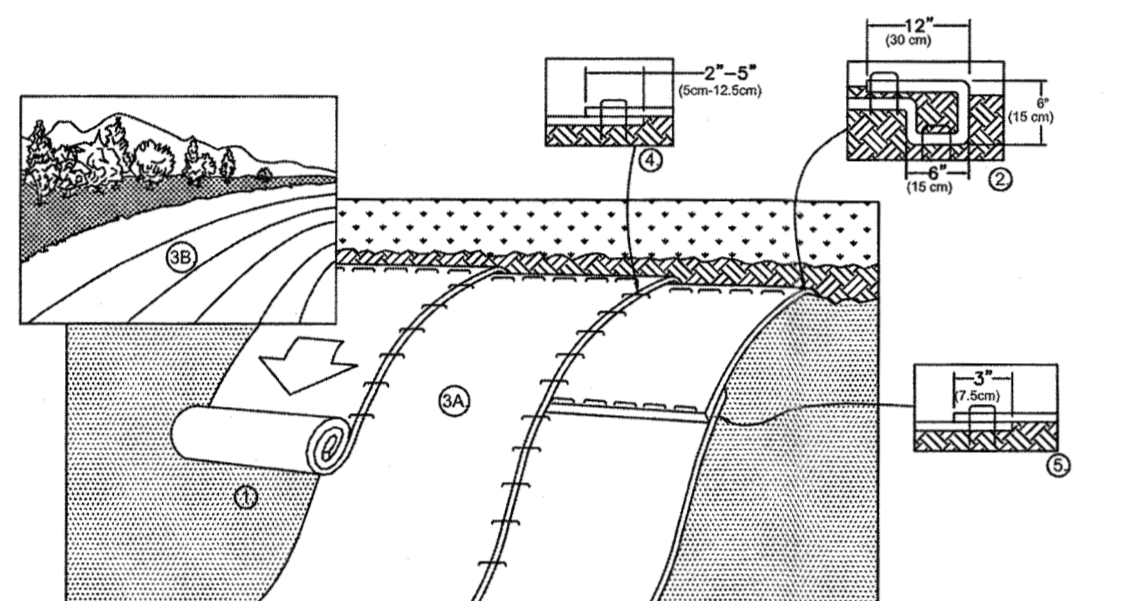
**SEEDING SCHEDULE**

**FOR SHOULDERS, SIDE DITCHES, SLOPES (MAX. 3:1):**

DATE	TYPE	PLANTING RATE
AUG 15 - NOV 1	TALL FESCUE	300 LBS/ACRE
NOV 1 - MAR 1	TALL FESCUE & ABRUZZI RYE	300 LBS/ACRE
MAR 1 - APR 15	TALL FESCUE	300 LBS/ACRE
APR 15 - JUN 30	HULLED COMMON BERMUDAGRASS	25 LBS/ACRE
JUL 1 - AUG 15	TALL FESCUE AND BROWNTOP MILLET OR SORGHUM-SUDAN HYBRIDS**	125 LBS/ACRE (TALL FESCUE); 35 LBS/ACRE (BROWNTOP MILLET); 30 LBS/ACRE (SORGHUM-SUDAN HYBRIDS)**

**FOR SHOULDERS, SIDE DITCHES, SLOPES (3:1 TO 2:1):**

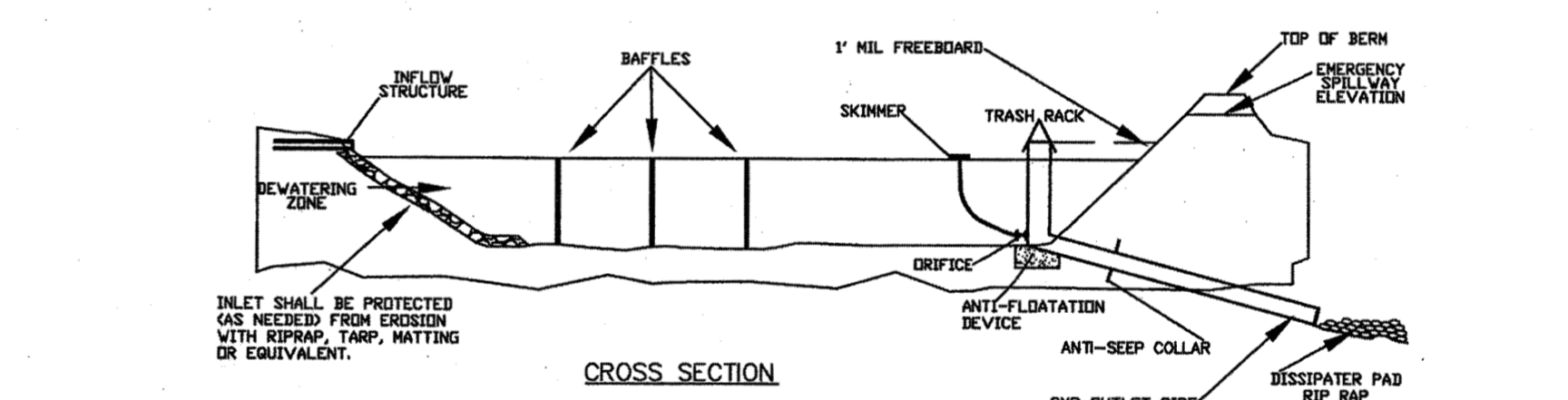
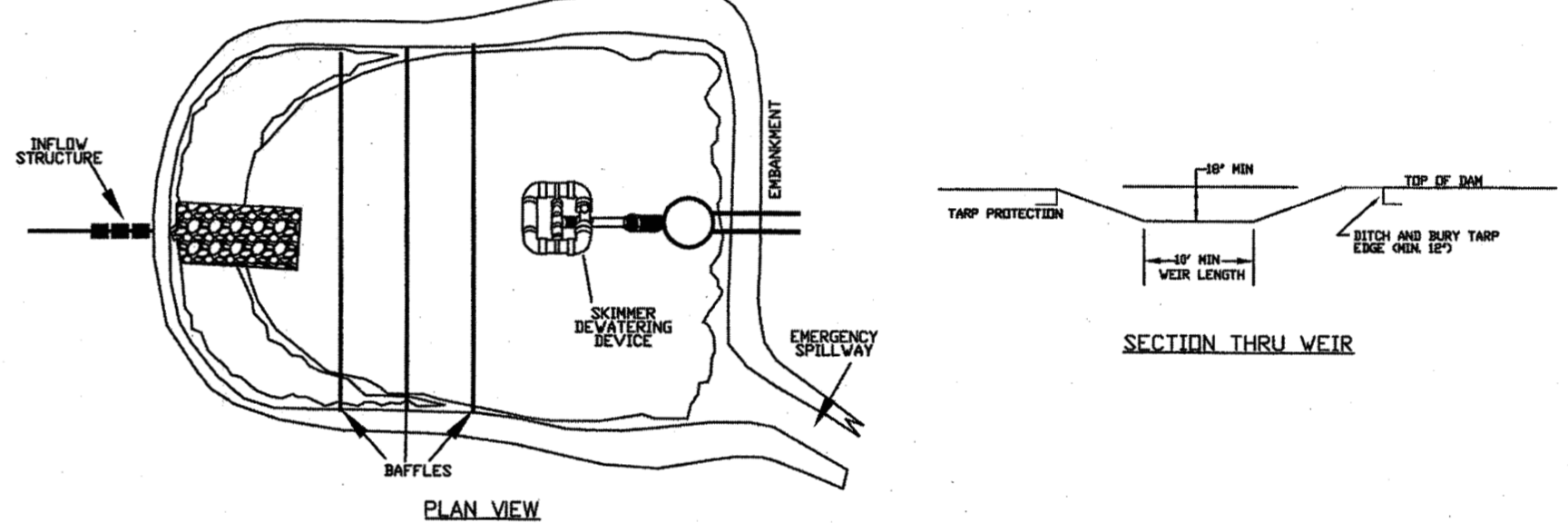
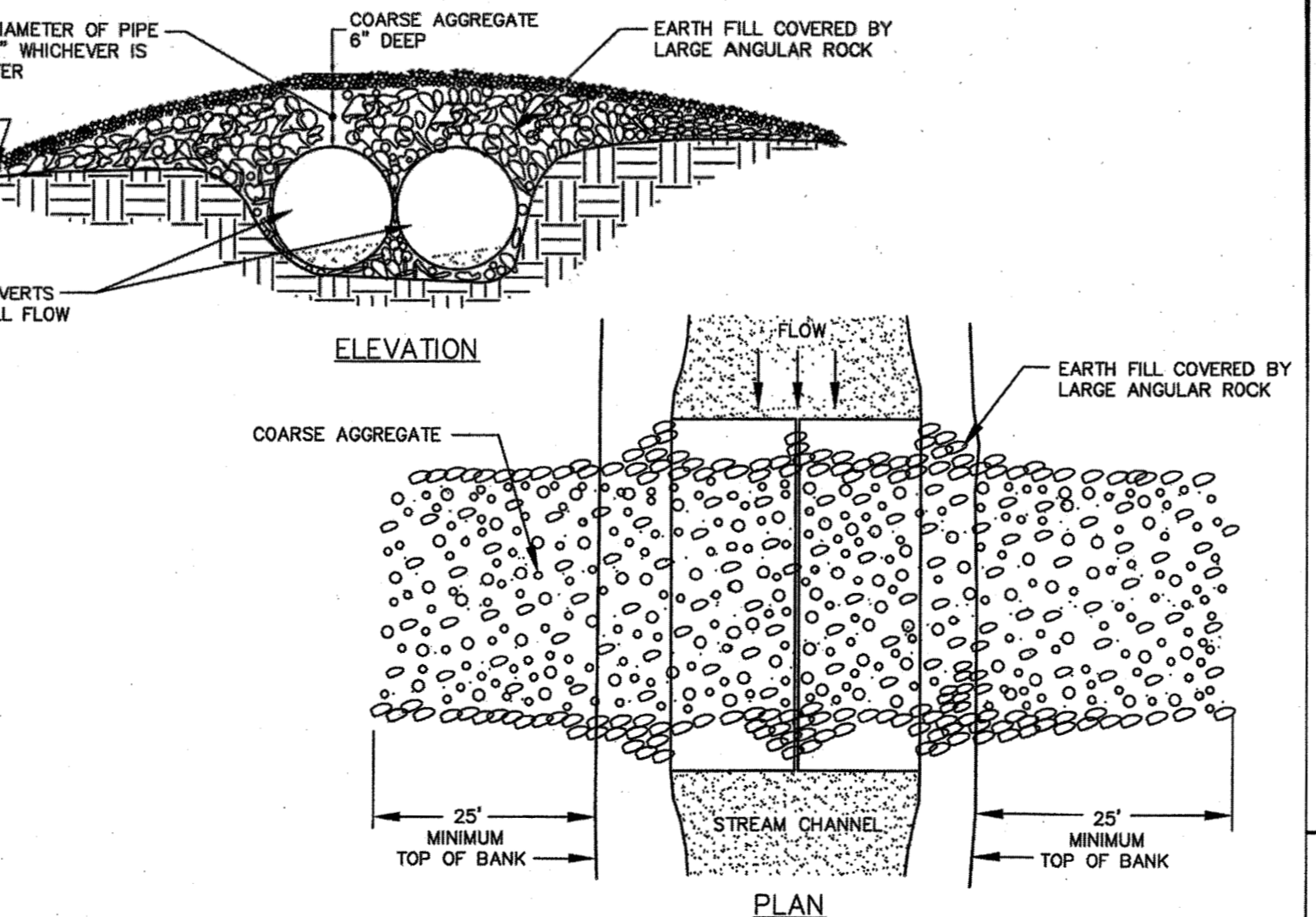
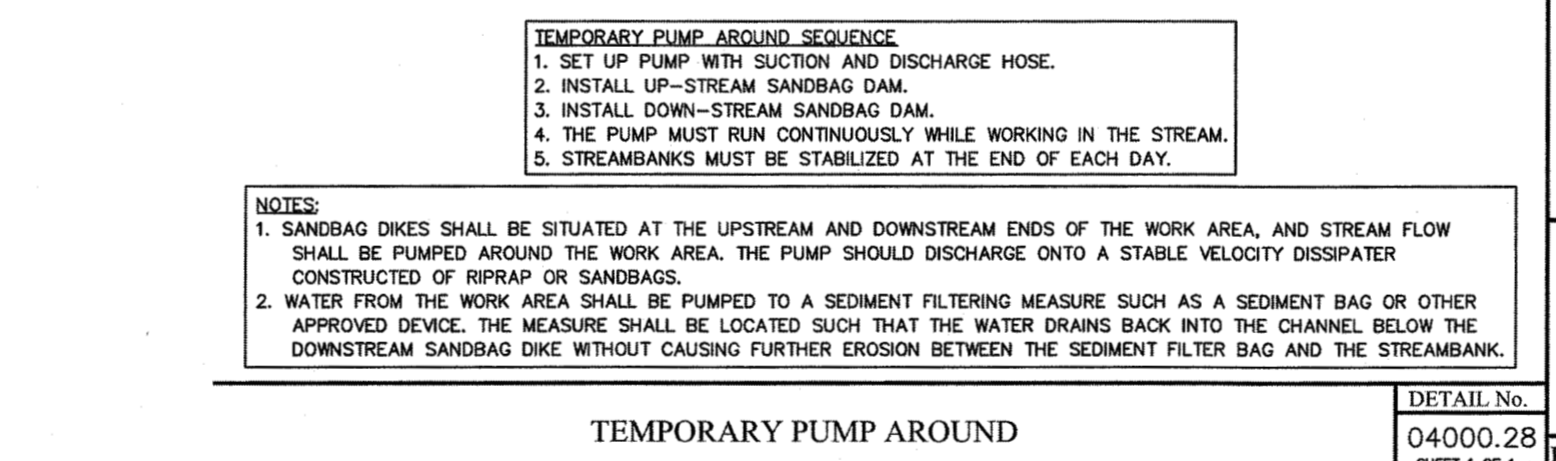
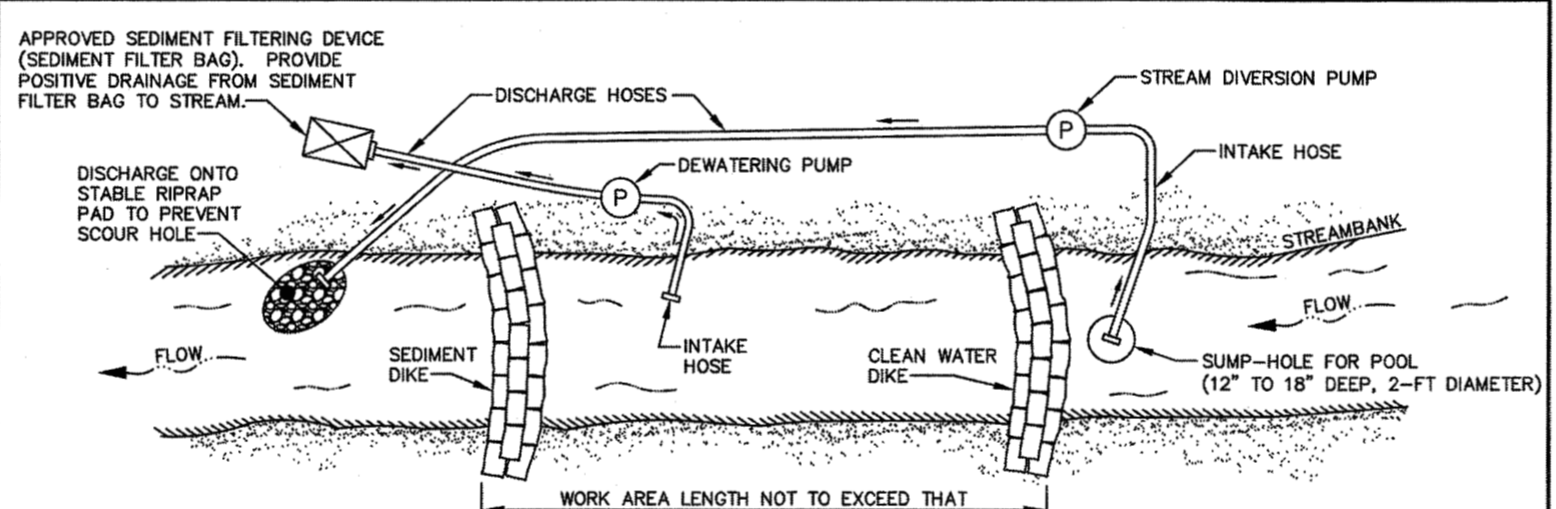
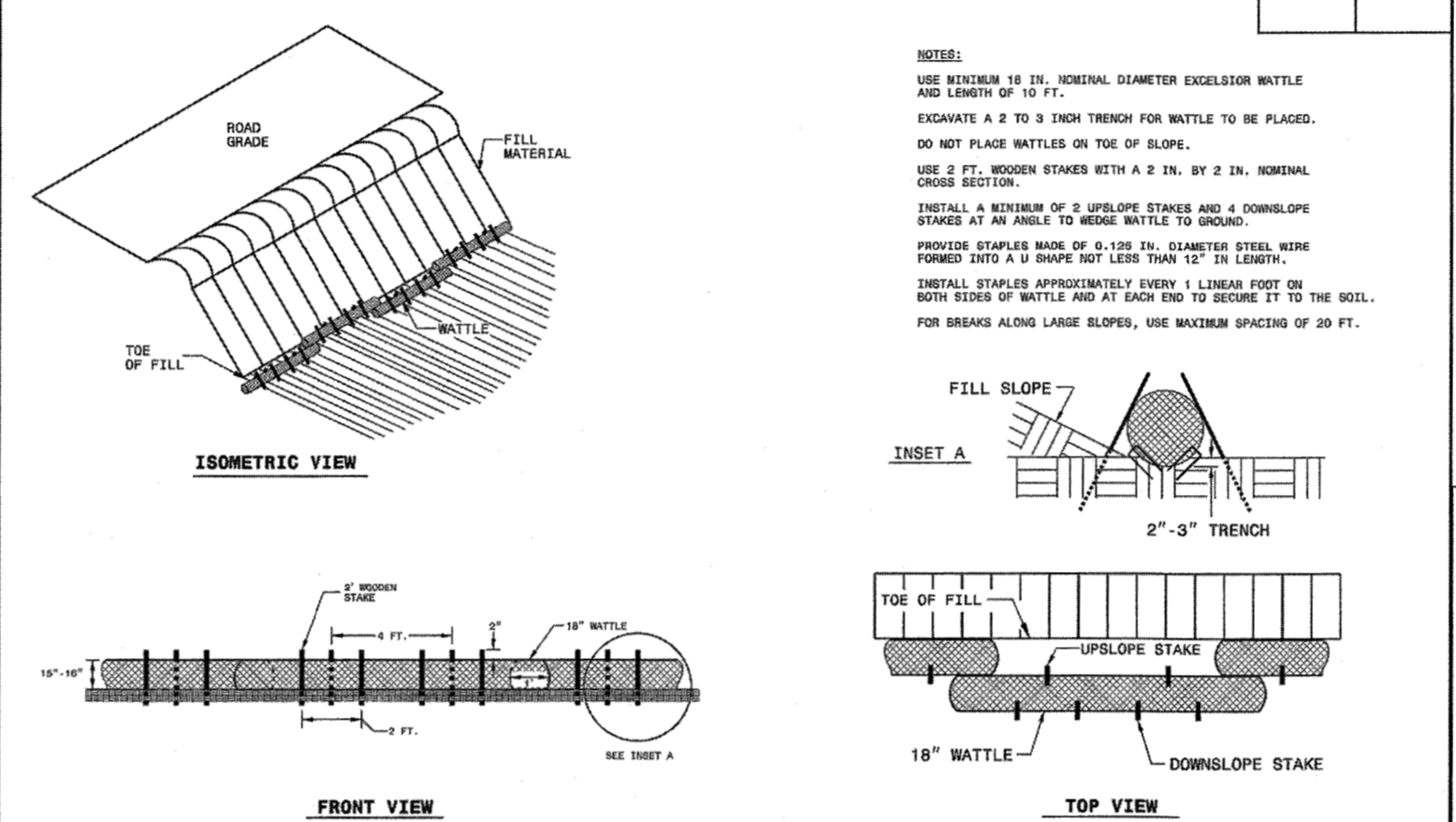
DATE	TYPE	PLANTING RATE
MAR 1 - JUN 1	SERICEA LESPEDEZA (SCARIFIED) AND USE THE FOLLOWING COMBINATIONS:	50 LBS/ACRE (SERICEA LESPEDEZA)
MAR 1 - APR 15	ADD TALL FESCUE	120 LBS/ACRE
MAR 1 - JUN 30	OR ADD WEEPING LOVE GRASS	10 LBS/ACRE
MAR 1 - JUN 30	OR ADD HULLED COMMON BERMUDAGRASS	25 LBS/ACRE
JUN 1 - SEP 1	TALL FESCUE AND BROWNTOP MILLET OR SORGHUM-SUDAN HYBRIDS**	120 LBS/ACRE (TALL FESCUE); 35 LBS/ACRE (BROWNTOP MILLET); 30 LBS/ACRE (SORGHUM-SUDAN HYBRIDS)**
SEP 1 - MAR 1	SERICEA LESPEDEZA (UNHULLED - UNSCARIFIED) AND TALL FESCUE	70 LBS/ACRE (SERICEA LESPEDEZA); 120 LBS/ACRE (TALL FESCUE)
NOV 1 - MAR 1	AND ABRUZZI RYE	25 LBS/ACRE



**MAINTENANCE**  
INSPECT MATTING ONCE A WEEK AND AFTER EACH RAINFALL. IF WASHOUT, BREAKAGE OR EROSION OCCURS, REPAIR SURFACE, RESEED, REMULCH AND INSTALL NEW NETTING AND ANCHORS AS REQUIRED. CONTINUE INSPECTIONS UNTIL VEGETATION IS FIRMLY ESTABLISHED.

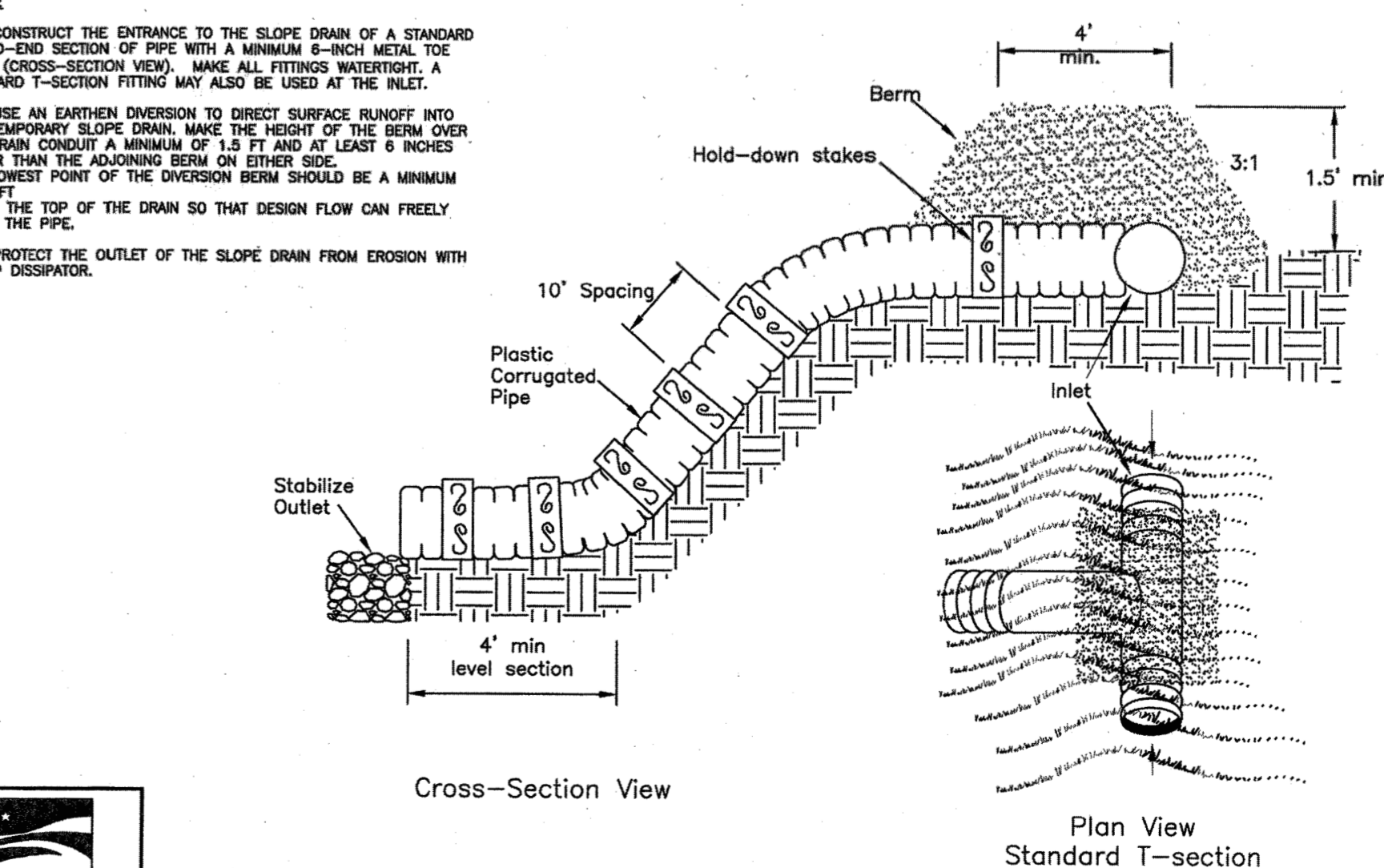
**SLOPE INSTALLATION AND STABILIZATION**  
NOT TO SCALE

**WATTLE BARRIER DETAIL**



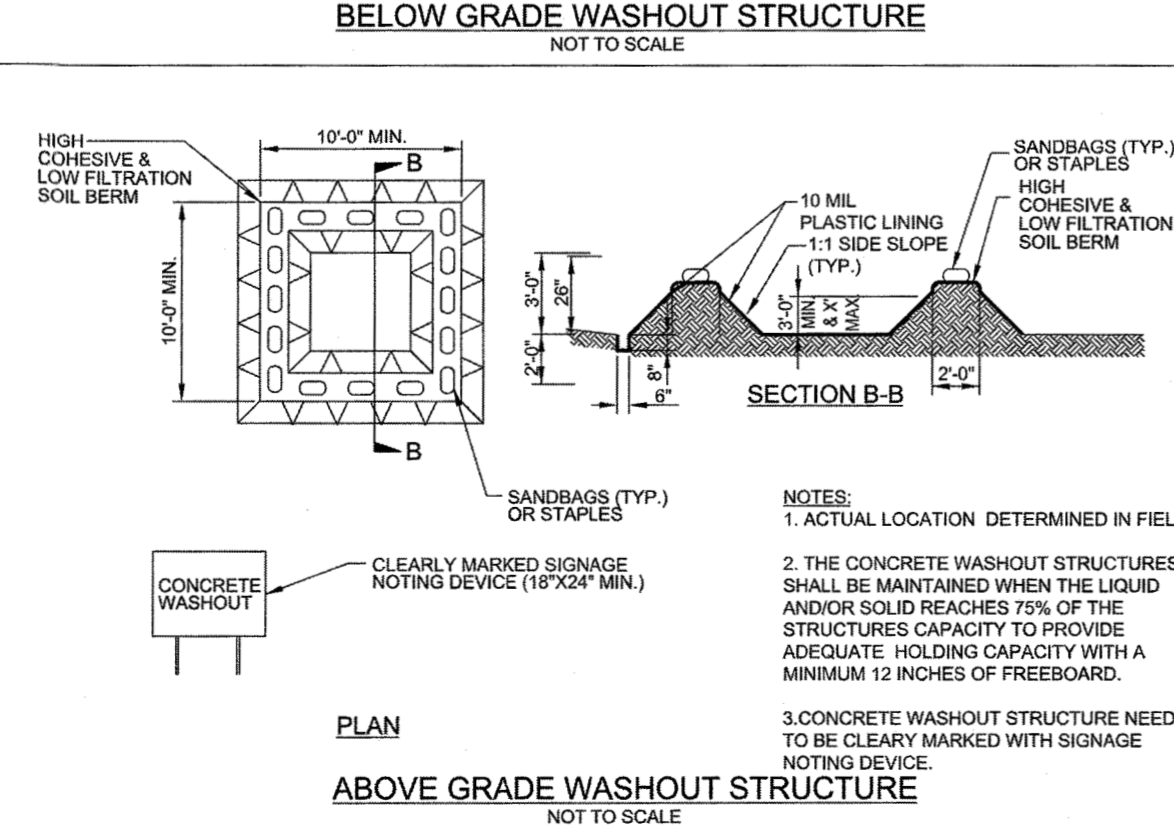
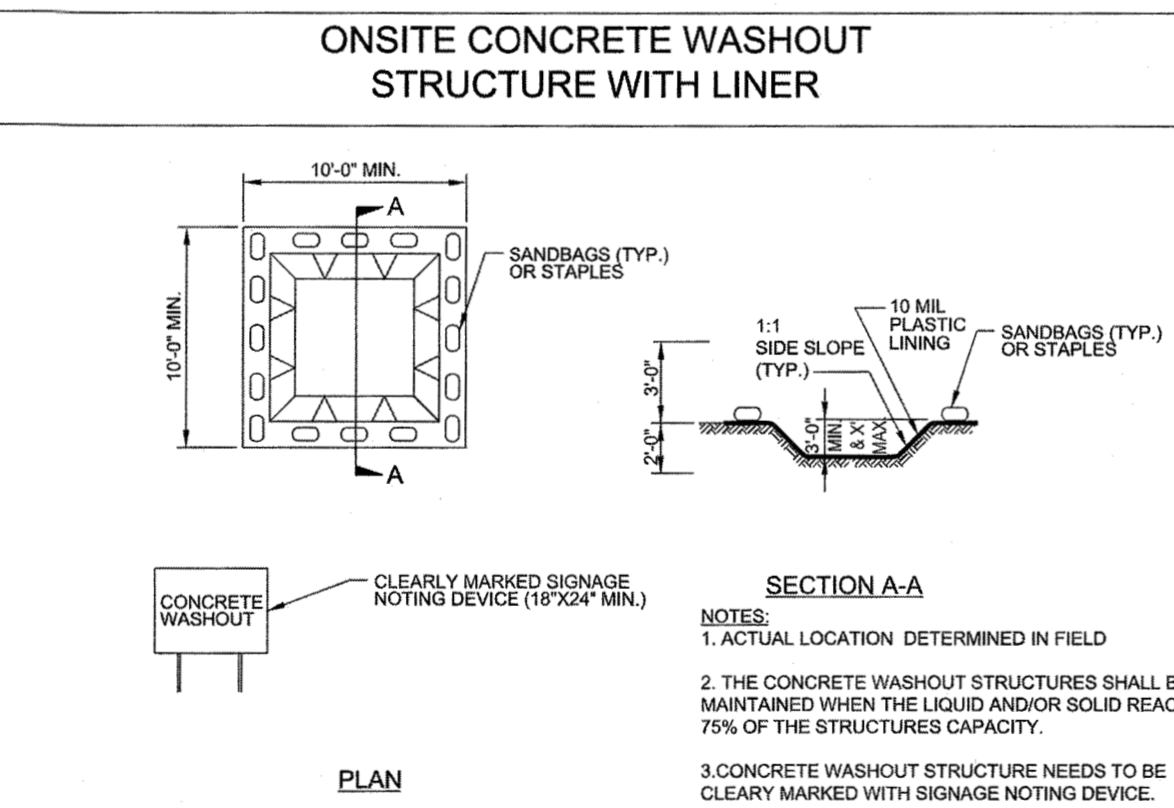
**NOTES:**

- 1) BASIN SHOULD BE CLEANED OUT WHEN CAPACITY REACHES AN ELEVATION REPRESENTING THAT THE BASIN IS HALF-FULL.
- 2) THE TARP USED TO PROTECT THE WEIR SHALL BE THE WIDTH SPECIFIED. THE LENGTH OF THE TARP SHALL BE ACCORDING TO AVAILABLE SUPPLY. IF MULTIPLE TARPS ARE TO BE USED, THEN TARPS SHALL BE OVERLAPPED AT LEAST 12". THE UPSTREAM 12" TARP SHALL OVERLAP THE DOWNSTREAM TARP. THE TARP SHALL BE 50 MIL HEAVY DUTY SILVER TARP/AULIUMS OR EQUIVALENT FOR UV RESISTANCE.
- 3) PROVIDE A MINIMUM OF THREE POROUS BAFFLES TO EVENLY DISTRIBUTE FLOW ACROSS THE BASIN, REDUCING TURBULENCE.
- 4) BAFFLE MATERIAL MUST BE SECURED AT THE BOTTOM AND SIDES USING STAPLES OR BY TRENCING AS FOR A SILT FENCE.
- 5) MOST OF THE SEDIMENT WILL ACCUMULATE IN THE FIRST BAY, SO THIS SHOULD BE READILY AVAILABLE FOR MAINTENANCE.
- 6) DURING THE CONSTRUCTION PHASE OF THE PROJECT, PERMANENT STORMWATER RISER SHALL ONLY DEWATER FROM THE TOP OF PIPE.
- 7) POND SHALL NOT BE CONVERTED FOR STORMWATER USE UNTIL APPROVED BY ENVIRONMENTAL ENGINEER.



**STANDARD TEMPORARY SLOPE DRAIN**  
EFFECTIVE: 01/31/08

**WITH LINER, NO GRAVEL APPROACH**



**PRELIMINARY DESIGN NOT FOR CONSTRUCTION**

A:\331\44872-storm-water\DWG\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CD-NTD.dwg | by: J.D. MacMillan

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GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Table with 3 columns: Site Area Description, Stabilize within this many calendar days after ceasing land disturbance, and Timeframe variations. Rows include perimeter dikes, high quality water zones, slopes steeper than 3:1, slopes 3:1 to 4:1, and areas with slopes flatter than 4:1.

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Table with 2 columns: Temporary Stabilization and Permanent Stabilization. Lists various methods like grass seed, hydroseeding, mulch, and structural methods.

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

- 1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the NC DWR List of Approved PAMS/Flocculants.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the NC DWR List of Approved PAMS/Flocculants and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

- 1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

- 1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g. dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

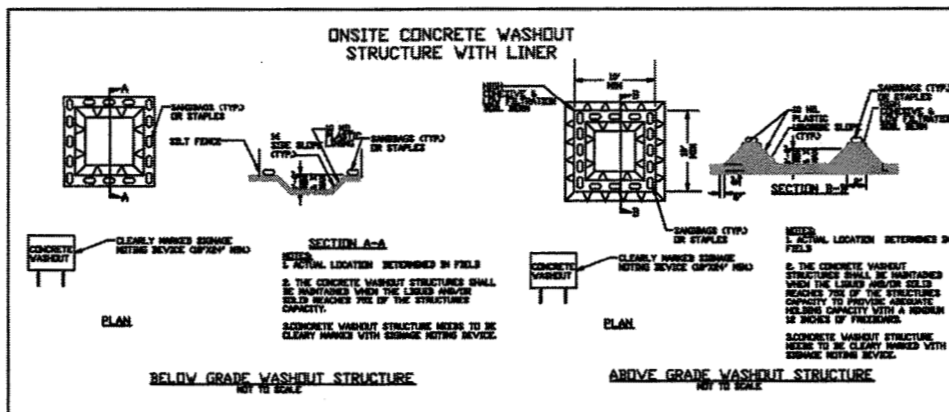
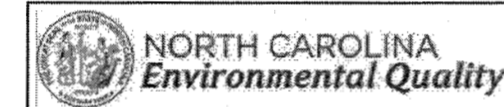
- 1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

- 1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

- 1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



CONCRETE WASHOUTS

- 1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this sheet.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

- 1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

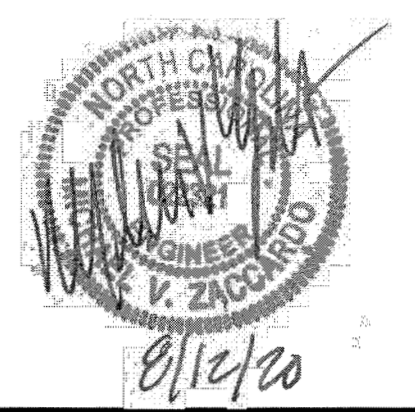
HAZARDOUS AND TOXIC WASTE

- 1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

TOWN CERTIFICATION

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: [Signature] DATE: 8-21-2020
DEVELOPMENT SERVICES ENGINEER
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
BY: [Signature] DATE: 8/18/2020
ADMINISTRATOR



NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19

PART III SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Table with 3 columns: Inspect, Frequency (during normal business hours), and Inspection records must include: (a) Rain gauge maintained in good working order, (b) E&S Measures, (c) Stormwater discharge outside (SDCA), (d) Perimeter of site, (e) Streams or wetlands on or offsite (where accessible), (f) Ground stabilization measures.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

The approved E&S plan as well as any approved deviation shall be kept on the site. The approved E&S plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&S plan shall be kept on site and available for inspection at all times during normal business hours.

Table with 2 columns: Item to Document and Documentation Requirements. Rows include (a) E&S Plan Documentation, (b) A phase of grading has been completed, (c) Ground cover is located and installed in accordance with the approved E&S plan, (d) The maintenance and repair requirements for all E&S measures have been performed, (e) Corrective actions have been taken to E&S measures.

2. Additional Documentation to be Kept on Site
In addition to the E&S plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

- (a) This General Permit as well as the Certificate of Coverage, after it is received.
(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years
All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported
Permittees shall report the following occurrences:
(a) Visible sediment deposition in a stream or wetland.
(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

- (c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.
(d) Anticipated bypasses and unanticipated bypasses.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements
After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Table with 2 columns: Occurrence and Reporting Timeframes (After Discovery) and Other Requirements. Rows include (a) Visible sediment deposition, (b) Oil spills and release of hazardous substances, (c) Anticipated bypasses, (d) Unanticipated bypasses, (e) Noncompliance with the conditions of this permit that may endanger health or the environment.

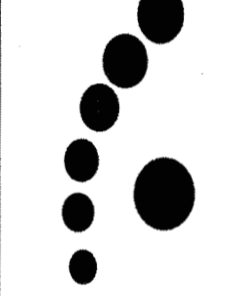
NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

THIS DRAWING PREPARED AT THE RALEIGH OFFICE
5410 Trinity Road, Suite 102 | Raleigh, NC 27607
TEL 919.866.4951 FAX 919.833.8124 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.
DATE: 08/12/2020

DRAWN BY: JD. MACMILLAN
DESIGNED BY: JD. MACMILLAN
CHECKED BY: M. ZACCARDO
SCALE:

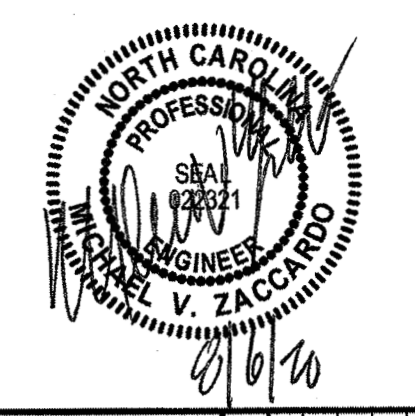


TIMMONS GROUP
NORTH CAROLINA LICENSE NO. C-1652
HARDIN HILL SPINE ROAD EXTENSION
KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA
EROSION AND SEDIMENT CONTROL DETAILS

JOB NO. 44872
SHEET NO. C7.8

RELEASED FOR CONSTRUCTION

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YOUR VISION ACHIEVED THROUGH OURS.

DATE: 08/06/2020  
 DRAWN BY: JD. MACMILLAN  
 DESIGNED BY: JD. MACMILLAN  
 CHECKED BY: M. ZACCARDO  
 SCALE: 1" = 80'

**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
**HARDIN HILL SPINE ROAD EXTENSION**  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
**LANDSCAPE PLAN**

REVISION DESCRIPTION

DATE

DATE: 08/06/2020

DRAWN BY: JD. MACMILLAN

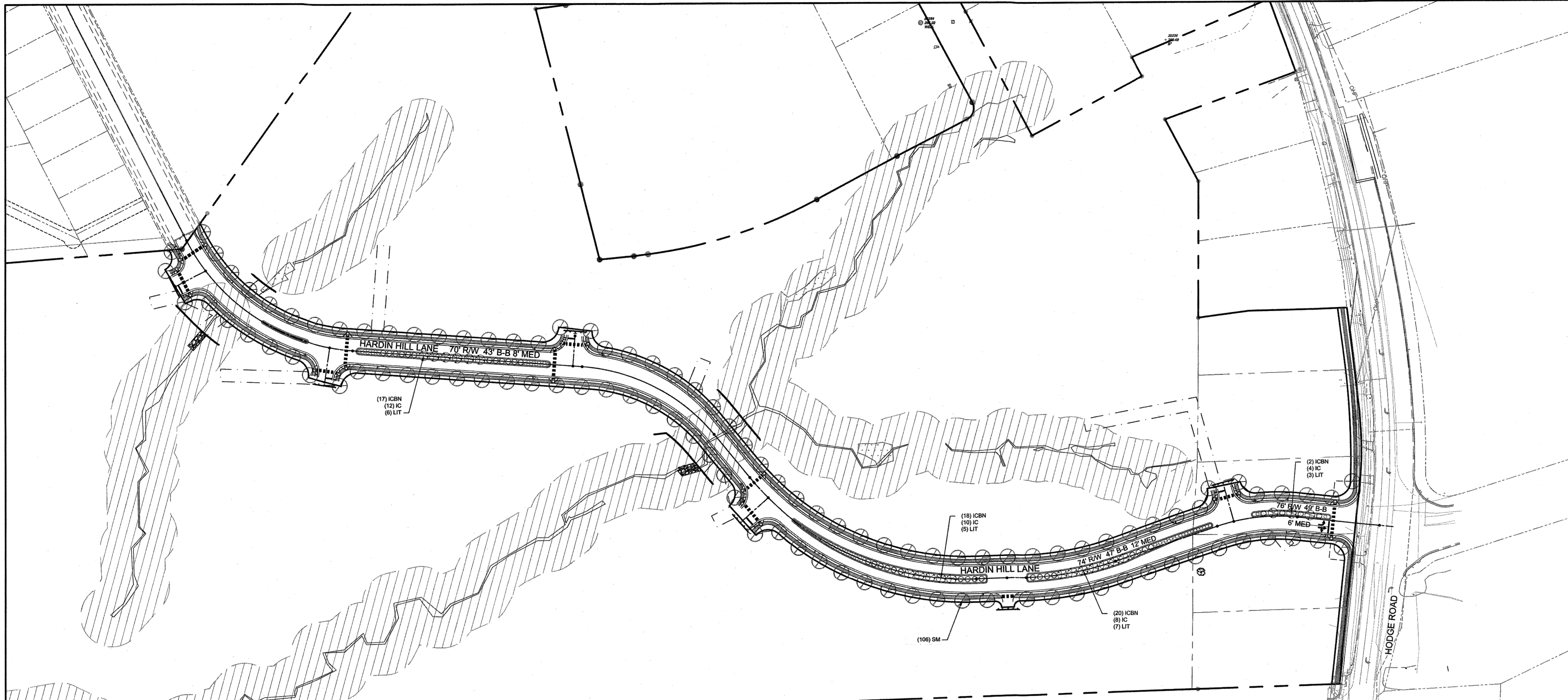
DESIGNED BY: JD. MACMILLAN

CHECKED BY: M. ZACCARDO

SCALE: 1" = 80'

JOB NO. 44872  
 SHEET NO. C8.0

RELEASED FOR CONSTRUCTION



KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HEIGHT	ROOT	COMMENTS
SM	Acer saccharum 'Bonfire'	Sugar Maple	106	2" Cal.	8' Min.	B&B	
ICBN	Ilex Cornuta 'Dwarf Buford'	Dwarf Buford Holly	57	18" HT/SPRD	18" HT/SPRD	CON	
IC	Ilex Crenata 'Helleri'	Helleri Holly	34	18" HT/SPRD	18" HT/SPRD	CON	
LIT	Lagerstroemia Indica 'Tuskegee'	Tuskegee Crape Myrtle	21	2" Cal.	6' Min	B&B or CON	

- NOTES:**
- CONTRACTOR SHALL CONTACT UTILITY LOCATOR SERVICE TO VERIFY ALL SUBSURFACE UTILITIES PRIOR TO AND DIGGING OR CONSTRUCTION ON THE SITE. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE RESULTING FROM HIS ACTIVITIES.
  - PLANT MATERIAL ON THIS SITE MUST BE INSTALLED IN CONFORMANCE WITH THE GENERAL PLANTING NOTES AND DETAILS ON THIS PLAN.
  - ALL SOD TO BE REBEL FESCUE IV, TURF GEM, LESCO OR EQUAL. ALL SEED TO BE REBEL FESCUE IV, TURF GEM, LESCO OR EQUAL @ 6 LBS. PER 1000 S.F.
  - ALL MULCH SHALL BE DOUBLE GROUND PINE BARK MULCH TO A DEPTH OF 4".
  - ALL ABOVE GROUND ELECTRICAL TRANSFORMERS, DUMPSTERS, AND BACKFLOW PREVENTION VALVE HOT BOXES SHALL BE SCREENED FROM VIEW WHILE MAINTAINING REQUIRED ACCESS TO LOCAL CODE STANDARDS AND REQUIREMENTS.
  - DO NOT ALTER PLANS WITHOUT PERMISSION FROM THE TOWN OF KNIGHTDALE AND THE DESIGN FIRM OR OWNER. NOTIFY THE DESIGN FIRM OF ANY DISCREPANCIES ON THE PLAN.
  - LANDSCAPE CONTRACTOR SHALL PROVIDE DESIGN BUILD IRRIGATION PROPOSAL TO THE OWNER FOR PROJECT AREAS TO BE SPECIFIED BY THE OWNER.
  - CONTRACTOR SHALL PROVIDE 6" PVC SLEEVES UNDER STREETS AND DRIVE AISLES FOR IRRIGATION LINES.
  - STREET TREES SHALL BE LOCATED BEHIND THE SIDEWALK.

**SCOPE OF WORK:**  
 Furnish all labor, materials, and equipment required or indicated by the drawings and specifications to complete the work including installation of all trees, shrubs, groundcover, annuals, seed, sod and mulch.

**MATERIALS AND WORK:**  
 The selection of all materials and the execution of all work required under the contract shall be subject to approval by the owner. The owner shall have the right to reject and all materials and any and all work, which in his opinion, does not meet the requirements of the contract.

**PLANT MATERIALS:**  
 All plant materials shall be nursery grown, freshly dug in the field, naturally shaped, well branched, fully foliated when in leaf with fully developed root systems. Trees must be self supporting, with straight trunks and leaders in tact. All plants must be free of disease, insect infestation or their eggs and shall have been grown in climatic conditions similar to those of the project site.

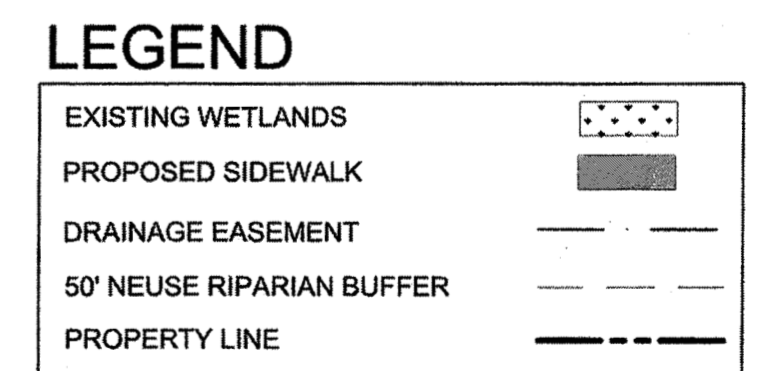
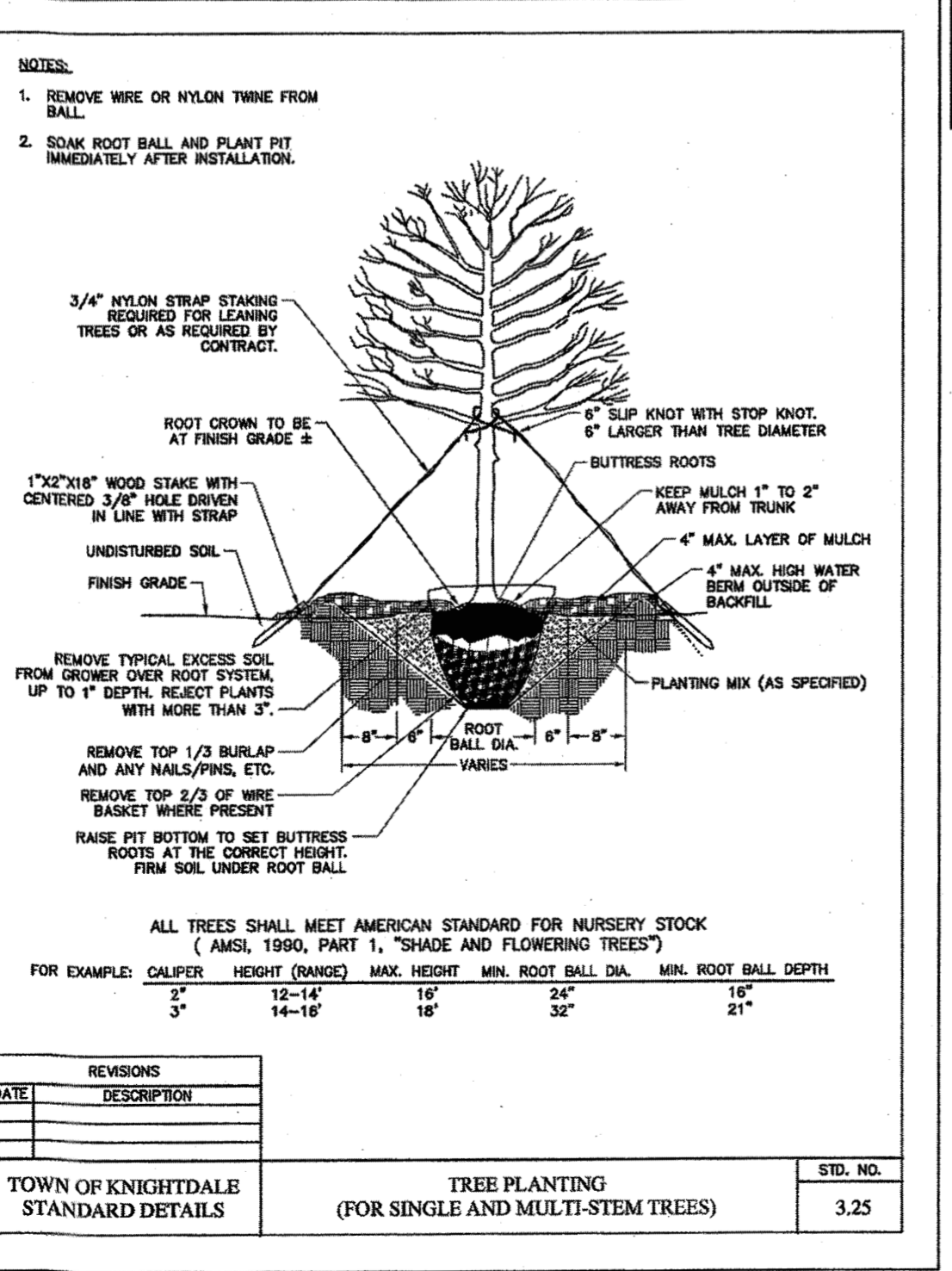
**PLANT SIZE:**  
 Specified sizes indicates the minimum allowable size at planting. Where container and height spreads are indicated for a single species, both size requirements shall be met. When only plant height or spread are indicated, container size shall be based on ANSI standards.

**ORGANIC MATTER:**  
 Aged manure, compost or pine bark fines, at the option of the contractor, material shall be air dried, finely shredded and suitable for horticultural purposes and shall contain no more than 35 moisture content by weight.

**PINE BARK MULCH:**  
 All pine bark mulch shall be clean, double ground, fine textured nugget mulch with minimal amounts of sawwood content.

**TURF AREAS:**  
 Prior to any seeding or sod application, verify that all trenching and land disturbing activities have been completed. Ensure all areas are free of stones, large soil clods and any other construction debris.

- PLANT NOTES:**
- Each single-family or duplex lot shall contain a minimum of one (1) canopy tree for every 2,000 square feet of lot area or fraction thereof up to 20,000 square feet in lot area. Any portion of the residential lot occupied by a recorded utility easement shall not be included as part of the total area. The location of planting to account for physical conditions may be adjusted by the Administrator. (SEE SHEET C8.1 FOR TREE REQUIRED CALCULATIONS.)
  - The use of existing trees meeting the following standards to satisfy this requirement is encouraged. Existing large shade trees measuring more than six (6) inches in DBH may be counted towards fulfilling this requirement.
  - Required street trees (Section 8.10) may not be counted towards the fulfillment of the residential landscaping requirement. Apart from required street trees, all other trees required under this Chapter shall be planted within the private lot.
  - Foundation plantings consisting of evergreen shrubs shall be installed along the entire foundation wall of the building. Plant installation shall be a minimum of two feet in height planted at four-foot intervals.



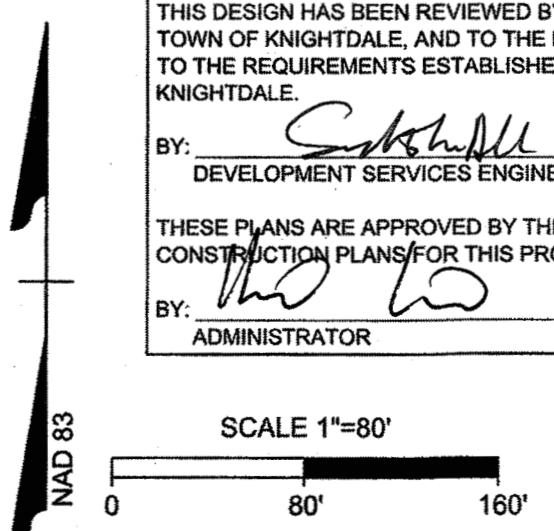
**TOWN CERTIFICATION**

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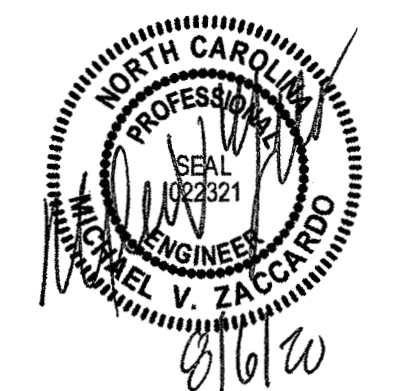
BY: *[Signature]* DATE: 8/21/2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8/18/2020  
 ADMINISTRATOR



s:\331\44872-stone-avenue-dwg\Sheet\CD\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CB-0-PLNT.dwg | by JD. MacMillan



THIS DRAWING PREPARED AT THE  
 OFFICE OF  
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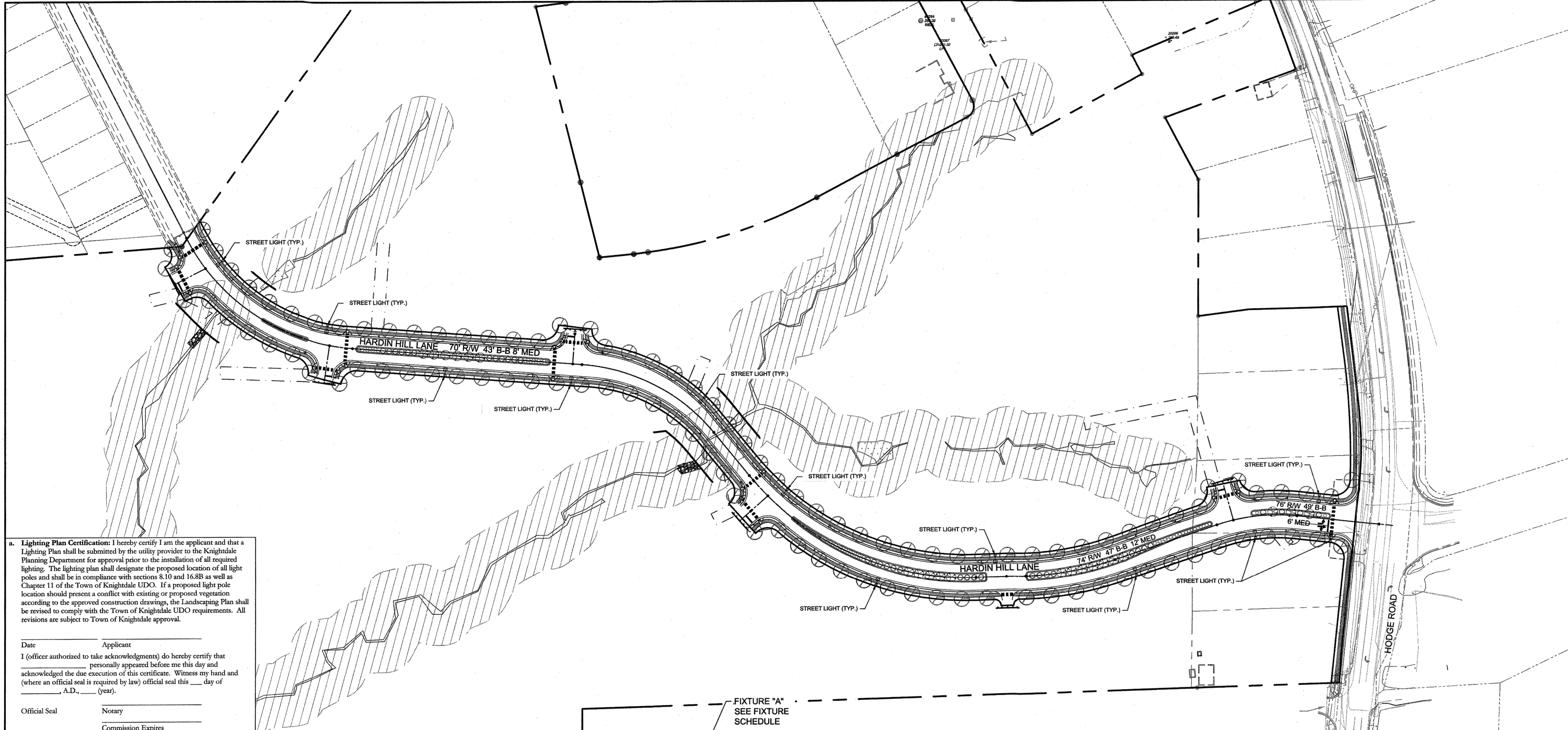
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 SCALE  
 1" = 80'

REVISION DESCRIPTION

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 BY: *[Signature]* DATE: 8/18/2020  
 ADMINISTRATOR

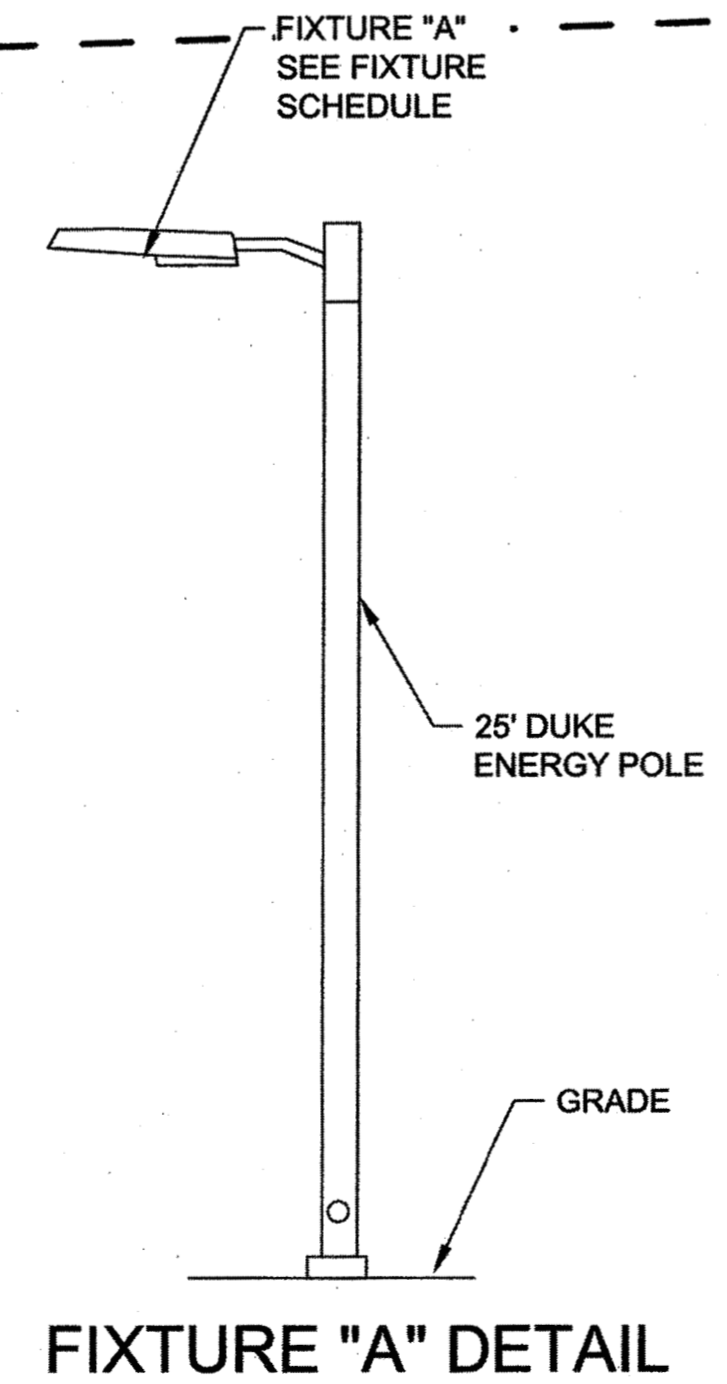
TIMMONS GROUP  
 NORTH CAROLINA LICENSE NO. C-1652  
 HARDIN HILL SPINE ROAD EXTENSION  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
 STREET LIGHTING PLAN  
 JOB NO. 44872  
 SHEET NO. C9.0

RELEASED FOR CONSTRUCTION



**a. Lighting Plan Certification:** I hereby certify I am the applicant and that a Lighting Plan shall be submitted by the utility provider to the Knightdale Planning Department for approval prior to the installation of all required lighting. The lighting plan shall designate the proposed location of all light poles and shall be in compliance with sections 8.10 and 16.8B as well as Chapter 11 of the Town of Knightdale UDO. If a proposed light pole location should present a conflict with existing or proposed vegetation according to the approved construction drawings, the Landscaping Plan shall be revised to comply with the Town of Knightdale UDO requirements. All revisions are subject to Town of Knightdale approval.

Date \_\_\_\_\_ Applicant \_\_\_\_\_  
 I (officer authorized to take acknowledgments) do hereby certify that personally appeared before me this day and acknowledged the due execution of this certificate. Witness my hand and (where an official seal is required by law) official seal this \_\_\_ day of \_\_\_\_\_ A.D., \_\_\_\_ (year).  
 Official Seal \_\_\_\_\_ Notary \_\_\_\_\_  
 Commission Expires \_\_\_\_\_



FIXTURE "A" DETAIL

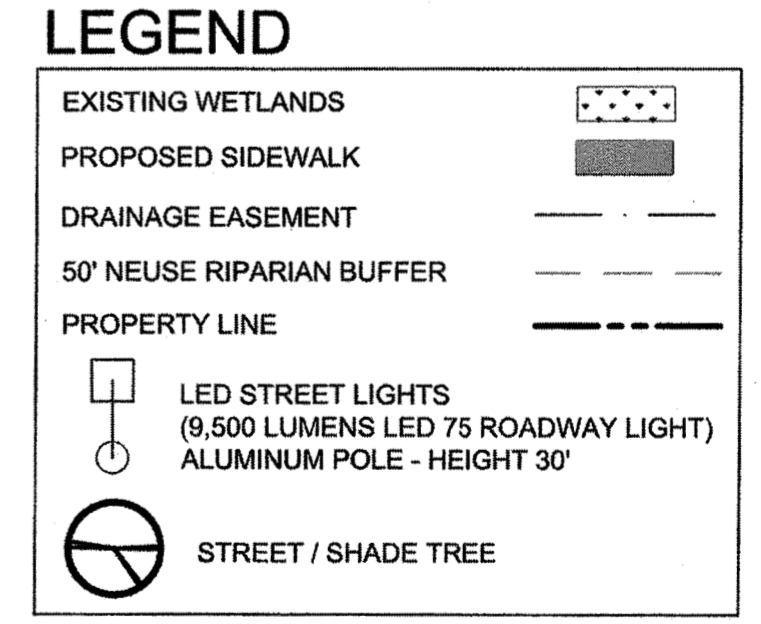
**11.5 Additional Outdoor Lighting Standards for Specific Lighting Types**  
 In addition to meeting the general lighting standards in Section 11.4, the following types of lighting shall also meet the additional specific standards listed below.

**A. Street Lighting**  
 Street lighting shall be placed on all streets by the developer to allow for the safe use of streets by cars, cyclists and pedestrians. Developer placed lighting shall also include all improved frontages on local and NCDOT streets. Developers requesting upgrades from the Town's minimum street light specification of a fiberglass pole with a fully-shielded, arm-mounted LED fixture shall pay the Town up front the difference in the costs of maintenance for the desired LED fixture and pole covering a period of 10 years. Developers interested in pursuing this option should consult with the Administrator concerning the Town's "Premium Lighting Policy". All street lighting shall conform to the specific standards for LED lighting in subsection 'B' as well as the following design standards:

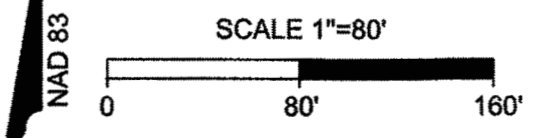
- Average Spacing Maximums:** The following maximum average spacing requirements between street lights shall apply to all local, collector and arterial street classifications according to the use context of the adjacent land as listed below, except alleys (Section 17.3A1) which are exempt from said requirements.
  - Local & Collector Streets:**
    - Residential at less than three (<3) unit per acre - 500 feet
    - Residential from three (3.0) to eight (8.0) units per acre - 250 feet
    - Residential over eight (>8.0) units per acre - 150 feet
    - All other uses - 300 feet
  - Arterial Streets: All uses - 150 feet**
- Minimum Initial Delivered Lumen Levels:**
  - Local Streets - 4,800 lumens
  - Collector Streets in Residential Areas - 12,500 lumens
  - Collector Streets in Other Areas - 12,500 lumens
  - Arterial Streets - 18,500 lumens
- BUG Rating:** All street lights shall be fully-shielded (no light at or above horizontal) and shall not exceed the following BUG ratings established for each type of street:
  - Local Streets - B1, U1, G1
  - Collector Streets in Residential Areas - B2, U2, G2
  - Collector Streets in Other Areas - B3, U3, G3
  - Arterial Streets - B3, U3, G3
- Placement:**
  - Although the primary purpose of street lighting is to provide adequate lighting for the roadway, street lighting should also promote pedestrian. Therefore, lighting should be placed in a manner to minimize the casting of shadows on sidewalks.
  - Lighting shall be placed as far from street trees as the landscaping plan will allow.
  - Lights on newly constructed streets shall be alternately staggered on each side of the street wherever possible.
  - Lights shall be placed at all street intersections, in street curves and at the end of any street or cul-de-sac.

(Note: For additional information on the connectivity and circulation of streets, please refer to Chp. 9)

TYP	SYMBOL	DESCRIPTION	LAMP	LUMENS	MOUNTING /BALLAST	LLF
A		LED ROADWAY TYPE II LED LIGHT FIXTURE, MOUNT ON 25' POLE	(1) 50W LED 4000 K	4476	25' DUKE ENERGY POLE	0.64



**TOWN CERTIFICATION**  
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 BY: *[Signature]* DATE: 8/21/2020  
 DEVELOPMENT SERVICES ENGINEER  
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
 BY: *[Signature]* DATE: 8/18/2020  
 ADMINISTRATOR



**Outdoor Lighting**  
**Roadway LED**

The Roadway LED is a green solution and great fit for streets, roads, long, narrow areas and parking lots. This energy-efficient luminaire delivers the light where it is needed while increasing visibility and reducing spill light to adjoining properties. Choose low to medium light output on wood or fiberglass poles for mount on an existing pole. Available with one to four fixtures per pole, depending on the fixture/pole combination selected.

LED (Light Emitting Diode)	50   70   110   150   220   280 watts
Mounting heights	15', 20', 25', 30', 35'
Colors	Bronze Black Gray Green
Poles	Style A, C Wood

For additional information, visit [dual-energy.com/outdoorlighting](http://dual-energy.com/outdoorlighting) or call us toll free 800.544.4950 (Toll and NY 800.521.2292 (TX))

**Outdoor Lighting**  
**Roadway LED**

Light source: LED (9,500)  
 Wattage: 50 | 70 | 110 | 150 | 220 | 280  
 Light pattern: (SMA Type II light)  
 EISA cutoff classification: Full cutoff  
 Color temperature: 4,000K  
 Warm-up and cool-down times: Instant on and off

**Poles available:**

Material	Mounting height	Color	
Aluminum	15', 20', 25', 30', 35'	Bronze Black Gray Green	
	Wood	25', 30', 35'	Standard

Features	Benefits
No installation cost	Press up capital for other projects
Design services by lighting professionals included	Meets industry standards and lighting ordinances
Maintenance included	Eliminates high and unexpected repair bills
Electricity included	Less expensive than metered service
Warranty included	Worry-free
One low monthly cost on your electric bill	Convenience and savings for you
Turnkey operation	Provides hassle-free installation and service
Backed by over 40 years of experience	A name you can trust today ... and tomorrow

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YOUR VISION ACHIEVED THROUGH OURS.

DATE  
 08/06/2020

DRAWN BY  
 J.D. MACMILLAN

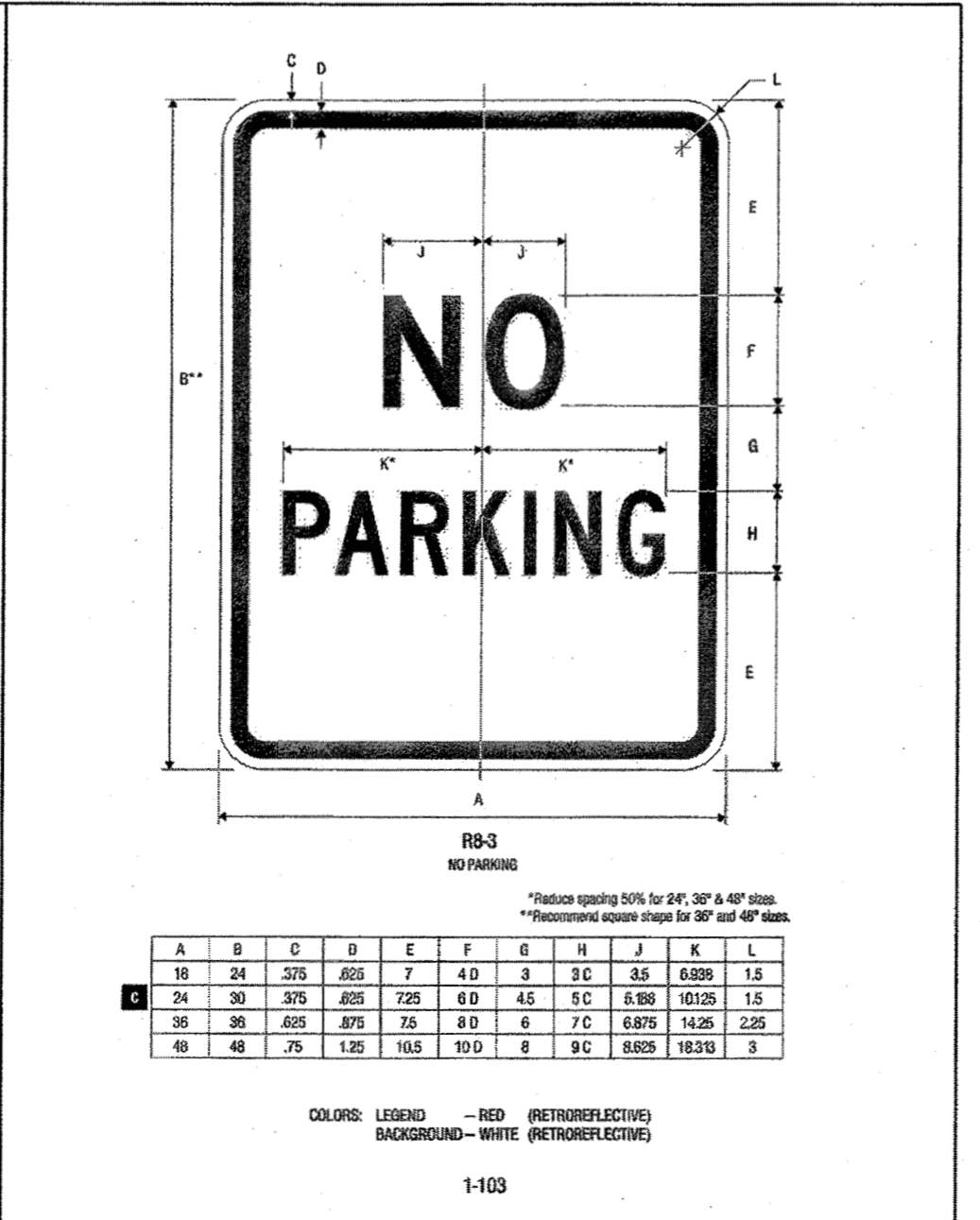
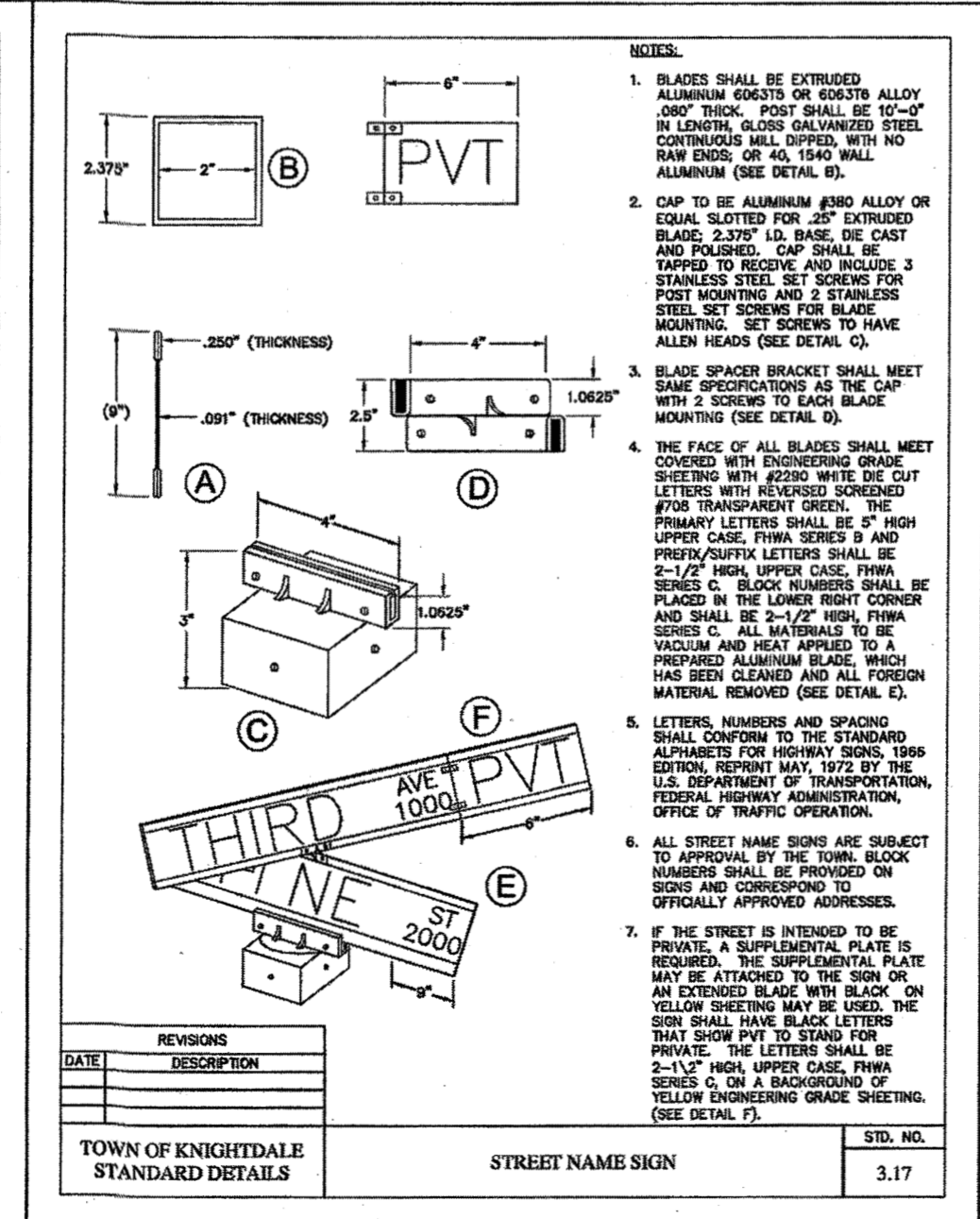
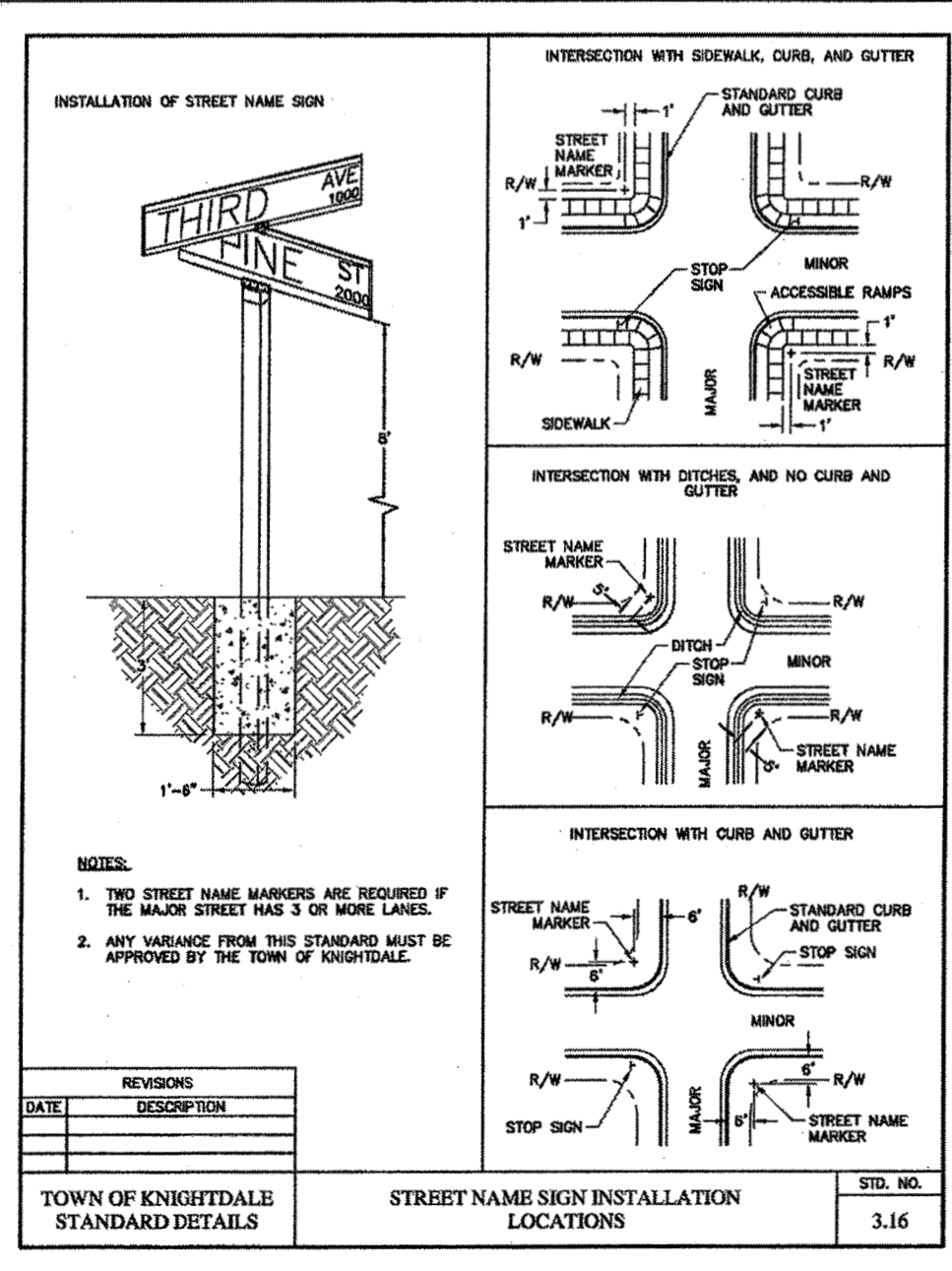
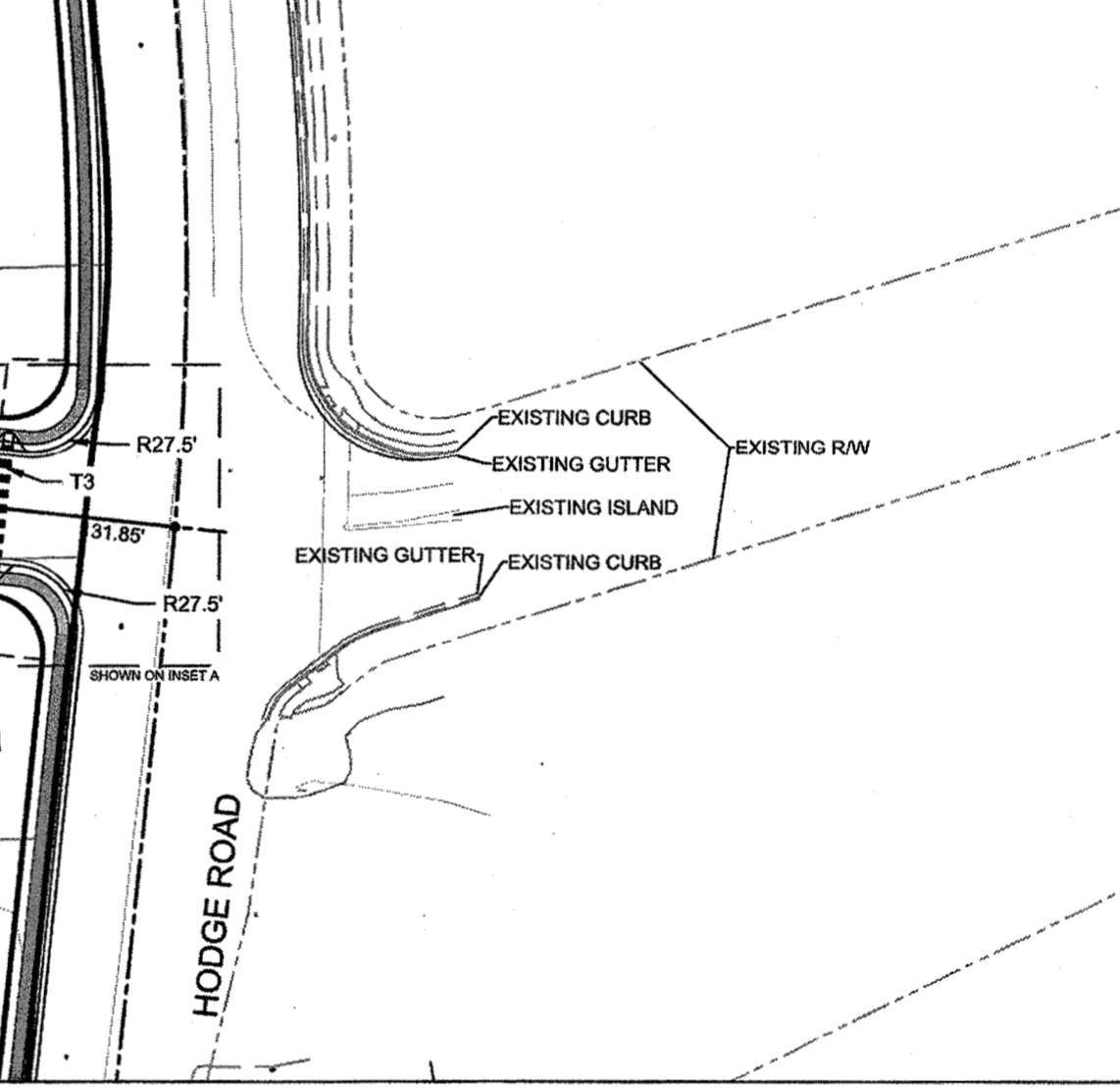
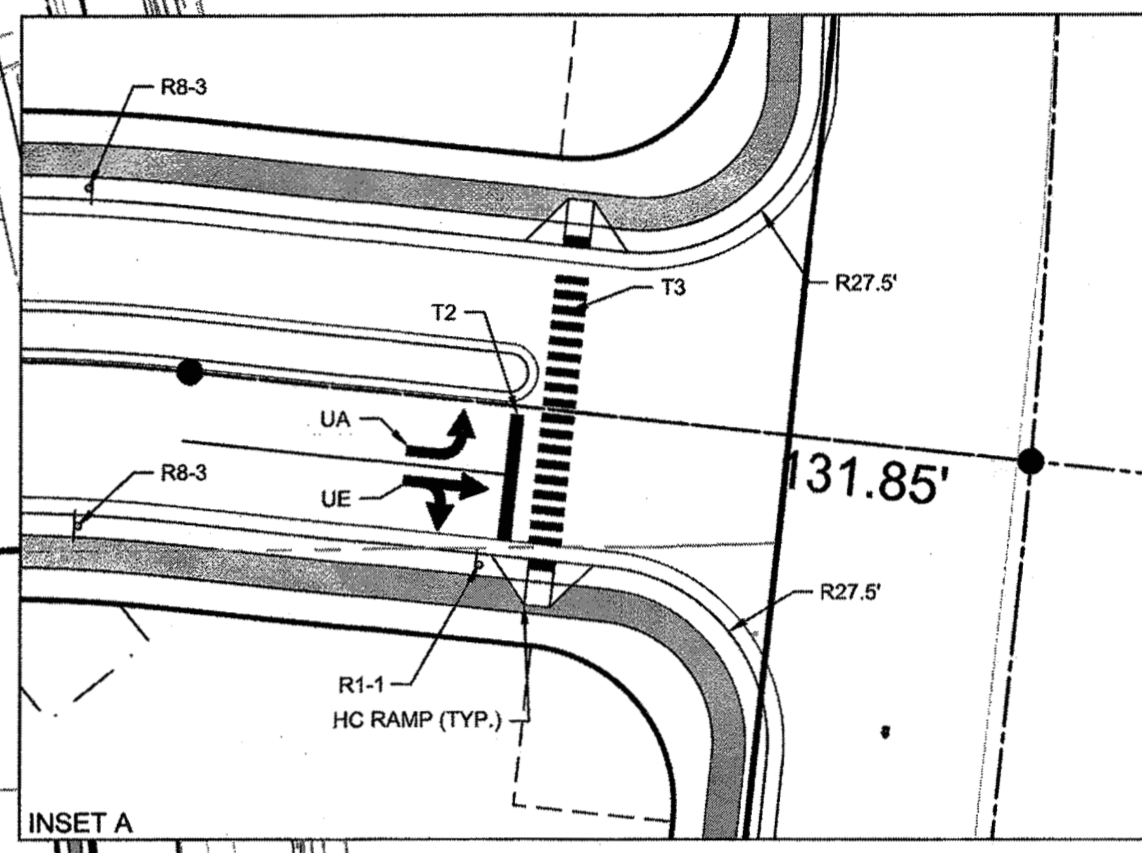
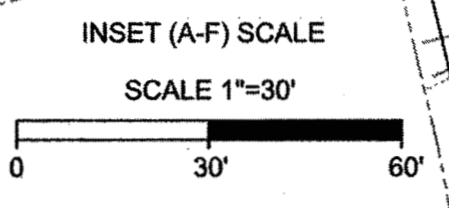
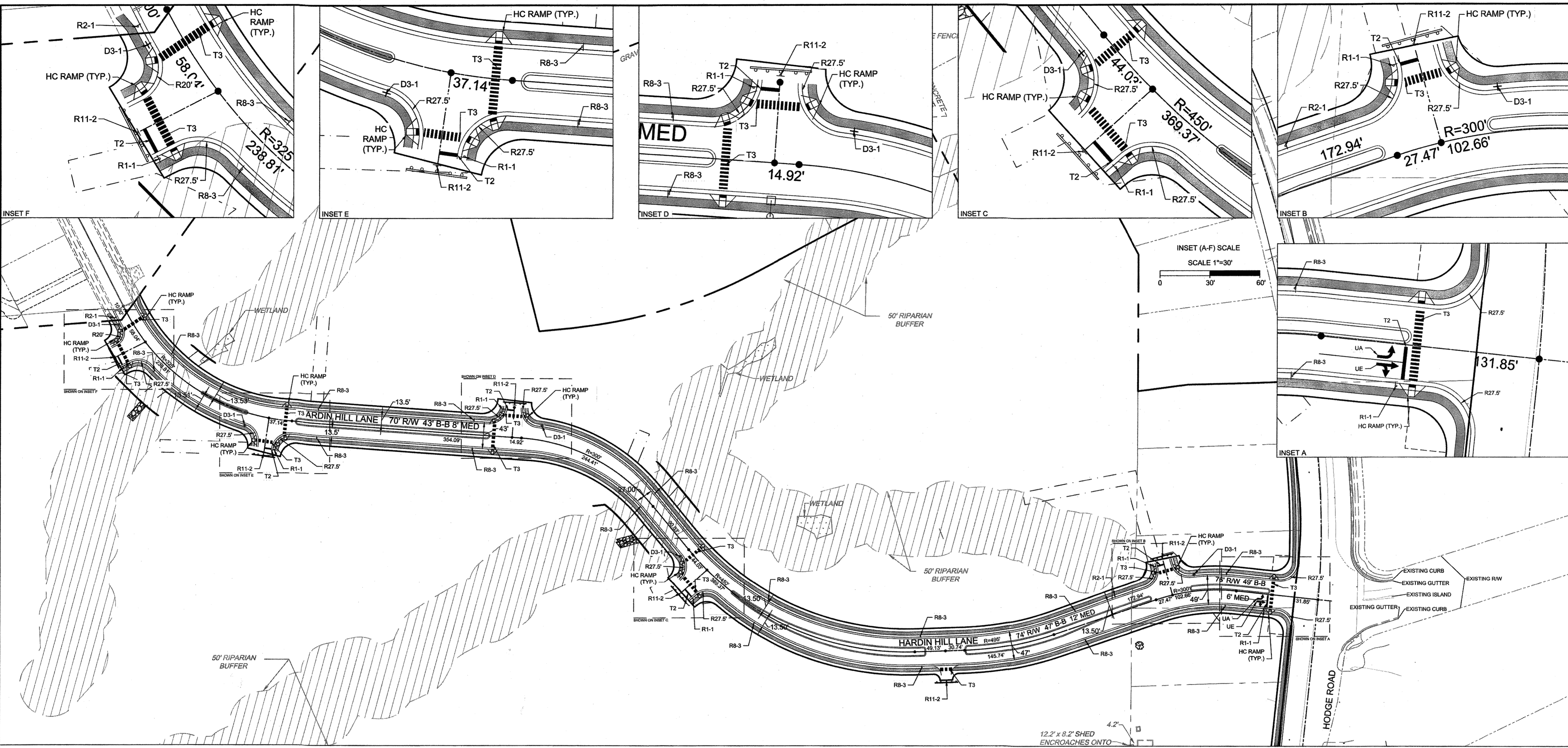
DESIGNED BY  
 J.D. MACMILLAN

CHECKED BY  
 M. ZACCARDO

SCALE  
 1" = 80'

REVISION DESCRIPTION  
 DATE

RELEASED FOR CONSTRUCTION



**LEGEND**

- EXISTING WETLANDS
- PROPOSED SIDEWALK
- DRAINAGE EASEMENT
- 50' NEUSE RIPARIAN BUFFER
- PROPERTY LINE

**SIGN LEGEND**

1. ALL SITE SIGNAGE SHALL BE IN ACCORDANCE WITH THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND NCOT STANDARDS.
2. ALL SIGNS SHALL BE MOUNTED WITH 7-FT MIN. VERTICAL CLEARANCE TO THE BOTTOM OF THE SIGN ON 3-LB. GALV. STEEL U-CHANNEL POST SET IN 3-FT DEEP x 12-IN DIA. CONCRETE FOOTING.
3. ALL SIGNAGE SHALL BE FIELD STAKED AND THE LOCATIONS APPROVED BY THE TOWN OF KNIGHTDALE AND/OR NCOT PRIOR TO SIGN INSTALLATION.
4. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL AS REQUIRED BY THE TOWN OF KNIGHTDALE, THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND ALL NCOT STANDARDS AND SPECIFICATIONS.
5. THE TOWN OF KNIGHTDALE REQUIRES ALL REGULATORY PAVEMENT MARKINGS TO BE HI-VIS THERMOPLASTIC, EXCEPT FOR PARKING SPACE STRIPING WHICH MAY BE WHITE PAINT.

Symbol	Description	Material	Transport Pay Item No.	Linear Length Adjustment
T1	WHITE LINE, RR X (10", 120 MIL)	Thermo	4705000000-E	1
T2	WHITE STOPBAR (24", 120 MIL)	Thermo	4710000000-E	1
T3	WHITE CROSSWALK LINE (24", 120 MIL)	Thermo	4710000000-E	1
UA	LEFT TURN ARROW (90 MIL)	Thermo	4725000000-E	1
UE	COMBO, RIGHT/STRAIGHT ARROW (90 MIL)	Thermo	4725000000-E	1

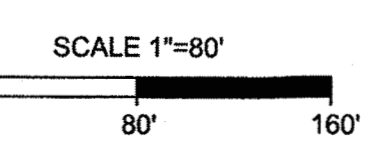
**TOWN CERTIFICATION**

THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *SAL M* DATE: 8/21/2020  
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 8/21/2020  
 ADMINISTRATOR

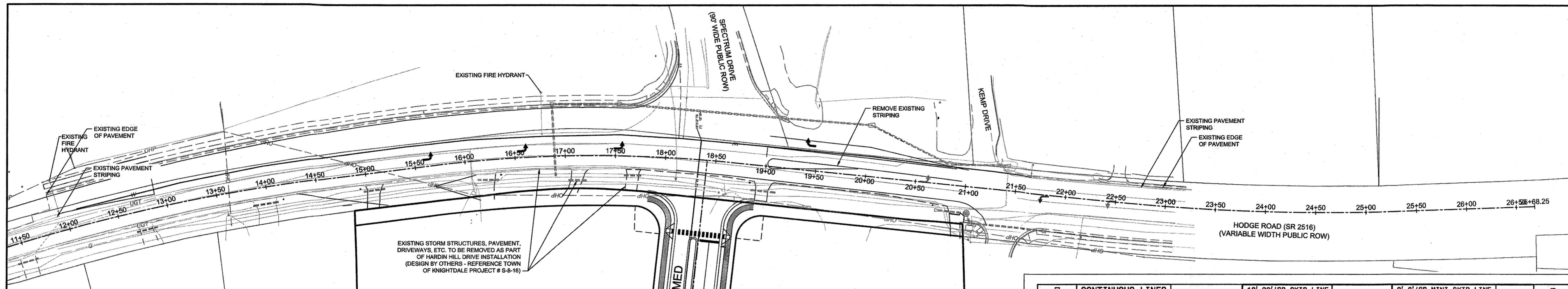


E:\3331\44872-stone-blvd\DWG\Sheet\CD\STONE RIVER - HARDIN HILL LANE\CD-SITE PLAN.dwg | by JD Macmillan

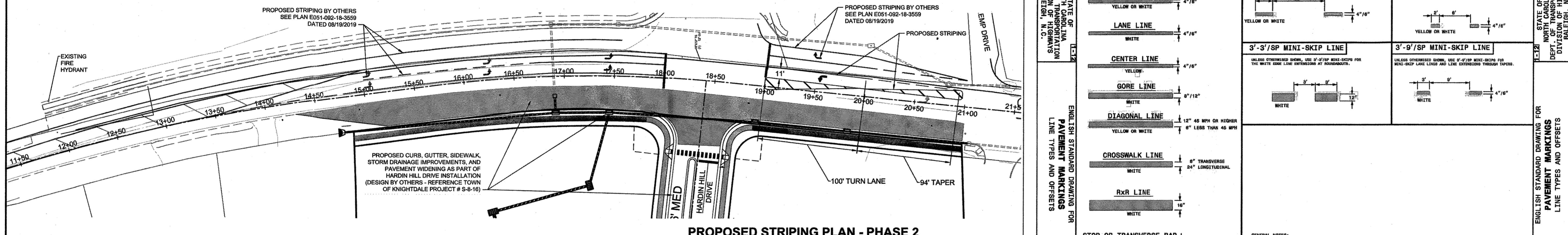
**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
 HARDIN HILL SPINE ROAD EXTENSION  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
 SIGNAGE AND MARKING PLAN

JOB NO.  
 44872  
 SHEET NO.  
 C10.0

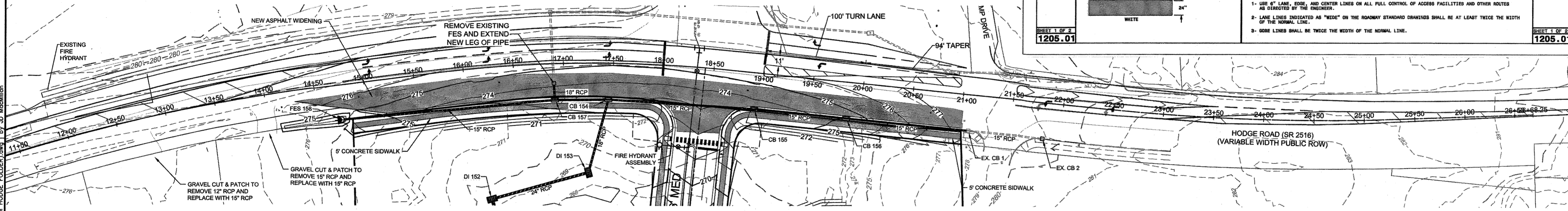
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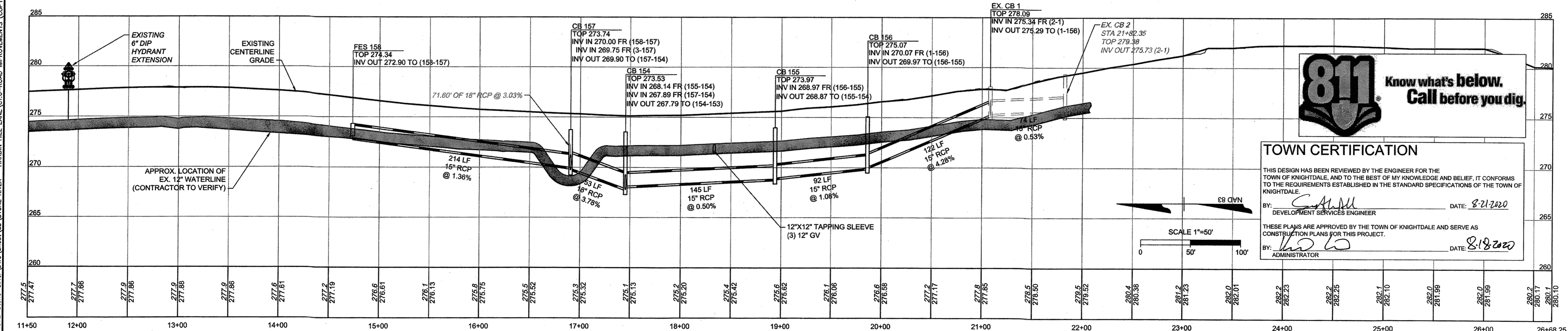
**EXISTING CONDITIONS AND DEMOLITION PLAN**



**PROPOSED STRIPING PLAN - PHASE 2**



**PROPOSED GRADING PLAN - PHASE 2**



**HODGE ROAD PROFILE STA 11+50 TO 26+68.25'**

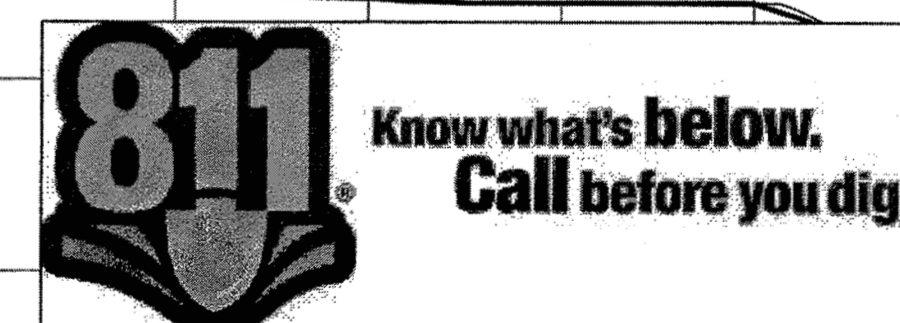
HORIZ SCALE: 1"=20'  
VERT SCALE: 1"=2'

LINE TYPE	WIDTH	COLOR
EDGE LINE	4" / 6"	YELLOW OR WHITE
LANE LINE	4" / 6"	WHITE
CENTER LINE	4" / 6"	YELLOW
GORE LINE	8" / 12"	WHITE
DIAGONAL LINE	12" 45 MPH OR HIGHER 8" LESS THAN 45 MPH	YELLOW OR WHITE
CROSSWALK LINE	8" TRANSVERSE 24" LONGITUDINAL	WHITE
RxR LINE	16"	WHITE
STOP OR TRANSVERSE BAR	24"	WHITE

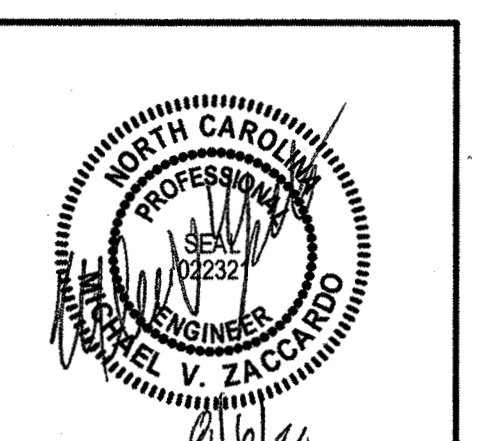
  

LINE TYPE	WIDTH	COLOR
10'-30"/SP SKIP LINE	10" / 30"	YELLOW OR WHITE
2'-6"/SP MINI-SKIP LINE	2" / 6"	YELLOW OR WHITE
3'-3"/SP MINI-SKIP LINE	3" / 3"	WHITE
3'-9"/SP MINI-SKIP LINE	3" / 9"	WHITE

GENERAL NOTES:  
 1- USE 6" LANE, EDGE, AND CENTER LINES ON ALL FULL CONTROL OF ACCESS FACILITIES AND OTHER ROUTES AS DIRECTED BY THE ENGINEER.  
 2- LANE LINES INDICATED AS "WIDE" ON THE ROADWAY STANDARD DRAWINGS SHALL BE AT LEAST TWICE THE WIDTH OF THE NORMAL LINE.  
 3- GORE LINES SHALL BE TWICE THE WIDTH OF THE NORMAL LINE.



**TOWN CERTIFICATION**  
 THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.  
 BY: *[Signature]* DATE: 8/21/2020  
 DEVELOPMENT SERVICES ENGINEER  
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
 BY: *[Signature]* DATE: 8/18/2020  
 ADMINISTRATOR



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REVISION DESCRIPTION	DATE	DRAWN BY	DESIGNED BY	CHECKED BY	SCALE
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**TIMMONS GROUP**  
 NORTH CAROLINA LICENSE NO. C-1652  
**HARDIN HILL SPINE ROAD EXTENSION**  
 KNIGHTDALE - WAKE COUNTY - NORTH CAROLINA  
**HODGE ROAD IMPROVEMENT PLAN**

JOB NO. 44872  
 SHEET NO. C11.0

RELEASED FOR CONSTRUCTION

E:\331\44872-store-silver\DWG\Sheet\CAD\ROAD IMPROVEMENTS (COPY FROM HODGE FOLDER).dwg | by JD. MacMillan



