

CONSTRUCTION DRAWINGS FOR

# KNIGHTDALE STATION PHASE R1 & R2

TOWN OF KNIGHTDALE PROJ. # S-3-13

KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

FEBRUARY 5, 2014

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PUBLIC WATER DISTRIBUTION/EXTENSION SYSTEM

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-3220

AUTHORIZATION TO CONSTRUCT [Signature]

DATE 2/28/14

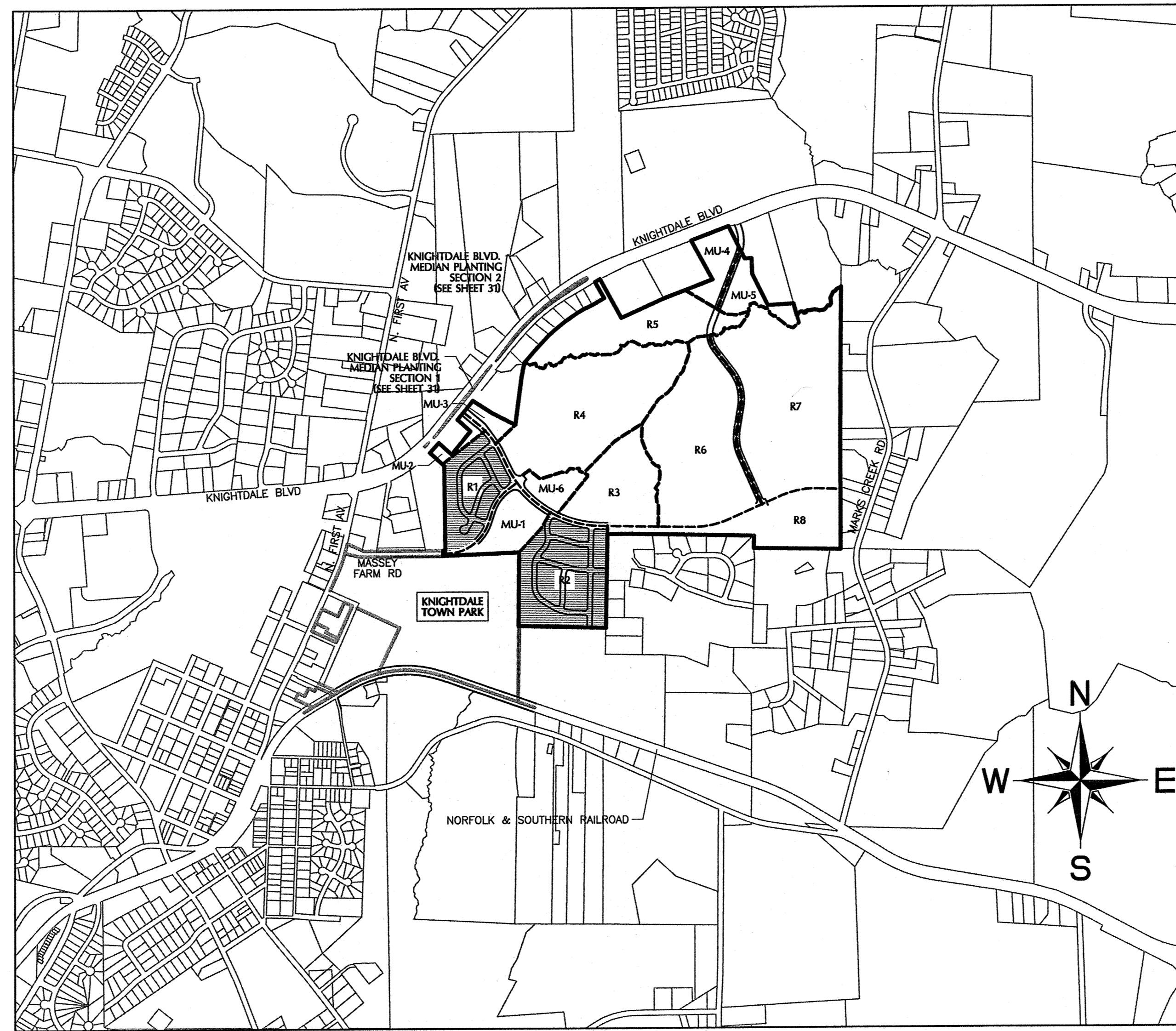
PUBLIC SEWER COLLECTION/EXTENSION SYSTEM

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-3917

AUTHORIZATION TO CONSTRUCT [Signature]

DATE 2/28/14



SITE DATA TABLE - PHASES R-1 & R-2

	R-1A	R-1B	R-1 TOTAL	R-2A	R-2B	R-2C	R-2 TOTAL
OWNER	KNIGHTDALE INVESTORS, LLC.						
PARCEL PIN No.	1754756986						
MINIMUM LOTS SETBACKS R1 & R2	10 FT						
FRONT YARD	25 FT						
REAR YARD	20% OF LOT WIDTH W/ A MIN. OF 5' PER SIDE						
SIDE YARD AGGREGATE (MINIMUM)	OF 5' PER SIDE						
EXISTING ZONING	-	-	UR12	-	-	-	GRB
PROPOSED USE	-	-	SINGLE FAMILY	-	-	-	SINGLE FAMILY
TOTAL TRACT AREA	8.16	6.41 AC	14.57 AC	7.81 AC	9.31 AC	8.14 AC	25.26 AC
OPEN SPACE (ACTIVE)	0.00 AC	0.00 AC	0.00 AC	0.00 AC	0.00 AC	0.00 AC	0.00 AC
OPEN SPACE (PASSIVE)	0.20 AC	0.82 AC	1.02	0.68 AC	1.95 AC	0.79 AC	3.42 AC
MAXIMUM DENSITY ALLOWED (UNITS/ACRE)	-	-	12	-	-	-	8
PROPOSED DENSITY (UNITS/ACRE)	-	-	2.88	-	-	-	3.44
TOTAL NUMBER OF LOTS ALLOWED	-	-	63	-	-	-	103
TOTAL NUMBER OF LOTS PROVIDED	22	20	42	26	29	32	87
TOTAL LINEAR FEET IN STREETS (PUBLIC)	2,563 LF	1,698 LF	4,261 LF	2,982 LF	1,377 LF	1,293 LF	5,652 LF
LINEAR FEET IN WATERLINES (6 IN)	871 LF	107 LF	978 LF	607 LF	227 LF	400 LF	1,234 LF
LINEAR FEET IN WATERLINES (8 IN)	887 LF	1,035 LF	1,922 LF	1,420 LF	1,271 LF	913 LF	3,604 LF
TOTAL LINEAR FEET IN WATERLINES (12 IN)	1,158 LF	814 LF	1,972 LF	1,162 LF	1,072 LF	771 LF	3,007 LF
TOTAL LINEAR FEET IN SEWER LINES	2,316 LF	1,956 LF	4,272 LF	3,189 LF	1,498 LF	1,313 LF	6,000 LF
PROJECTED WATER USAGE (GPD)	3,001 LF	712 LF	3,713 LF	2,053 LF	717 LF	771 LF	3,541 LF
PROJECTED SEWER USAGE (GPD)	5,500	5,000	10,500	6,500	7,250	8,000	21,750
(250 GPD/UNIT)	5,500	5,000	10,500	6,500	7,250	8,000	21,750
MINIMUM LOT WIDTH REQUIRED	-	-	60 LF	-	-	-	60 LF
LOT WIDTH (TYP)	-	-	70 LF	-	-	-	60 LF
MINIMUM LOT AREA PROVIDED	-	-	8,260 SF	-	-	-	6,947 SF
MEDIAN LOT AREA PROVIDED	-	-	9,541 SF	-	-	-	7,781 SF
AVERAGE LOT AREA PROVIDED	-	-	10,936 SF	-	-	-	8,360 SF

LEGEND

DESCRIPTION	EXISTING	PROPOSED
1' CONTOUR INTERVAL	--- ---	--- ---
5' CONTOUR INTERVAL	--- ---	--- ---
PROPERTY LINE BY SURVEY	-----	-----
PROPERTY LINE BY DEED	-----	-----
EASEMENT LINE	-----	-----
SANITARY SEWER	---S---	---SS---
STORM DRAINAGE	---SD---	---SD---
WATERLINE	---W---	---W---
FIRE HYDRANT ASSEMBLY	---FH---	---FH---
CABLE TV	---TV---	---TV---
FIBER OPTIC	---FO---	---FO---
OVERHEAD ELECTRICAL	---OHE---	---OHE---
GAS	---G---	---G---
TELEPHONE	---T---	---T---
FENCING STRUCTURE	---X---	---X---
WATERWAYS	---W---	---W---
WETLANDS	---W---	---W---
FORCE MAIN	---FM---	---FM---
100 yr FLOOD	---F---	---F---
TREELINE	---T---	---T---

ATTENTION CONTRACTORS

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF WATER AND SEWER AS APPROVED IN THESE PLANS IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT (919) 296-4540 AT LEAST 24 HOURS PRIOR TO BEGINNING ANY 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 JOB SITE, 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 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: 2/5/2014  
TOWN ENGINEER

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

BY: [Signature] DATE: 4/16/14  
ADMINISTRATOR

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 16.88 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: 2/28/14

APPLICANT: [Signature]

I, OFFICER AUTHORIZED TO TAKE KNOWLEDGEMENTS, DO HEREBY CERTIFY THAT [Signature] HAS 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 February, A.D. 2014 (YEAR).

OFFICIAL SEAL: [Signature] NOTARY

COURTNEY JENKINS  
PUBLIC  
WAKE COUNTY, NC

NOTARY  
Courtney Jenkins  
COMMISSION EXPIRES  
October 6, 2018

OWNER/DEVELOPER

**KNIGHTDALE INVESTORS, LLC.**

P.O. BOX 3557  
CARY, NC 27519

Attention: KARL BLACKLEY  
Telephone: (919) 481-3000  
Fax: (919) 677-8600

PREPARED BY:

**WITHERS & RAVENEL**

ENGINEERS | PLANNERS | SURVEYORS

115 MacKenan Drive Cary, North Carolina 27511 tel: 919-469-3340 www.wITHERSRAVENEL.COM License No. C-0832

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, JOHN C. HINATOLYA, 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) N/A OF THESE DRAWINGS.

BY: [Signature] PE  
DATE: 2/5/14

SEAL  
31982  
ENGINEER  
JOHN C. HINATOLYA

REVISION BLOCK

NO.	DESCRIPTION	DATE	BY
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

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. THE 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 (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.

TREE LEGEND	
TREE DESCRIPTION	
	60% MATURING PINE 20% MATURING OAK (5" CALIPER & UP 20'-30" HEIGHT) 20% OTHER SPECIES
	80% YOUNG PINE 10-15% OAK 5% MAPLE (2"-4" CALIPER & 15'-20" HEIGHT)
	80% MATURING/YOUNG PINE MIX 10-15% MATURING OAK 5% MATURING MAPLE (MATURE - 5" CALIPER & UP 20'-30" HEIGHT) (YOUNG - 2"-4" CALIPER & 15'-20" HEIGHT)
	60% MATURING PINE 40% MATURING OAK (5" CALIPER & UP) (PINE - 30'-40' HEIGHT) (OAK - 20'-30' HEIGHT)

JAMES ERVIN RIGSBEE  
D.B. 3066, PG. 225  
PIN NO. 1754-77-3240

S 57°15'10" E 255.24' CMF S 63°10'10" E 298.11'

BOBBY D. TAYLOR  
ANGELA J. TAYLOR  
D.B. 15318, PG. 648  
PIN NO. 1754-66-7682

S 47°48'17" E 194.72'  
N 47°36'08" W 220.21'

EXISTING WAKE ELECTRIC  
MEMBERSHIP CORP. 30' R/W  
D.B. 2312, P.G. 95

G&F PROPERTIES, LLC  
D.B. 8139, PG. 672  
PIN NO. 1754-65-5899

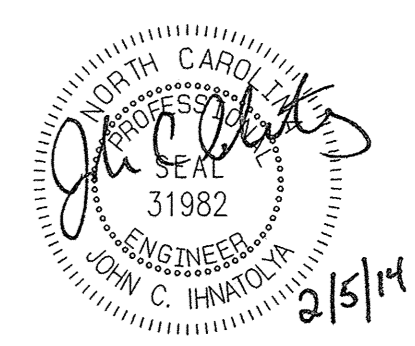
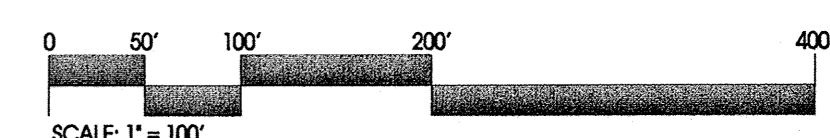
TOWN OF KNIGHTDALE  
D.B. 14002, PG. 1873  
PIN NO. 1754-64-7714

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: 2/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/16/14  
ADMINISTRATOR



No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	020902513

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

**EXISTING CONDITIONS**

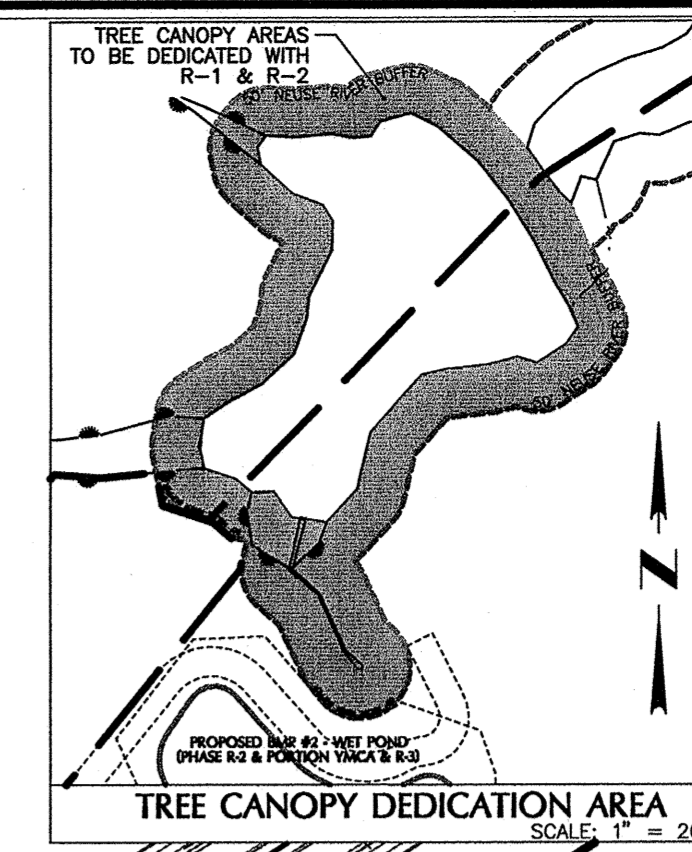
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Sheet No.  
**1** of 38

JAMES ERVIN RIGSBEE  
D.B. 3066, PG. 225  
PIN NO. 1754-77-3240

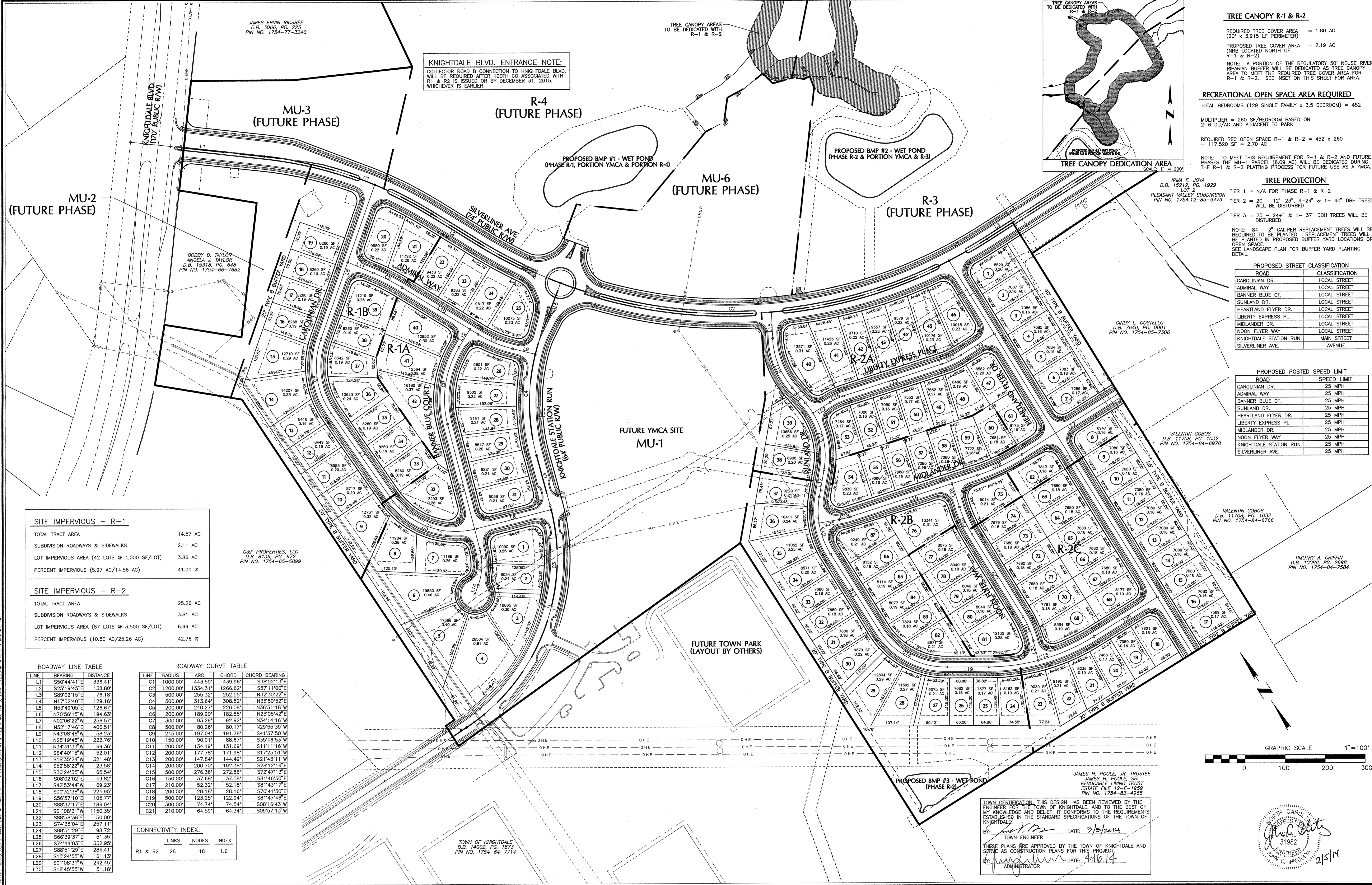
**KNIGHTDALE BLVD. ENTRANCE NOTE:**  
COLLECTOR ROAD B CONNECTION TO KNIGHTDALE BLVD. WILL BE REQUIRED AFTER 100TH CO ASSOCIATED WITH R1 & R2 IS ISSUED OR BY DECEMBER 31, 2015, WHICHEVER IS EARLIER.



**TREE CANOPY R-1 & R-2**  
REQUIRED TREE COVER AREA = 1.80 AC (20' x 3,915 LF PERIMETER)  
PROPOSED TREE COVER AREA = 2.19 AC (NRB LOCATED NORTH OF R-1 & R-2)  
NOTE: A PORTION OF THE REGULATORY 50' NEUSE RIVER RIPARIAN BUFFER WILL BE DEDICATED AS TREE CANOPY AREA TO MEET THE REQUIRED TREE COVER AREA FOR R-1 & R-2. SEE INSET ON THIS SHEET FOR AREA.

**RECREATIONAL OPEN SPACE AREA REQUIRED**  
TOTAL BEDROOMS (129 SINGLE FAMILY x 3.5 BEDROOM) = 452  
MULTIPLIER = 260 SF/BEDROOM BASED ON 2-6 DU/AC AND ADJACENT TO PARK  
REQUIRED REC OPEN SPACE R-1 & R-2 = 452 x 260 = 117,520 SF = 2.70 AC

NOTE: TO MEET THIS REQUIREMENT FOR R-1 & R-2 AND FUTURE PHASES THE MU-1 PARCEL (8.09 AC) WILL BE DEDICATED DURING THE R-1 & R-2 PLATTING PROCESS FOR FUTURE USE AS A YMCA.



**SITE IMPERVIOUS - R-1**

TOTAL TRACT AREA	14.57 AC
SUBDIVISION ROADWAYS & SIDEWALKS	2.11 AC
LOT IMPERVIOUS AREA (42 LOTS @ 4,000 SF/LOT)	3.86 AC
PERCENT IMPERVIOUS (5.97 AC/14.56 AC)	41.00 %

**SITE IMPERVIOUS - R-2**

TOTAL TRACT AREA	25.26 AC
SUBDIVISION ROADWAYS & SIDEWALKS	3.81 AC
LOT IMPERVIOUS AREA (87 LOTS @ 3,500 SF/LOT)	6.99 AC
PERCENT IMPERVIOUS (10.80 AC/25.26 AC)	42.76 %

**ROADWAY LINE TABLE**

LINE	BEARING	DISTANCE
L1	S50°44'41"E	336.41'
L2	S25°19'45"E	138.80'
L3	S89°02'15"E	76.18'
L4	N17°52'40"E	129.16'
L5	N53°49'05"E	126.67'
L6	N17°56'15"W	169.63'
L7	N02°06'22"W	256.57'
L8	N52°17'46"E	406.51'
L9	N43°08'48"W	58.23'
L10	N25°19'45"W	222.76'
L11	N34°31'33"W	69.36'
L12	S64°40'15"E	53.01'
L13	S18°35'24"E	321.48'
L14	S52°58'22"W	23.58'
L15	S30°24'35"W	65.54'
L16	S08°02'02"E	49.82'
L17	S42°53'44"W	69.23'
L18	S07°32'38"W	224.95'
L19	S56°37'10"E	105.77'
L20	S88°37'17"E	186.04'
L21	S01°08'31"W	1150.35'
L22	S88°58'36"E	50.00'
L23	S74°35'04"E	257.11'
L24	S88°51'29"E	98.72'
L25	S66°39'37"E	51.35'
L26	S74°44'03"E	332.95'
L27	S88°51'29"E	284.41'
L28	S15°24'55"W	61.13'
L29	S01°08'31"W	242.45'
L30	S18°45'55"W	51.18'

**ROADWAY CURVE TABLE**

LINE	RADIUS	ARC	CHORD	CHORD BEARING
C1	1000.00'	443.59'	439.96'	S38°02'13"E
C2	1200.00'	1334.31'	1266.62'	S57°11'00"E
C3	500.00'	255.32'	252.55'	N32°30'22"E
C4	500.00'	313.64'	308.52'	N35°50'52"E
C5	200.00'	240.27'	225.08'	N36°31'18"W
C6	200.00'	189.90'	182.83'	N25°05'42"E
C7	300.00'	93.29'	92.92'	N34°14'16"W
C8	500.00'	80.26'	80.17'	N29°55'39"W
C9	245.00'	197.04'	191.78'	S41°37'50"W
C10	150.00'	90.01'	88.67'	S35°46'53"W
C11	200.00'	134.19'	131.69'	S11°11'16"W
C12	200.00'	177.78'	171.98'	S17°25'51"W
C13	200.00'	147.84'	144.49'	S21°43'11"W
C14	200.00'	200.70'	192.38'	S28°12'16"E
C15	500.00'	276.36'	272.86'	S72°47'13"E
C16	150.00'	37.68'	37.58'	S81°46'50"E
C17	210.00'	52.32'	52.18'	S81°43'17"E
C18	200.00'	28.18'	28.16'	S70°41'50"E
C19	500.00'	123.25'	122.94'	S81°47'46"E
C20	300.00'	74.74'	74.54'	S08°16'43"W
C21	210.00'	64.59'	64.34'	S09°57'13"W

**CONNECTIVITY INDEX:**

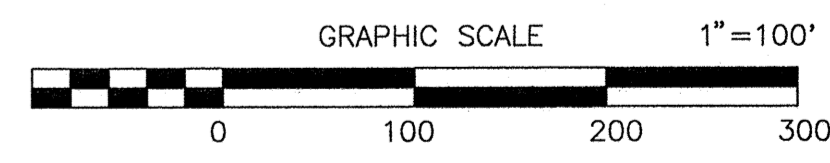
LINKS	NODES	INDEX
R1 & R2	28	18 1.6

**PROPOSED STREET CLASSIFICATION**

ROAD	CLASSIFICATION
CAROLINIAN DR.	LOCAL STREET
ADMIRAL WAY	LOCAL STREET
BANNER BLUE CT.	LOCAL STREET
SUNLAND DR.	LOCAL STREET
HEARTLAND FLYER DR.	LOCAL STREET
LIBERTY EXPRESS PL.	LOCAL STREET
MIDLANDER DR.	LOCAL STREET
NOON FLYER WAY	LOCAL STREET
KNIGHTDALE STATION RUN	MAIN STREET
SILVERLINER AVE.	AVENUE

**PROPOSED POSTED SPEED LIMIT**

ROAD	SPEED LIMIT
CAROLINIAN DR.	25 MPH
ADMIRAL WAY	25 MPH
BANNER BLUE CT.	25 MPH
SUNLAND DR.	25 MPH
HEARTLAND FLYER DR.	25 MPH
LIBERTY EXPRESS PL.	25 MPH
MIDLANDER DR.	25 MPH
NOON FLYER WAY	25 MPH
KNIGHTDALE STATION RUN	25 MPH
SILVERLINER AVE.	25 MPH



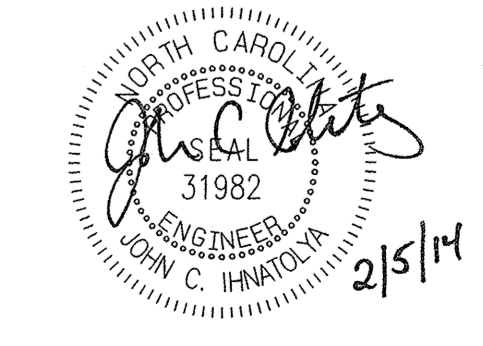
JAMES H. POOLE, JR. TRUSTEE  
JAMES H. POOLE, SR.  
REVOCABLE LIVING TRUST  
ESTATE FILE 12-E-1269  
PIN NO. 1754-83-4985

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: 3/5/2014  
TOWN ENGINEER

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

BY: [Signature] DATE: 4-10-14  
ADMINISTRATOR



No.	Revision	Date	By	Designer	W&R	Scale	SEE SHEET
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI				
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI				

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

**OVERALL SUBDIVISION PLAN - R1 & R2**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

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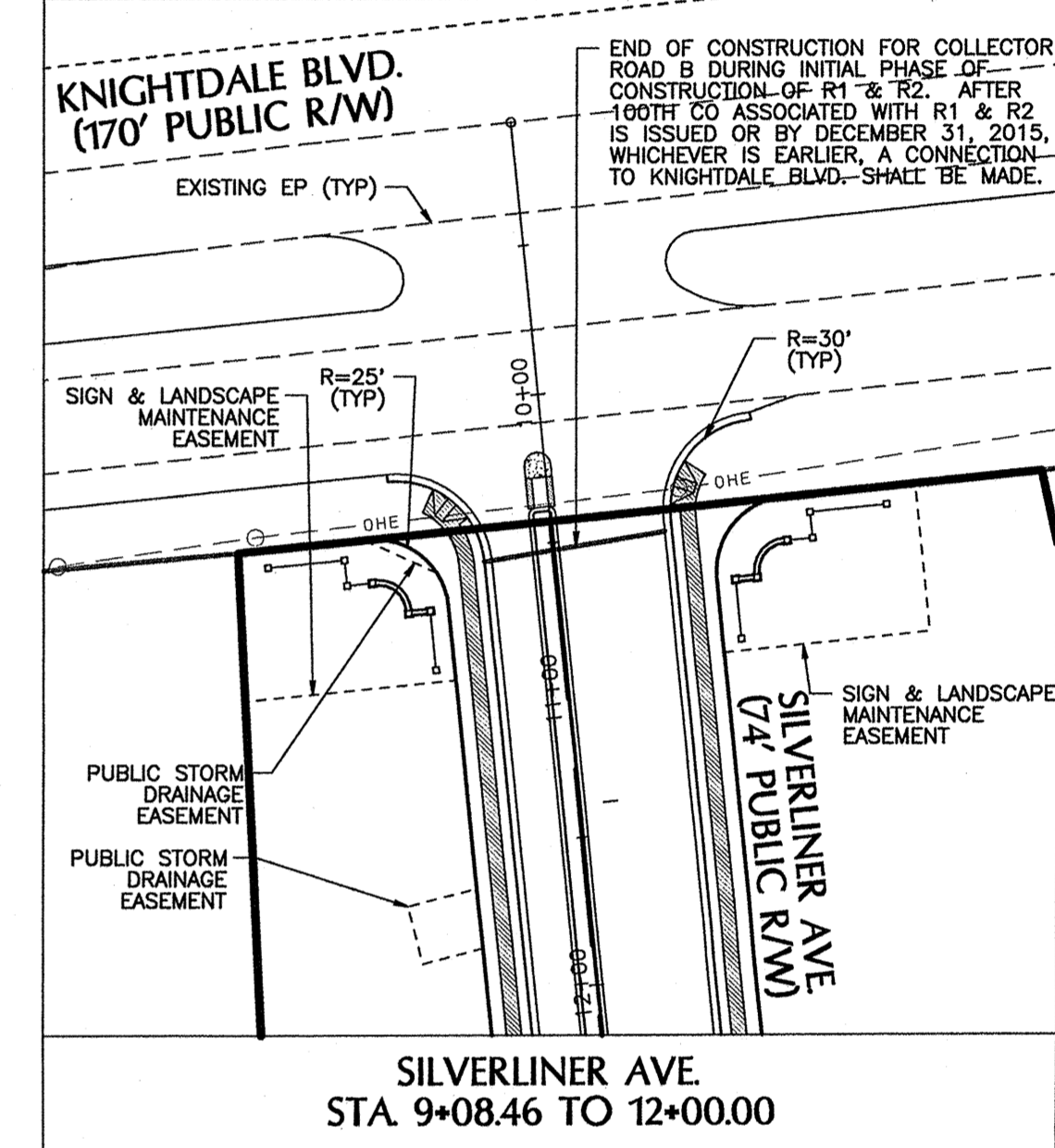
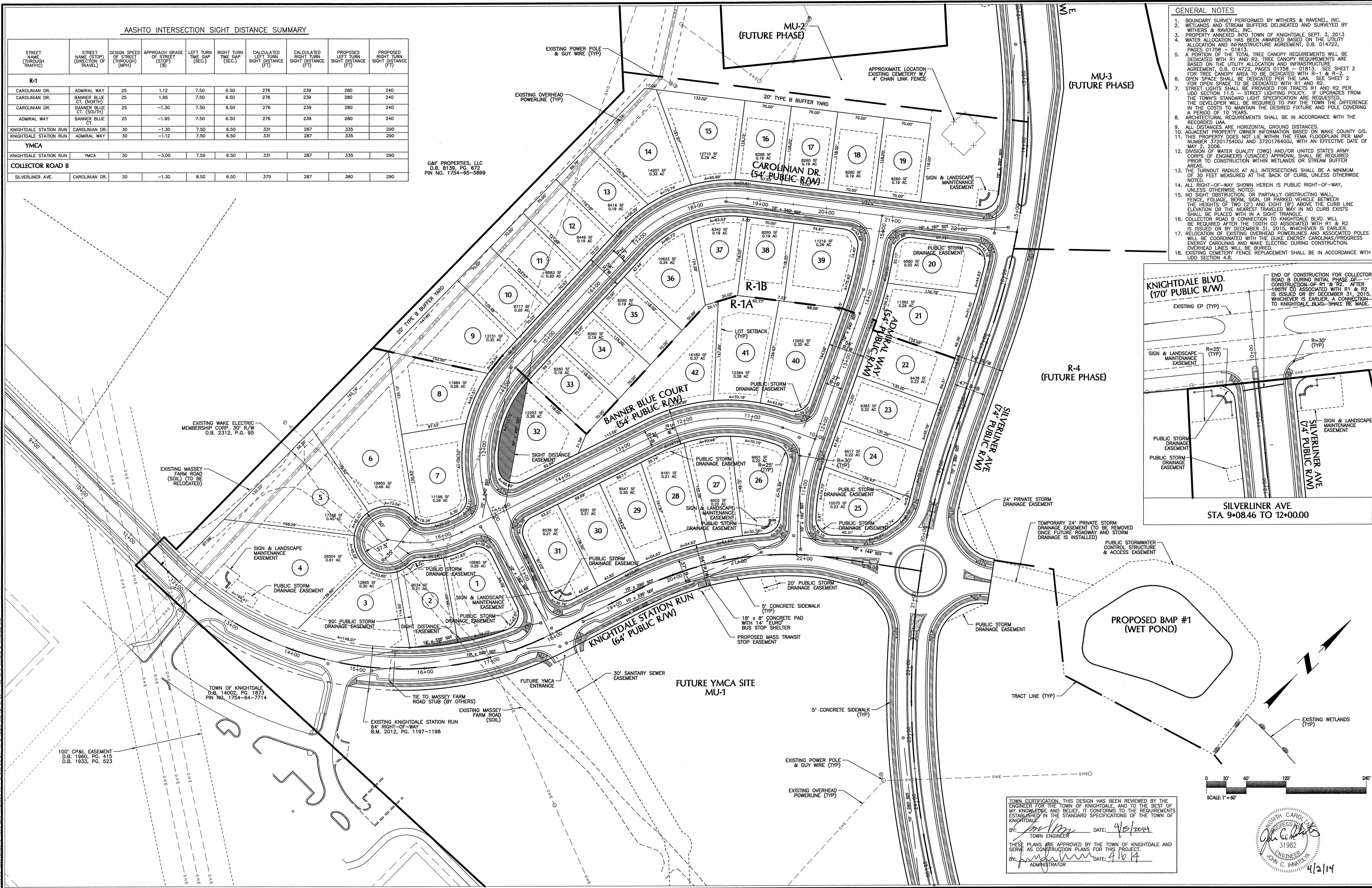
Sheet No. **2** of **38**

**AASHTO INTERSECTION SIGHT DISTANCE SUMMARY**

STREET NAME (THROUGH TRAFFIC)	STREET NAME (STOP)	DESIGN SPEED (THROUGH) (MPH)	APPROACH GRADE OF STREET (STOP) (%)	LEFT TURN TIME GAP (SEC.)	RIGHT TURN TIME GAP (SEC.)	CALCULATED LEFT TURN SIGHT DISTANCE (FT)	CALCULATED RIGHT TURN SIGHT DISTANCE (FT)	PROPOSED LEFT TURN SIGHT DISTANCE (FT)	PROPOSED RIGHT TURN SIGHT DISTANCE (FT)
<b>R-1</b>									
CAROLINIAN DR.	ADMIRAL WAY	25	1.12	7.50	6.50	276	239	280	240
CAROLINIAN DR.	BANNER BLUE CT. (NORTH)	25	1.95	7.50	6.50	276	239	280	240
CAROLINIAN DR.	BANNER BLUE CT. (SOUTH)	25	-1.30	7.50	6.50	276	239	280	240
ADMIRAL WAY	BANNER BLUE CT.	25	-1.95	7.50	6.50	276	239	280	240
KNIGHTDALE STATION RUN	CAROLINIAN DR.	30	-1.30	7.50	6.50	331	287	335	290
KNIGHTDALE STATION RUN	ADMIRAL WAY	30	-1.12	7.50	6.50	331	287	335	290
<b>YMCA</b>									
KNIGHTDALE STATION RUN	YMCA	30	-3.00	7.50	6.50	331	287	335	290
<b>COLLECTOR ROAD B</b>									
SILVERLINER AVE.	CAROLINIAN DR.	30	-1.30	8.50	6.50	375	287	380	290

C&F PROPERTIES, LLC  
D.B. 6139, PG. 672  
PIN NO. 1754-65-5899

- GENERAL NOTES**
- BOUNDARY SURVEY PERFORMED BY WITHERS & RAVENEL, INC.
  - WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERS & RAVENEL, INC. TOWN OF KNIGHTDALE SEPT. 3, 2013
  - PROPERTY ANNEXED INTO TOWN OF KNIGHTDALE SEPT. 3, 2013
  - WATER ALLOCATION HAS BEEN AWARDED BASED ON THE UTILITY ALLOCATION AND INFRASTRUCTURE AGREEMENT, D.B. 014722, PAGES 01758 - 01813.
  - A PORTION OF THE TOTAL TREE CANOPY REQUIREMENTS WILL BE DEDICATED WITH R1 AND R2. TREE CANOPY REQUIREMENTS ARE BASED ON THE UTILITY ALLOCATION AND INFRASTRUCTURE AGREEMENT, D.B. 014722, PAGES 01758 - 01813. SEE SHEET 2 FOR TREE CANOPY AREA TO BE DEDICATED WITH R-1 & R-2.
  - OPEN SPACE SHALL BE DEDICATED PER THE UUA. SEE SHEET 2 FOR OPEN SPACE TO BE DEDICATED WITH R1 AND R2.
  - STREET LIGHTS SHALL BE PROVIDED FOR TRACTS R1 AND R2 PER UDO SECTION 11.5 - STREET LIGHTING POLICY. IF UPGRADES FROM THE TOWN'S STANDARD LIGHT SPECIFICATION ARE REQUESTED, THE DEVELOPER WILL BE REQUIRED TO PAY THE TOWN THE DIFFERENCE IN THE COSTS TO MAINTAIN THE DESIRED FIXTURE AND POLE COVERING A PERIOD OF 10 YEARS.
  - ARCHITECTURAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE RECORDED UUA.
  - ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES.
  - ADJACENT PROPERTY OWNER INFORMATION BASED ON WAKE COUNTY GIS.
  - THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720175400J AND 3720176400J, WITH AN EFFECTIVE DATE OF MAY 2, 2006.
  - DIVISION OF WATER QUALITY (DWO) AND/OR UNITED STATES ARMY CORPS OF ENGINEERS (USACE) APPROVAL SHALL BE REQUIRED PRIOR TO CONSTRUCTION WITHIN WETLANDS OR STREAM BUFFER AREAS.
  - THE TURNOUT RADIUS AT ALL INTERSECTIONS SHALL BE A MINIMUM OF 30 FEET MEASURED AT THE BACK OF CURB, UNLESS OTHERWISE NOTED.
  - ALL RIGHT-OF-WAY SHOWN HEREIN IS PUBLIC RIGHT-OF-WAY, UNLESS OTHERWISE NOTED.
  - NO SIGHT OBSTRUCTION, OR PARTIALLY OBSTRUCTING WALL, FENCE, FOLIAGE, BERM, SIGN, OR PARKED VEHICLE BETWEEN THE HEIGHTS OF TWO (2') AND EIGHT (8') ABOVE THE CURB LINE ELEVATION OR THE NEAREST TRAVELED WAY IN NO CURB EXISTS SHALL BE PLACED WITHIN A SIGHT TRIANGLE.
  - COLLECTOR ROAD B CONNECTION TO KNIGHTDALE BLVD. WILL BE REQUIRED AFTER THE 100TH GO ASSOCIATED WITH R1 & R2 IS ISSUED OR BY DECEMBER 31, 2015, WHICHEVER IS EARLIER.
  - RELOCATION OF EXISTING OVERHEAD POWERLINES AND ASSOCIATED POLES WILL BE COORDINATED WITH THE DUKE ENERGY CAROLINAS/PROGRESS ENERGY CAROLINAS AND WAKE ELECTRIC DURING CONSTRUCTION. OVERHEAD LINES WILL BE BURIED.
  - EXISTING CEMETERY FENCE REPLACEMENT SHALL BE IN ACCORDANCE WITH UDO SECTION 4.8.

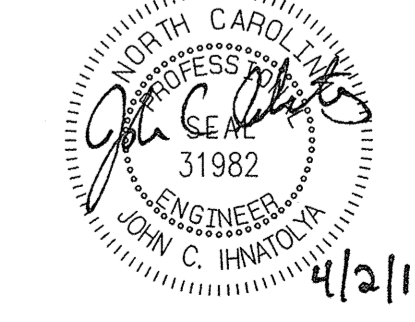


TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 4/2/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/16/14  
ADMINISTRATOR



No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI
4	WAKE COUNTY EC COMMENTS & BMP #1 & 2 REVISIONS	04/02/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	020902513

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

**SITE PLAN - R1**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

115 Mackenran Drive Cary, North Carolina 27511 Tel: 919-469-3340 www.wITHERSRAVENEL.com License No. C-0832

Sheet No. **3** of **38**



JAMES H. POOLE, JR. TRUSTEE  
 JAMES H. POOLE, SR.  
 REVOCABLE LIVING TRUST  
 ESTATE FILE 12-E-1959  
 PIN NO. 1754-83-4965

TIMOTHY A. GRIFFIN  
 D.B. 10096, PG. 2698  
 PIN NO. 1754-84-7584

VALENTIN COBOS  
 D.B. 11708, PG. 1032  
 PIN NO. 1754-84-6766

VALENTIN COBOS  
 D.B. 11708, PG. 1032  
 PIN NO. 1754-84-6978

CINDY L. COSTELLO  
 D.B. 7640, PG. 0001  
 PIN NO. 1754-85-7306

AASHTO INTERSECTION SIGHT DISTANCE SUMMARY

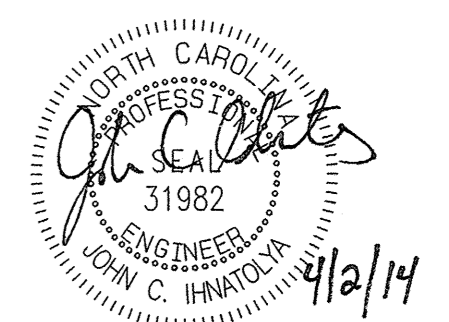
STREET NAME (THROUGH TRAFFIC)	STREET NAME (STOP) (DIRECTION OF TRAVEL)	DESIGN SPEED OF STREET (MPH)	APPROACH GRADE OF STREET (%)	LEFT TURN TIME GAP (SEC.)	RIGHT TURN TIME GAP (SEC.)	CALCULATED LEFT TURN SIGHT DISTANCE (FT)	CALCULATED RIGHT TURN SIGHT DISTANCE (FT)	PROPOSED LEFT TURN SIGHT DISTANCE (FT)	PROPOSED RIGHT TURN SIGHT DISTANCE (FT)
<b>R-2</b>									
SUNLAND DR.	LIBERTY EXPRESS PL.	25	1.90	7.50	6.50	276	239	280	240
SUNLAND DR.	MIDLANDER DR.	25	-1.60	7.50	6.50	276	239	280	240
SUNLAND DR.	NOON FLYER WAY	25	1.20	7.50	6.50	276	239	280	240
HEARTLAND FLYER DR.	SUNLAND DR.	25	1.35	7.50	6.50	276	239	280	240
HEARTLAND FLYER DR.	LIBERTY EXPRESS PL.	25	-0.90	7.50	6.50	276	239	280	240
HEARTLAND FLYER DR.	MIDLANDER DR. (WEST)	25	-1.00	7.50	6.50	276	239	280	240
HEARTLAND FLYER DR.	MIDLANDER DR. (EAST)	25	-1.00	7.50	6.50	276	239	280	240
MIDLANDER DR.	NOON FLYER WAY	25	-2.85	7.50	6.50	276	239	280	240
<b>COLLECTOR ROAD B</b>									
SILVERLINER AVE.	HEARTLAND FLYER DR.	30	-1.60	8.50	6.50	375	287	380	290
SILVERLINER AVE.	SUNLAND DR.	30	-2.40	8.50	6.50	375	287	380	290

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: 4/15/2014  
 TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/16/14  
 ADMINISTRATOR



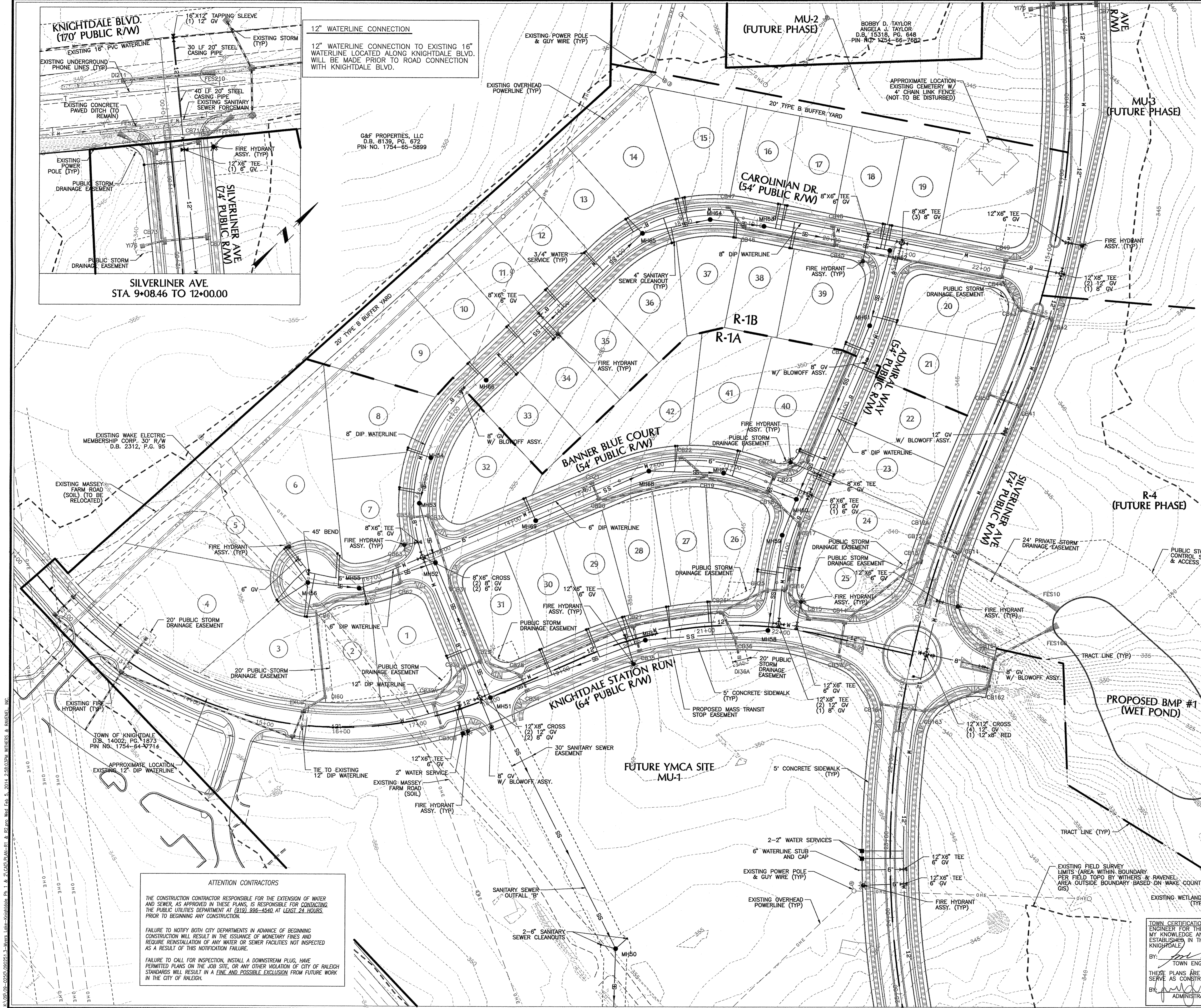
No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI
4	WAKE COUNTY EC COMMENTS & BMP #1 & #2 REVISIONS	04/02/14	JCI

Designer: W&R  
 Scale: SEE SHEET  
 Drawn By: JCI  
 Date: 01/29/14  
 Checked By: JCI  
 Job No.: 020902513

**KNIGHTDALE STATION  
 PHASE R1 & R2**  
 TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

**SITE PLAN - R2**

**WITHERS & RAVENEL**  
 ENGINEERS | PLANNERS | SURVEYORS  
 115 MacKenzie Drive Cary, North Carolina 27511 tel: 919-469-3340 www.withersravenel.com License No. C-0832



- UTILITY NOTES**
- ALL SANITARY SEWER LINES SHALL BE 8" OR 12" DIAMETER UNLESS OTHERWISE SPECIFIED, SEE PLANS.
  - ALL SANITARY SEWER MAINS SHALL BE PUBLIC UNLESS OTHERWISE SPECIFIED.
  - ALL POTABLE WATER MAINS SHALL BE DIP.
  - A 3' MINIMUM COVER IS REQUIRED ON ALL WATER MAINS AND SEWER FORCEMAINS.
  - INSTALL 3/4" COPPER WATER SERVICES WITH METERS LOCATED AT ROW OR WITHIN A 2'x2' WATERLINE EASEMENT IMMEDIATELY ADJACENT TO ROW.
  - INSTALL 4" PVC/DIP SEWER SERVICES @ 1.0% MINIMUM GRADE WITH CLEANOUTS LOCATED AT ROW OR EASEMENT LINE AND SPACED EVERY 75 LF MAXIMUM.
  - PRESSURE REDUCING VALVES ARE REQUIRED ON ALL WATER SERVICES EXCEEDING 80 PSI.
  - FIRE HYDRANTS SHALL BE SPACED IN ACCORDANCE WITH THE CITY OF RALEIGH AND TOWN OF KNIGHTDALE STANDARDS.
  - UTILITY SEPARATION REQUIREMENTS:
    - A DISTANCE OF 100' 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 25' 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 AND MUST BE APPROVED BY THE PUBLIC WORKS 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 AND INSTALLED TO WATERLINE SPECIFICATIONS.
    - MAINTAIN 18" MINIMUM VERTICAL SEPARATION AT ALL WATER MAIN AND RCP STORM DRAIN CROSSINGS; MAINTAIN 24" MINIMUM VERTICAL SEPARATION AT ALL SANITARY SEWER AND RCP STORM DRAIN CROSSINGS. WHERE ADEQUATE SEPARATIONS CANNOT BE ACHIEVED, SPECIFY DIP MATERIALS AND A CONCRETE CRADLE HAVING 6" MINIMUM CLEARANCE (PER COR PUD DETAILS W-41 AND S-49).
    - ALL OTHER UNDERGROUND UTILITIES SHALL CROSS WATER AND SEWER FACILITIES WITH 18" MINIMUM VERTICAL SEPARATION REQUIRED.
  - ANY NECESSARY FIELD REVISIONS ARE SUBJECT TO REVIEW AND APPROVAL OF AN AMENDED PLAN AND/OR PROFILE BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT PRIOR TO CONSTRUCTION.
  - CONTRACTOR SHALL MAINTAIN CONTINUOUS WATER AND SEWER SERVICE TO EXISTING RESIDENCES AND 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.
  - ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS (REFERENCE: CORPUD HANDBOOK, CURRENT EDITION) AND TOWN OF KNIGHTDALE DESIGN STANDARDS AND SPECIFICATIONS.
  - ALL ENVIRONMENTAL PERMITS APPLICABLE TO THE PROJECT MUST BE OBTAINED FROM NCDWQ, USACE, & OR FEMA FOR ANY RIPARIAN BUFFER, WETLAND &/OR FLOODPLAIN IMPACTS (RESPECTIVELY) PRIOR TO CONSTRUCTION.

**PUBLIC WATER DISTRIBUTION/EXTENSION SYSTEM**

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-3220  
 AUTHORIZATION TO CONSTRUCT David J. Withers  
 DATE 2/28/14

**PUBLIC SEWER COLLECTION/EXTENSION SYSTEM**

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-3917  
 AUTHORIZATION TO CONSTRUCT David J. Withers  
 DATE 2/28/14

**PROPOSED BMP #1 (WET POND)**

TRACT LINE (TYP)

EXISTING WETLANDS (TYP)

EXISTING FIELD SURVEY LIMITS (AREA WITHIN BOUNDARY PER FIELD TOPO BY WITHERS & RAVENEL AREA OUTSIDE BOUNDARY BASED ON WAKE COUNTY GIS)

SCALE 1" = 60'

ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH ALL CITY OF RALEIGH & TOWN OF KNIGHTDALE DESIGN STANDARDS, DETAILS AND SPECIFICATIONS

**ATTENTION CONTRACTORS**

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT (919) 998-4540 AT LEAST 24 HOURS PRIOR TO BEGINNING ANY 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.

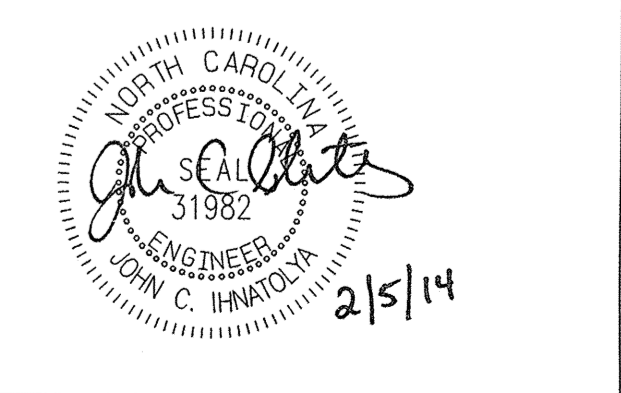
FAILURE TO CALL FOR INSPECTION, INSTALL A DOWNSTREAM PLUG, HAVE PERMITTED PLANS ON THE JOB SITE, OR ANY OTHER VIOLATION OF CITY OF RALEIGH STANDARDS WILL RESULT IN A FINE AND POSSIBLE EXCLUSION FROM FUTURE WORK IN THE CITY OF RALEIGH.

TOWN 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: John C. Hanlon DATE: 2/5/2014  
 TOWN ENGINEER

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

BY: John C. Hanlon DATE: 2/16/14  
 ADMINISTRATOR



No.	Revision	Date	By	Designer	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI	W&R	SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI	JCI	01/29/14
				Checked By	Job No.
				JCI	020902513

**KNIGHTDALE STATION  
 PHASE R1 & R2**

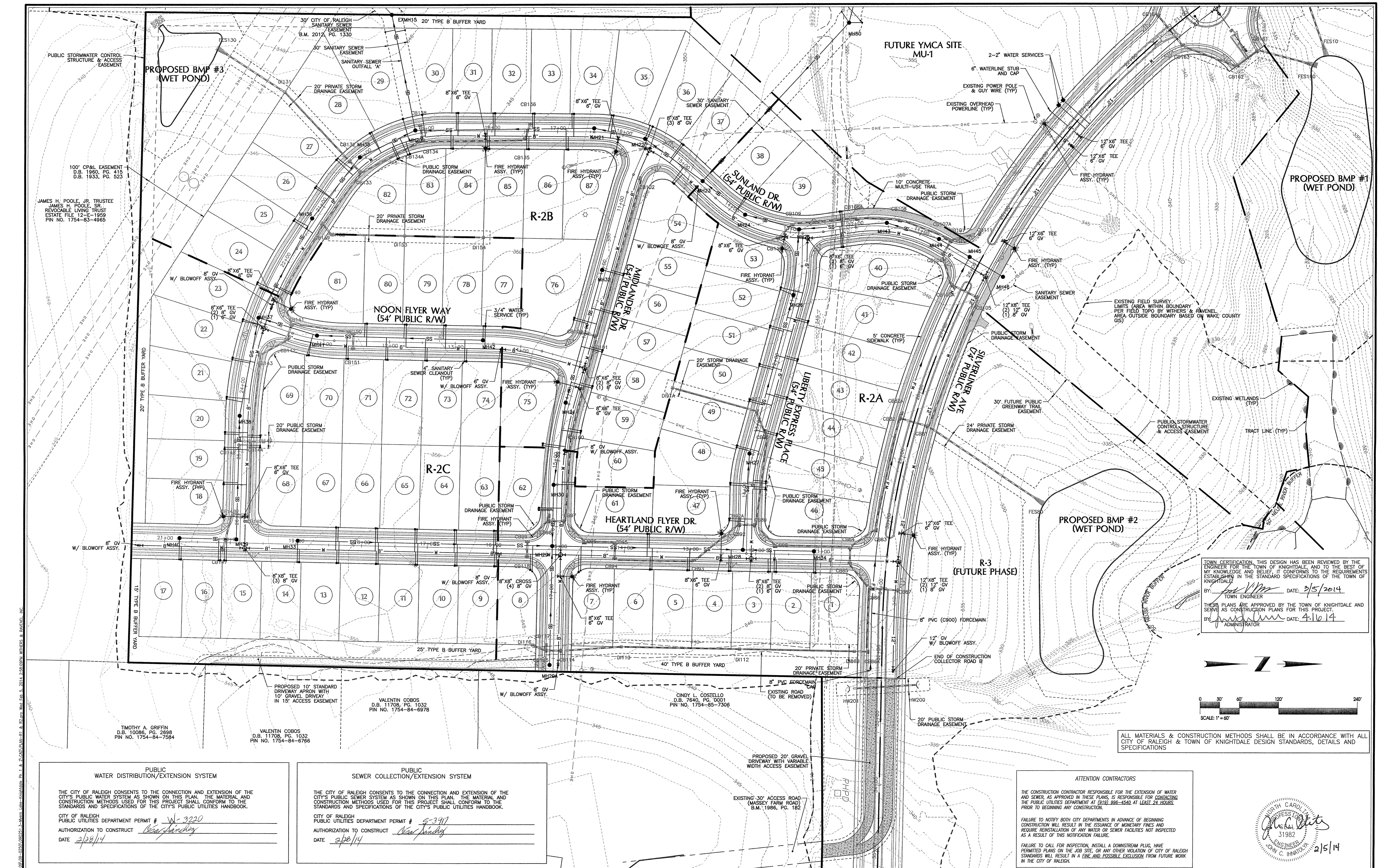
TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

**UTILITY PLAN - R1**

**WITHERS & RAVENEL**  
 ENGINEERS | PLANNERS | SURVEYORS

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Sheet No. **5 of 38**

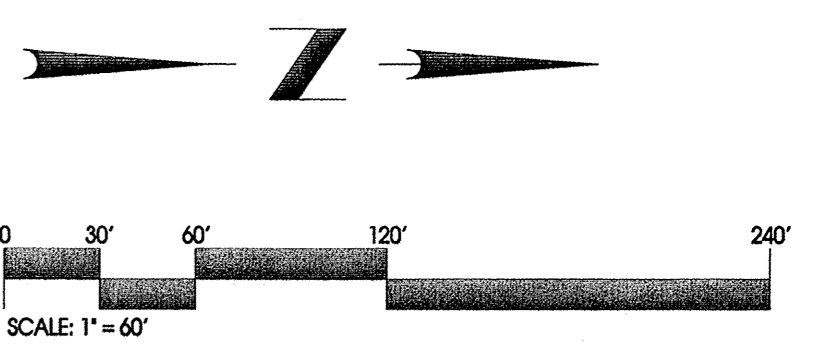


TOWN CERTIFICATION, THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 3/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4.16.14  
ADMINISTRATOR



ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH ALL CITY OF RALEIGH & TOWN OF KNIGHTDALE DESIGN STANDARDS, DETAILS AND SPECIFICATIONS.

**ATTENTION CONTRACTORS**

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT (919) 988-4840 AT LEAST 24 HOURS PRIOR TO BEGINNING ANY 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 JOB SITE, 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.

*[Signature]*  
ENGINEER  
JOHN C. HANCOCK  
2/5/14

**PUBLIC WATER DISTRIBUTION/EXTENSION SYSTEM**

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-3220  
AUTHORIZATION TO CONSTRUCT *[Signature]*  
DATE 2/28/14

**PUBLIC SEWER COLLECTION/EXTENSION SYSTEM**

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-3911  
AUTHORIZATION TO CONSTRUCT *[Signature]*  
DATE 2/28/14

No.	Revision	Date	By	Designer	W&R	Scale	SEE SHEET
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI				
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI				

Drawn By: JCI Date: 01/29/14  
Checked By: JCI Job No: 020902513

**KNIGHTDALE STATION  
PHASE R1 & R2**

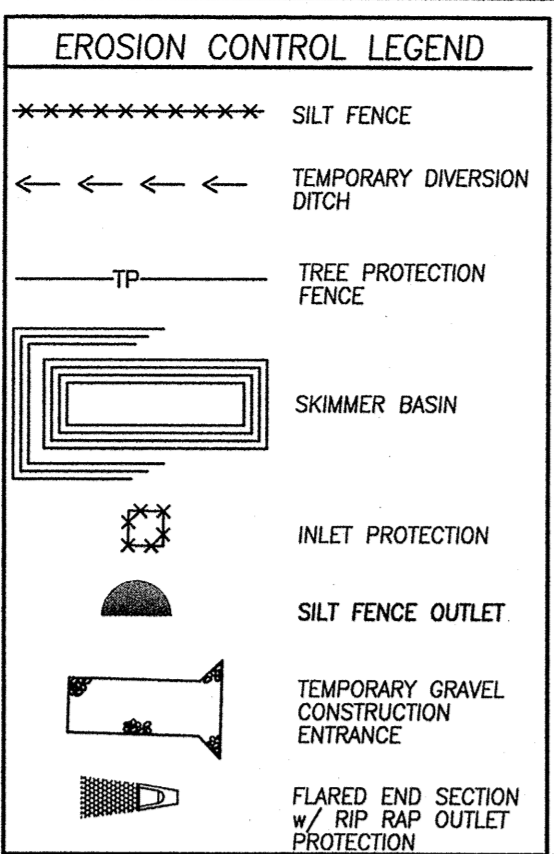
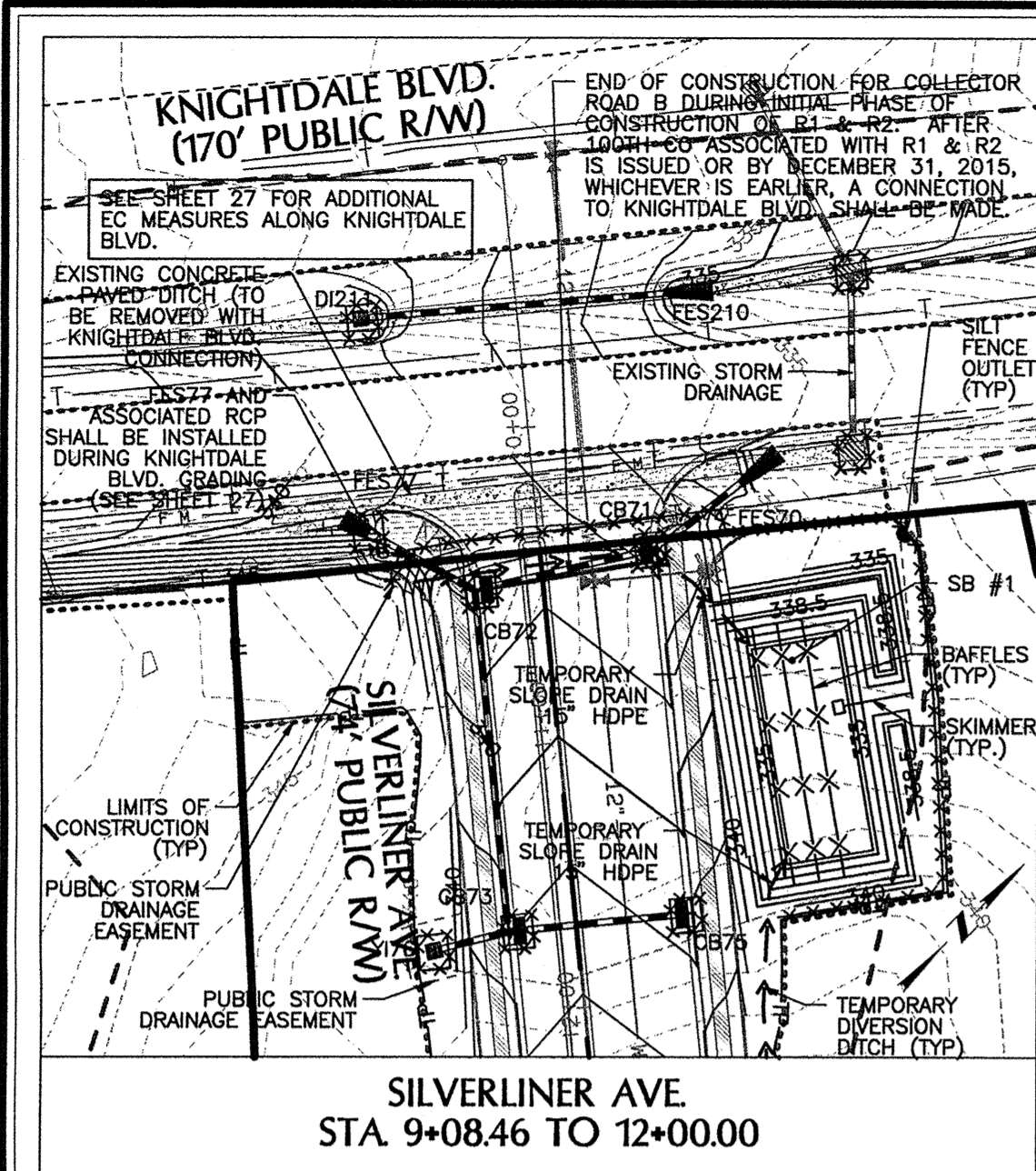
TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

**UTILITY PLAN - R2**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

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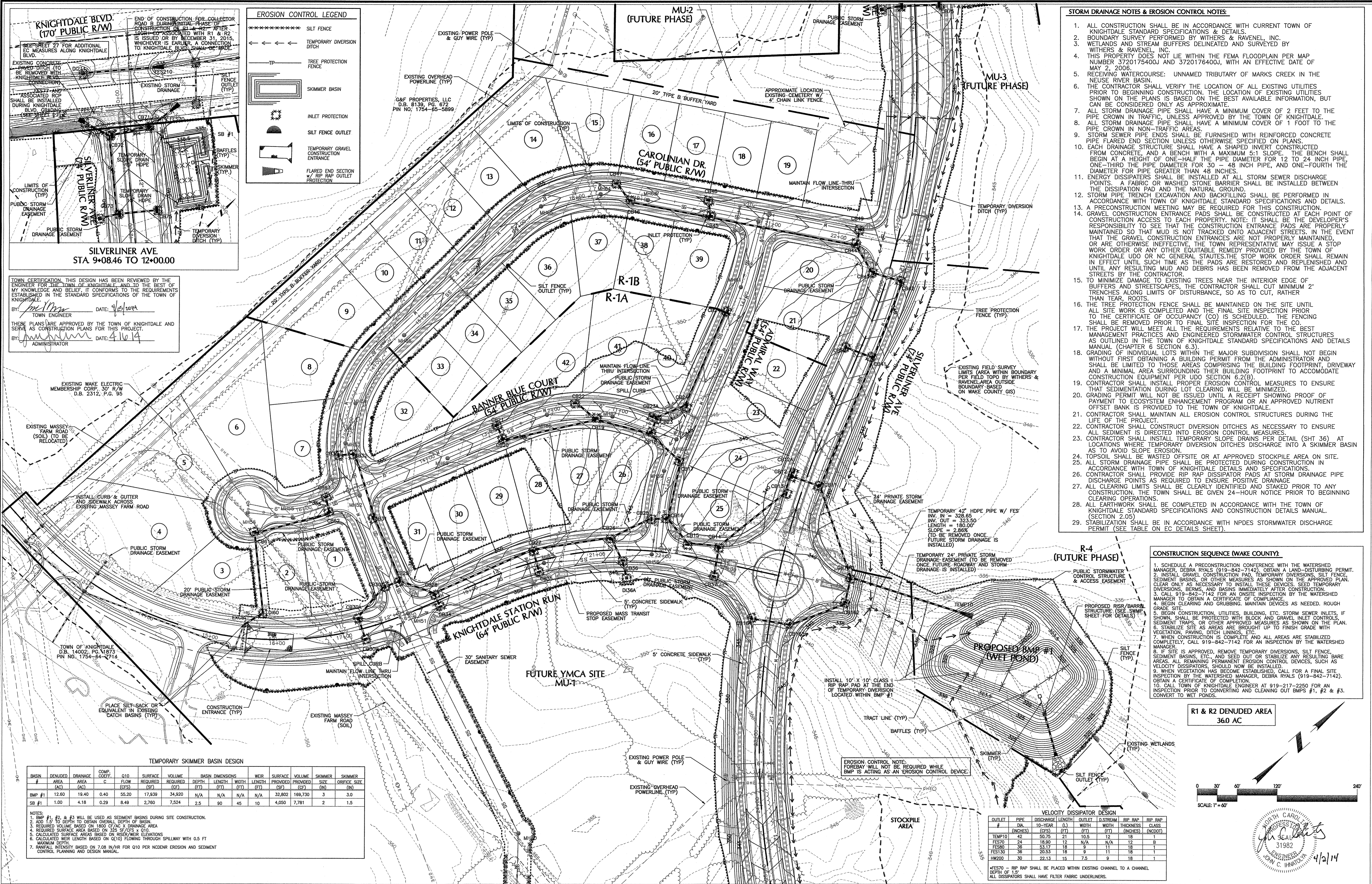
Sheet No. **6 of 38**



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.

DATE: 4/2/2014

DATE: 4/16/14



- ### STORM DRAINAGE NOTES & EROSION CONTROL NOTES:
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
  - BOUNDARY SURVEY PERFORMED BY WITHERS & RAVENEL, INC.
  - WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERS & RAVENEL, INC.
  - THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720175400J AND 3720176400J, WITH AN EFFECTIVE DATE OF MAY 2, 2006.
  - RECEIVING WATERCOURSE: UNNAMED TRIBUTARY OF MARKS CREEK IN THE NEUSE RIVER BASIN.
  - THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. THE LOCATION OF EXISTING UTILITIES SHOWN ON THIS PLAN IS BASED ON THE BEST AVAILABLE INFORMATION, BUT CAN BE CONSIDERED ONLY AS APPROXIMATE.
  - ALL STORM DRAINAGE PIPE SHALL HAVE A MINIMUM COVER OF 2 FEET TO THE PIPE CROWN IN TRAFFIC, UNLESS APPROVED BY THE TOWN OF KNIGHTDALE.
  - ALL STORM DRAINAGE PIPE SHALL HAVE A MINIMUM COVER OF 1 FOOT TO THE PIPE CROWN IN NON-TRAFFIC AREAS.
  - STORM SEWER PIPE ENDS SHALL BE FURNISHED WITH REINFORCED CONCRETE PIPE FLARED END SECTION UNLESS OTHERWISE SPECIFIED ON PLANS.
  - EACH DRAINAGE STRUCTURE SHALL HAVE A SHAPED INVERT CONSTRUCTED FROM CONCRETE, AND A BENCH WITH A MAXIMUM 5:1 SLOPE. THE BENCH SHALL BEGIN AT A HEIGHT OF ONE-HALF THE PIPE DIAMETER FOR 12 TO 24 INCH PIPE, ONE-THIRD THE PIPE DIAMETER FOR 30 INCH PIPE, AND ONE-FOURTH THE DIAMETER FOR PIPE GREATER THAN 48 INCHES.
  - ENERGY DISSIPATORS SHALL BE INSTALLED AT ALL STORM SEWER DISCHARGE POINTS. A FABRIC OR WASHED STONE BARRIER SHALL BE INSTALLED BETWEEN THE DISSIPATION PAD AND THE NATURAL GROUND.
  - STORM PIPE TRENCH EXCAVATION AND BACKFILL SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
  - A PRECONSTRUCTION MEETING MAY BE REQUIRED FOR THIS CONSTRUCTION.
  - GRAVEL CONSTRUCTION ENTRANCE PADS SHALL BE CONSTRUCTED AT EACH POINT OF CONSTRUCTION ACCESS TO EACH PROPERTY. NOTE: IT SHALL BE THE DEVELOPER'S RESPONSIBILITY TO SEE THAT THE CONSTRUCTION ENTRANCE PADS ARE PROPERLY MAINTAINED SO THAT MUD IS NOT TRACKED ONTO ADJACENT STREETS. IN THE EVENT THAT THE GRAVEL CONSTRUCTION ENTRANCES ARE NOT PROPERLY MAINTAINED, OR ARE OTHERWISE INEFFECTIVE, THE TOWN REPRESENTATIVE MAY ISSUE A STOP WORK ORDER OR ANY OTHER EQUITABLE REMEDY PROVIDED BY THE TOWN OF KNIGHTDALE LUDO AND GENERAL STATUTES. THE STOP WORK ORDER SHALL REMAIN IN EFFECT UNTIL SUCH TIME AS THE PADS ARE RESTORED AND REPLENISHED AND UNTIL ANY RESULTING MUD AND DEBRIS HAS BEEN REMOVED FROM THE ADJACENT STREETS BY THE CONTRACTOR.
  - TO MINIMIZE DAMAGE TO EXISTING TREES NEAR THE INTERIOR EDGE OF BUFFERS AND STREETSCAPES, THE CONTRACTOR SHALL CUT MINIMUM 2' TRENCHES ALONG LIMITS OF DISTURBANCE, 30 AS TO CUT, RATHER THAN TEAR, ROOTS.
  - THE TREE PROTECTION FENCE SHALL BE MAINTAINED ON THE SITE UNTIL ALL SITE WORK IS COMPLETED AND THE FINAL SITE INSPECTION PRIOR TO THE CERTIFICATE OF OCCUPANCY (CO) IS SCHEDULED. THE FENCING SHALL BE REMOVED PRIOR TO FINAL SITE INSPECTION FOR THE CO.
  - THE PROJECT WILL MEET ALL THE REQUIREMENTS RELATIVE TO THE BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS MANUAL (CHAPTER 6 SECTION 6.2).
  - GRADING OF INDIVIDUAL LOTS WITHIN THE MAJOR SUBDIVISION SHALL NOT BEGIN WITHOUT FIRST OBTAINING A BUILDING PERMIT FROM THE ADMINISTRATOR AND SHALL BE LIMITED TO THOSE AREAS COMPRISING THE BUILDING FOOTPRINT, DRIVEWAY AND A MINIMAL AREA SURROUNDING THEIR BUILDING FOOTPRINT TO ACCOMMODATE CONSTRUCTION EQUIPMENT PER UDO SECTION 6.2(B).
  - CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING LOT CLEARING WILL BE MINIMIZED.
  - GRADING PERMIT WILL NOT BE ISSUED UNTIL A RECEIPT SHOWING PROOF OF PAYMENT TO ECOSYSTEM ENHANCEMENT PROGRAM OR AN APPROVED NUTRIENT OFFSET BANK IS PROVIDED TO THE TOWN OF KNIGHTDALE.
  - CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL STRUCTURES DURING THE LIFE OF THE PROJECT.
  - CONTRACTOR SHALL CONSTRUCT DIVERSION DITCHES AS NECESSARY TO ENSURE ALL SEDIMENT IS DIRECTED INTO EROSION CONTROL MEASURES.
  - CONTRACTOR SHALL INSTALL TEMPORARY SLOPE DRAINS PER DETAIL (SHT 36) AT LOCATIONS WHERE TEMPORARY DIVERSION DITCHES DISCHARGE INTO A SKIMMER BASIN AS TO AVOID SLOPE EROSION.
  - TOPSOIL SHALL BE WASTED OFFSITE OR AT APPROVED STOCKPILE AREA ON SITE.
  - ALL STORM DRAINAGE PIPE SHALL BE PROTECTED DURING CONSTRUCTION IN ACCORDANCE WITH TOWN OF KNIGHTDALE DETAILS AND SPECIFICATIONS.
  - CONTRACTOR SHALL PROVIDE RIP RAP DISSIPATOR PADS AT STORM DRAINAGE PIPE DISCHARGE POINTS AS REQUIRED TO ENSURE POSITIVE DRAINAGE.
  - ALL CLEARING LIMITS SHALL BE CLEARLY IDENTIFIED AND STAKED PRIOR TO ANY CONSTRUCTION. THE TOWN SHALL BE GIVEN 24-HOUR NOTICE PRIOR TO BEGINNING CLEARING OPERATIONS.
  - ALL EARTHWORK SHALL BE COMPLETED IN ACCORDANCE WITH THE TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND CONSTRUCTION DETAILS MANUAL (SECTION 2.05).
  - STABILIZATION SHALL BE IN ACCORDANCE WITH NPDES STORMWATER DISCHARGE PERMIT (SEE TABLE ON EC DETAILS SHEET).

- ### CONSTRUCTION SEQUENCE (WAKE COUNTY):
- SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE WATERSHED MANAGER, DEBRA RYALS (919-842-7142), OBTAIN 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 TEMPORARY DIVERSIONS, BERMS, AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
  - CALL 919-842-7142 FOR AN ONSITE INSPECTION BY THE WATERSHED MANAGER TO OBTAIN A CERTIFICATE OF COMPLIANCE.
  - BEGIN CLEARING AND GRUBBING. MAINTAIN DEVICES AS NEEDED. ROUGH GRADE SITE.
  - BEGIN CONSTRUCTION, UTILITIES, BUILDING, ETC. STORM SEWER INLETS, IF SHOWN, SHALL BE PROTECTED WITH BLOCK AND GRAVEL INLET CONTROLS, SEDIMENT TRAPS, OR OTHER APPROVED MEASURES AS SHOWN ON THE PLAN.
  - STABILIZE SITE AS AREAS ARE BROUGHT UP TO FINISH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC.
  - WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE STABILIZED COMPLETELY, CALL 919-842-7142 FOR AN INSPECTION BY THE WATERSHED MANAGER.
  - 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 WATERSHED MANAGER, DEBRA RYALS (919-842-7142). OBTAIN A CERTIFICATE OF COMPLETION.
  - CALL TOWN OF KNIGHTDALE ENGINEER AT 919-217-2250 FOR AN INSPECTION PRIOR TO CONVERTING AND CLEANING OUT BMPs #1, #2 & #3. CONVERT TO WET PONDS.

R1 & R2 DENUDED AREA  
36.0 AC

### TEMPORARY SKIMMER BASIN DESIGN

BASIN #	AREA (AC)	DRAINAGE AREA (AC)	COMP. COEFF.	Q10 (CFS)	SURFACE REQUIRED (SF)	VOLUME REQUIRED (CF)	BASIN DIMENSIONS (FT)	WEIR LENGTH (FT)	SURFACE AREA (SF)	VOLUME (CF)	SKIMMER SIZE (IN)	SKIMMER ORIFICE SIZE (IN)
BMP #1	12.60	19.40	0.40	55.20	17,939	34,920	N/A	N/A	32,802	169,730	3	3.0
SB #1	1.00	4.18	0.29	8.49	2,760	7,524	2.5	80	4,050	7,781	2	1.5

NOTES:  
 1. BMP #1, #2, & #3 WILL BE USED AS SEDIMENT BASINS DURING SITE CONSTRUCTION.  
 2. ADD 15' TO DEPTH TO OBTAIN OVERALL DEPTH OF BASIN.  
 3. REQUIRED VOLUME BASED ON 100 CF/AC Y DRAINAGE AREA.  
 4. REQUIRED SURFACE AREA BASED ON 325 SF/CF x Q10.  
 5. CALCULATED SURFACE AREAS BASED ON RISER NEAR ELEVATIONS.  
 6. CALCULATED WEIR LENGTH BASED ON Q(10) FLOWING THROUGH SPILLWAY WITH 0.5 FT MAXIMUM DEPTH.  
 7. RAINFALL INTENSITY BASED ON 7.08 IN/HR FOR Q10 PER NCCENR EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

### VELOCITY DISSIPATOR DESIGN

OUTLET #	PIPE DIAMETER (INCHES)	DISCHARGE (CFS)	LENGTH (FT)	OUTLET WIDTH (FT)	DISCHARGE LENGTH (FT)	RIP RAP CLASS (INCHES)	RIP RAP THICKNESS (INCHES)	RIP RAP AREA (SQ FT)
TEMP10	42	50.75	21	10.5	12	18	1	
FES70	24	18.90	12	N/A	12	B		
FES90	36	33.17	18	9	11	18	1	
FES130	36	20.55	18	9	11	18	1	
HW200	30	22.13	15	7.5	9	18	1	

FES70 - RIP RAP SHALL BE PLACED WITHIN EXISTING CHANNEL TO A CHANNEL DEPTH OF 1.5'. ALL DISSIPATORS SHALL HAVE FILTER FABRIC UNDERLINERS.

No.	Revision	Date	By	Designer	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/27/13	JCI	W&R	SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI		
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI		
4	WAKE COUNTY EC COMMENTS & BMP #1 & #2 REVISIONS	04/02/14	JCI		

Design: W&R  
 Scale: SEE SHEET  
 Drawn By: JCI  
 Date: 01/29/14  
 Checked By: JCI  
 Job No.: 02090253

**KNIGHTDALE STATION  
 PHASE R1 & R2**  
 WAKE COUNTY  
 NORTH CAROLINA

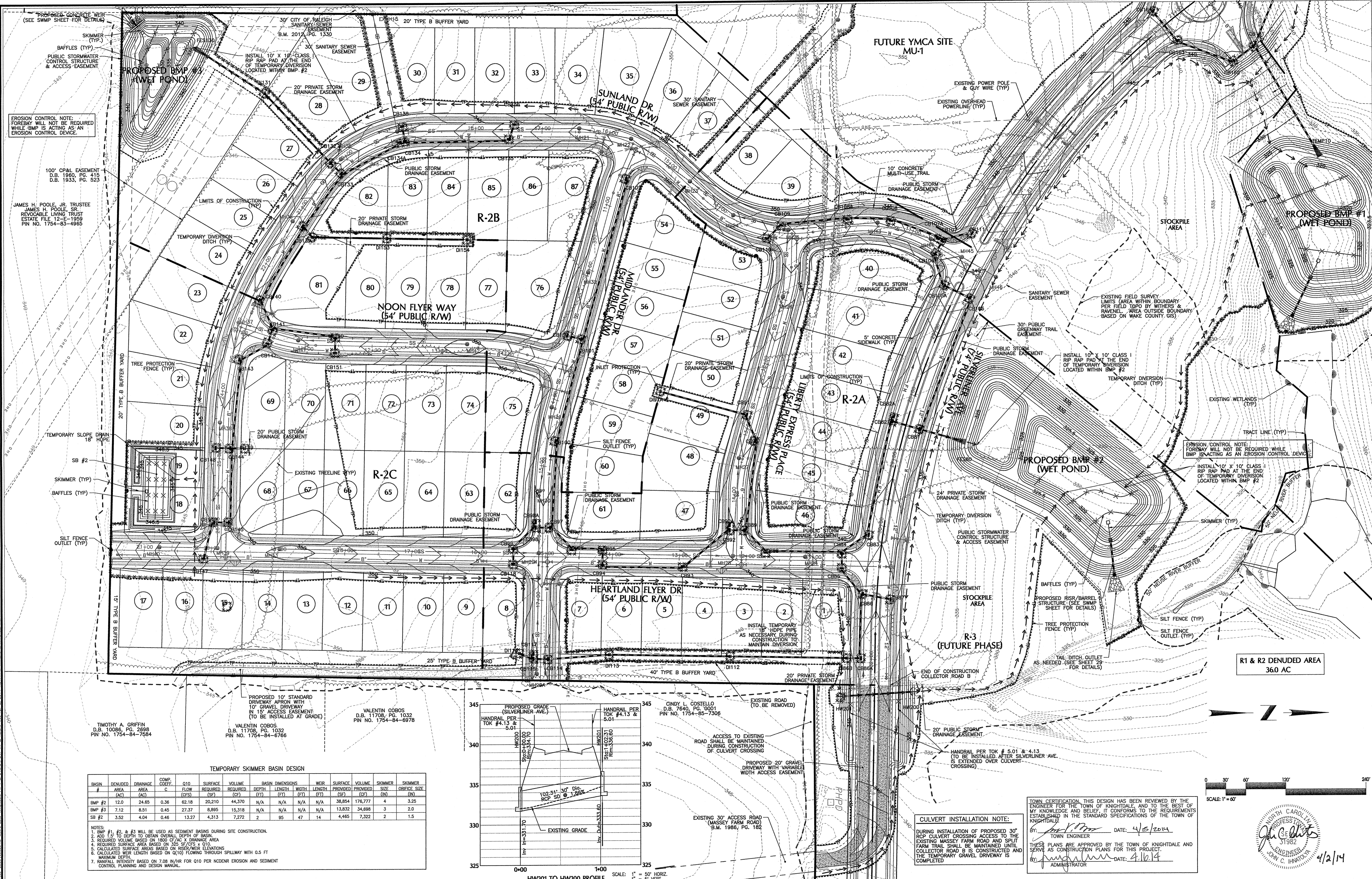
**EROSION CONTROL AND STORM  
 DRAINAGE PLAN - R1**

**WITHERS & RAVENEL**  
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115 MacKean Drive Cary, North Carolina 27511 | tel: 919-468-3340 | www.wITHERSANDRAVENEL.COM | License No. C-0832

Sheet No. **7** of **38**





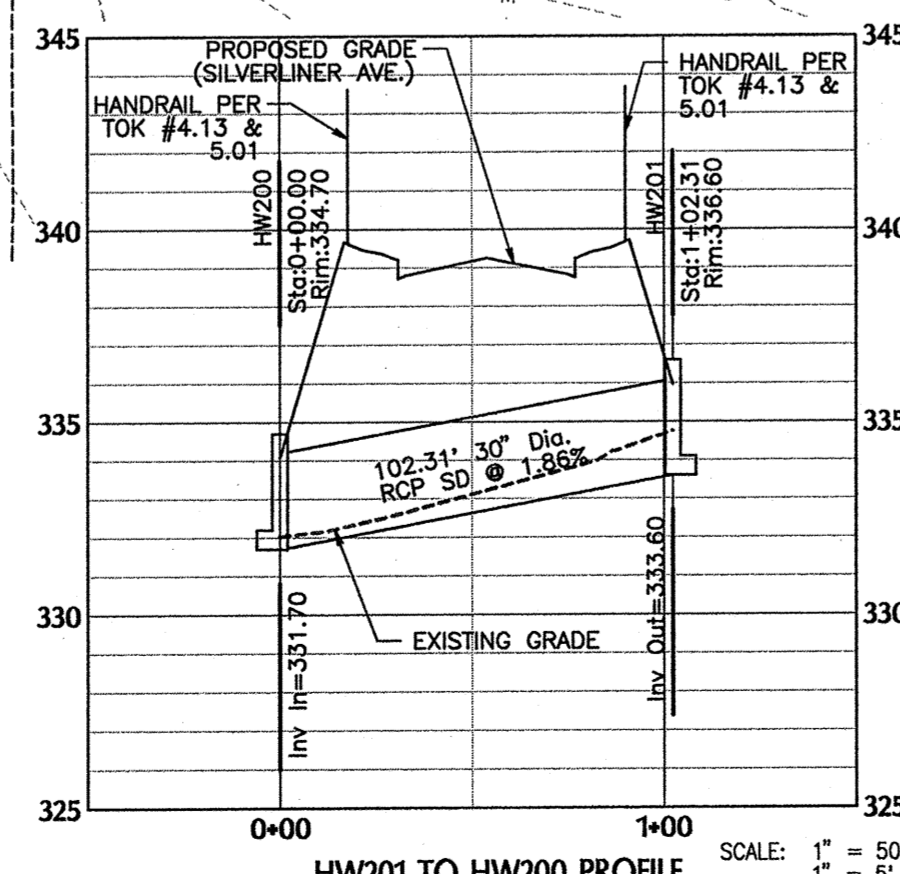
EROSION CONTROL NOTE:  
FOREBAY WILL NOT BE REQUIRED WHILE BMP IS ACTING AS AN EROSION CONTROL DEVICE.

EROSION CONTROL NOTE:  
FOREBAY WILL NOT BE REQUIRED WHILE BMP IS ACTING AS AN EROSION CONTROL DEVICE.

TIMOTHY A. GRIFFIN  
D.B. 10086, PG. 2898  
PIN NO. 1754-84-7584

VALENTIN COBOS  
D.B. 11708, PG. 1032  
PIN NO. 1754-84-8766

VALENTIN COBOS  
D.B. 11708, PG. 1032  
PIN NO. 1754-84-8766



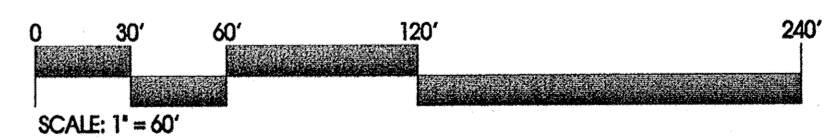
TEMPORARY SKIMMER BASIN DESIGN

BASIN #	DENUDED AREA (AC)	DRAINAGE AREA (AC)	COMP. COEFF. C	Q10 FLOW (CFS)	SURFACE REQUIRED (SQ. FT)	VOLUME REQUIRED (CU. FT)	BASIN DEPTH (FT)	BASIN LENGTH (FT)	BASIN WIDTH (FT)	WEIR LENGTH (FT)	SURFACE PROVIDED (SQ. FT)	VOLUME PROVIDED (CU. FT)	SKIMMER SIZE (IN)	SKIMMER ORIFICE SIZE (IN)
BMP #2	12.0	24.65	0.36	62.18	20,210	44,370	N/A	N/A	N/A	N/A	38,854	176,777	4	3.25
BMP #3	7.12	8.51	0.45	27.37	8,895	15,318	N/A	N/A	N/A	N/A	13,832	34,688	3	2.0
SB #2	3.52	4.04	0.46	13.27	4,313	7,272	2	95	47	14	4,465	7,322	2	1.5

NOTES:  
1. BMP #1, #2, & #3 WILL BE USED AS SEDIMENT BASINS DURING SITE CONSTRUCTION.  
2. ADD 1.5' TO DEPTH TO OBTAIN OVERALL DEPTH OF BASIN.  
3. REQUIRED VOLUME BASED ON 1800 CF/A DRAINAGE AREA.  
4. REQUIRED SURFACE AREA BASED ON 325 SQ. FT/S X Q10.  
5. CALCULATED SURFACE AREAS BASED ON RISER/WEIR ELEVATIONS.  
6. CALCULATED WEIR LENGTH BASED ON Q10 FLOWING THROUGH SPILLWAY WITH 0.5 FT MAXIMUM DEPTH.  
7. RAINFALL INTENSITY BASED ON 7.08 IN/HR FOR Q10 PER NCDCR EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

CULVERT INSTALLATION NOTE:  
DURING INSTALLATION OF PROPOSED 30" RCP CULVERT CROSSING ACCESS TO THE EXISTING MASSEY FARM ROAD AND SPLIT FARM TRAIL SHALL BE MAINTAINED UNTIL COLLECTOR ROAD B IS CONSTRUCTED AND THE TEMPORARY GRAVEL DRIVEWAY IS COMPLETED.

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.  
DATE: 4/15/2014  
TOWN ENGINEER  
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
DATE: 4/16/14  
ADMINISTRATOR



No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI
4	WAKE COUNTY EC COMMENTS & BMP #1 & #2 REVISIONS	04/02/14	JCI

Designer: W&R  
Scale: SEE SHEET  
Drawn By: JCI  
Date: 01/29/14  
Checked By: JCI  
Job No.: 020902513

KNIGHTDALE STATION  
PHASE R1 & R2  
TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

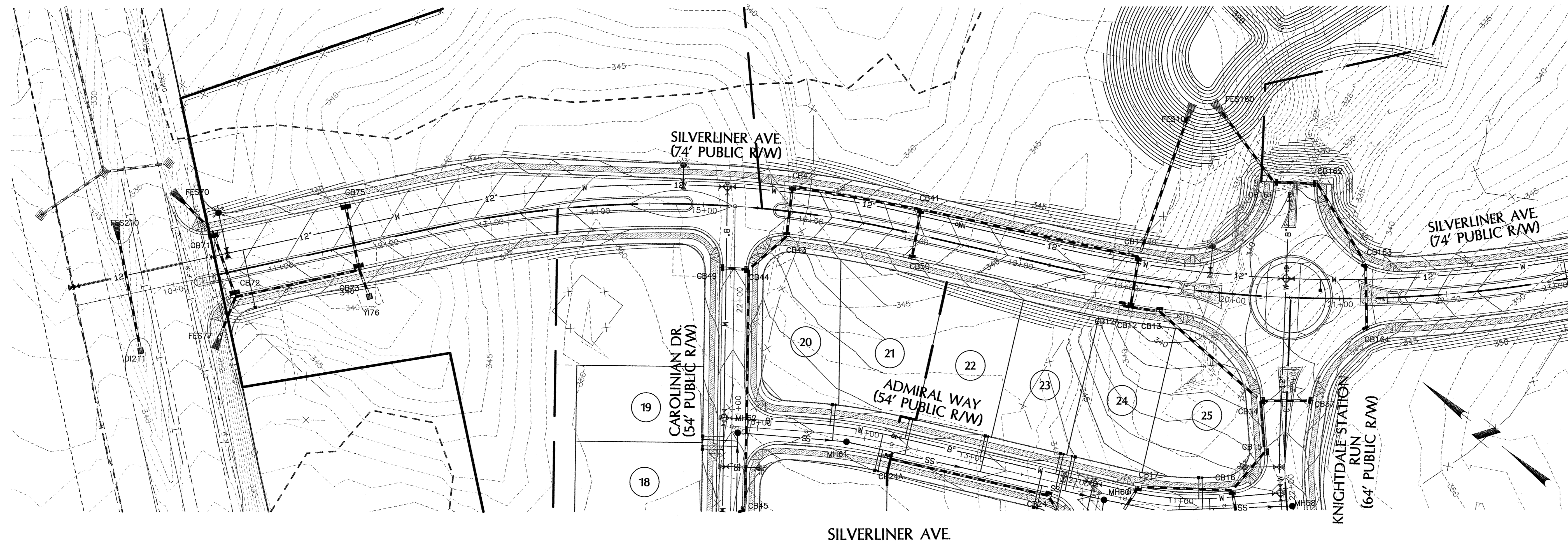
EROSION CONTROL AND STORM DRAINAGE PLAN - R2

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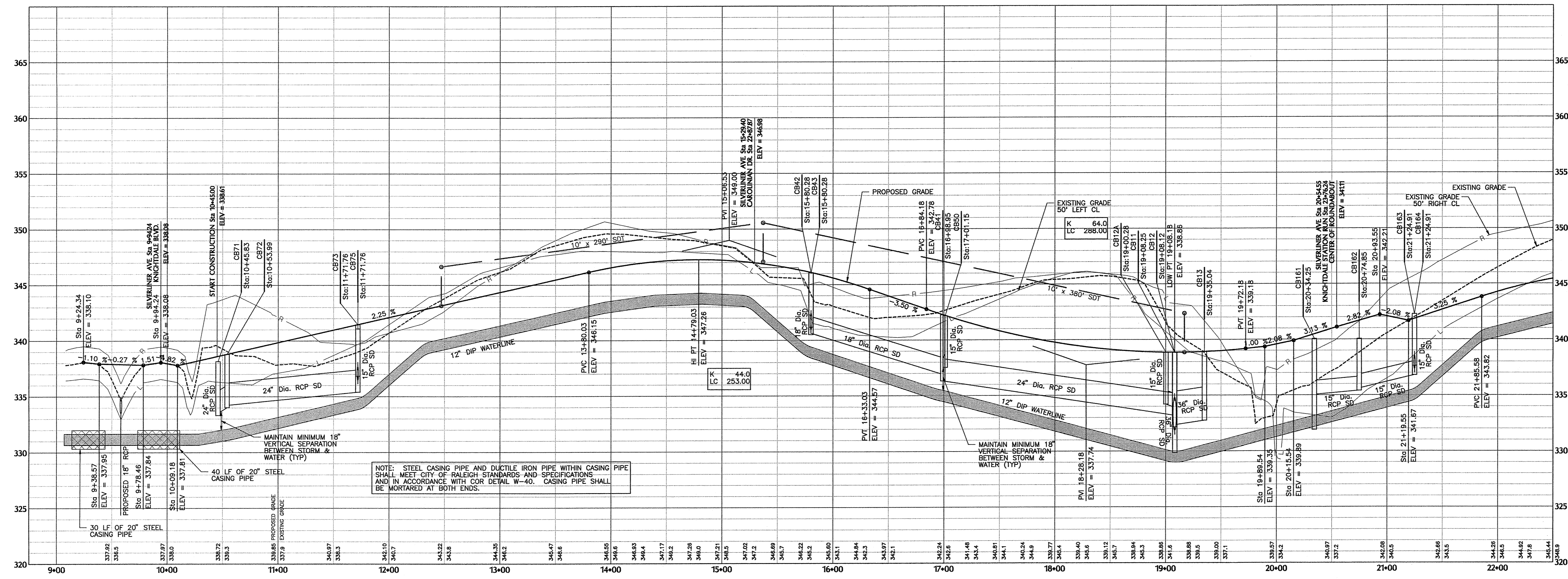
Sheet No. 8 of 38







SILVERLINER AVE

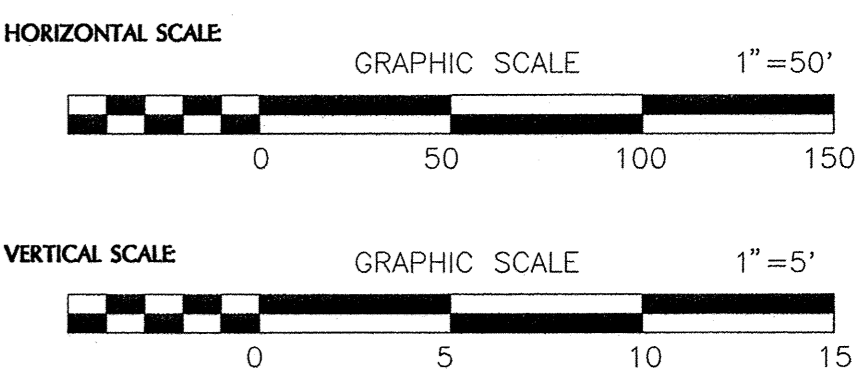


TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 3/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/10/14  
ADMINISTRATOR



Professional Engineer Seal for John C. Hattaway, No. 31982, State of North Carolina. Date: 2/5/14.

No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	020902513

**KNIGHTDALE STATION**  
PHASE R1 & R2

TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

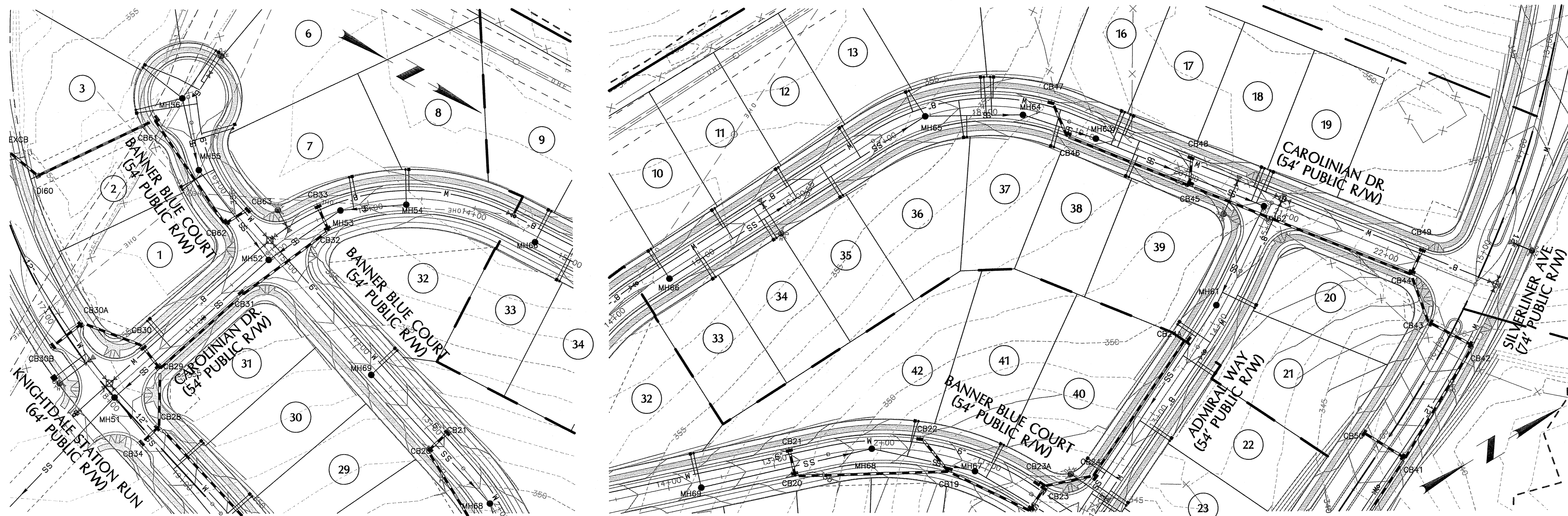
**SILVERLINER AVE. PLAN & PROFILE**  
STA. 13+58.53 TO 22+50.00

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ENGINEERS | PLANNERS | SURVEYORS

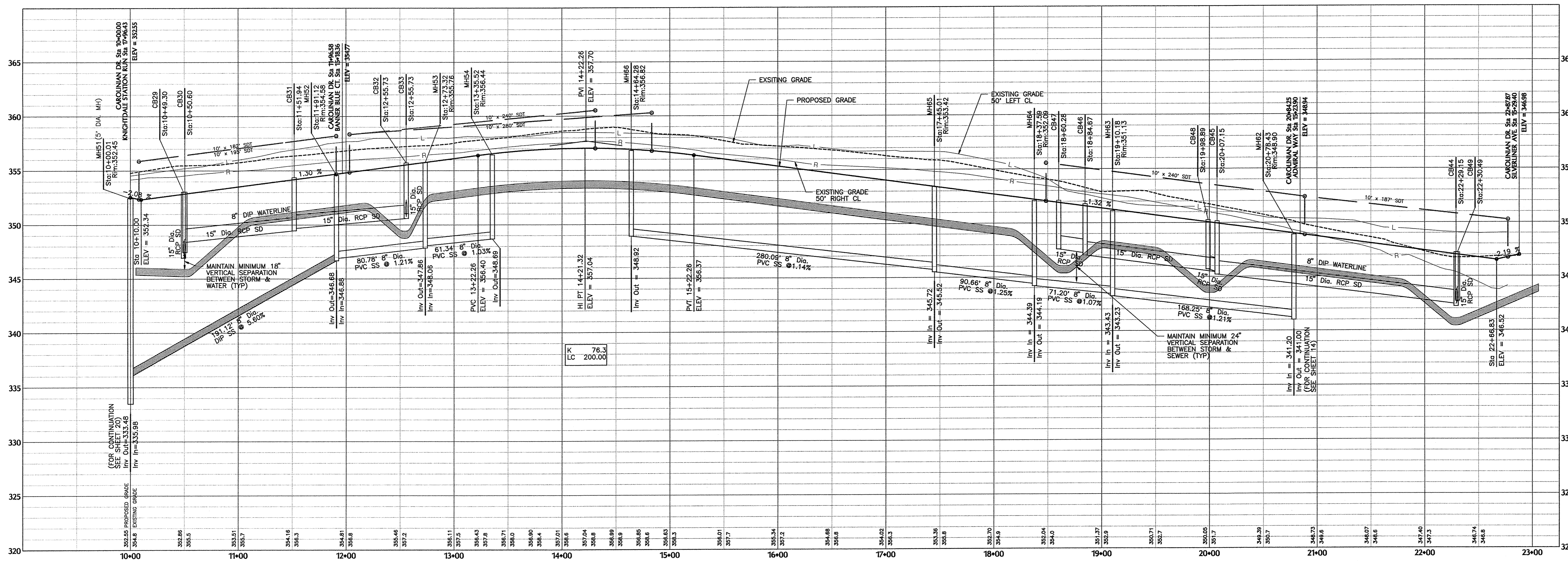
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Sheet No. **11** of **38**





CAROLINIAN DR.



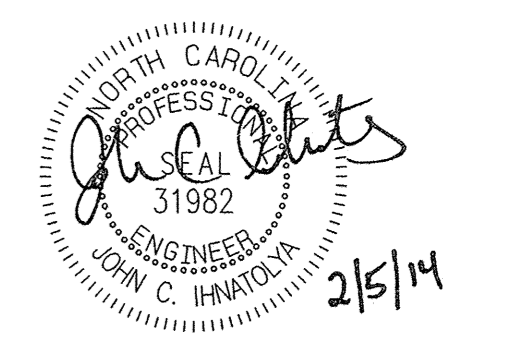
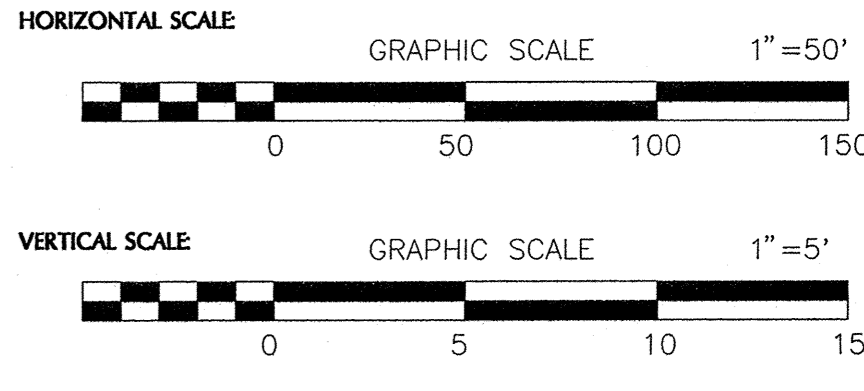
SIGNED: *[Signature]*

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: 3/5/14  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/16/14  
ADMINISTRATOR



No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	020902513

KNIGHTDALE STATION  
PHASE R1 & R2

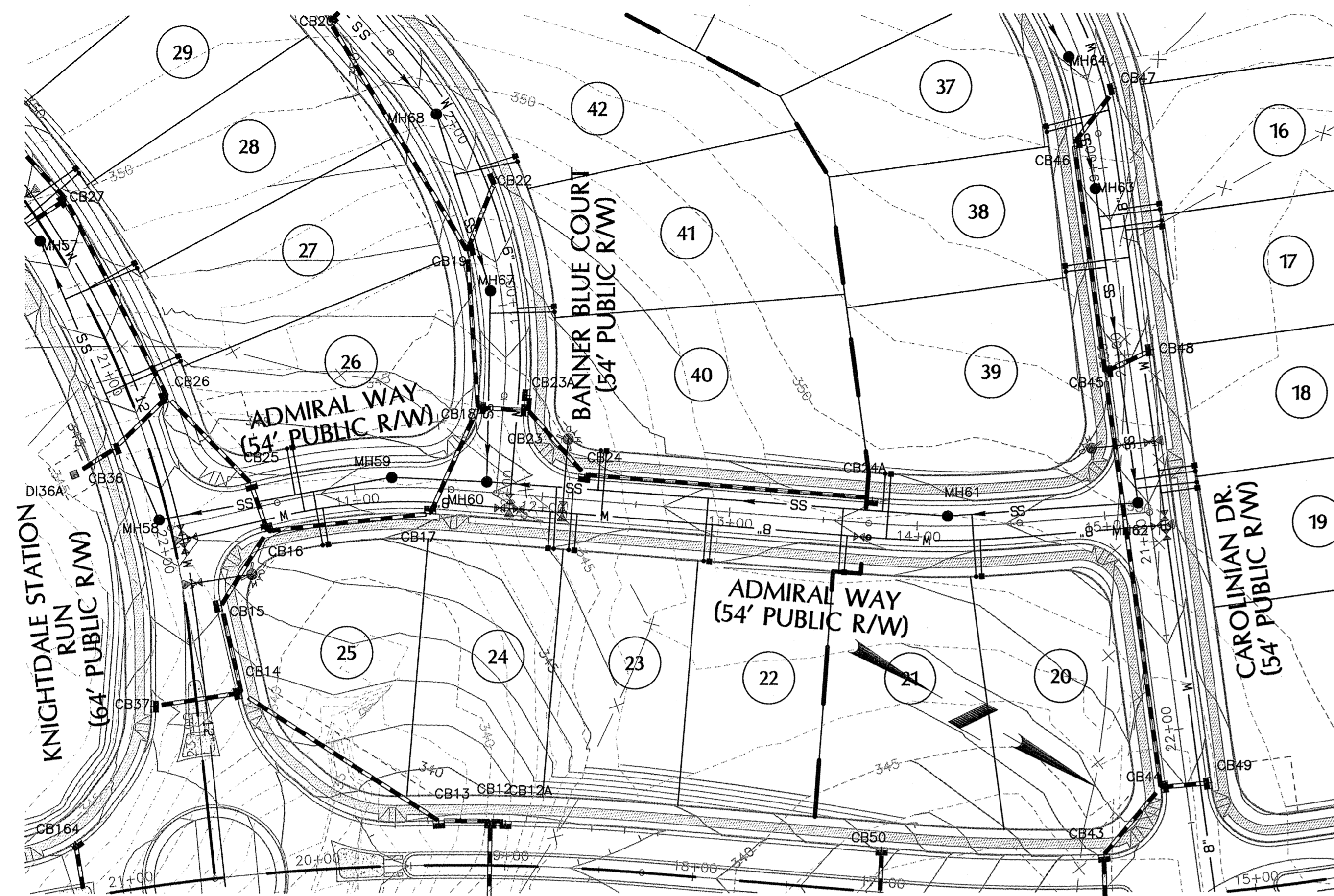
TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

CAROLINIAN DR. PLAN & PROFILE  
STA. 10+00.00 TO 22+77.01

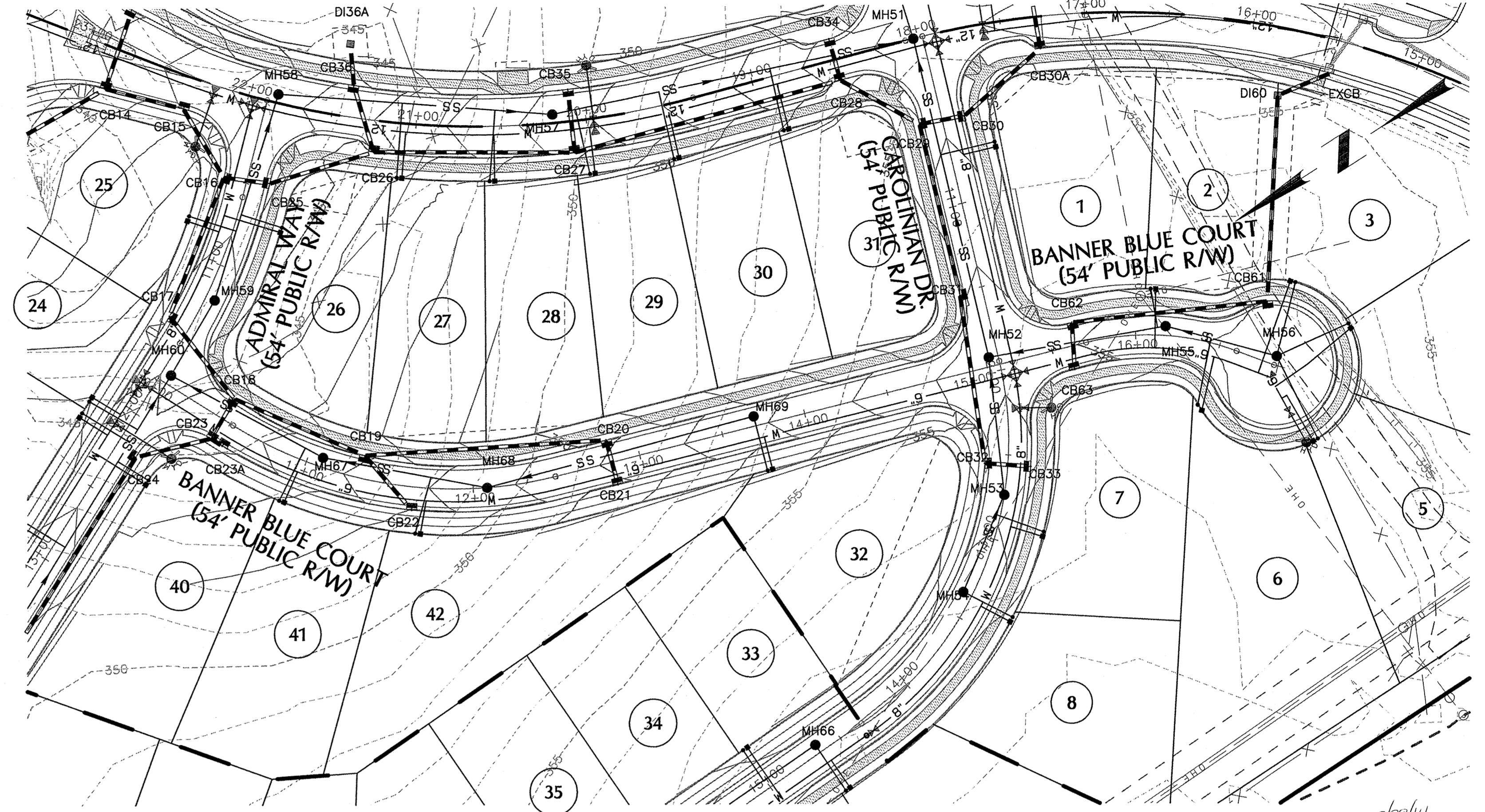
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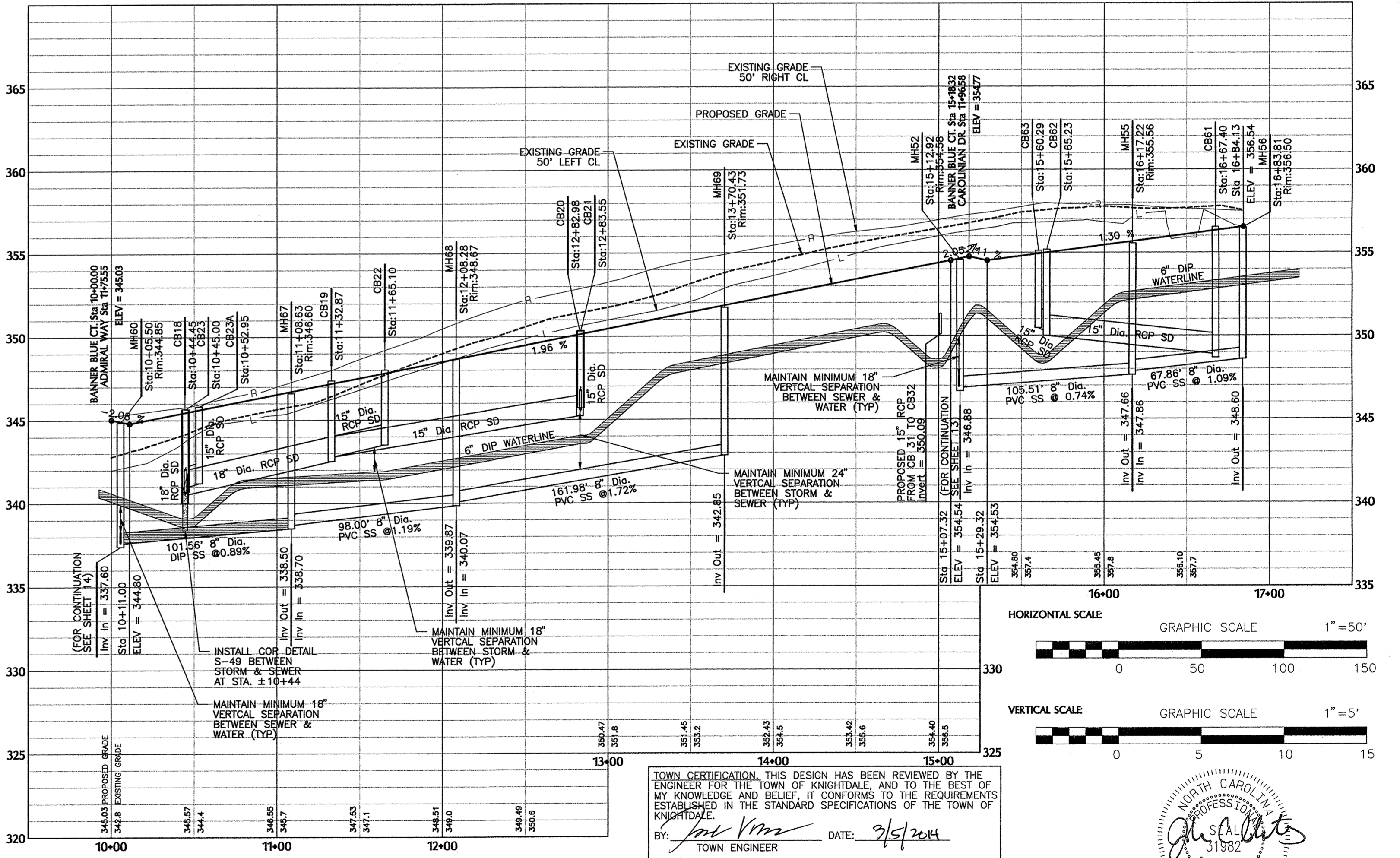
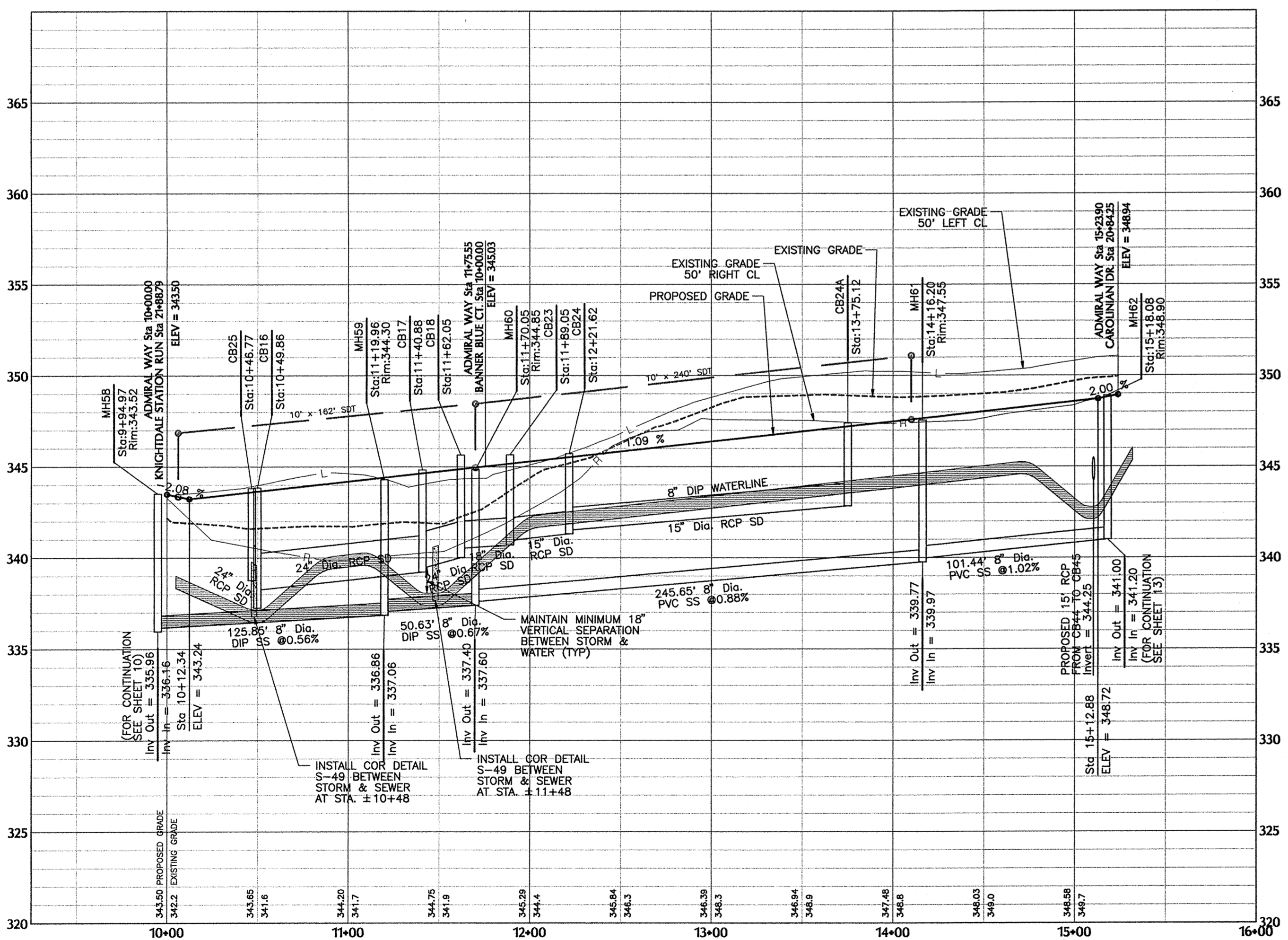
Sheet No.  
**13 of 38**



ADMIRAL WAY



BANNER BLUE CT.



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No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	02090213

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE      WAKE COUNTY      NORTH CAROLINA

**ADMIRAL WAY STA. 10+00.00 TO 15+23.90 PLAN & PROFILE  
BANNER BLUE CT. STA. 10+00.00 TO 16+84.13 PLAN & PROFILE**

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Sheet No. **14 of 38**

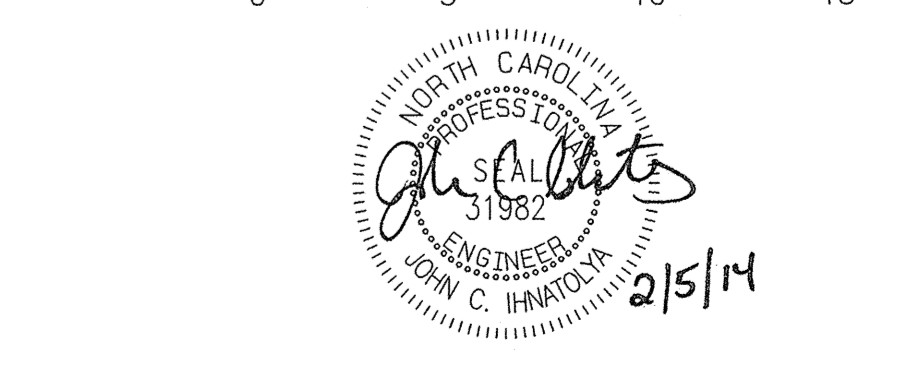
TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *Tom Vma* DATE: 2/5/2014

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

BY: *John C. Ihantola* DATE: 4/16/14

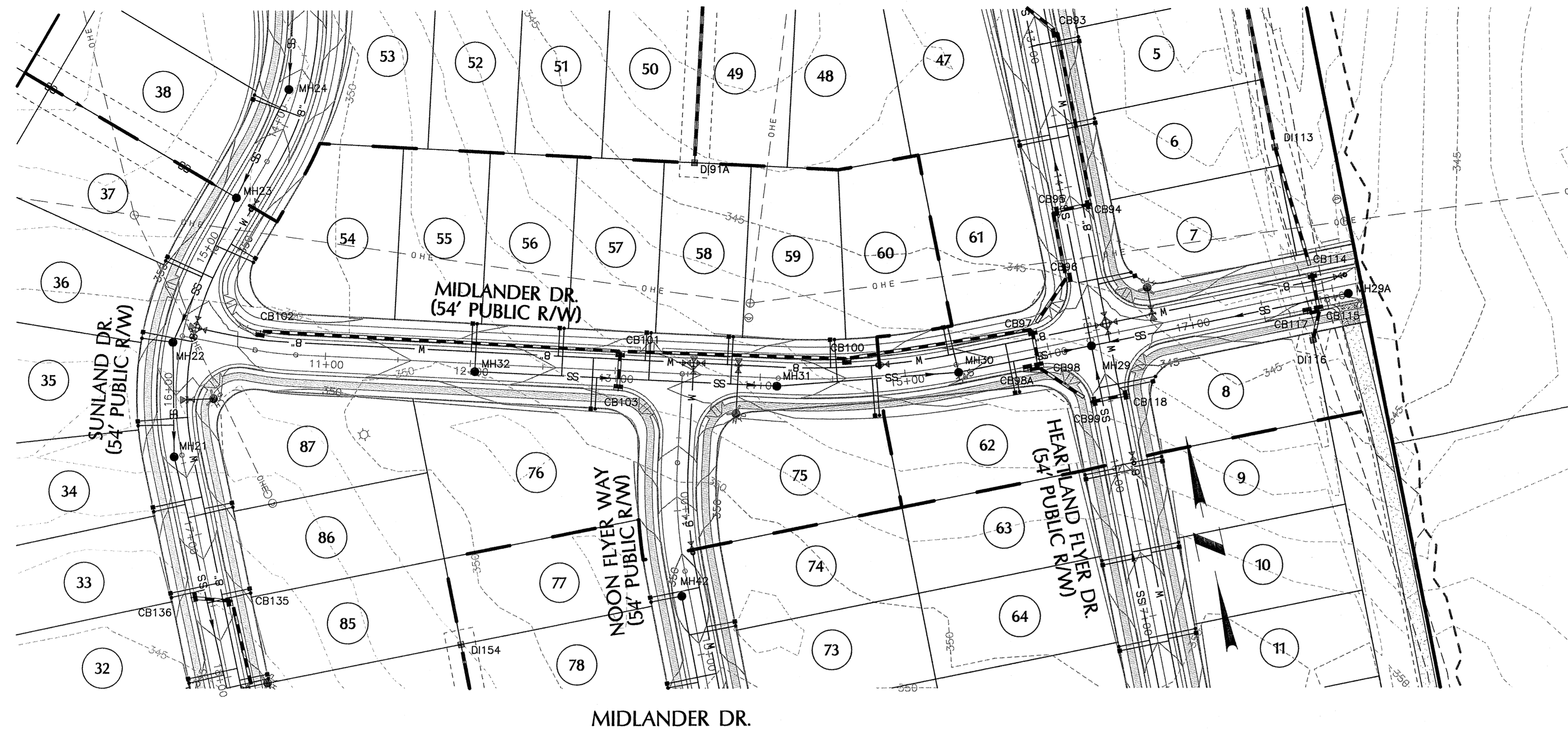
ADMINISTRATOR



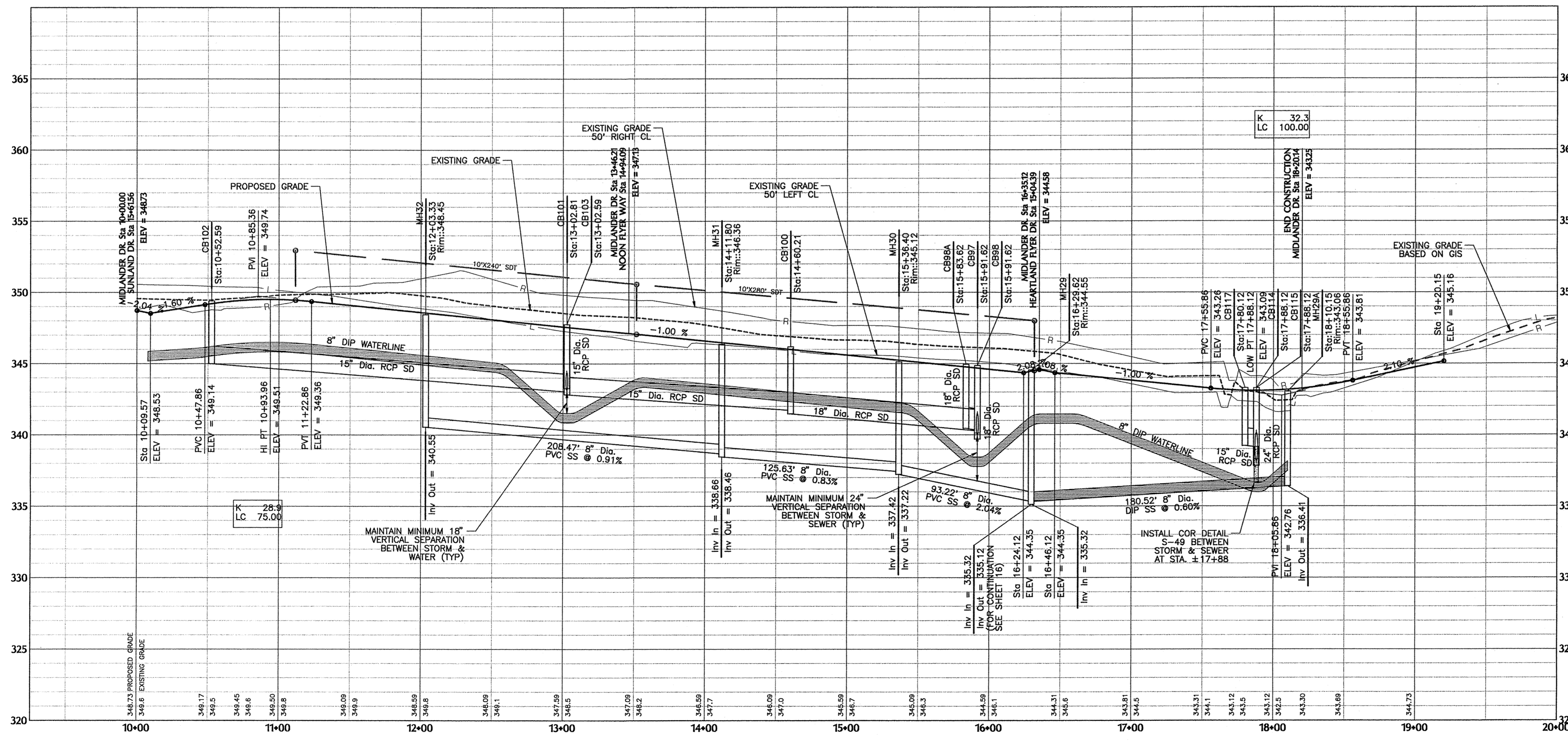




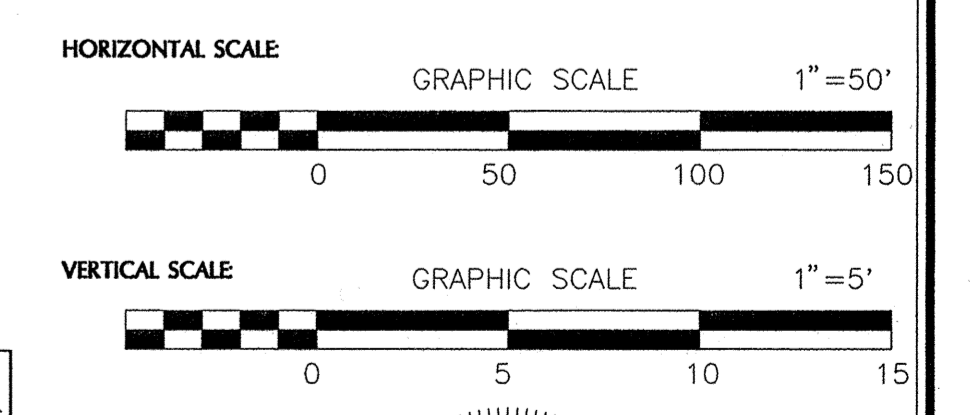




MIDLANDER DR.



SIGNED: *Clear J. [Signature]* 2/28/14



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]* TOWN ENGINEER DATE: 3/5/2014

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

BY: *[Signature]* ADMINISTRATOR DATE: 4/10/14



No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	02090213

**KNIGHTDALE STATION  
PHASE R1 & R2**

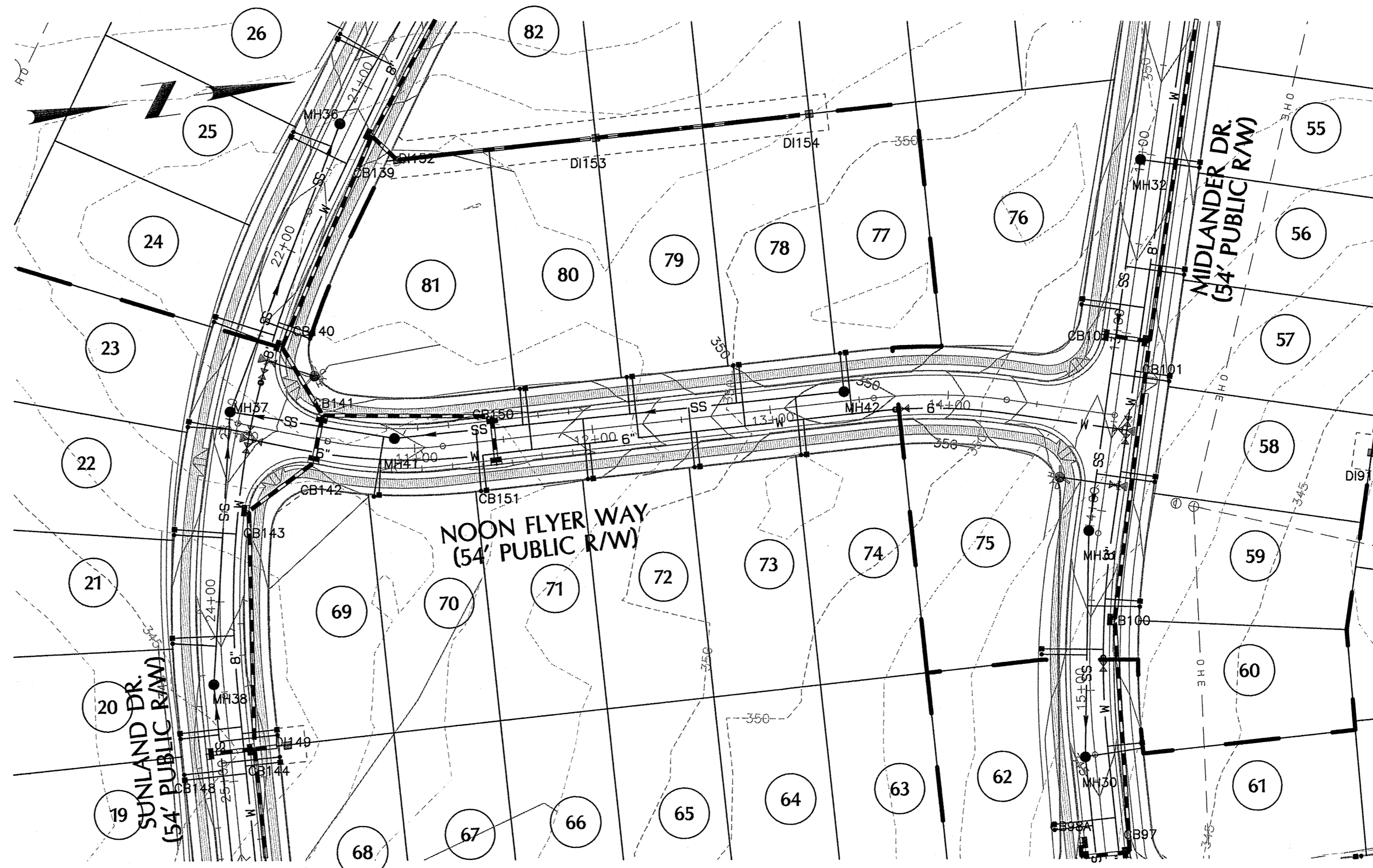
TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

**MIDLANDER DR. PLAN & PROFILE  
STA. 10+00.00 TO 16+35.12**

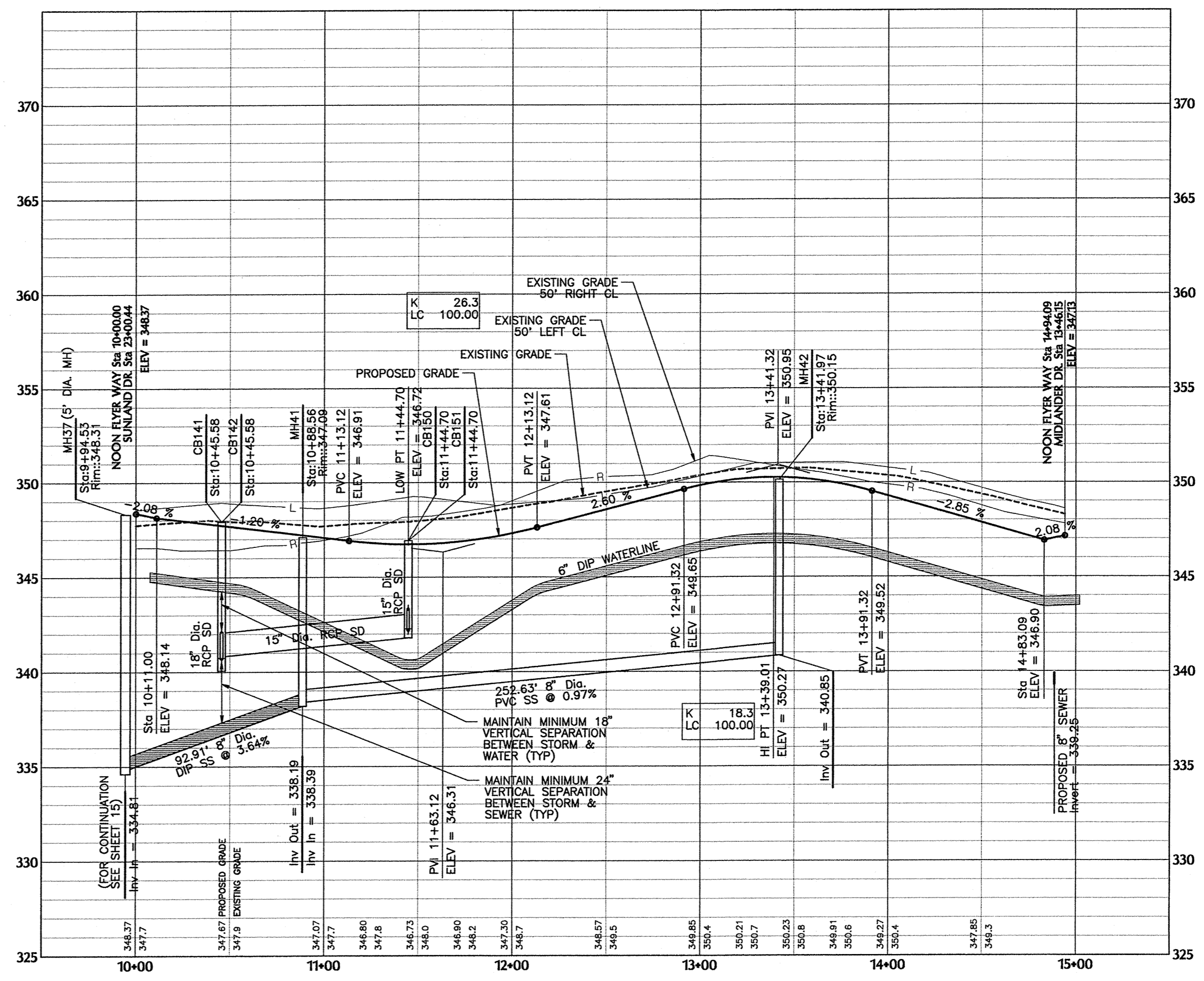
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NOON FLYER WAY



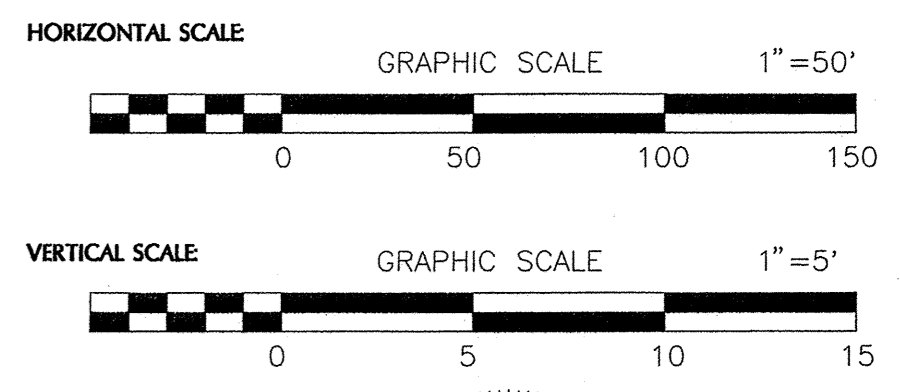
2/20/14  
SIGNED: *Carly Sanley*

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: *John C. Ihnatolia* DATE: 2/5/2014  
TOWN ENGINEER

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

BY: *John C. Ihnatolia* DATE: 2/16/14  
ADMINISTRATOR



31982  
ENGINEER  
JOHN C. IHNATOLIA  
2/5/14

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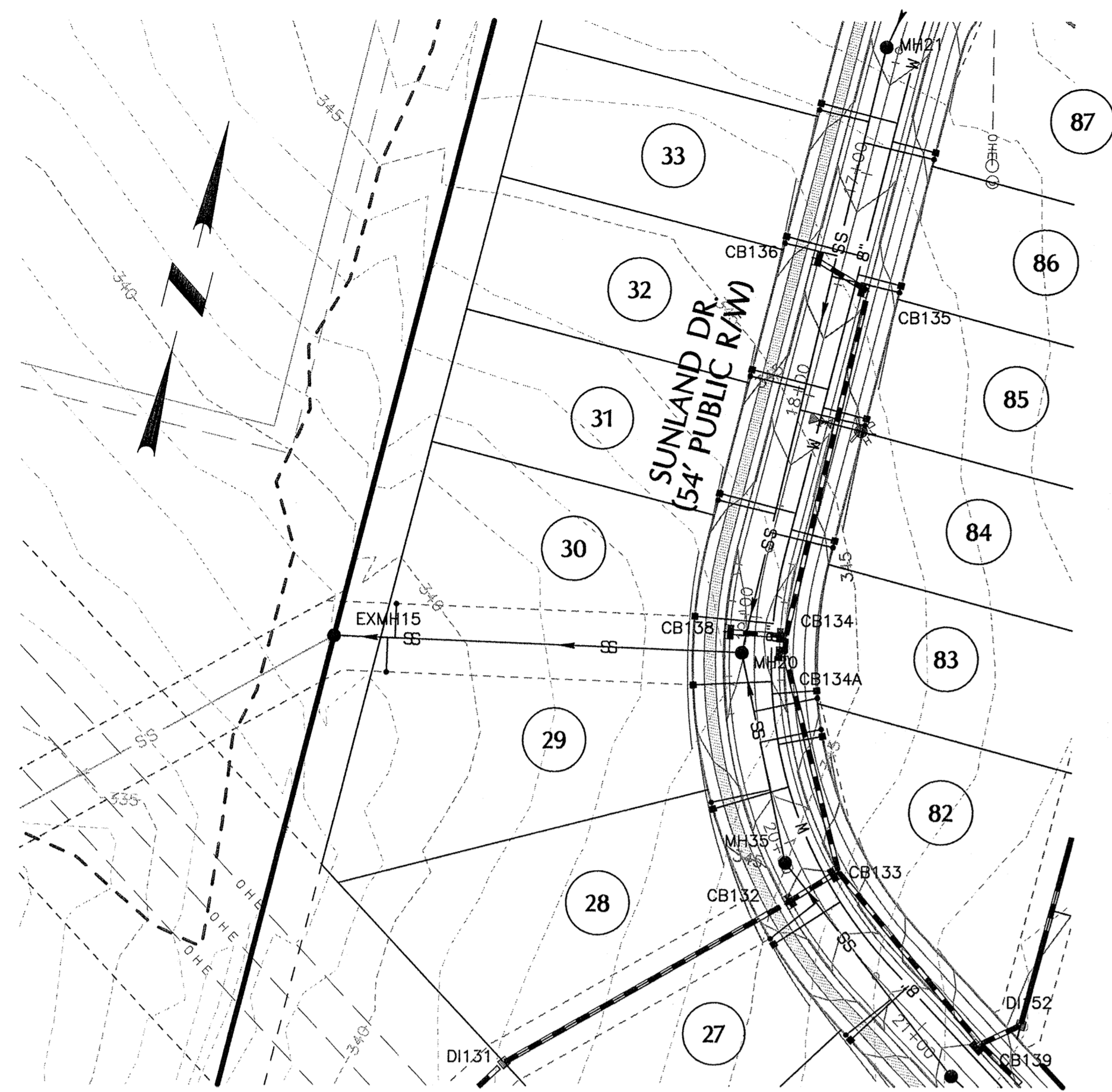
No.	Revision	Date	By	Designer	W&R	Scale	SEE SHEET
1	RESPONSE TO 1ST REVIEW COMMENTS	11/27/13	JCI				
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI				

**KNIGHTDALE STATION**  
**PHASE R1 & R2**  
TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

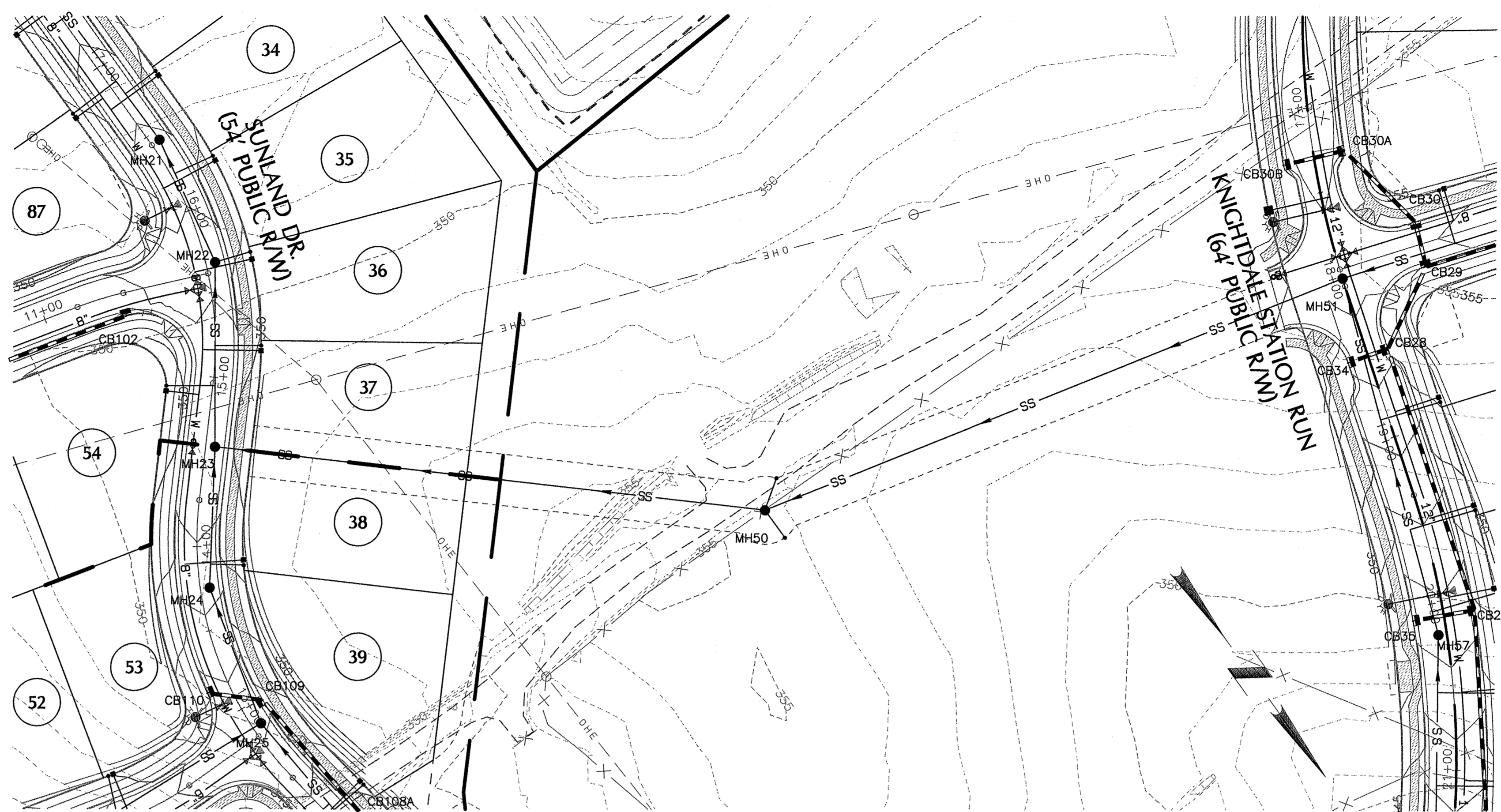
**NOON FLYER WAY PLAN & PROFILE**  
**STA. 10+00.00 TO 14+94.09**

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115 MacKenzie Drive Cary, North Carolina 27511 Tel: 919-469-3340 www.wITHERSRAVENEL.com License No. C-0832

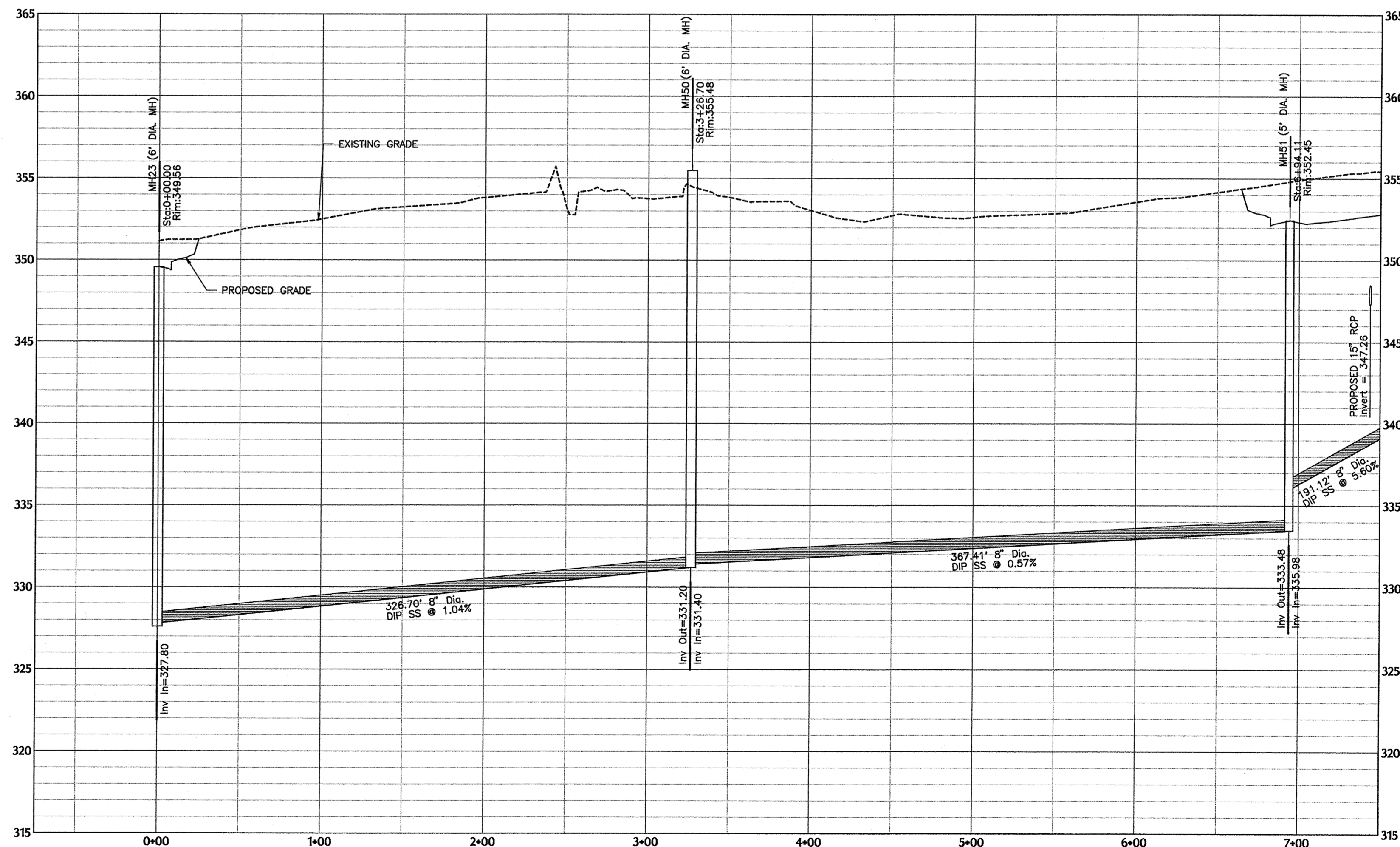
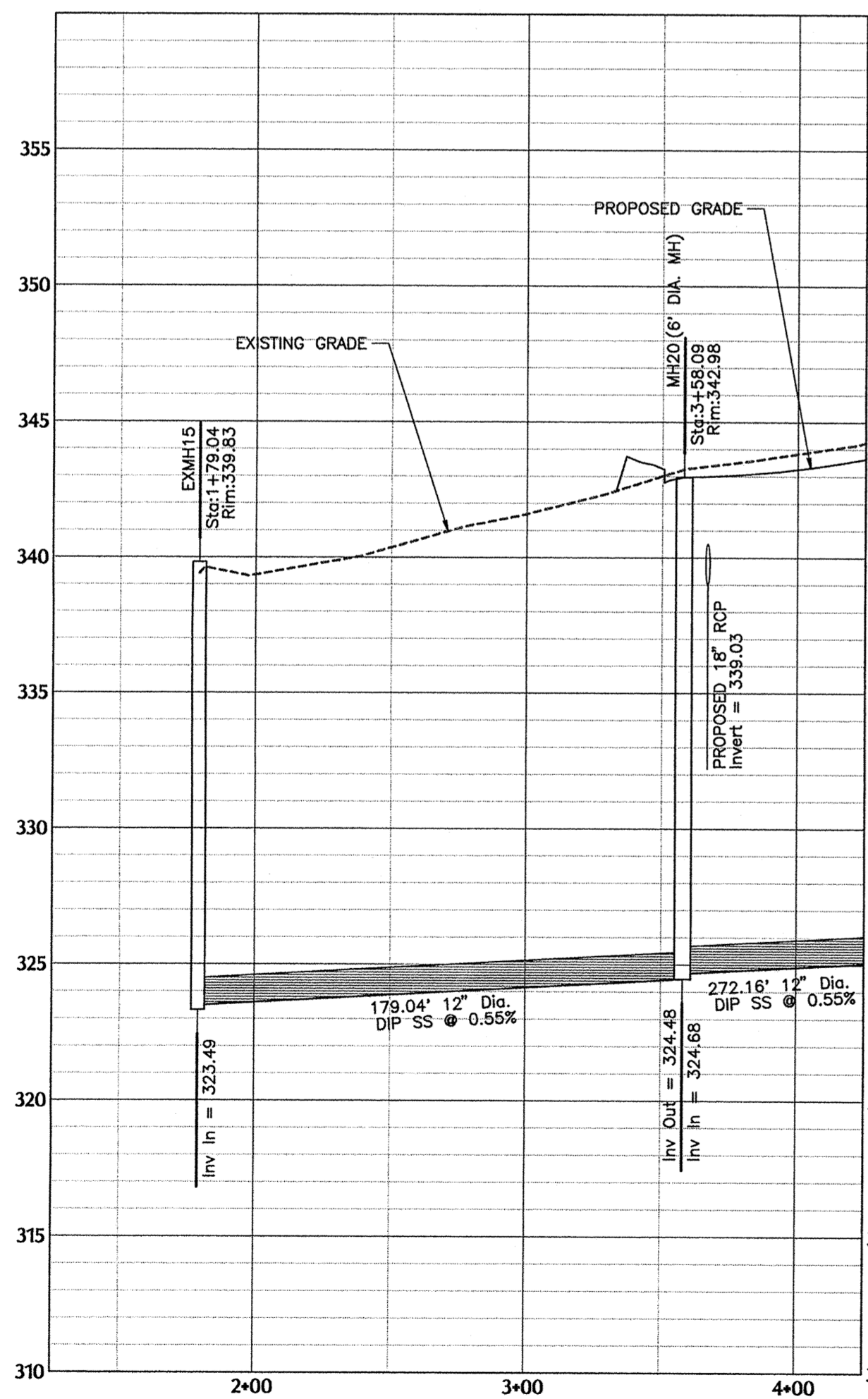
Sheet No.  
**19** of **38**



SANITARY OUTFALL 'A'

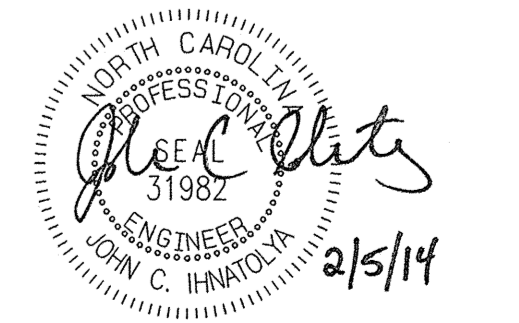
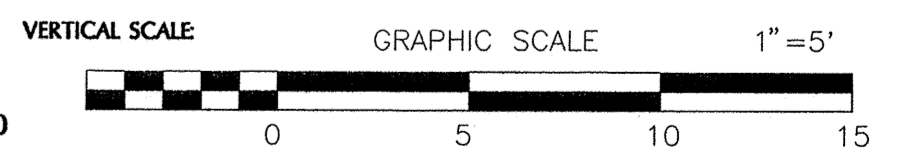
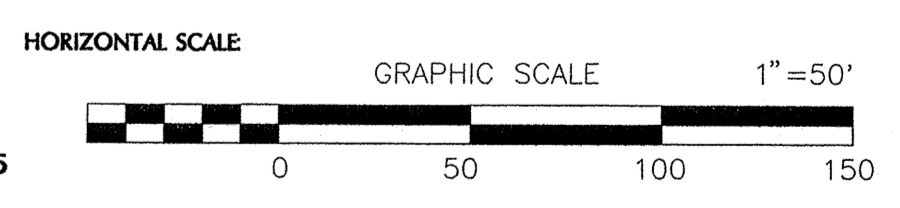


SANITARY OUTFALL 'B'



2/5/14  
SIGNED: *John C. Irwin*

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: *John C. Irwin* DATE: 2/5/2014  
TOWN ENGINEER  
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
BY: *John C. Irwin* DATE: 2/5/14  
ADMINISTRATOR



K:\03\_03-0250\_020251\_31\Draws\John-Irwin\Knightdale Ph. 1 & 2\020 PLAN-R1 & R2.dwg, Wed Feb 5, 2014, 2:55:30PM, WITHERS & RAVENEL, INC.

No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

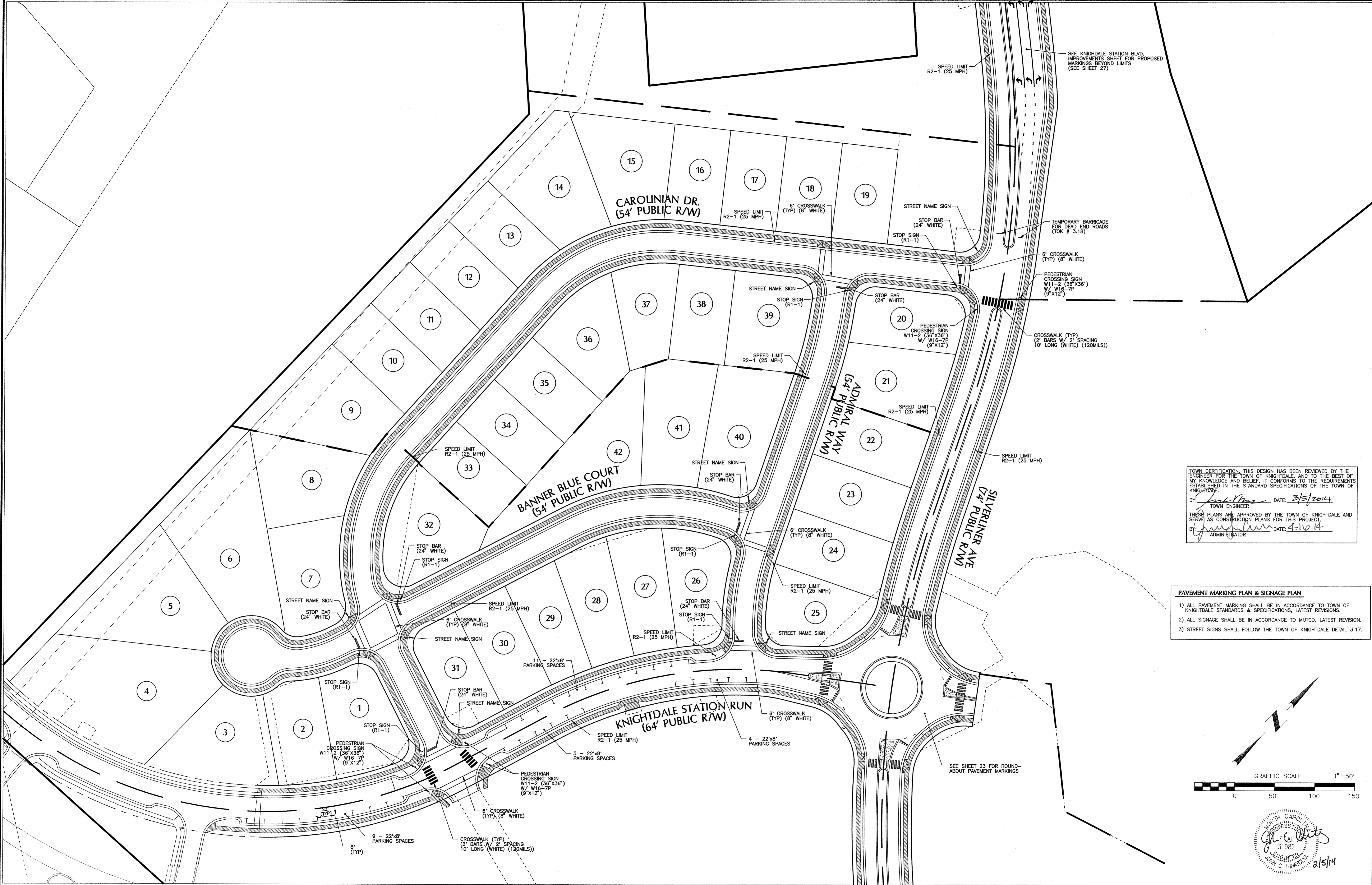
Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	020902513

TOWN OF KNIGHTDALE  
**KNIGHTDALE STATION**  
**PHASE R1 & R2**  
 WAKE COUNTY  
 NORTH CAROLINA

**SANITARY SEWER OUTFALL 'A' & 'B'**  
**PLAN & PROFILE**

**WITHERS & RAVENEL**  
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Sheet No.  
**20 of 38**



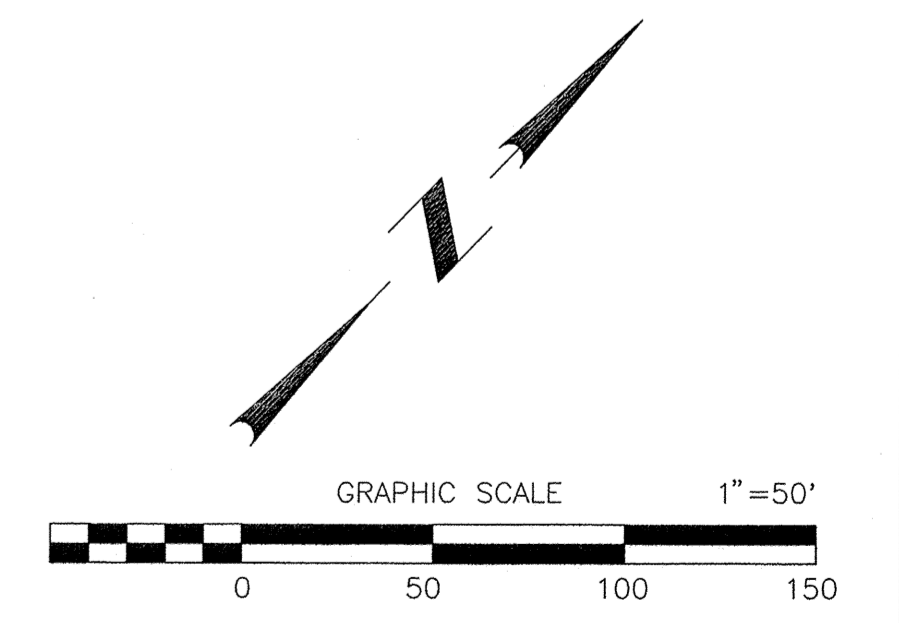
TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 3/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4-10-14  
ADMINISTRATOR

- PAVEMENT MARKING PLAN & SIGNAGE PLAN**
- 1) ALL PAVEMENT MARKING SHALL BE IN ACCORDANCE TO TOWN OF KNIGHTDALE STANDARDS & SPECIFICATIONS, LATEST REVISIONS.
  - 2) ALL SIGNAGE SHALL BE IN ACCORDANCE TO MUTCD, LATEST REVISION.
  - 3) STREET SIGNS SHALL FOLLOW THE TOWN OF KNIGHTDALE DETAIL 3.17.



Professional Engineer Seal for John C. Harston, License No. 31982, State of North Carolina. Signature and date: 2/5/14.

No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer: W&R Scale: SEE SHEET  
 Drawn By: JCI Date: 01/29/14  
 Checked By: JCI Job No.: 020902513

**KNIGHTDALE STATION  
 PHASE R1 & R2**  
 TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

**STREET SIGNAGE PLAN - R1**

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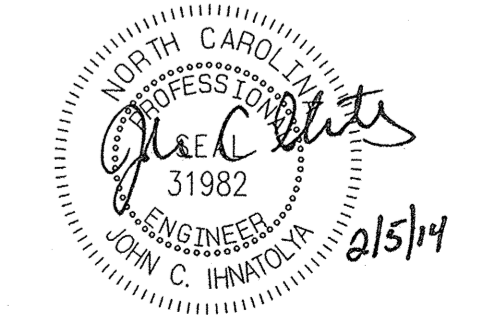
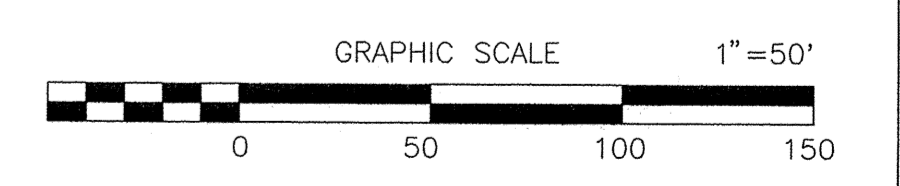
TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 2/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/16/14  
ADMINISTRATOR

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  - 2) ALL SIGNAGE SHALL BE IN ACCORDANCE TO MUTCD, LATEST REVISION.
  - 3) STREET SIGNS SHALL FOLLOW THE TOWN OF KNIGHTDALE DETAIL 3.17.



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2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

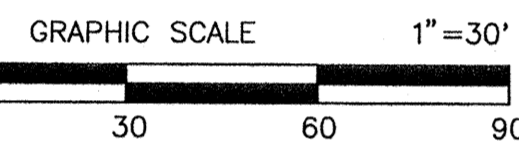
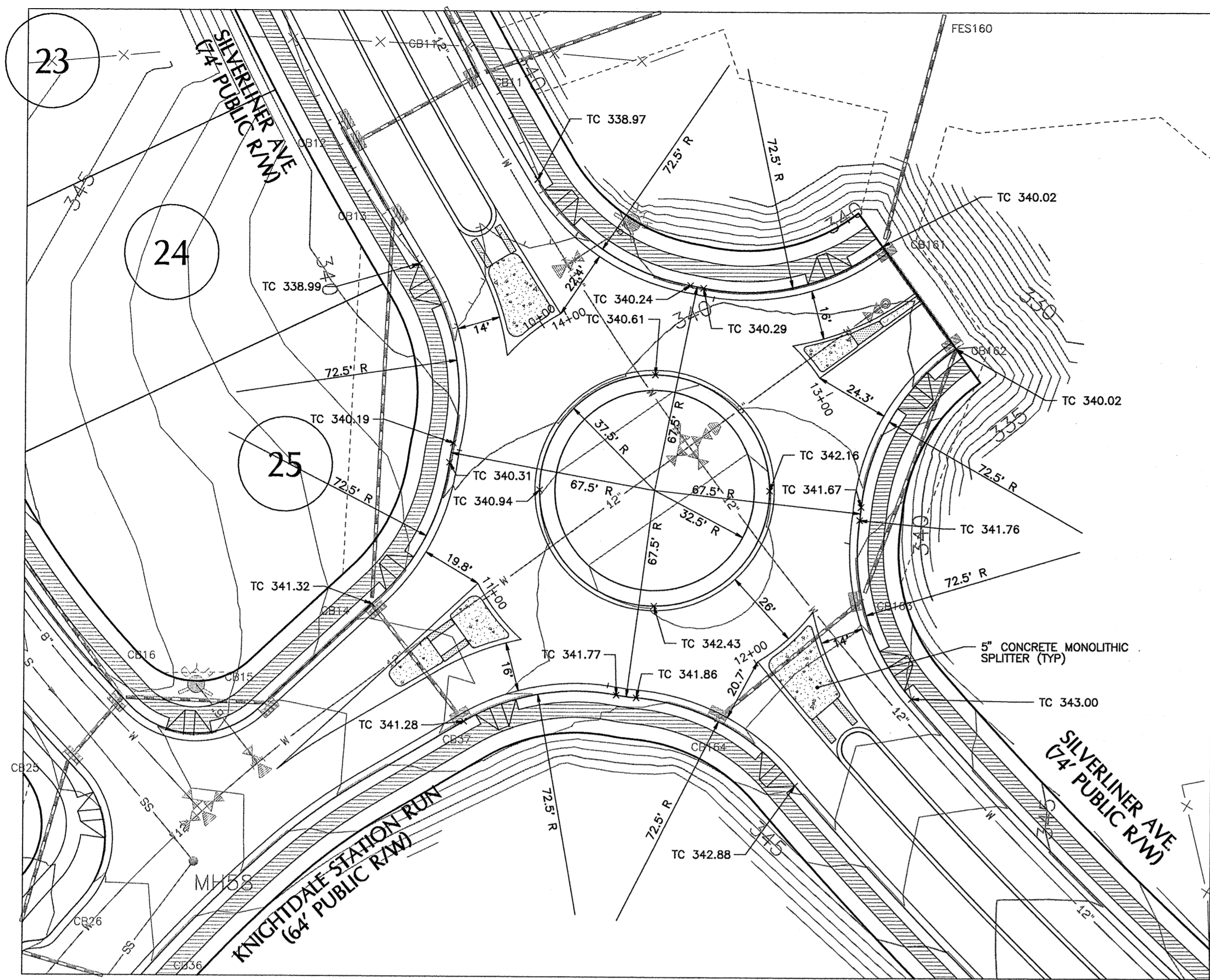
Designer: W&R Scale: SEE SHEET  
 Drawn By: JCI Date: 01/29/14  
 Checked By: JCI Job No: 020902513

**KNIGHTDALE STATION  
 PHASE R1 & R2**  
 TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

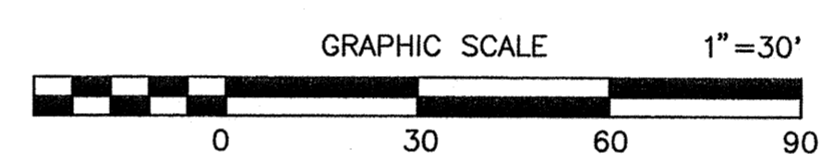
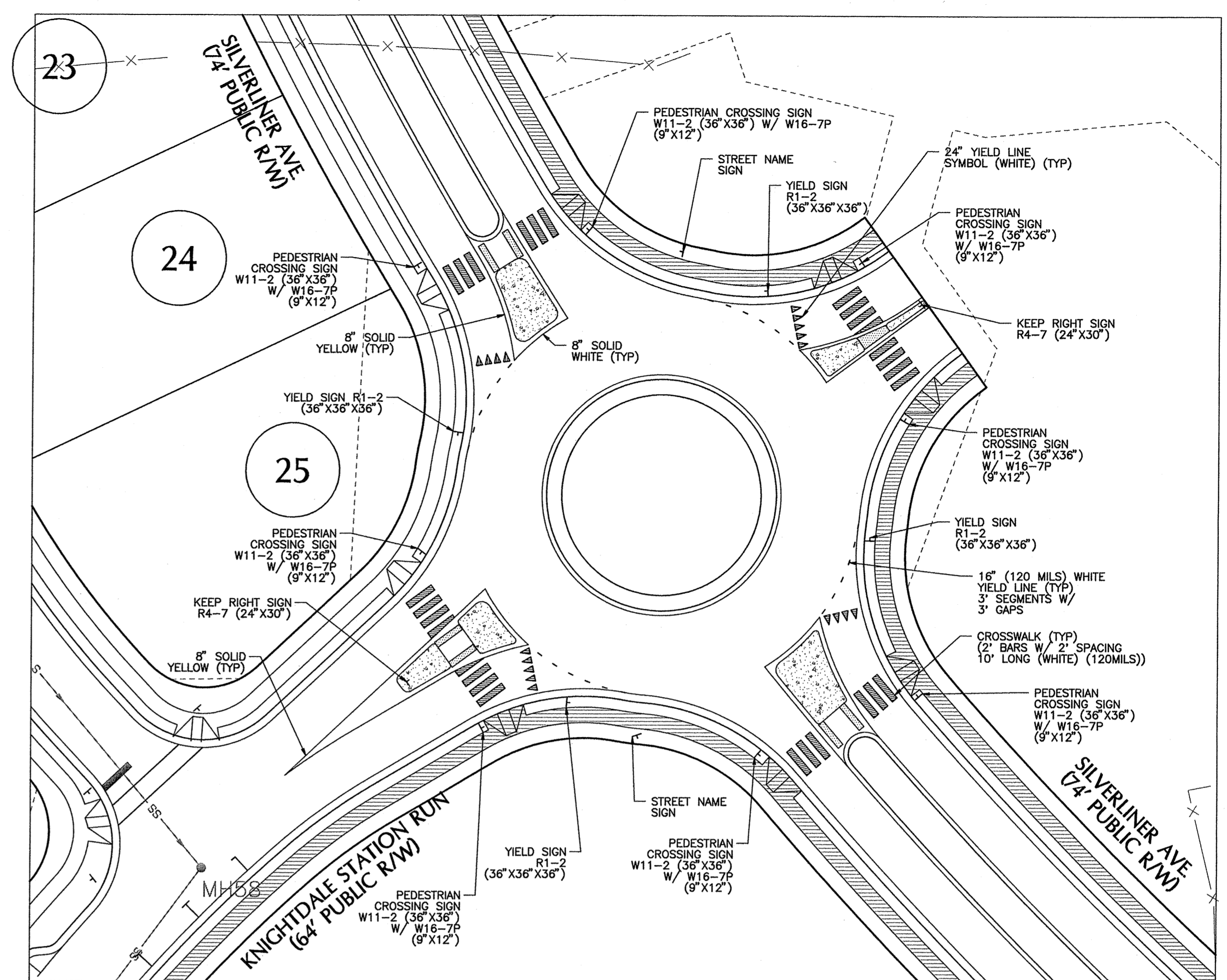
**STREET SIGNAGE PLAN - R2**

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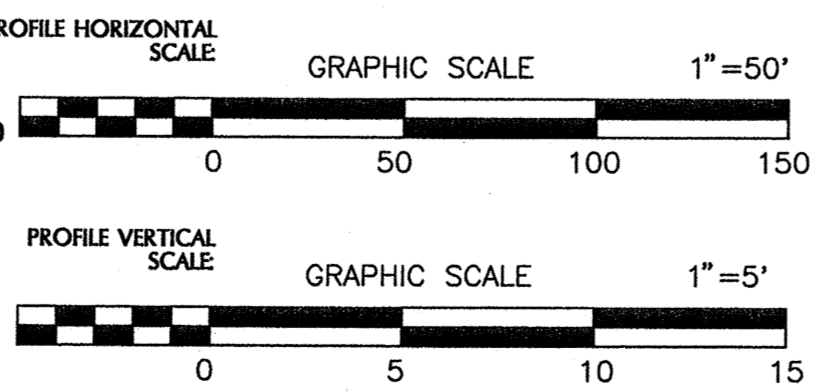
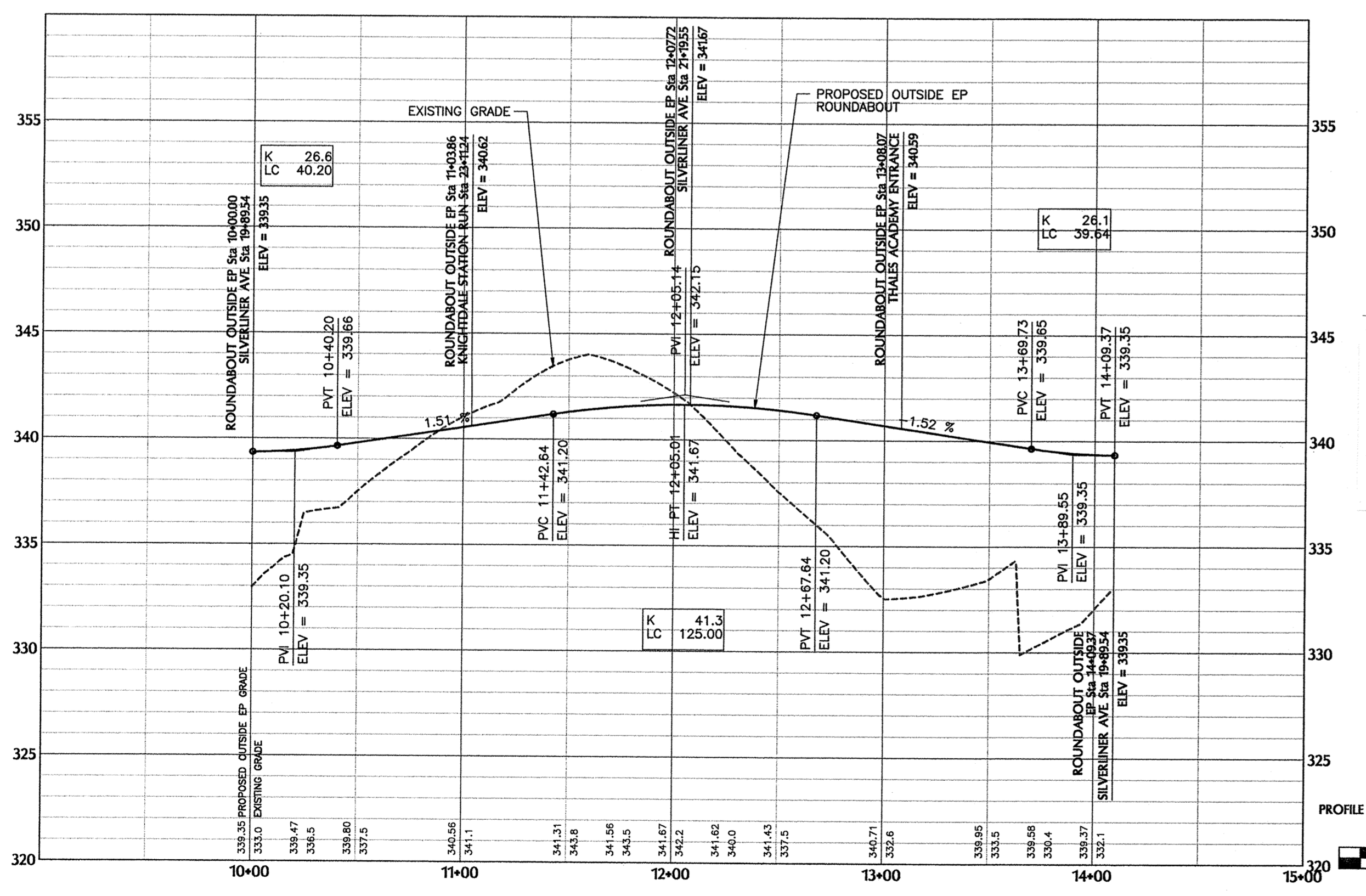
Sheet No. **22** of **38**



ROUND-A-BOUT GRADING PLAN

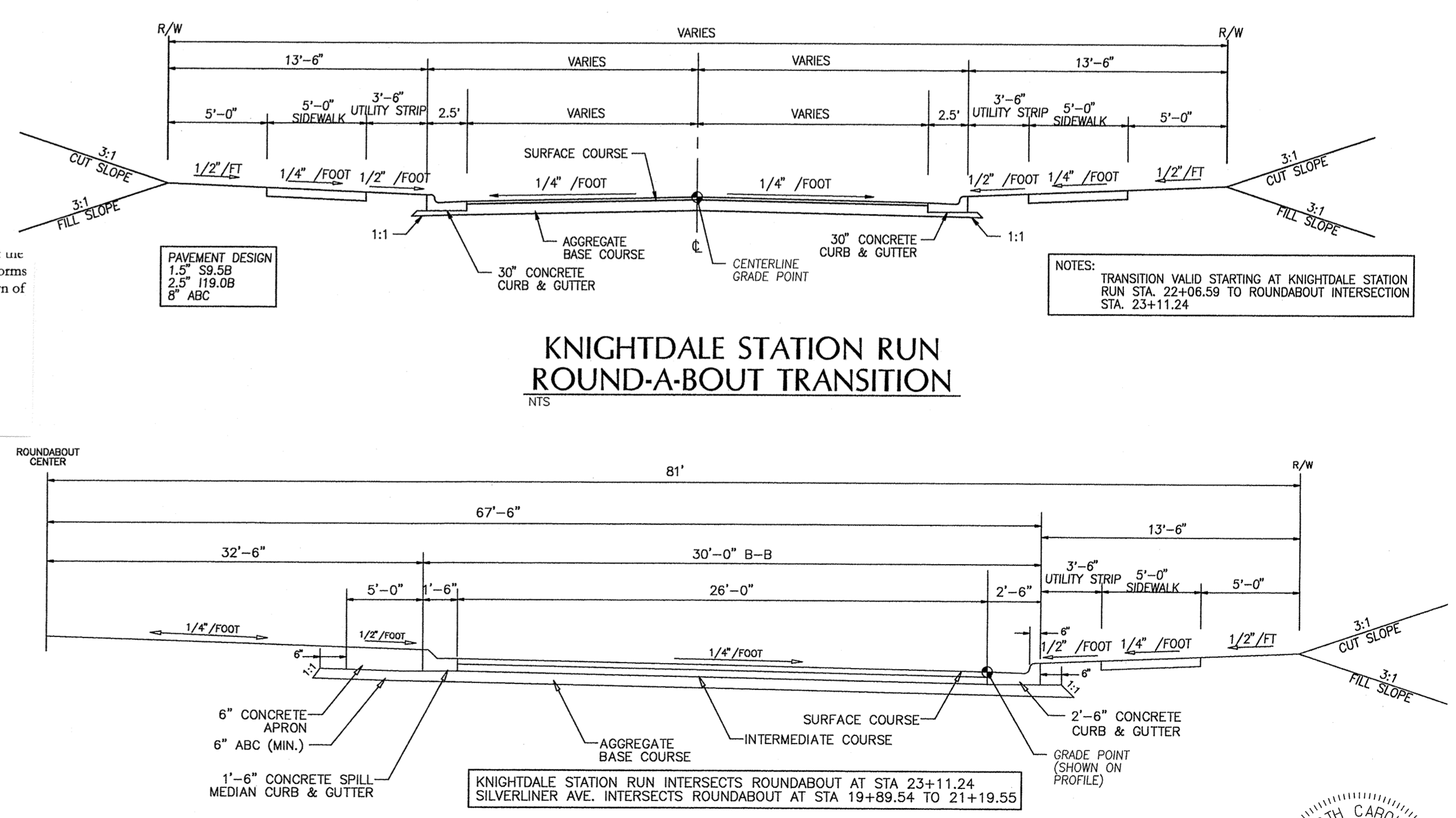


ROUND-A-BOUT PAVEMENT MARKING & SIGNAGE PLAN



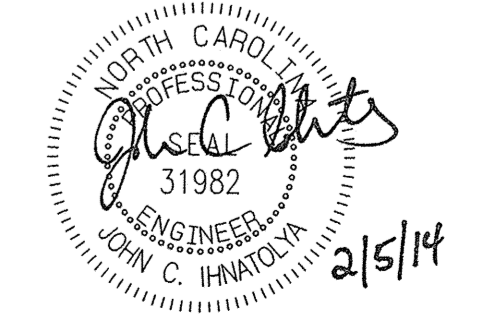
ROUND-A-BOUT OUTSIDE EP PROFILE

a. **Town Certification.** This design has been reviewed by the Engineer for use 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: 4/15/2014  
 Town Engineer  
 These plans are approved by the Town of Knightdale and serve as construction plans for this project.  
 By: *[Signature]* Date: 4/16/14  
 Administrator



NOTE: CONCRETE MIX FOR APRON SHALL BE STANDARD CURB & GUTTER MIX PER TOWN OF KNIGHTDALE STANDARDS.

TYPICAL ROADWAY SECTION ROUND-A-BOUT



No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	00902513

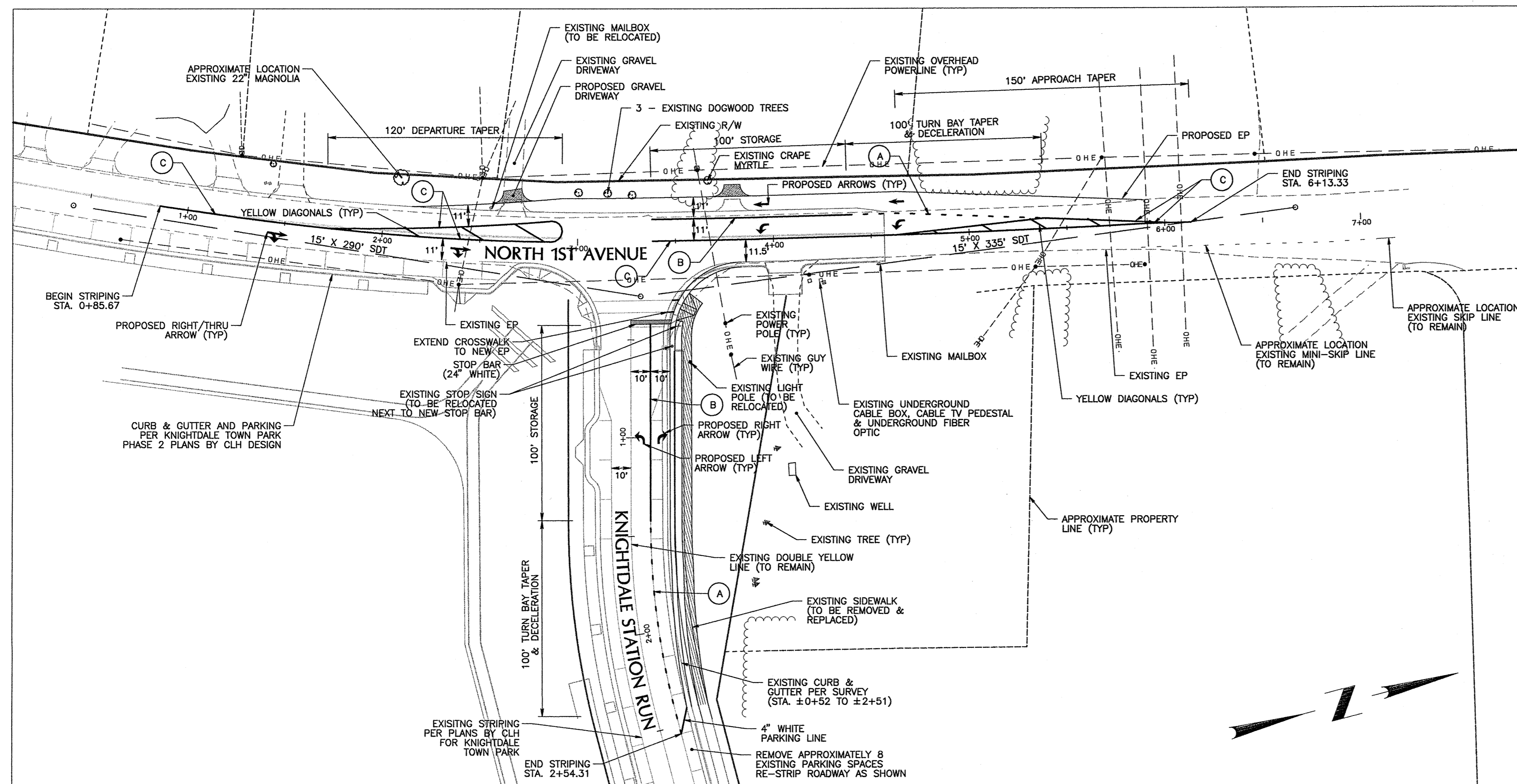
**KNIGHTDALE STATION  
PHASE R1 & R2**  
 TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

**ROUND-A-BOUT GRADING AND PAVEMENT  
MARKING PLAN**

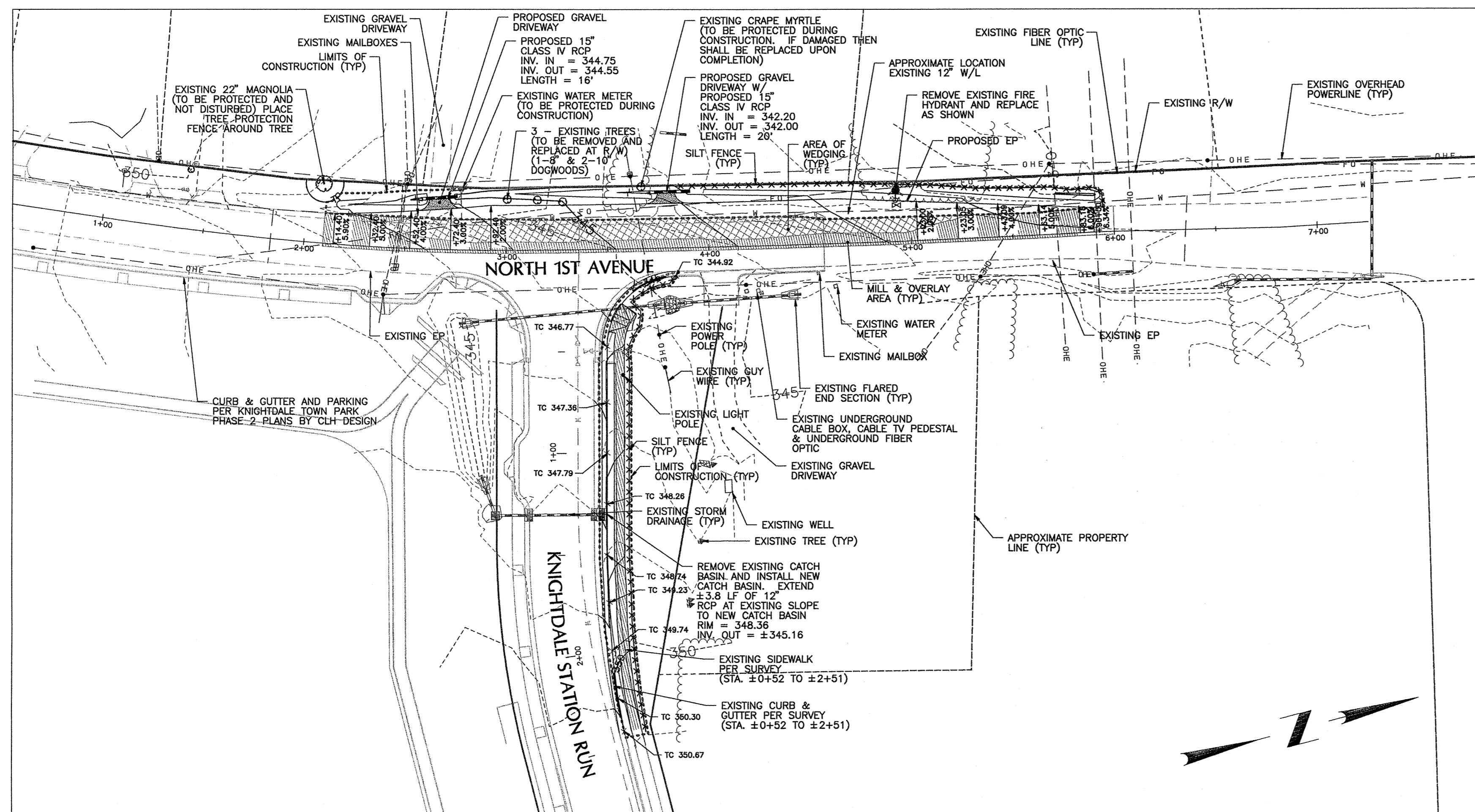
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**NORTH 1ST AVENUE PAVEMENT MARKING & SIGNAGE PLAN**



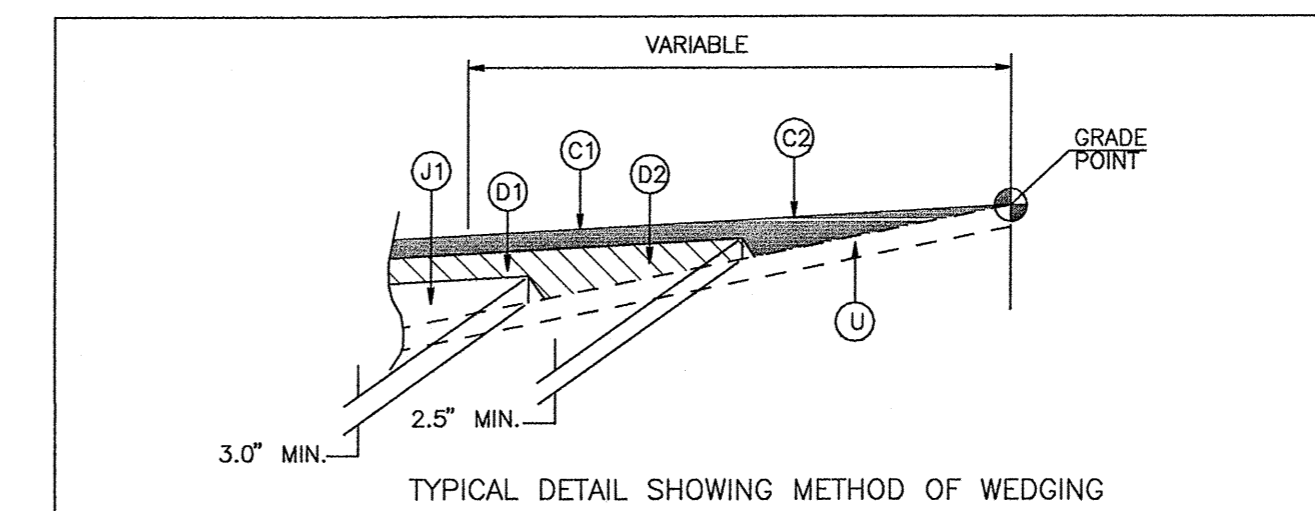
**NORTH 1ST AVENUE GRADING PLAN**

**PAVEMENT MARKING LEGEND**

	PAVEMENT MARKING SYMBOLS
(A)	4" WHITE MINI-SKIP LINE (3'-9"/SP)
(B)	6" WHITE LANE LINE
(C)	4" DOUBLE YELLOW CENTER LINE

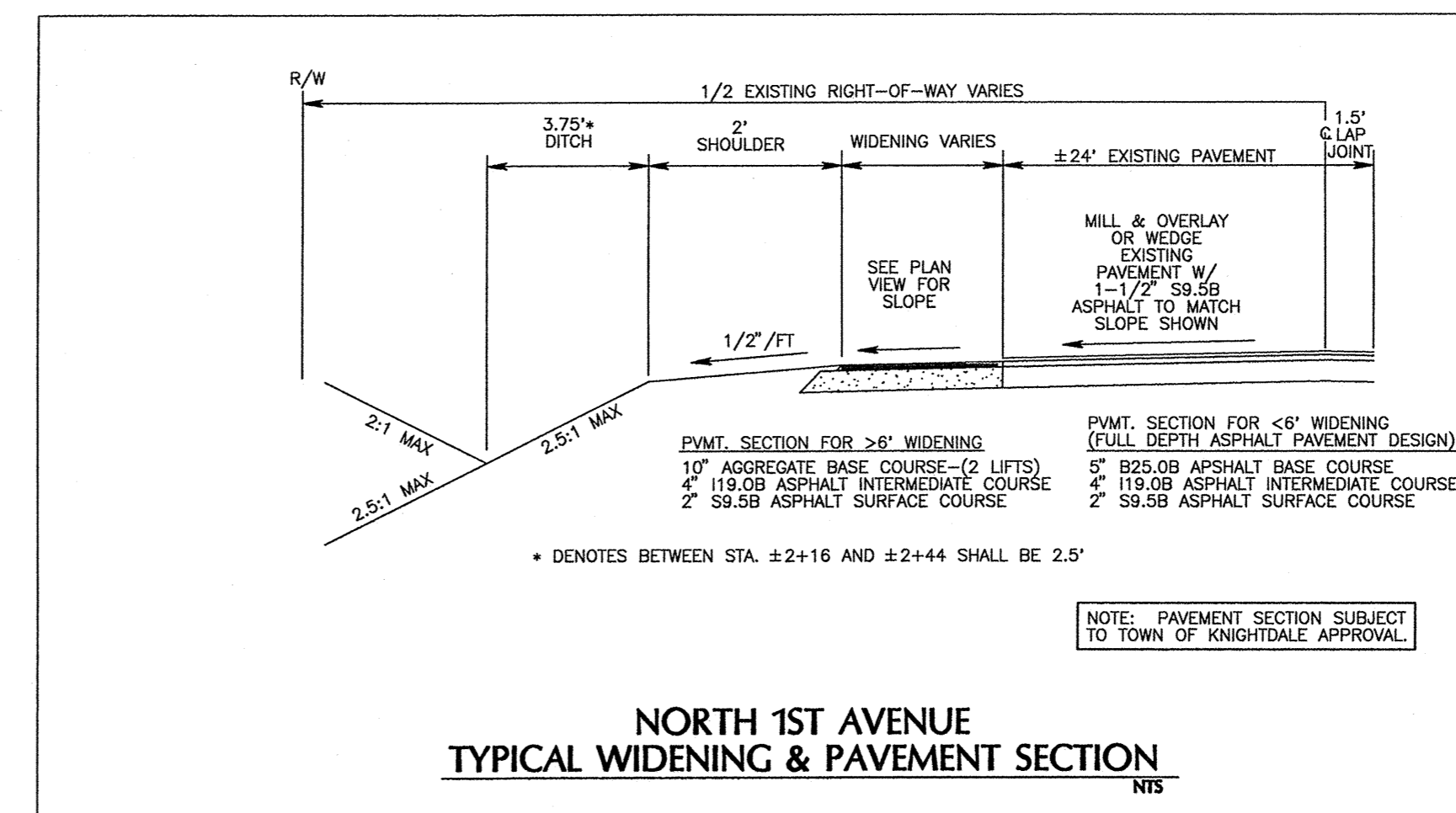
- GENERAL NOTES:**
- ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS (REFERENCE: CORPUS HANDBOOK, CURRENT EDITION) AND TOWN OF KNIGHTDALE DESIGN STANDARDS AND SPECIFICATIONS.
  - TOPOGRAPHIC SURVEY PERFORMED BY WITHERS & RAVENEL, INC. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. THE LOCATION OF EXISTING UTILITIES SHOWN ON THE PLANS IS BASED ON THE BEST AVAILABLE INFORMATION, BUT CAN BE CONSIDERED ONLY AS APPROXIMATE.
  - ALL EXISTING MAILBOXES SHALL BE RELOCATED UPON COMPLETION OF CONSTRUCTION. TEMPORARY MAILBOX LOCATIONS SHALL BE PROVIDED DURING CONSTRUCTION.

- NOTES:**
- PERMANENT MARKINGS SHALL BE THERMOPLASTIC AND INSTALLED AFTER FINAL OVERLAY IS COMPLETED.
  - ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARDS & SPECIFICATIONS.
  - PREMARKINGS SHALL BE APPROVED BY TOWN OF KNIGHTDALE ENGINEER PRIOR TO COMPLETION.
  - PERMANENT PAVEMENT MARKERS SHALL BE INSTALLED IN ACCORDANCE WITH NCDOT STD 1250.01.



**NORTH 1ST AVENUE PAVEMENT SCHEDULE**

CODE	DESCRIPTION
C1	PROP. APPROX. 2.0" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH LAYER.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1.5" IN DEPTH OR GREATER THAN 2.0" IN DEPTH.
D1	PROP. 4" DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 2.5" IN DEPTH OR GREATER THAN 4.0" IN DEPTH.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 2.5" IN DEPTH OR GREATER THAN 4.0" IN DEPTH.
J1	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3.0" IN DEPTH OR GREATER THAN 5.5" IN DEPTH.
U	EXISTING ASPHALT PAVEMENT

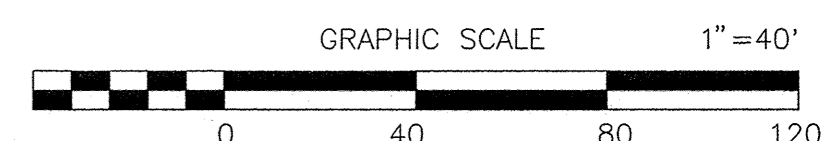


TOWN CERTIFICATION, THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 2/5/14  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4.16.14  
ADMINISTRATOR



*[Professional Engineer Seal]*  
NORTH CAROLINA PROFESSIONAL ENGINEER  
JOHN C. HANATON  
2/5/14

No.	Revision	Date	By	Designer	W&R	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI			SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI			

**KNIGHTDALE STATION PHASE R1 & R2**

TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

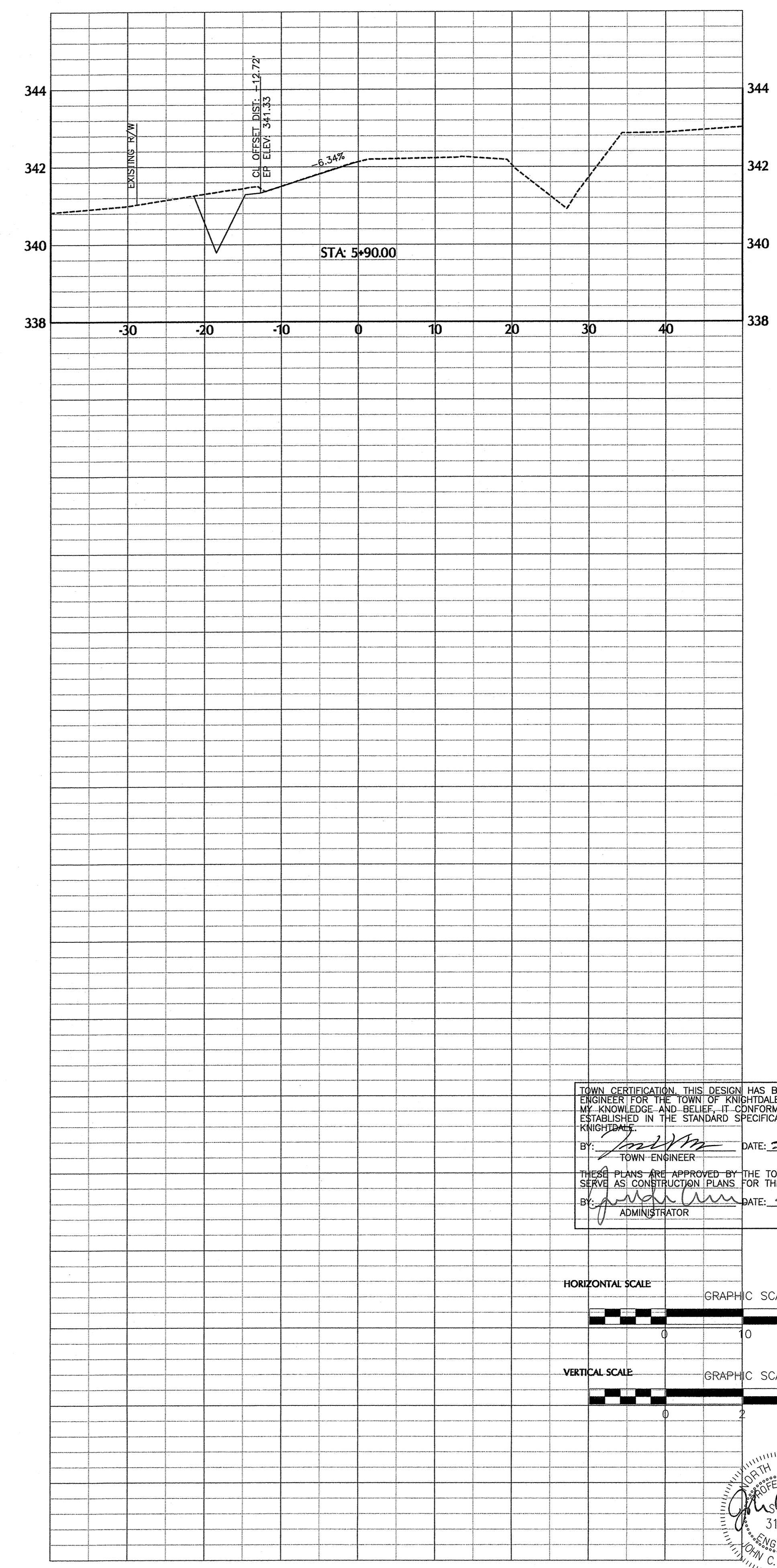
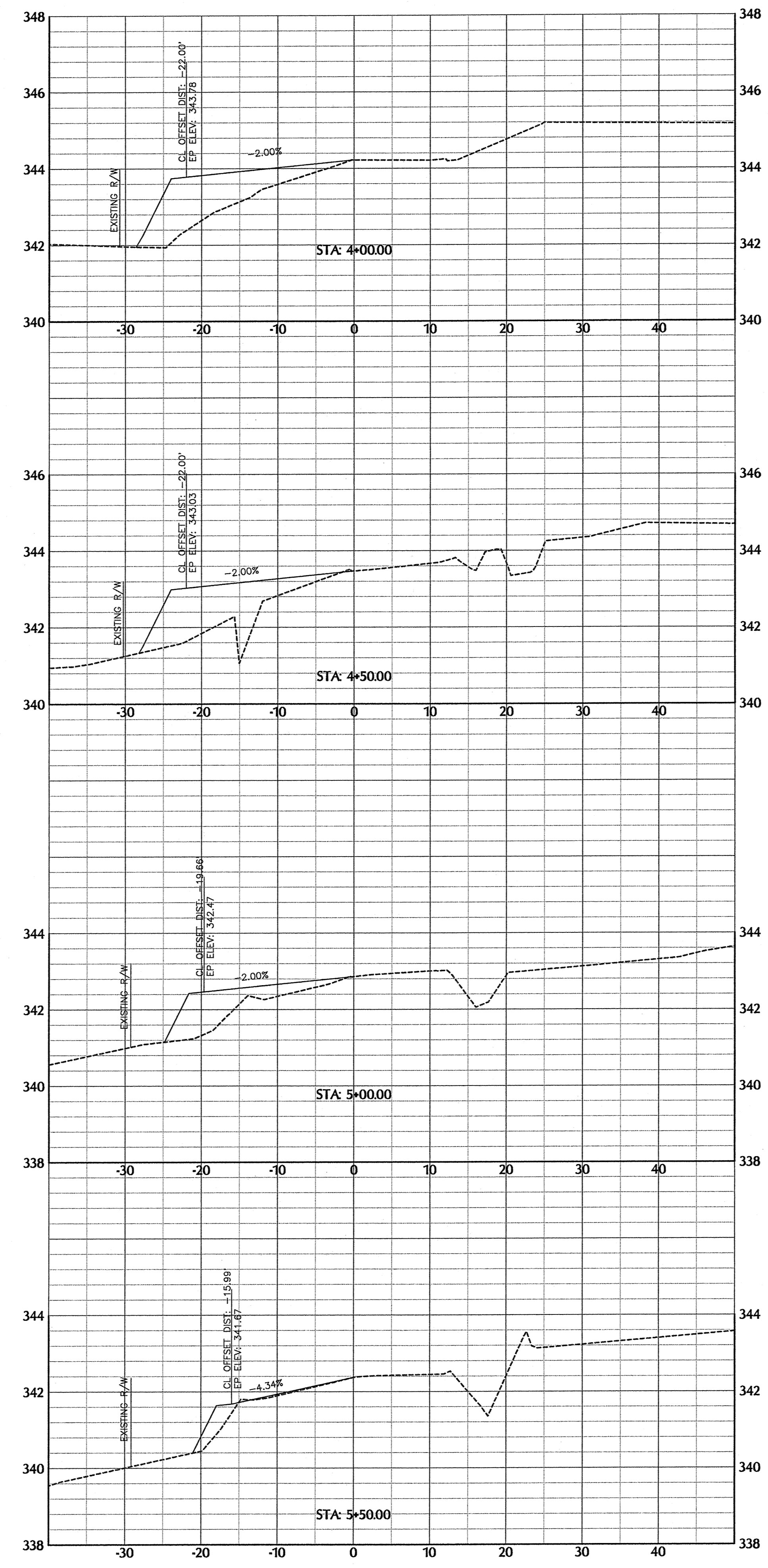
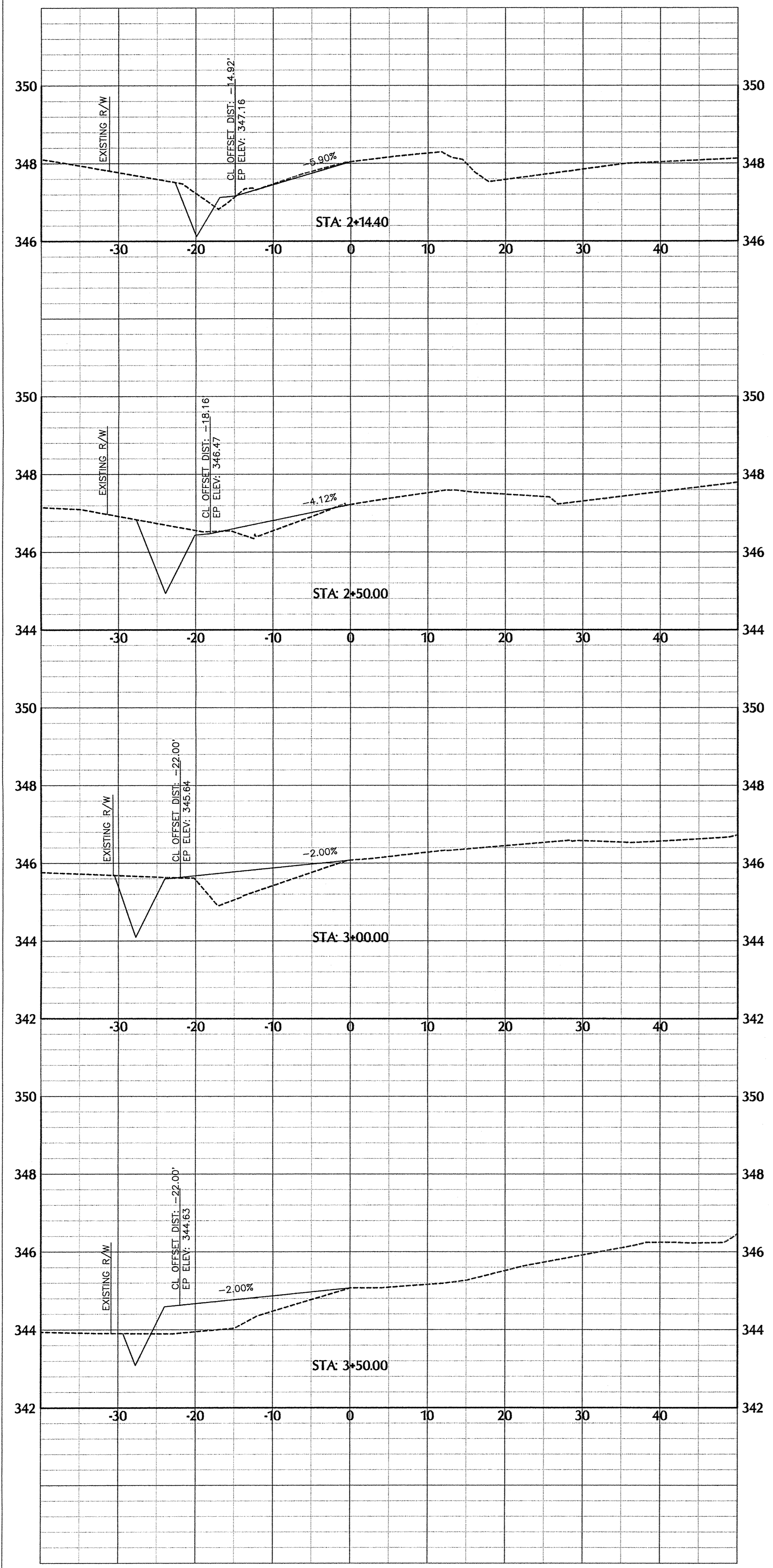
**NORTH 1ST AVENUE IMPROVEMENTS**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

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Sheet No. **25 of 38**

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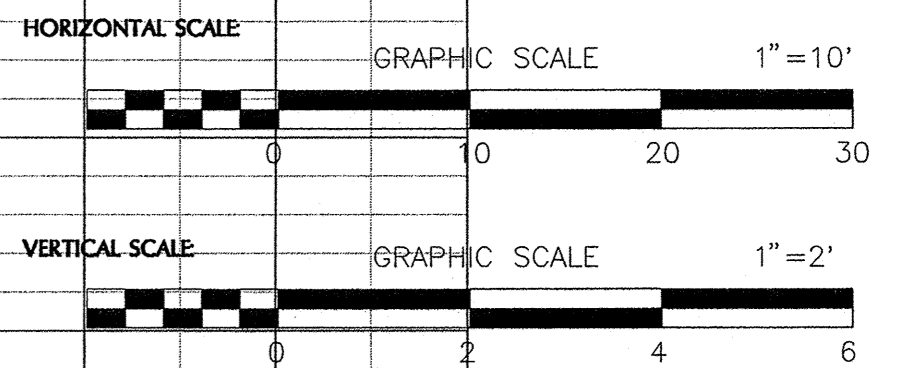


TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 2/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 2/10/14  
ADMINISTRATOR



*[Signature]*  
PROFESSIONAL ENGINEER  
31982  
JOHN C. HAVATIA  
2/5/14

No.	Revision	Date	By
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI

Designer	W&R	Scale	SEE SHEET
Drawn By	JCI	Date	01/29/14
Checked By	JCI	Job No.	020902513

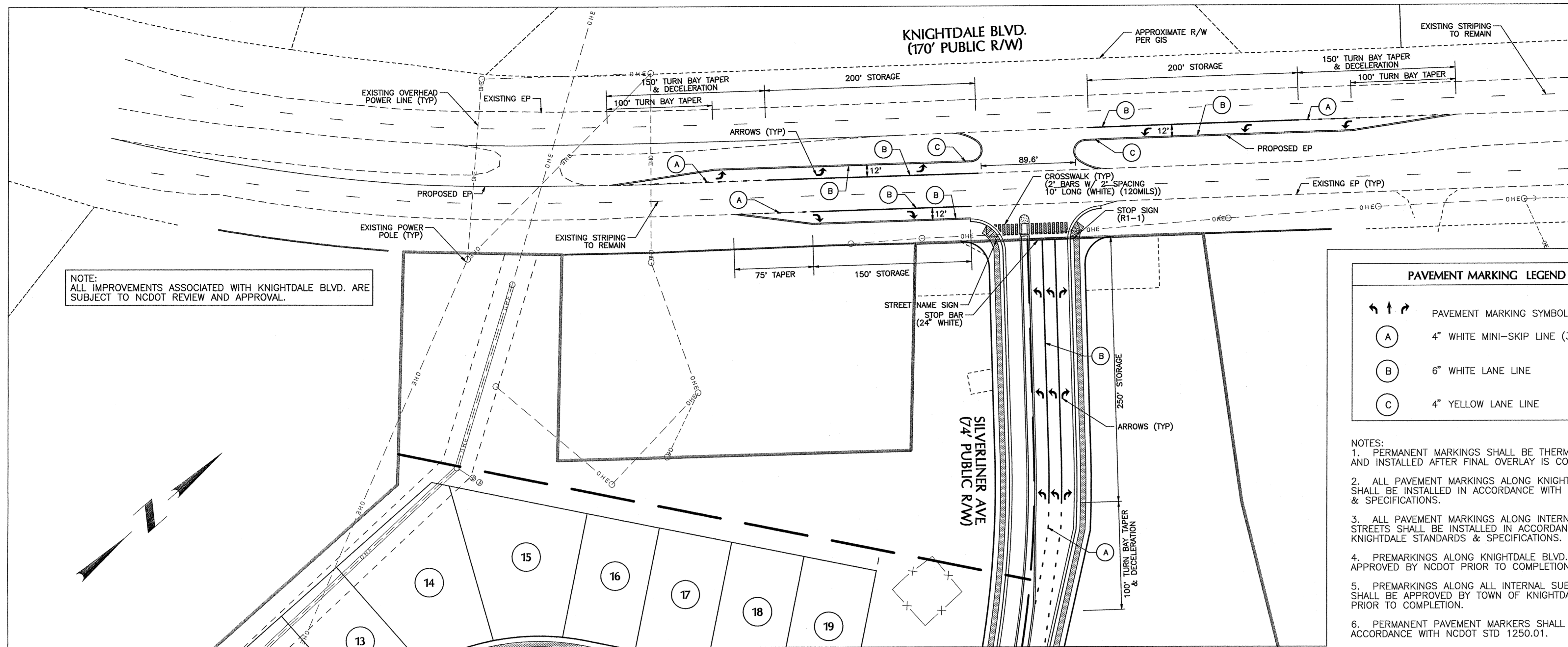
**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE  
WAKE COUNTY  
NORTH CAROLINA

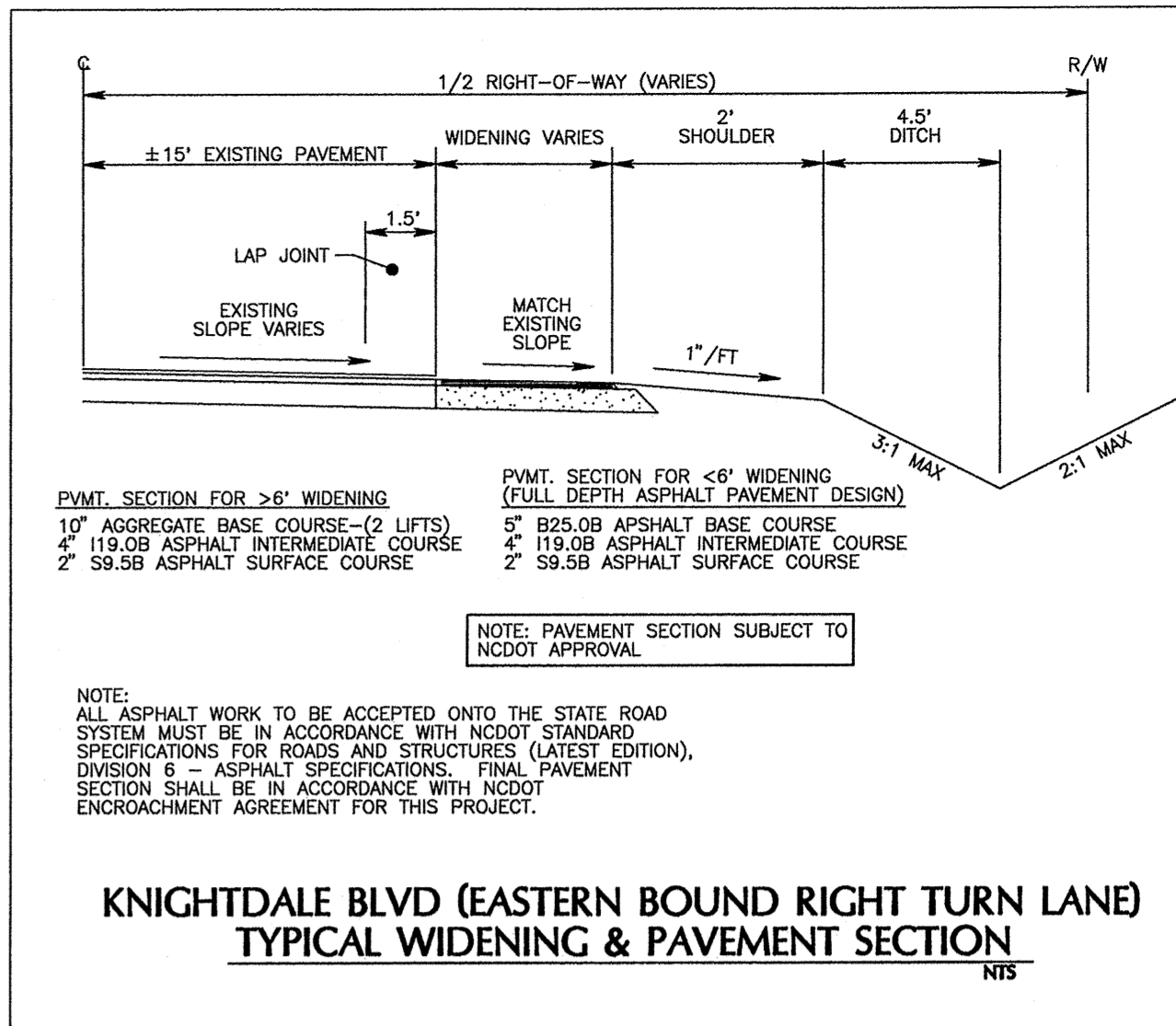
**NORTH 1ST AVENUE CROSS SECTIONS**

**WITHERS & RAVENEL**  
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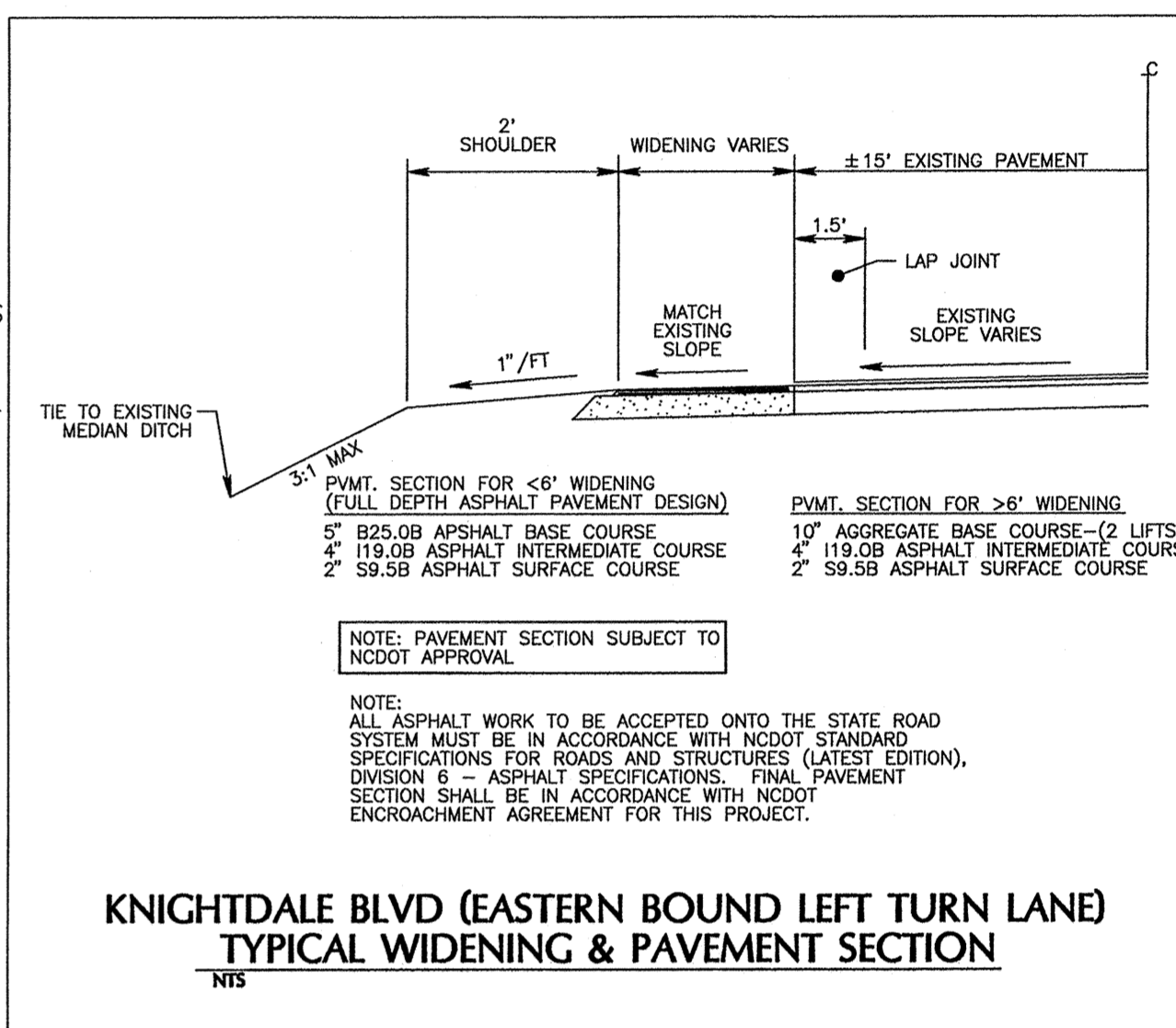
Sheet No.  
**26 of 38**



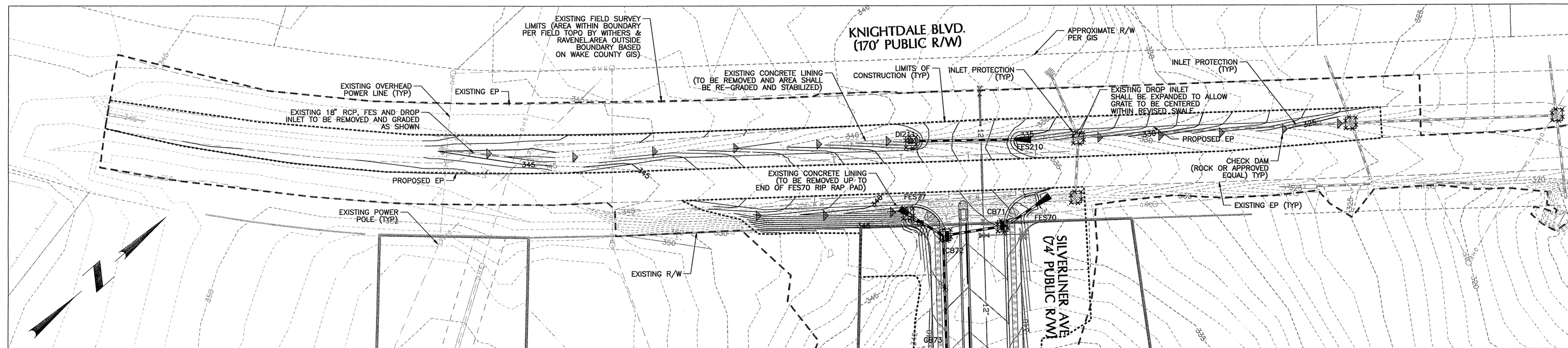
KNIGHTDALE BLVD. & COLLECTOR ROAD B PAVEMENT MARKING PLAN



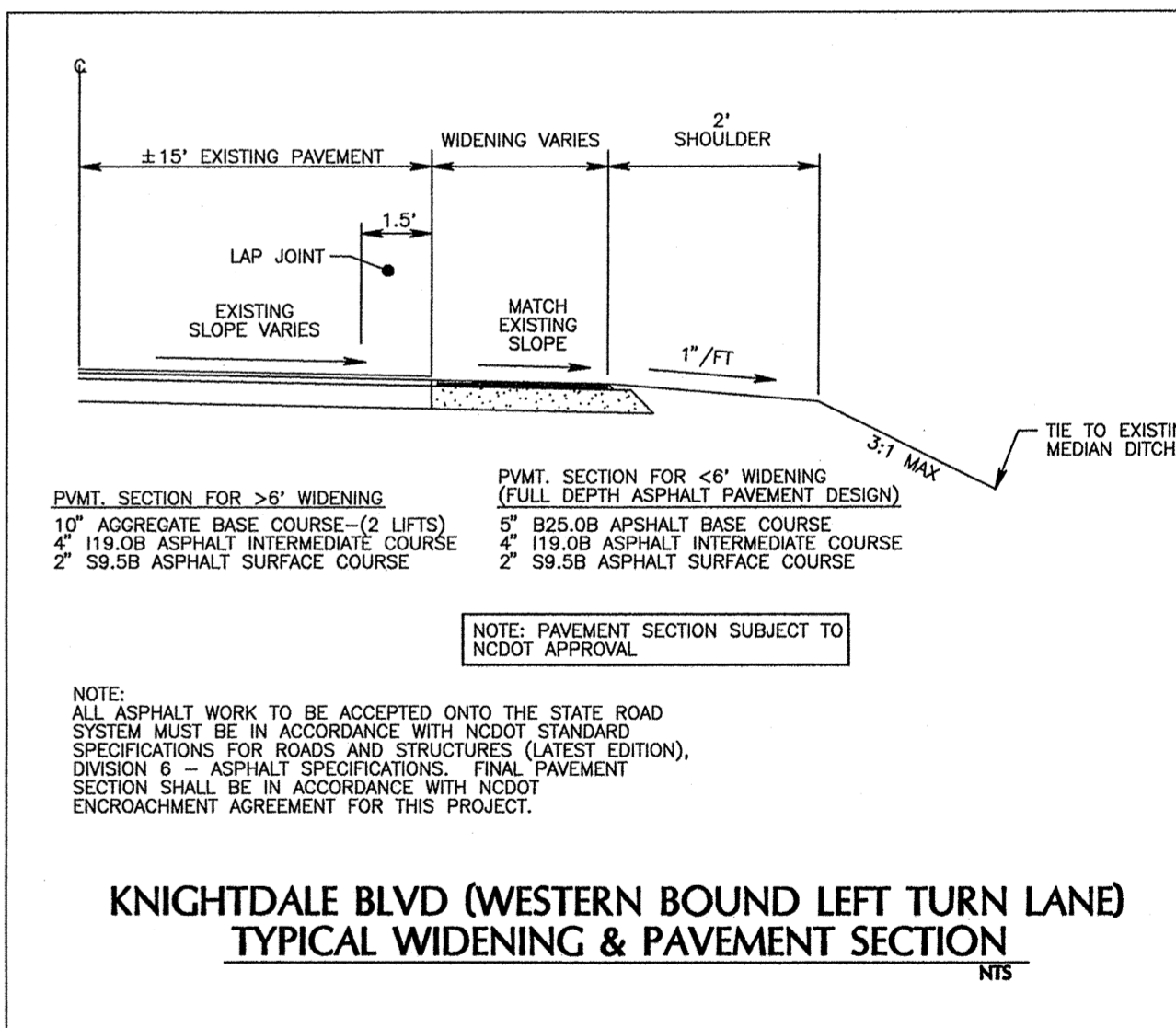
KNIGHTDALE BLVD (EASTERN BOUND RIGHT TURN LANE) TYPICAL WIDENING & PAVEMENT SECTION



KNIGHTDALE BLVD (EASTERN BOUND LEFT TURN LANE) TYPICAL WIDENING & PAVEMENT SECTION



KNIGHTDALE BLVD. GRADING PLAN



KNIGHTDALE BLVD (WESTERN BOUND LEFT TURN LANE) TYPICAL WIDENING & PAVEMENT SECTION

STORM DRAINAGE PIPE SCHEDULE

DS Inlet	US Invert	DS Invert	US Invert	Pipe Size	Pipe Material	Pipe Length (ft)	Pipe Slope (%)	Post-development Discharge (cfs)	Ave Vel (ft/s)
FES210	CB211	332.90	334.05	18" Dia.	CLASS IV	111.53	1.03	4.63	4.43

STORM DRAINAGE INLET SCHEDULE

Inlet Name	Runoff Coeff	System Int (in/hr)	Drainage Area (ac)	Inlet Sys Q (cfs)	Rim Elev	Floor Elev	Box Depth (ft)
DI211	0.60	7.08	1.09	4.63	336.40	334.05	2.35

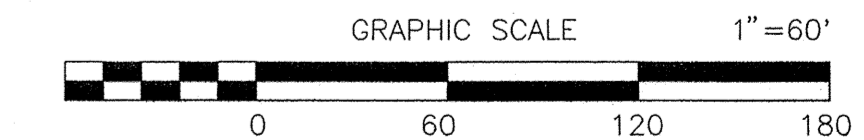
VELOCITY DISSIPATOR DESIGN

Outlet #	Pipe Dia (inches)	Discharge (cfs)	Length (ft)	Outlet Width (ft)	D-Stream Width (ft)	Rip Rap Thickness (inches)	Rip Rap Class (NCDOT)
FES210	18	4.63	8	N/A	N/A	12	B
FES210	18	4.63	8	N/A	N/A	12	B

STORM DRAINAGE NOTES:  
 1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT NCDOT STANDARD SPECIFICATIONS AND DETAILS.  
 2. RIM ELEVATION GIVEN FOR OB IS TOP OF CURB, DI IS TOP OF GRATE FOR GRATED INLET, JB IS TOP OF RIM.  
 3. ALL PIPING SHALL BE CLASS III REINFORCED CONCRETE PIPE (RCP) UNLESS NOTED OTHERWISE.

NOTE: ALL IMPROVEMENTS ASSOCIATED WITH KNIGHTDALE BLVD. ARE SUBJECT TO NCDOT REVIEW AND APPROVAL.

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: 2/5/2014  
 TOWN ENGINEER  
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.  
 BY: [Signature] DATE: 4/16/14  
 ADMINISTRATOR



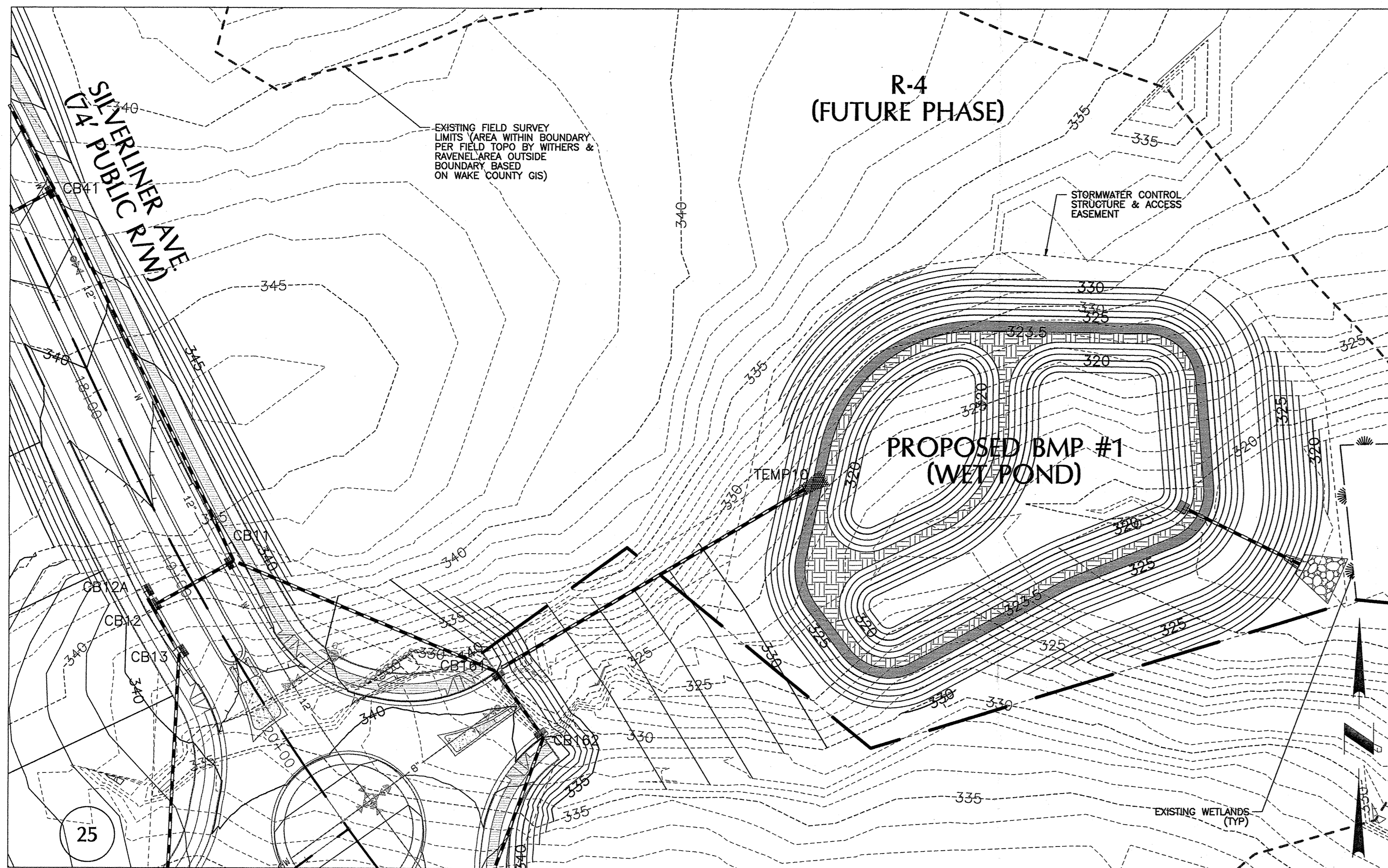
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KNIGHTDALE STATION  
 PHASE R1 & R2  
 WAKE COUNTY  
 NORTH CAROLINA

KNIGHTDALE BLVD. IMPROVEMENTS

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Sheet No. 27 of 38



### BMP #1 - WET POND

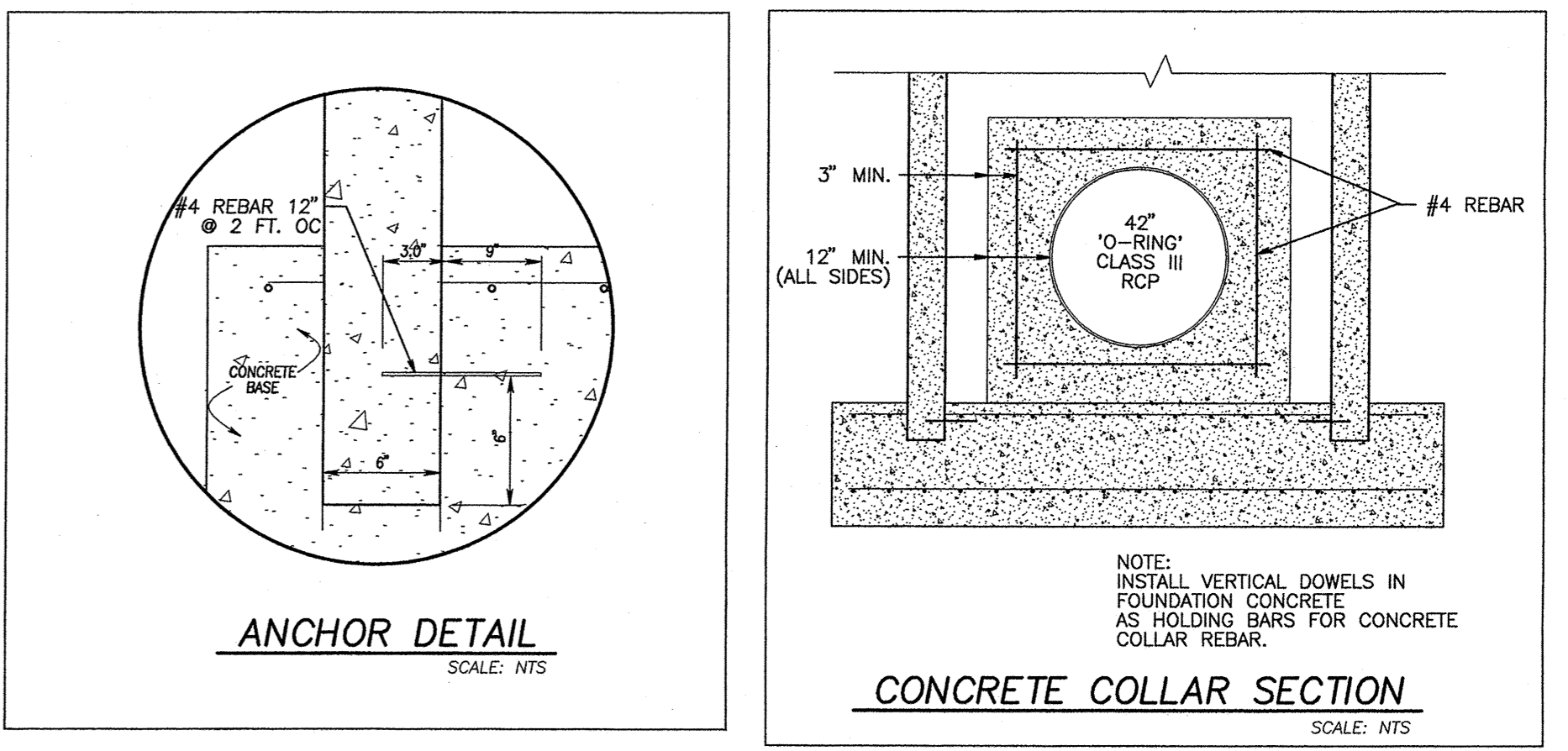
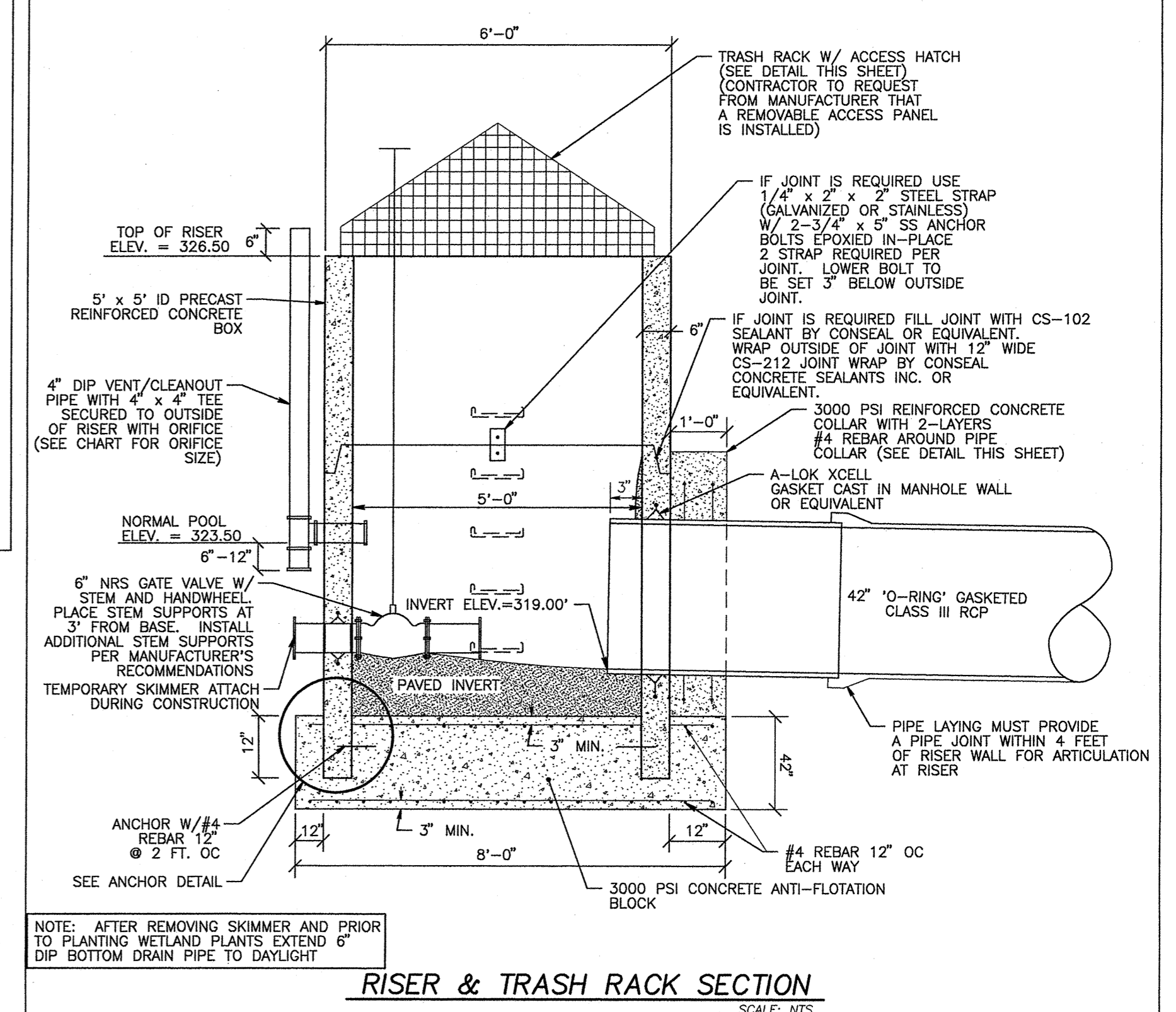
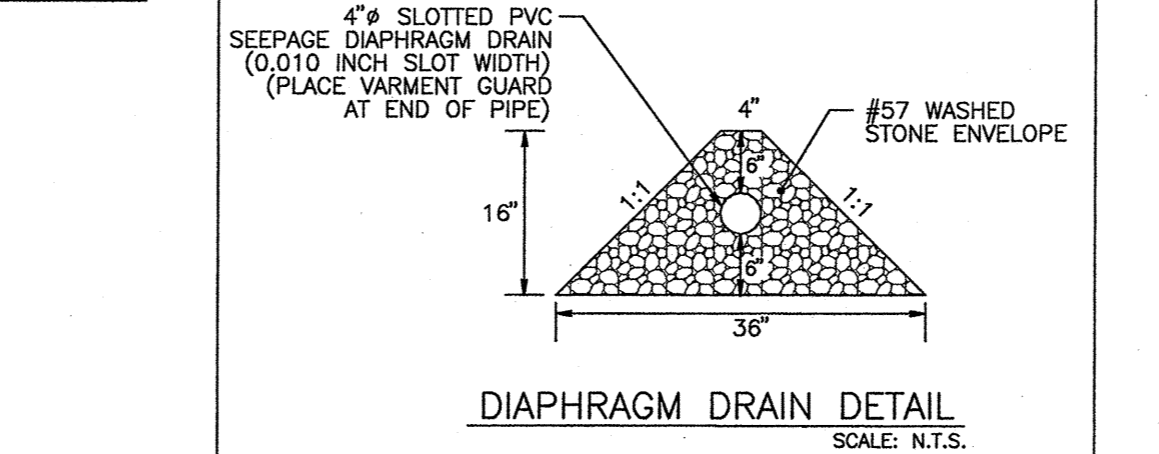
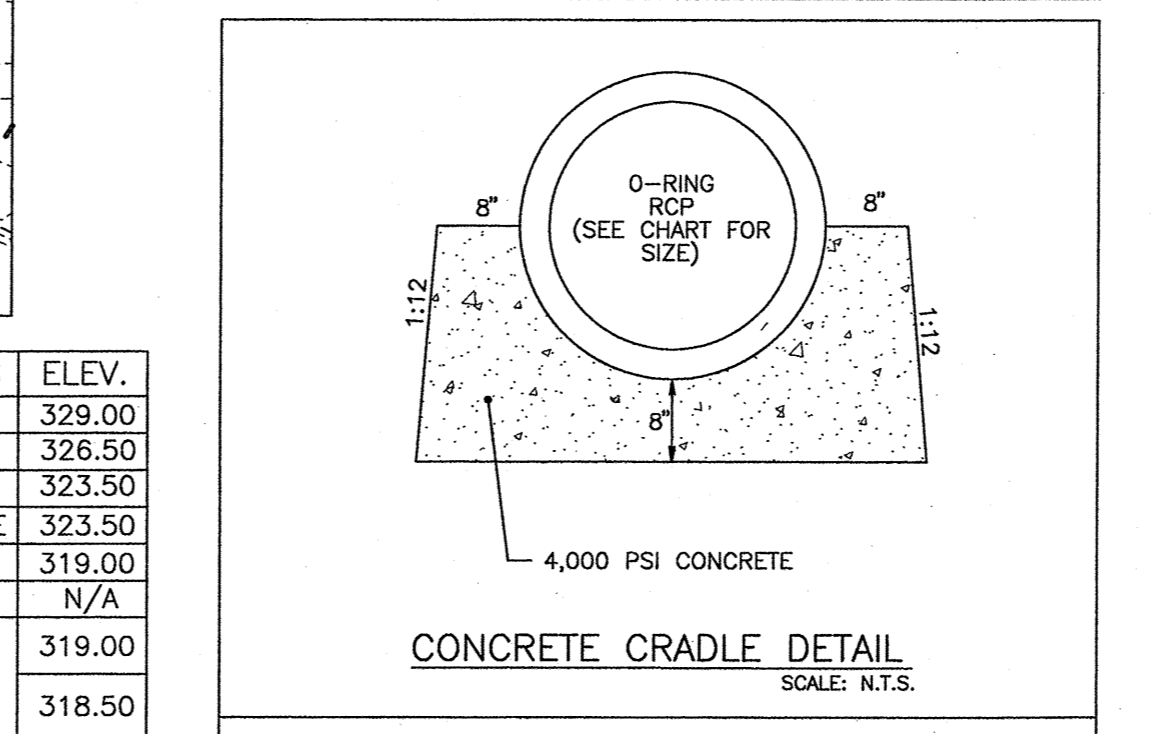
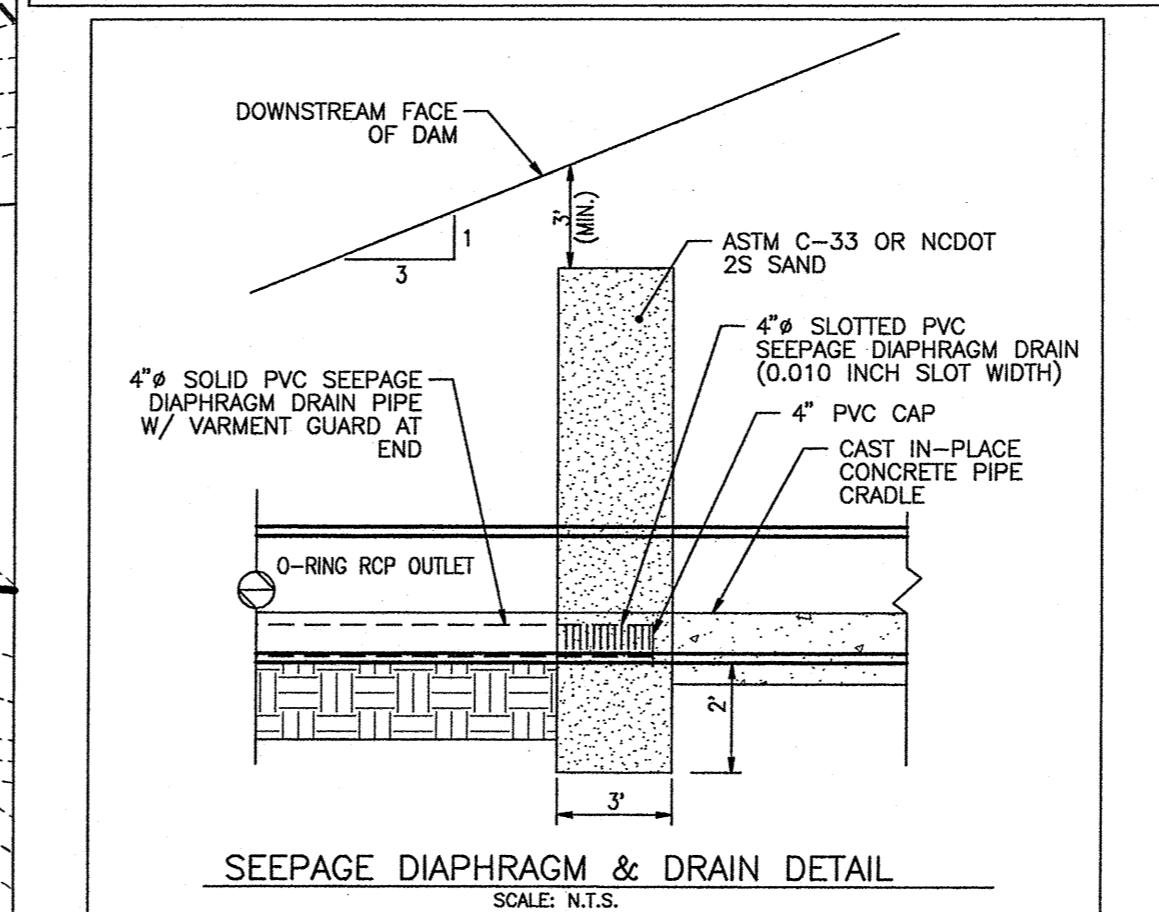
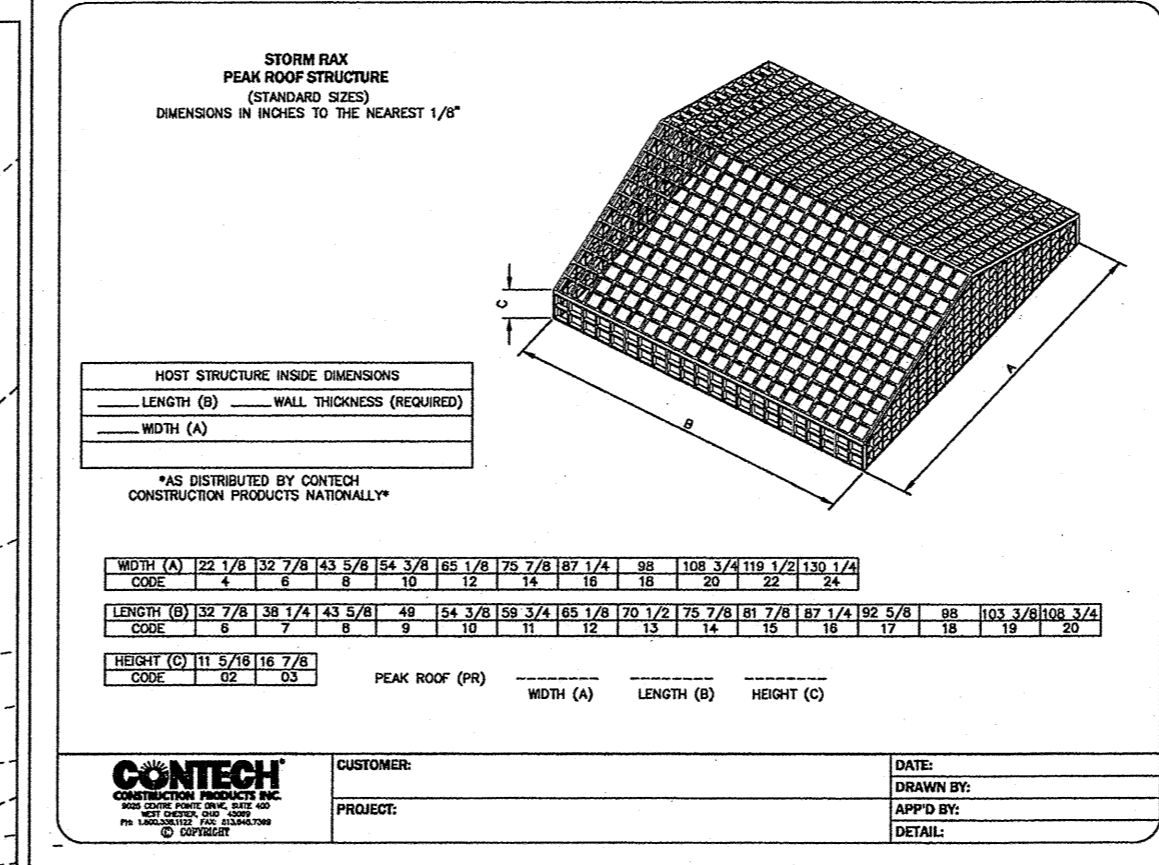
ITEM	DIMENSIONS	ELEV.
TOP OF DAM WIDTH	10'	329.00
TOP OF RISER	5'X5' ID	326.50
NORMAL POOL	24,809 SF	323.50
NORMAL POOL ORIFICE	3.5" ORIFICE	323.50
BOTTOM DRAIN	6"	319.00
ANTI-FLOATATION DEVICE	8'x8'x3.5'	N/A
OUTLET PIPE INVERT IN	66 LF OF 42" O-RING CLASS III RCP @ 0.76%	319.00
OUTLET PIPE INVERT OUT		318.50

### CLAY LINER SPECIFICATIONS

THE CLAY LINER FOR THE WET POND SHALL BE AT LEAST 12" THICK AND MEET THE FOLLOWING SPECIFICATIONS:

- UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION OF CL, CH, ML, SC
- MINIMUM OF 40% PASSING #200 SIEVE
- MINIMUM PLASTICITY INDEX OF 12
- MAXIMUM INFILTRATION RATE OF 0.01 IN/HR
- A MINIMUM OF 2 TESTS OF EACH ABOVE PARAMETER SHALL BE COMPLETED BY THE CONTRACTOR ON THE LINER MATERIAL AND PRESENTED TO THE ENGINEER FOR APPROVAL.
- COMPACTION TO A MINIMUM OF 93% PER ASTM D698, AND WITHIN 3% OF THE OPTIMUM MOISTURE CONTENT (1) COMPACTION DENSITY TEST PER 2500 SQ. FT.)

THE CLAY LINER SHALL BE PLACED UNDER THE BOTTOM OF THE BMP PERMANENT POOL TO A THICKNESS OF 12 INCHES. A MINIMUM OF 8 INCHES OF TOPSOIL SHALL BE THE FINISHED GRADE AS SHOWN ON THE DRAWINGS AND/OR DETAILS. CARE SHALL BE TAKEN WHEN TRACKING IN THE TOPSOIL TO NOT PUNCTURE OR DAMAGE THE CLAY. A CLAY/SOIL MIXTURE MAY BE USED IF THE ABOVE SPECIFICATIONS ARE SATISFIED AND WITH WRITTEN APPROVAL BY THE ENGINEER.



### PLANT LIST - BMP #1

PLANT TYPE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	NOTES
<b>BMP SHALLOW LAND (NORMAL POOL TO 6" ABOVE) = 3,079 SF</b>						
50 HERB. PLANTS / 200 SF (3,079 SF) = 770						
HERBACEOUS	154	<i>Asclepias incarnata</i>	Swamp Milkweed	CONT.	4" POT	24" O.C.
	154	<i>Chelone glabra</i>	White Turtlehead	CONT.	4" POT	24" O.C.
	154	<i>Eupatoriadelphus fistulosus</i>	Joe-Pye weed	CONT.	4" POT	24" O.C.
	154	<i>Kosteletzkya virginica</i>	Seashore Mallow	CONT.	4" POT	24" O.C.
	154	<i>Labelia cardinalis</i>	Cardinal Flower	CONT.	4" POT	24" O.C.
<b>BMP SHALLOW WATER (NORMAL POOL TO 6" BELOW) = 4,522 SF</b>						
50 HERB. PLANTS / 200 SF (4,522 SF) = 1,131						
HERBACEOUS	226	<i>Iris virginica</i>	Blue Flag Iris	CONT.	4" POT	24" O.C.
	226	<i>Juncus effusus</i>	Soft Rush	CONT.	4" POT	24" O.C.
	226	<i>Pontarea cordata</i>	Pickereelweed	CONT.	4" POT	24" O.C.
	226	<i>Saururus cernuus</i>	Lizard's tail	CONT.	4" POT	24" O.C.
	227	<i>Schoenoplectus tabernaemontani</i>	Soft Stem Bulrush	CONT.	4" POT	24" O.C.

-A MINIMUM OF THREE (3) DIVERSE SPECIES MUST BE USED FOR EACH PLANTING ZONE.  
 -TOPSOIL SHALL BE USED OVER THE CLAY LINER AS NECESSARY TO PROMOTE AND MAINTAIN VEGETATION ESPECIALLY ALONG THE VEGETATED SHELF FOR THE ABOVE PLANTINGS.  
 -PROFESSIONAL CERTIFICATION OF PLANTING WILL BE REQUIRED.

OUTLET #	PIPE DIA (INCHES)	DISCHARGE (CFS)	LENGTH (FT)	OUTLET WIDTH (FT)	DISTANCE (FT)	RIP PAD WIDTH (INCHES)	RIP PAD THICKNESS (INCHES)	RIP PAD CLASS
BMP #1	42	21.35	21	10.5	24.5	22	1	1

STORM EVENT	FLOW (CFS)	ELEV. (FT)
1-YEAR	0.46	325.70
10-YEAR	21.35	326.97
100-YEAR	114.76	328.02

VELOCITY DISSIPATOR DESIGN  
 NOTE: ALL DISSIPATORS SHALL HAVE FILTER FABRIC UNDERLINERS. INSTALL RIP PAD AT LEVEL GRADE.

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.

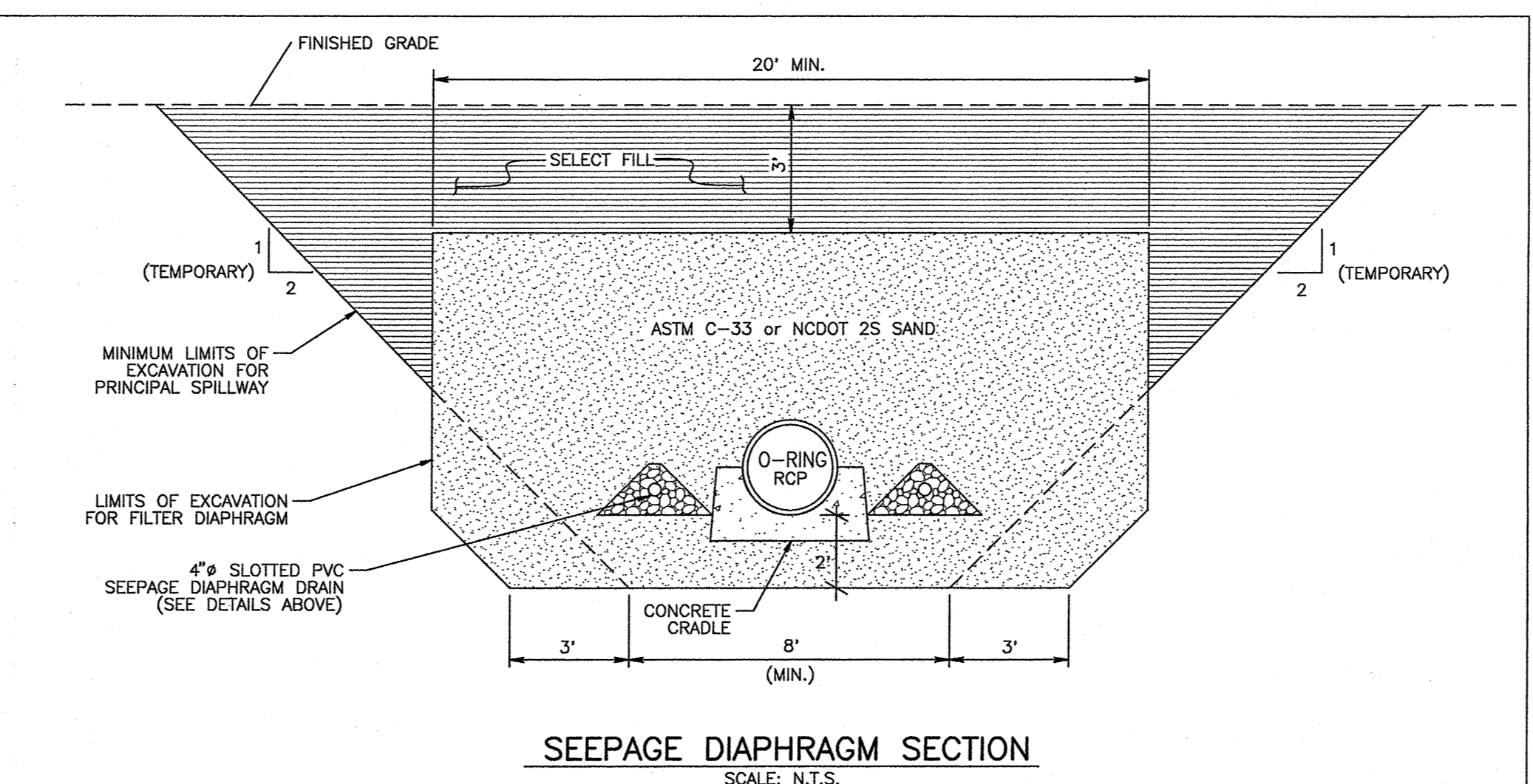
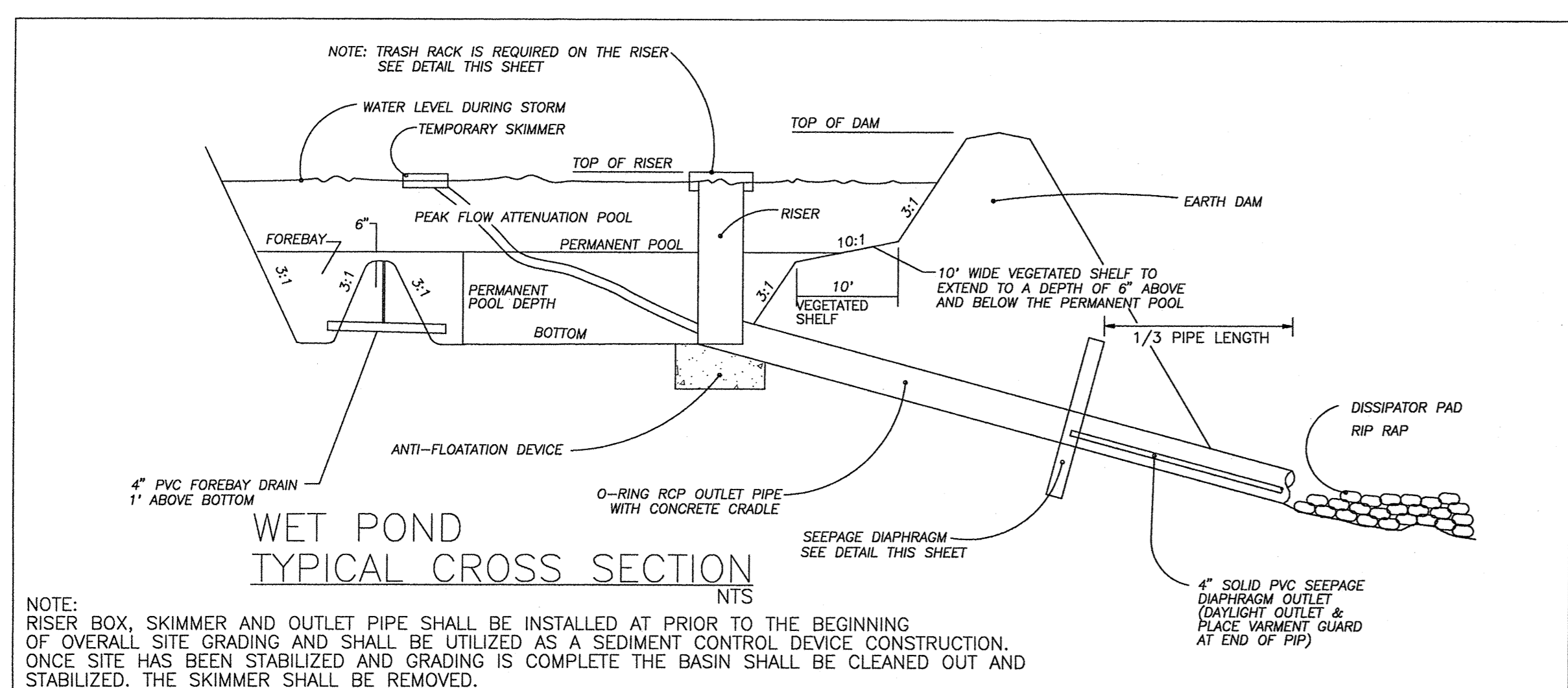
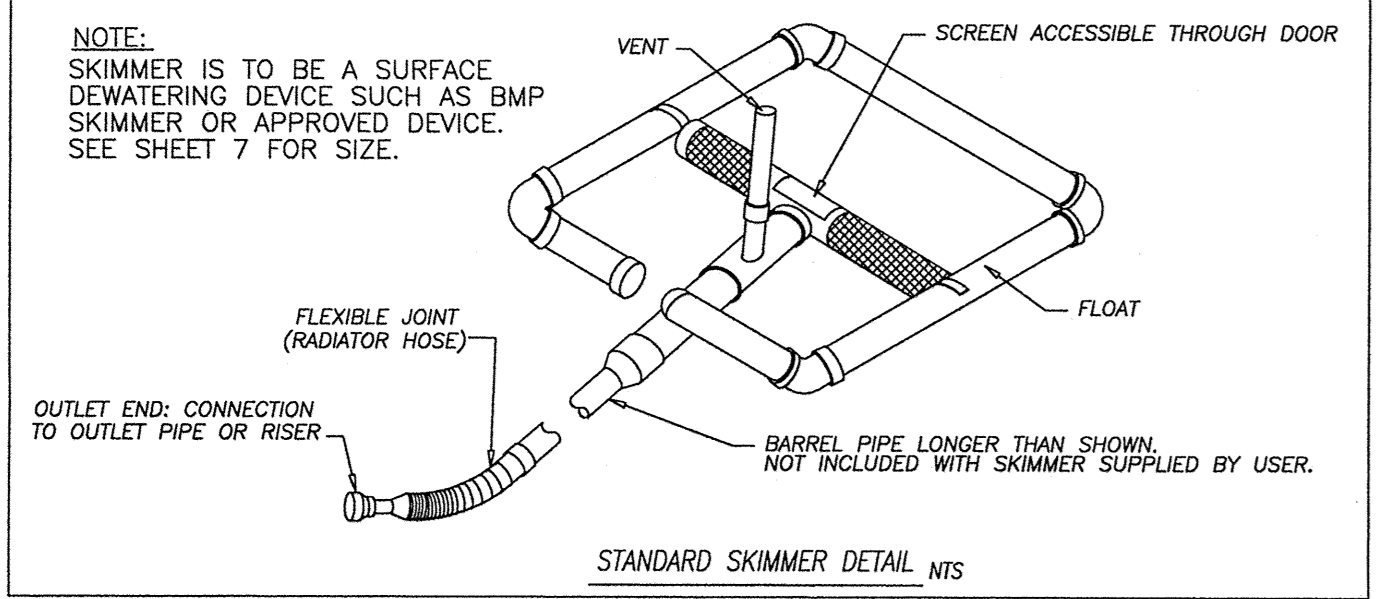
BY: *[Signature]* DATE: 4/15/2014  
 TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/16/14  
 ADMINISTRATOR

**BMP #1 OUTFLOW SUMMARY**

4/2/14



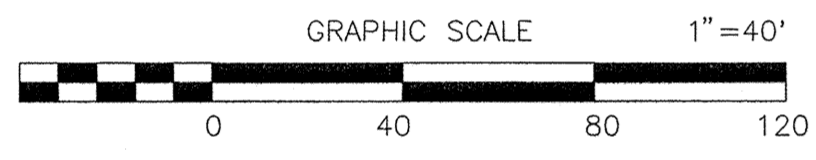
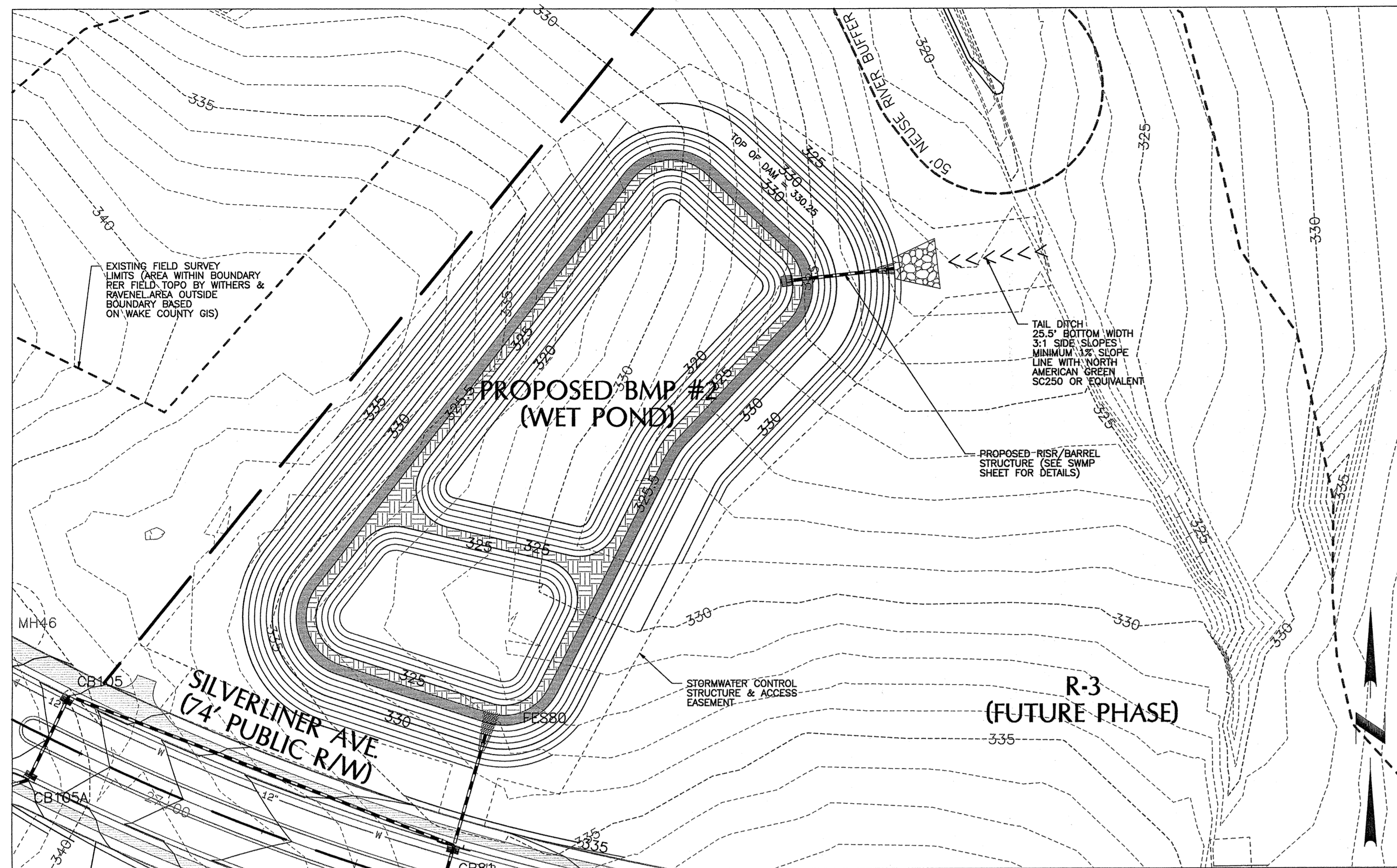
No.	Revision	Date	By	Designer	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI		SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI		
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI		01/29/14
4	WAKE COUNTY EC COMMENTS & BMP #1 & #2 REVISIONS	04/02/14	JCI		02/09/2013

**KNIGHTDALE STATION**  
**PHASE R1 & R2**  
 TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

**STORMWATER MANAGEMENT PLAN - BMP #1**

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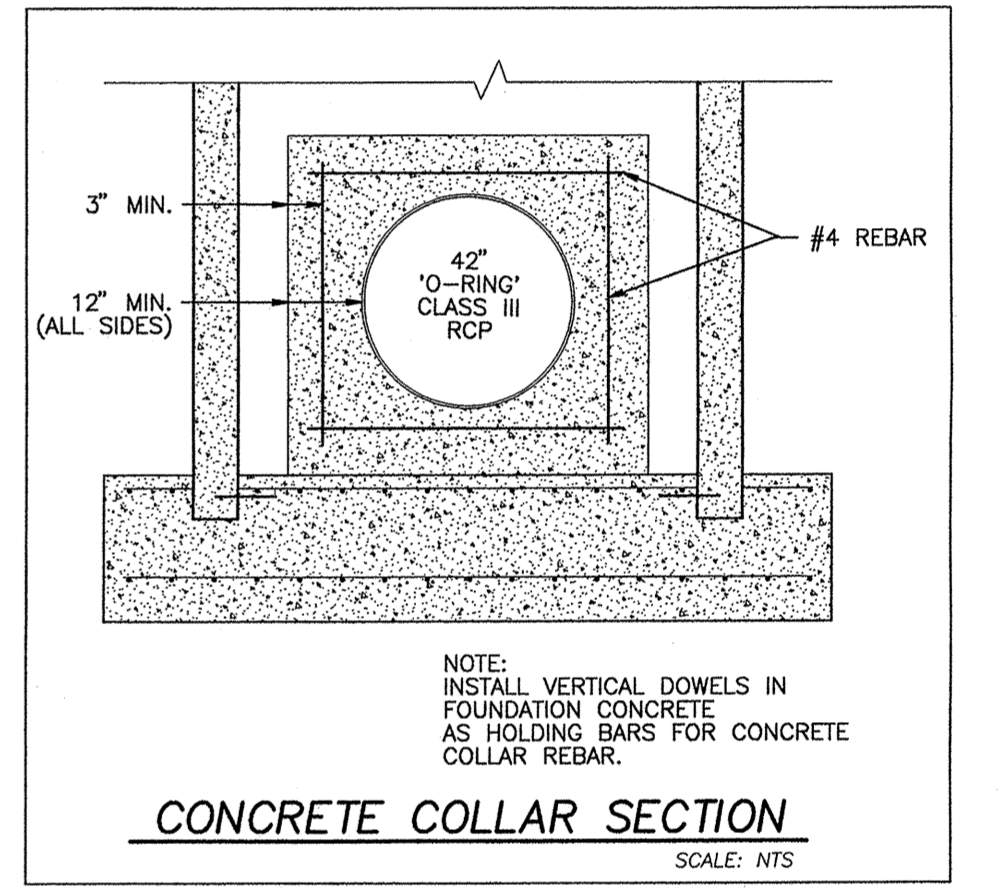
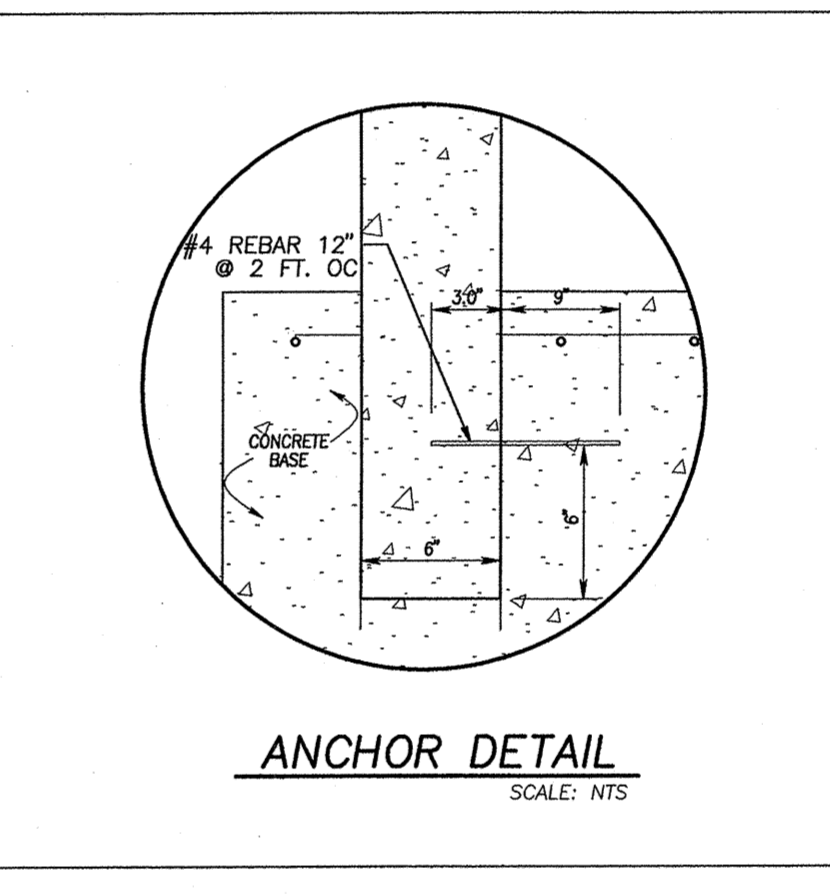
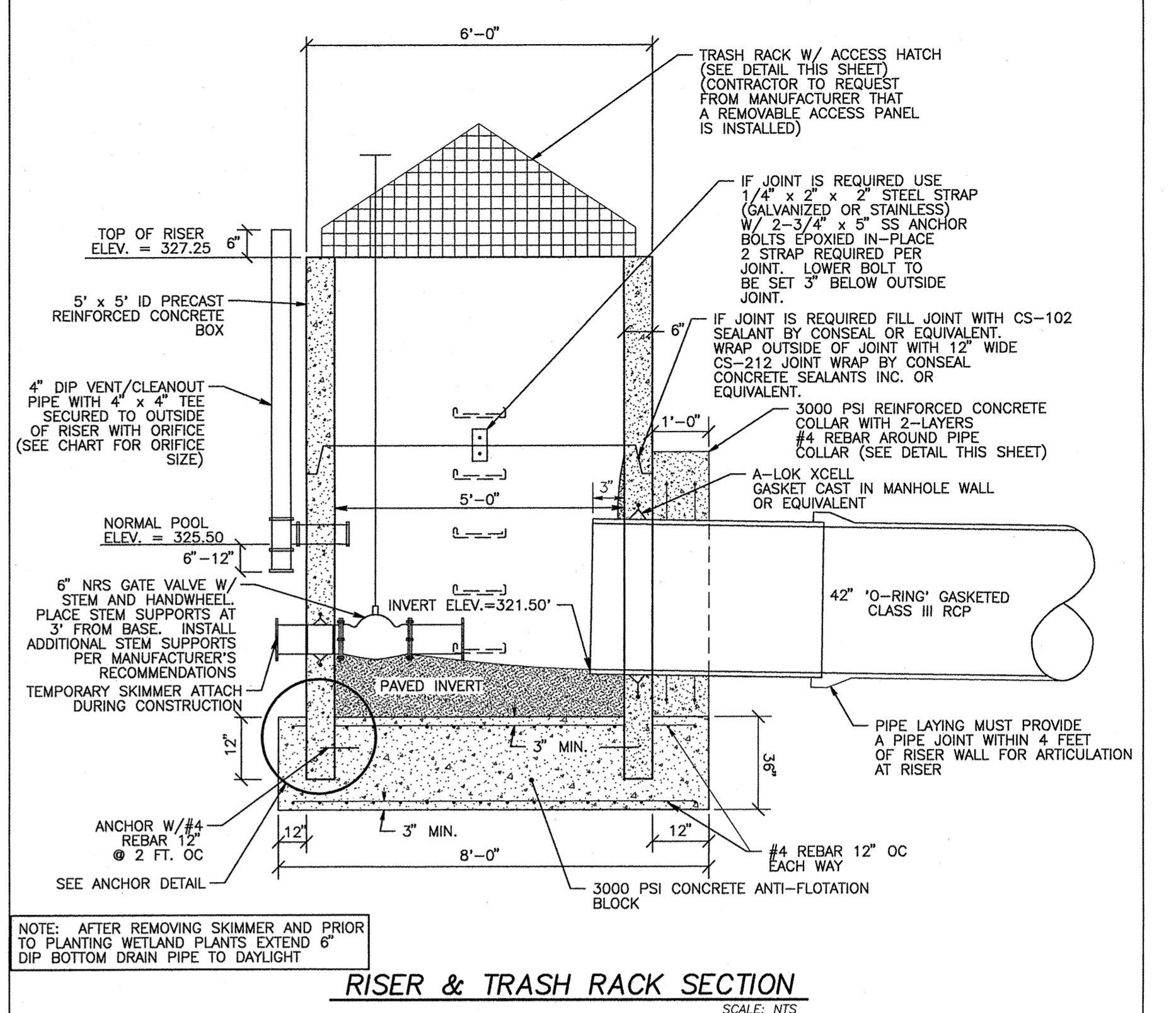
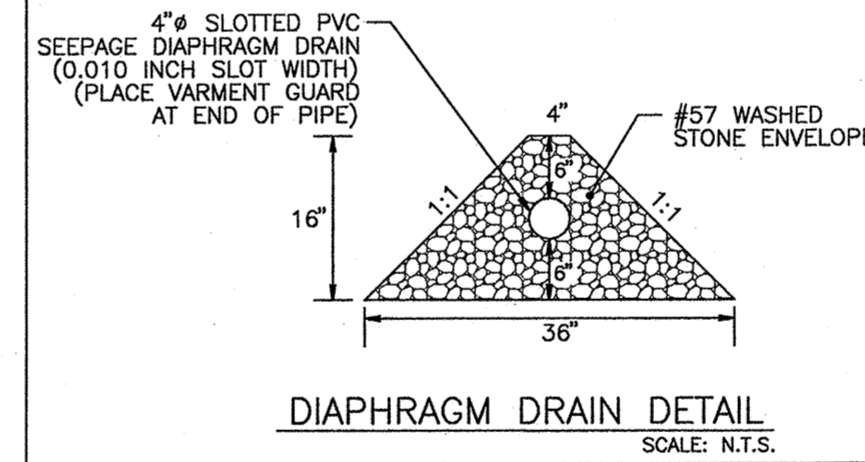
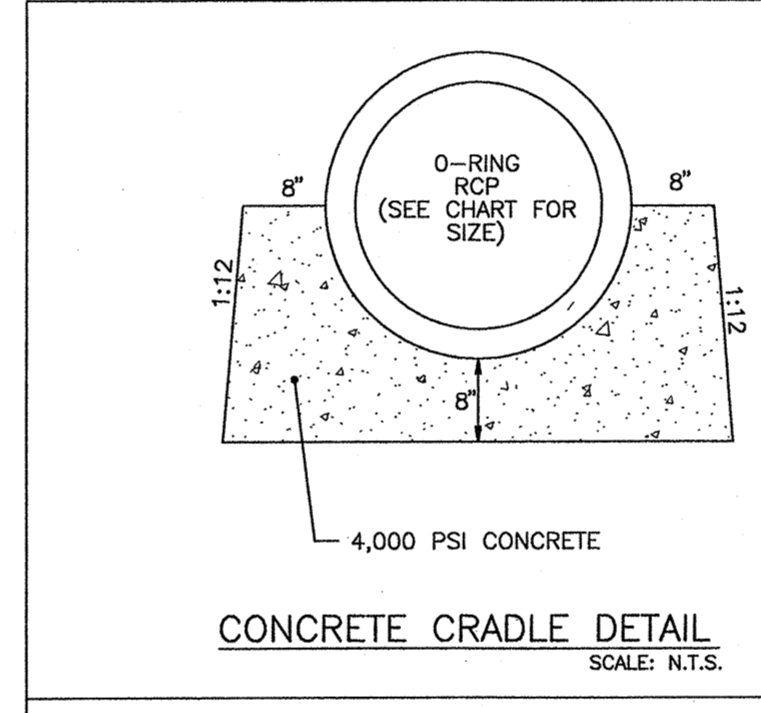
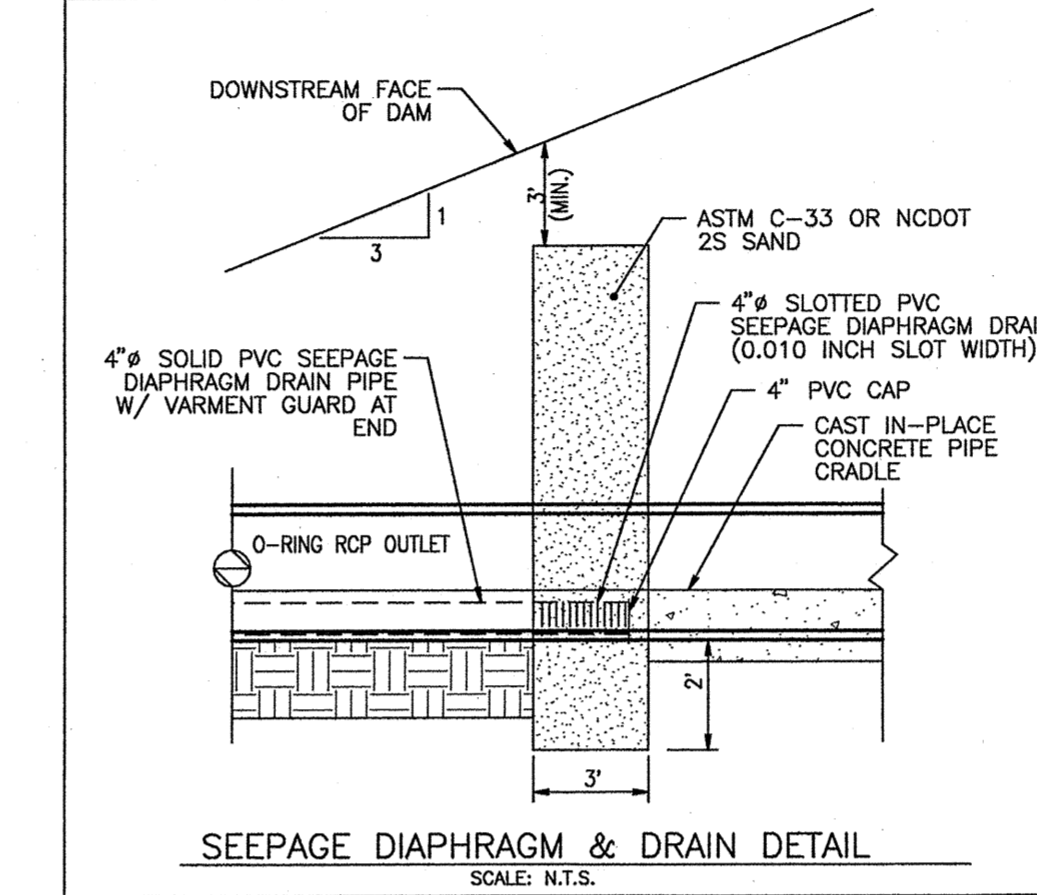
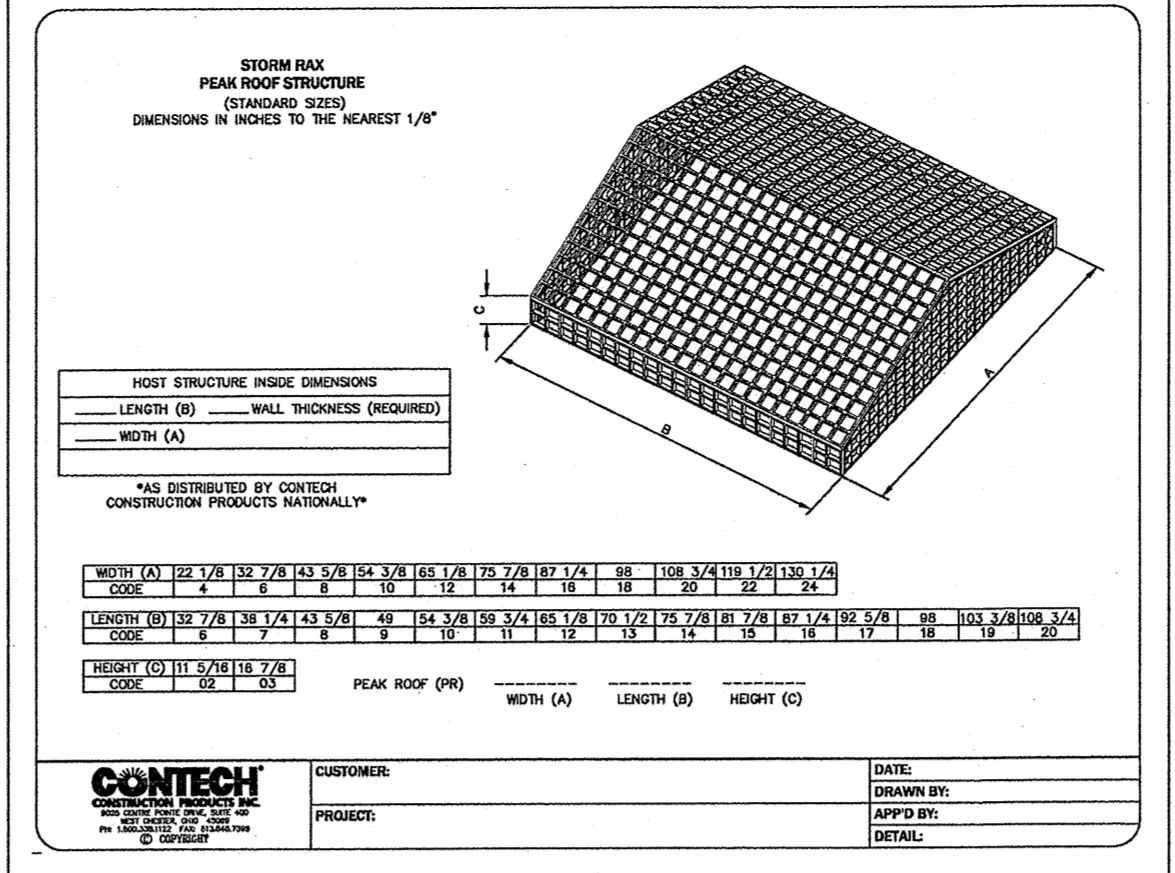
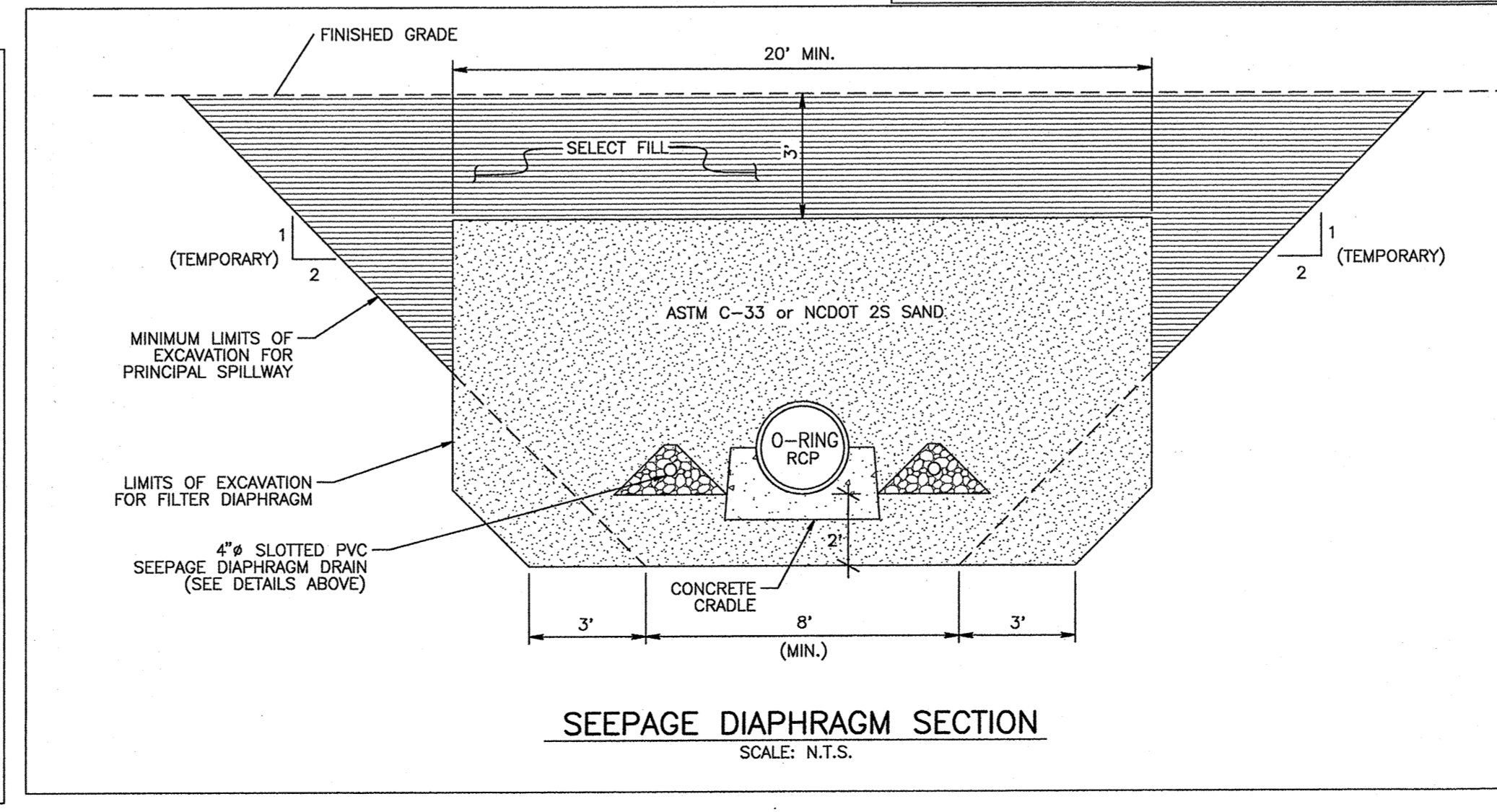
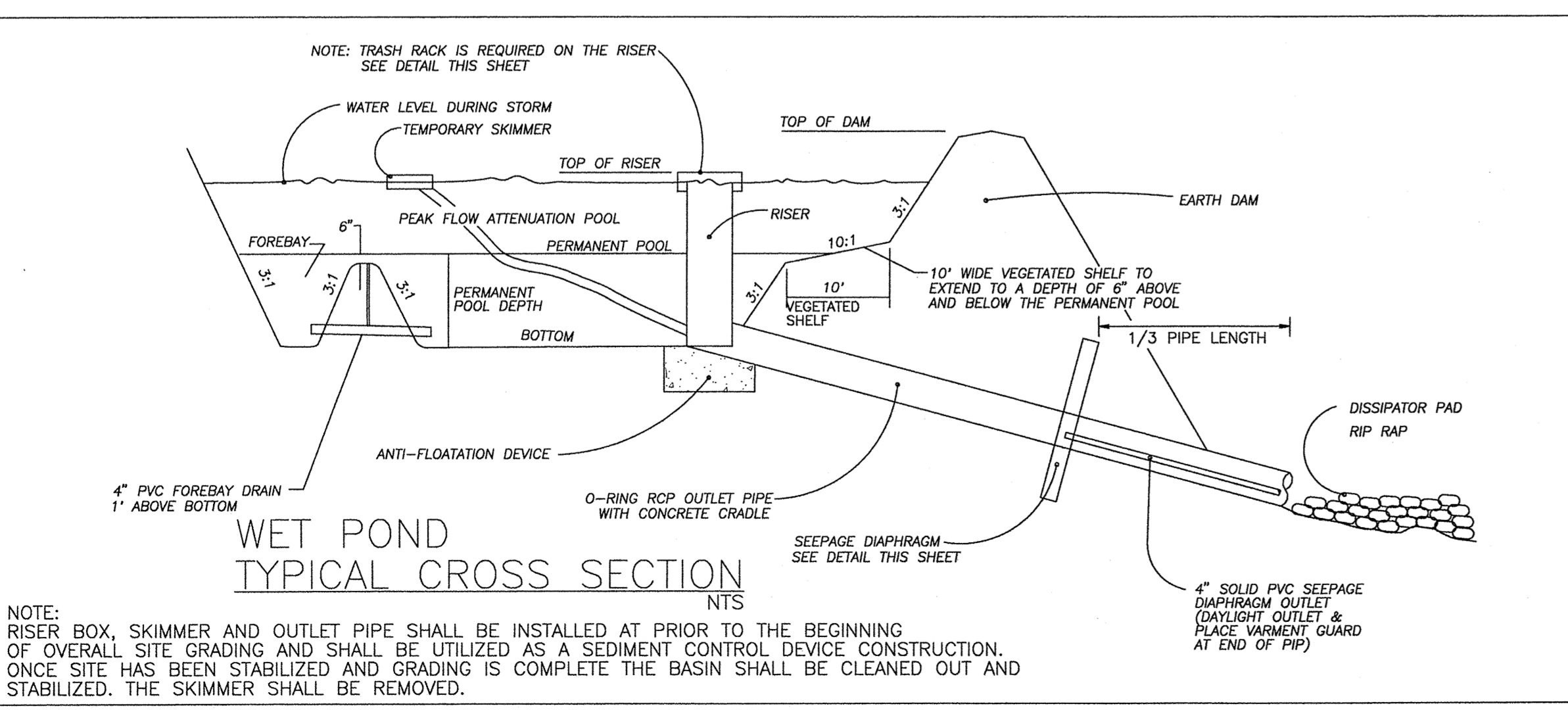
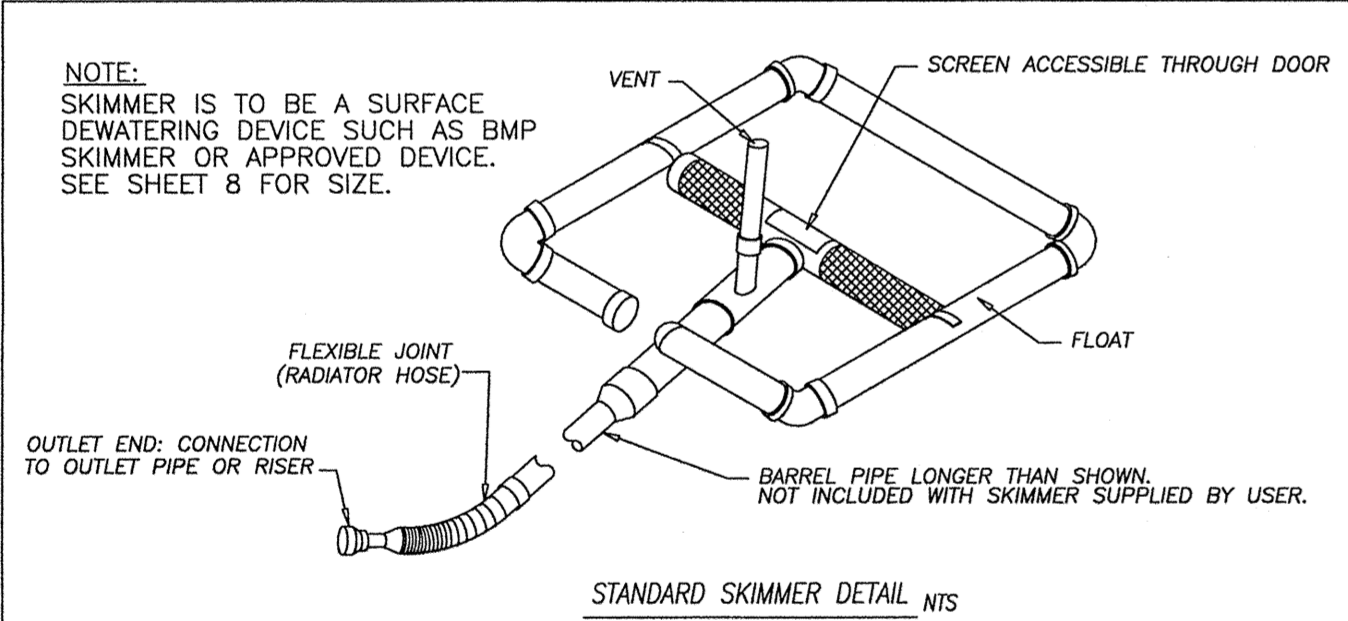
**BMP #2 - WET POND**

ITEM	DESCRIPTION	QUANTITY	UNIT
1	TOP OF DAM WIDTH	10'	
2	TOP OF RISER	5'x5' ID	
3	NORMAL POOL	31,766 SF	
4	NORMAL POOL ORIFICE	3.5" ORIFICE	
5	BOTTOM DRAIN	6"	
6	ANTI-FLOATATION DEVICE	8'x8'x3'	
7	OUTLET PIPE INVERT IN	5.4 LF OF 42" O-RING CLASS III RCP @ 0.93%	
8	OUTLET PIPE INVERT OUT		

**CLAY LINER SPECIFICATIONS**

THE CLAY LINER FOR THE WET POND SHALL BE AT LEAST 12" THICK AND MEET THE FOLLOWING SPECIFICATIONS:

- UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION OF CL, CH, ML, SC
- MINIMUM OF 40% PASSING #200 SIEVE
- MINIMUM PLASTICITY INDEX OF 12
- MAXIMUM INFILTRATION RATE OF 0.01 IN/HR
- A MINIMUM OF 2 TESTS OF EACH ABOVE PARAMETER SHALL BE COMPLETED BY THE CONTRACTOR ON THE LINER MATERIAL AND PRESENTED TO THE ENGINEER FOR APPROVAL
- A MINIMUM OF 8 INCHES OF TOPSOIL SHALL BE THE FINISHED GRADE AS SHOWN ON THE DRAWINGS AND/OR DETAILS. CARE SHALL BE TAKEN WHEN TRACKING IN THE TOPSOIL TO NOT PUNCTURE OR DAMAGE THE CLAY. A CLAY/SOIL MIXTURE MAY BE USED IF THE ABOVE SPECIFICATIONS ARE SATISFIED AND WITH WRITTEN APPROVAL BY THE ENGINEER.



**PLANT LIST - BMP #2**

PLANT TYPE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	NOTES
<b>BMP SHALLOW LAND (NORMAL POOL TO 6" ABOVE) = 3,991 SF 50 HERB. PLANTS / 200 SF (3,991 SF) = 998</b>						
HERBACEOUS	200	<i>Asclepias incarnata</i>	Swamp Milkweed	CONT.	4" POT	24" O.C.
HERBACEOUS	200	<i>Chelone glabra</i>	White Turtlehead	CONT.	4" POT	24" O.C.
HERBACEOUS	200	<i>Eupatoriadelphus fistulosus</i>	Joe-Pye weed	CONT.	4" POT	24" O.C.
HERBACEOUS	199	<i>Kosteletzkya virginica</i>	Seashore Mallow	CONT.	4" POT	24" O.C.
HERBACEOUS	199	<i>Lobelia cardinalis</i>	Cardinal Flower	CONT.	4" POT	24" O.C.
<b>BMP SHALLOW WATER (NORMAL POOL TO 6" BELOW) = 4,841 SF 50 HERB. PLANTS / 200 SF (4,841 SF) = 1,211</b>						
HERBACEOUS	242	<i>Iris virginica</i>	Blue Flag Iris	CONT.	4" POT	24" O.C.
HERBACEOUS	242	<i>Juncus effusus</i>	Soft Rush	CONT.	4" POT	24" O.C.
HERBACEOUS	242	<i>Pontederia cordata</i>	Pickersweed	CONT.	4" POT	24" O.C.
HERBACEOUS	242	<i>Saururus cernuus</i>	Lizard's tail	CONT.	4" POT	24" O.C.
HERBACEOUS	243	<i>Schoenoplectus tabernaemontani</i>	Soft Stem Bulrush	CONT.	4" POT	24" O.C.

-A MINIMUM OF THREE (3) DIVERSE SPECIES MUST BE USED FOR EACH PLANTING ZONE.  
 -TOPSOIL SHALL BE USED OVER THE CLAY LINER AS NECESSARY TO PROMOTE AND MAINTAIN VEGETATION ESPECIALLY ALONG THE VEGETATED SHELF FOR THE ABOVE PLANTINGS.  
 -PROFESSIONAL CERTIFICATION OF PLANTING WILL BE REQUIRED.

**BMP #2 OUTFLOW SUMMARY**

VELOCITY DISSIPATOR DESIGN	OUTLET #	PIPE DIA. (INCHES)	DISCHARGE LENGTH (FEET)	OUTLET WIDTH (FEET)	DISTANCE BETWEEN DISSIPATORS (FEET)	RIP RAP THICKNESS (INCHES)	RIP RAP CLASS (NCDOT)
BMP #2	42	53.25	22	10.5	25.5	22	1

STORM EVENT	FLOW (CFS)	ELEV. (FT)
1-YEAR	1.09	327.27
10-YEAR	53.25	328.14
100-YEAR	111.98	329.22

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.

DATE: 4/15/2014  
 DATE: 4/16/14

Professional Engineer Seal for Jennifer C. Withers, License No. 31982, State of North Carolina. Date: 4/2/14.

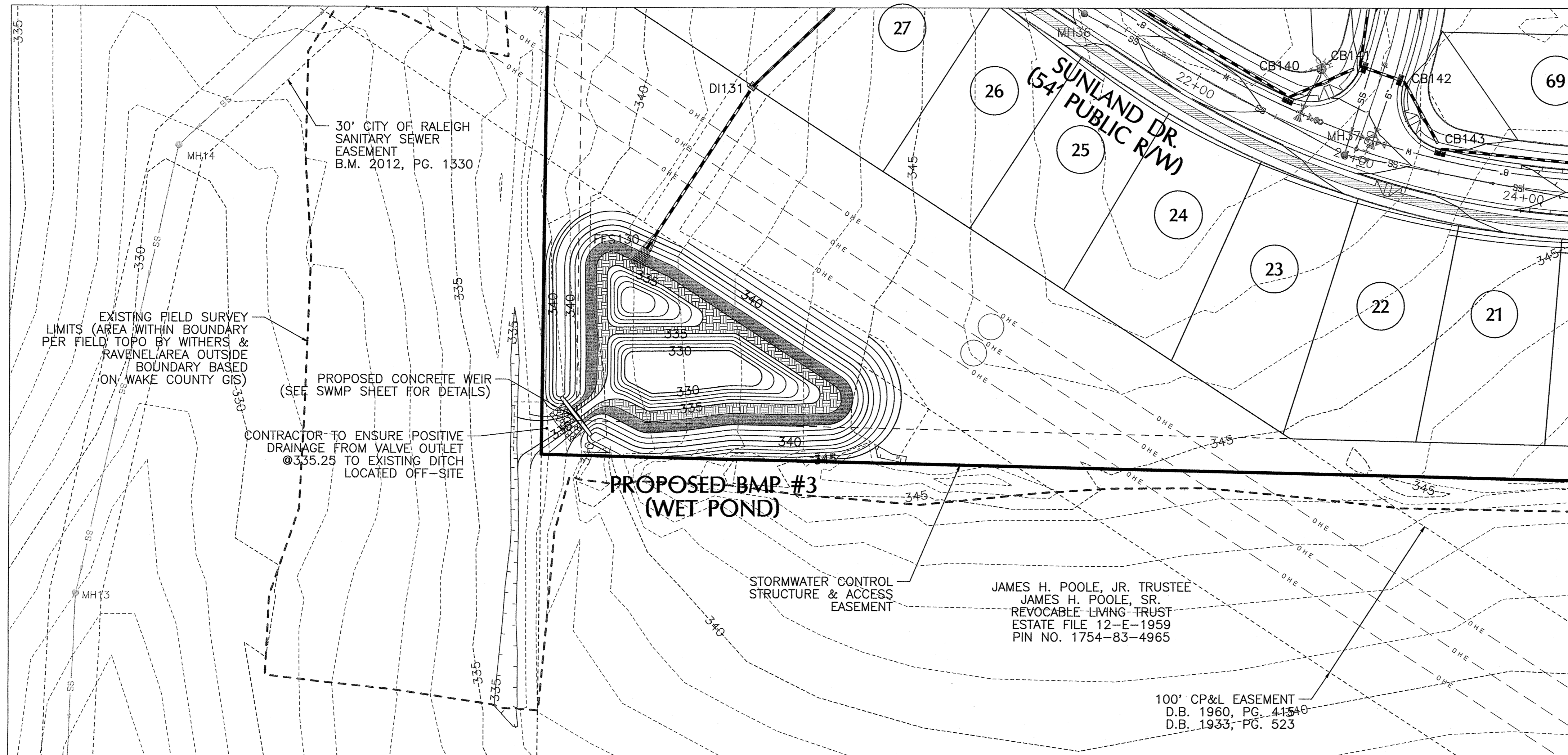
No.	Revision	Date	By	Designer	Scale	SEE SHEET
1	RESPONSE TO 1ST REVIEW COMMENTS	11/27/13	JCI	WAR		
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI			
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI			01/29/14
4	WAKE COUNTY EC COMMENTS & BMP #1 & #2 REVISIONS	04/02/14	JCI			00902513

**KNIGHTDALE STATION PHASE R1 & R2**  
 WAKE COUNTY  
 NORTH CAROLINA

**STORMWATER MANAGEMENT PLAN - BMP #2**

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Sheet No. **29** of **38**

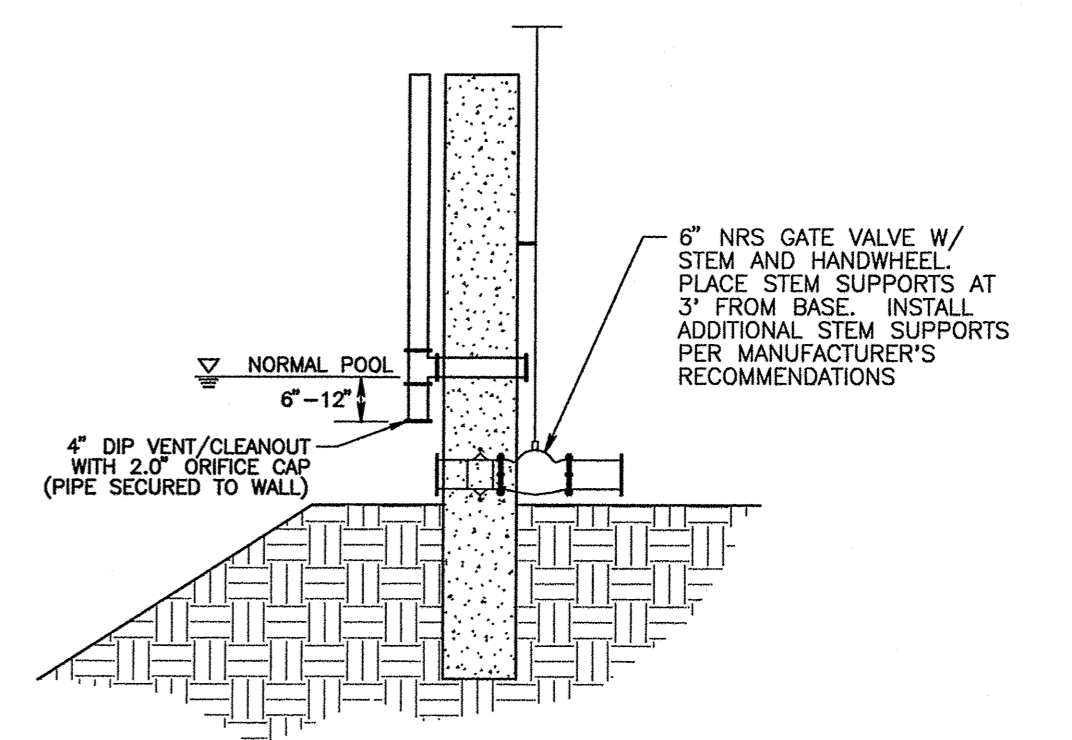


**CLAY LINER SPECIFICATIONS**

THE CLAY LINER FOR THE WET POND SHALL BE AT LEAST 12" THICK AND MEET THE FOLLOWING SPECIFICATIONS:

- UNIFIED SOIL CLASSIFICATION SYSTEM DESIGNATION OF CL, CH, ML, SC
- MINIMUM OF 40% PASSING #200 SIEVE
- MINIMUM PLASTICITY INDEX OF 12
- MAXIMUM INFILTRATION RATE OF 0.01 IN/HR
- A MINIMUM OF 2 TESTS OF EACH ABOVE PARAMETER SHALL BE COMPLETED BY THE CONTRACTOR ON THE LINER MATERIAL AND PRESENTED TO THE ENGINEER FOR APPROVAL
- COMPACTION TO A MINIMUM OF 93% PER ASTM D698, AND WITHIN 3% OF THE OPTIMUM MOISTURE CONTENT (1 COMPACTION DENSITY TEST PER 2500 SQ. FT.)

THE CLAY LINER SHALL BE PLACED UNDER THE BOTTOM OF THE BMP PERMANENT POOL TO A THICKNESS OF 12 INCHES. A MINIMUM OF 8 INCHES OF TOPSOIL SHALL BE THE FINISHED GRADE AS SHOWN ON THE DRAWINGS AND/OR DETAILS. CARE SHALL BE TAKEN WHEN TRACKING IN THE TOPSOIL TO NOT PUNCTURE OR DAMAGE THE CLAY. A CLAY/SOIL MIXTURE MAY BE USED IF THE ABOVE SPECIFICATIONS ARE SATISFIED AND WITH WRITTEN APPROVAL BY THE ENGINEER.



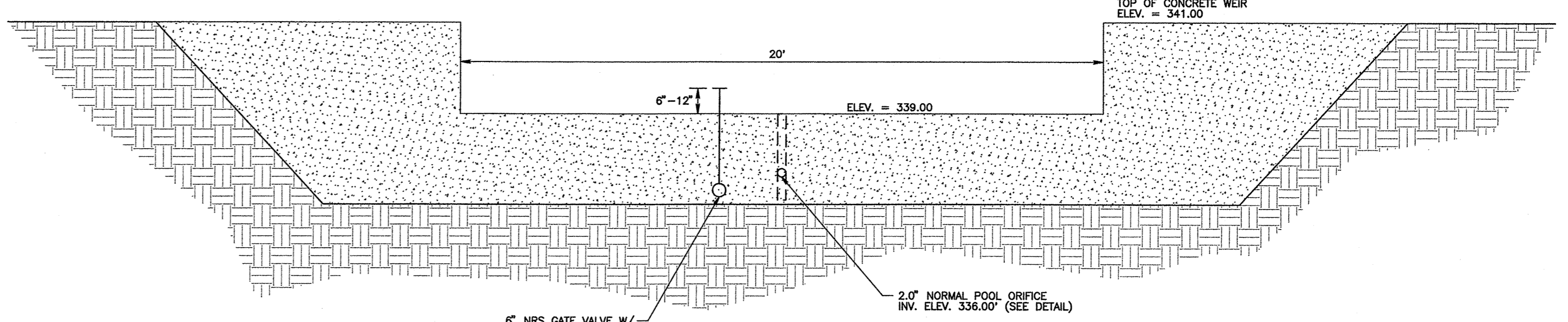
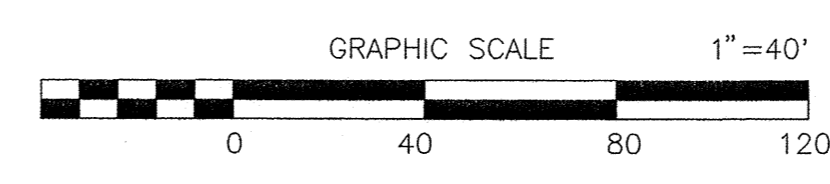
TYPICAL WEIR OUTLET NORMAL POOL ORIFICE

**BMP #3 - WET POND**

**PLANT LIST - BMP #3**

PLANT TYPE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	NOTES
<b>BMP SHALLOW LAND (NORMAL POOL TO 6" ABOVE) = 2,692 SF</b>						
50 HERB. PLANTS / 200 SF (2,692 SF) = 673						
HERBACEOUS	150	Asclepias incarnata	Swamp Milkweed	CONT.	4" POT 24" O.C.	
	150	Chelone glabra	White Turtlehead	CONT.	4" POT 24" O.C.	
	125	Eupatoriadelphus fistulosus	Joe-Pye weed	CONT.	4" POT 24" O.C.	
	128	Kosteletzkya virginica	Seashore Mallow	CONT.	4" POT 24" O.C.	
	120	Lobelia cardinalis	Cardinal Flower	CONT.	4" POT 24" O.C.	
<b>BMP SHALLOW WATER (NORMAL POOL TO 6" BELOW) = 2,711 SF</b>						
50 HERB. PLANTS / 200 SF (2,711 SF) = 678						
HERBACEOUS	150	Iris virginica	Blue Flag Iris	CONT.	4" POT 24" O.C.	
	150	Juncus effusus	Soft Rush	CONT.	4" POT 24" O.C.	
	113	Pontearia cordata	Pickeralweed	CONT.	4" POT 24" O.C.	
	115	Saururus cernuus	Lizard's tail	CONT.	4" POT 24" O.C.	
	150	Schoenoplectus tabernaemontani	Soft Stem Bulrush	CONT.	4" POT 24" O.C.	

-A MINIMUM OF THREE (3) DIVERSE SPECIES MUST BE USED FOR EACH PLANTING ZONE.  
 -TOPSOIL SHALL BE USED OVER THE CLAY LINER AS NECESSARY TO PROMOTE AND MAINTAIN VEGETATION ESPECIALLY ALONG THE VEGETATED SHELF FOR THE ABOVE PLANTINGS.  
 -PROFESSIONAL CERTIFICATION OF PLANTING WILL BE REQUIRED.



NOTE: CONCRETE WEIR TO BE DESIGNED BY STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.

**CONCRETE WEIR STRUCTURE OUTLET**

**BMP #3**  
 2.0" NORMAL POOL ORIFICE @ ELEV. 336.00' (SEE DETAIL.)  
 NORMAL POOL SURFACE AREA = 8,433 SF  
 5' WIDE TOP OF DAM @ ELEV. 341.00'

**BMP #3 OUTFLOW SUMMARY**

STORM EVENT	FLOW (CFS)	ELEV. (FT)
1-YEAR	0.16	338.38
10-YEAR	15.24	339.34
100-YEAR	58.40	339.95

VELOCITY DISSIPATOR DESIGN

OUTLET #	PIPE DIA (INCHES)	DISCHARGE (CFS)	LENGTH (FT)	OUTLET WIDTH (FT)	D.STREAM WIDTH (FT)	RIP RAP THICKNESS (INCHES)	RIP RAP CLASS
BMP #3	N/A	15.24	10'	20'	20'	22"	31982

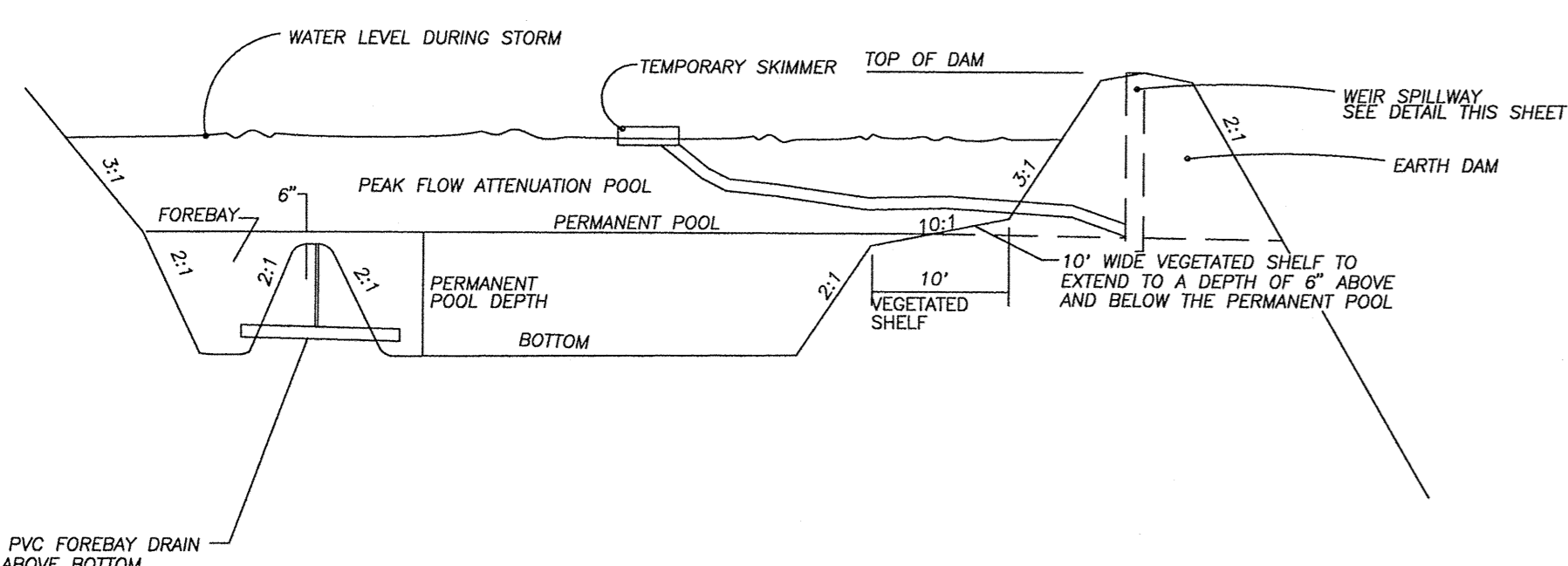
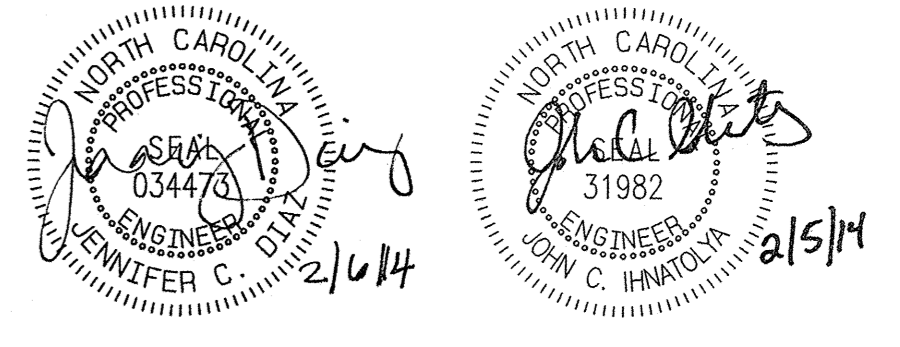
NOTE: ALL DISSIPATORS SHALL HAVE FILTER FABRIC UNDERLINERS. INSTALL RIP RAP PADS AT LEVEL GRADE.

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: 2/5/2014  
 TOWN ENGINEER

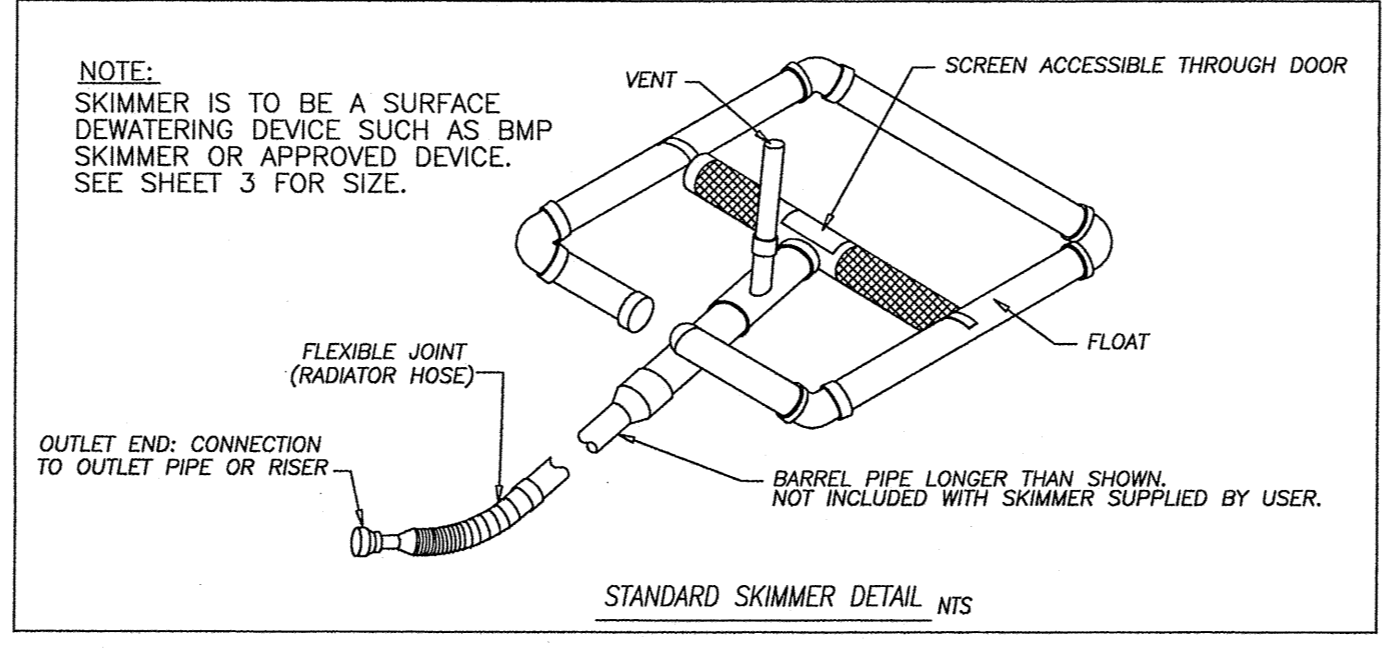
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 4/10/14  
 ADMINISTRATOR



**WET POND TYPICAL CROSS SECTION**

NOTE: WEIR AND SKIMMER SHALL BE INSTALLED AT PRIOR TO THE BEGINNING OF OVERALL SITE GRADING AND SHALL BE UTILIZED AS A SEDIMENT CONTROL DEVICE CONSTRUCTION. ONCE SITE HAS BEEN STABILIZED AND GRADING IS COMPLETE THE BASIN SHALL BE CLEANED OUT AND STABILIZED. THE SKIMMER SHALL BE REMOVED.



No.	Revision	Date	By	Designer	W&R	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI			SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI			

Drawn By: JCI Date: 01/29/14  
 Checked By: JCI Job No: 020902513

**KNIGHTDALE STATION  
 PHASE R1 & R2**

TOWN OF KNIGHTDALE  
 WAKE COUNTY  
 NORTH CAROLINA

**STORMWATER MANAGEMENT PLAN - BMP #3**

**WITHERS & RAVENEL**  
 ENGINEERS | PLANNERS | SURVEYORS  
 115 MacKean Drive Cary, North Carolina 27511 tel: 919-469-3340 www.wITHERSRAVENEL.COM License No. C-0832

KNIGHTDALE STATION MASTER PLANT SCHEDULE										02.05.14
PLANT TYPE	QTY	KEY	BOTANICAL NAME	COMMON NAME	ROOT	SIZE	HEIGHT	NOTES		
CANOPY STREET TREES	43	ASL	Acer saccharum 'Legacy'	Sugar Maple	B&B	2"	8' min.	MATCHED; 40' O.C.		
	43	GBA	Ginkgo biloba 'Autumn Gold'	Autumn Gold Ginkgo	B&B	2"	8' min.	MATCHED; 40' O.C.		
	75	PCH	Pistacia chinensis	Chinese Pistache	B&B	2"	8' min.	MATCHED; 40' O.C.		
	125	QUA	Quercus acutissima	Sawtooth Oak	B&B	2"	8' min.	MATCHED; 40' O.C.		
	105	UPB	Ulmus Parvifolia 'UPMTF'	Bosque Elm	B&B	2"	8' min.	MATCHED; 40' O.C.		
UNDERSTORY TREES	43	ZSM	Zelkova serrata 'ZSFKF'	Myrtar Zelkova	B&B	2"	8' min.	MATCHED; 40' O.C.		
	24	LIM	Lagerstromia indica 'Muskogee'	Muskogee Crape Myrtle	B&B		8' min.	MATCHED		
SHRUBS & GROUND COVER	16	PSO	Prunus serrulata 'Okame'	Okame Cherry	B&B		6' min.	MATCHED		
	48	ARC	Abelia x grandiflora 'Confetti'	Confetti Glossy Abelia	CONT.	3 Gal.	18" min.	36" O.C.		
	75	JHH	Juniperus horizontalis 'Hedges'	Good Vibrations Juniper	CONT.	3 Gal.	38" min.	48" O.C.		
	39	LCC	Loropetalum chinense 'Crimson Fire'	Crimson Fire Chinese Witchhazel	CONT.	3 Gal.	18" min.	36" O.C.		
	80	PAH	Pennisetum alopecuroides 'Hamel'	Hamel Fountain Grass	CONT.	1 Gal.	18" min.	24" O.C.		

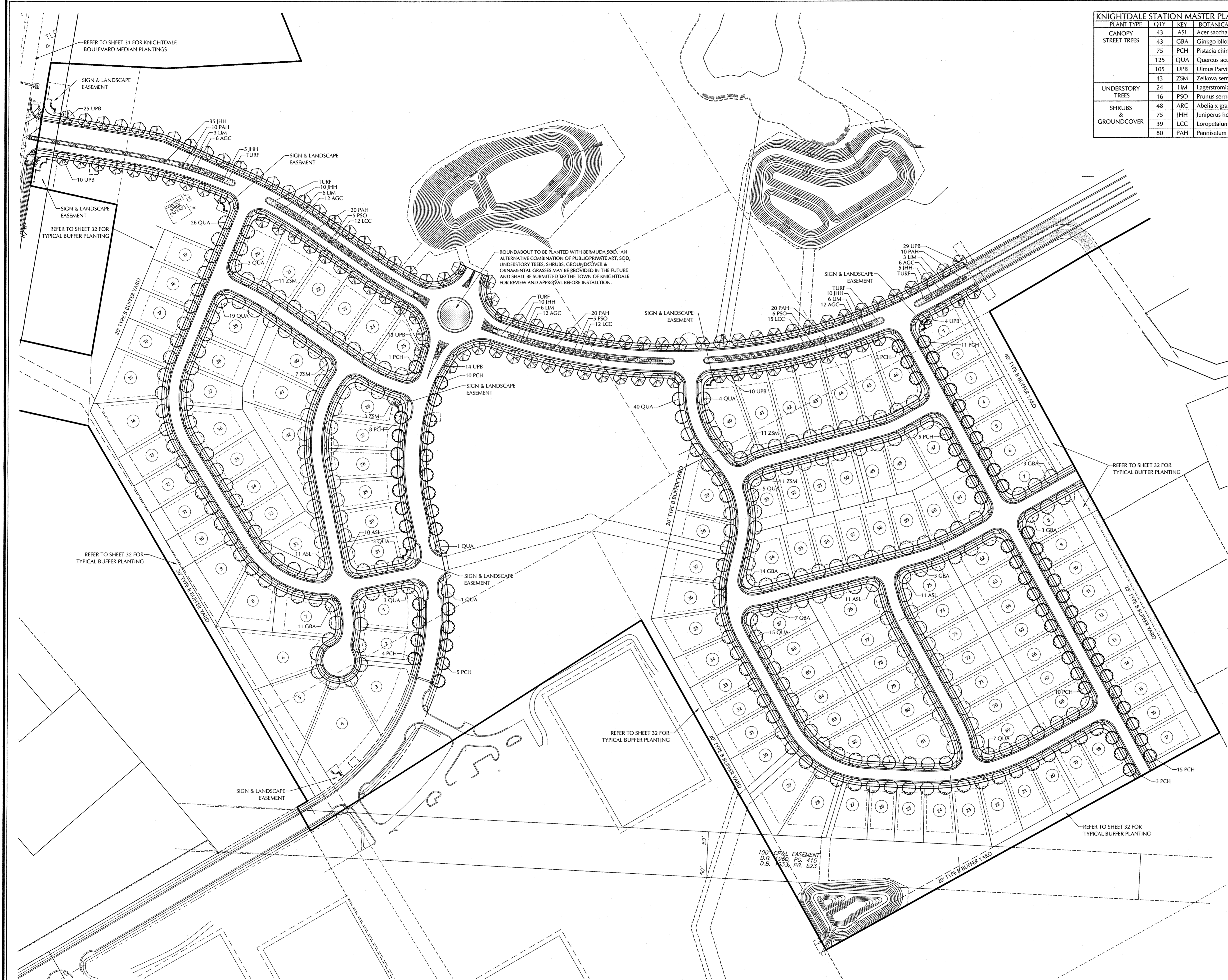
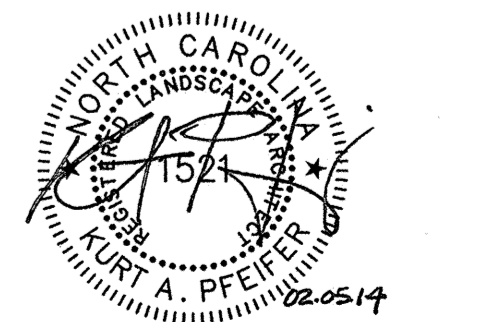
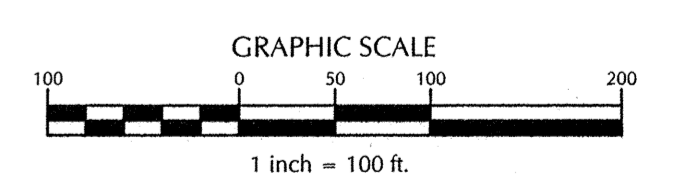
- GENERAL LANDSCAPE NOTES**
- TREE PROTECTION FENCE SHALL SURROUND ALL EXISTING PLANTINGS AND EXISTING BUFFER AREAS WHERE APPLICABLE AND SHALL BE MAINTAINED UNTIL ALL SITE WORK IS COMPLETE. THE FENCE SHALL BE REMOVED PRIOR TO THE FINAL SITE INSPECTION FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY.
  - WHERE EXISTING OR PROPOSED VEGETATION FAILS TO FUNCTION ADEQUATELY AS REQUIRED, THE TOWN OF KNIGHTDALE SITE INSPECTOR RESERVES THE RIGHT TO REQUIRE SUPPLEMENTAL PLANTINGS IN ADDITION TO THOSE SHOWN ON THE LANDSCAPE PLAN BASED ON ACTUAL FIELD CONDITIONS.
  - NO CHANGES TO ANY ASPECT OF THIS SITE PLAN, INCLUDING BUT NOT LIMITED TO LANDSCAPING, GRADING, BUILDING ELEVATIONS (ESPECIALLY COLOR), LIGHTING, OR UTILITIES WILL BE MADE WITHOUT THE APPROVAL OF THE TECHNICAL REVIEW COMMITTEE OF THE TOWN OF KNIGHTDALE.
  - ALL EXTERIOR SITE LIGHTING WILL BE DESIGNED TO PREVENT OFF-SITE GLARE.
  - THE SITE SHALL BE STABILIZED AND SEEDED PRIOR TO THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY (CO).
  - ALL ABOVE GROUND UTILITY EQUIPMENT (AND FACILITIES ASSOCIATED WITH ON-SITE ELECTRIC, TELEPHONE, GAS, CABLE, OR OTHER SIMILAR UTILITY) AND ENCLOSED TRASH CONTAINMENT SHALL BE SCREENED BY THE ELEMENTS OF A TYPE B (SEMI-OPAQUE) BUFFER YARD TO A SIX (6) FEET IN HEIGHT OR THE HEIGHT OF THE UTILITY OR ENCLOSURE, WHICHEVER IS LESS.
  - ALL RIP RAP PADS, DETENTION PONDS, AND OTHER STORMWATER RELATED DEVICES SHALL BE SCREENED WITH EVERGREEN PLANTINGS TO REDUCE VISUAL IMPACT FROM OFF-SITE.
  - NO TREE SHALL BE LOCATED WITHIN TEN FEET OF A LIGHT POLE OR 12 FEET FROM ELECTRICAL TRANSFORMERS.
  - THIS PLAN IS FOR PLANTING PURPOSES ONLY. FOR INFORMATION REGARDING ROAD WORK GEOMETRY, GRADING, WALLS, UTILITIES, ETC., REFER TO THE CIVIL DRAWINGS.
  - ALL PLANTS AND PLANTING PROCEDURES SHALL MEET OR EXCEED A.N.L.A. STANDARDS AS SET FORTH IN "AMERICAN STANDARD FOR NURSERY STOCK", 2004 OR LATER EDITION.
  - ALL TREES AND SHRUBS SHALL BE FULL, WELL-BRANCHED PLANTS WHICH ARE CHARACTERISTIC TO THE SPECIES.
  - ALL CANOPY TREES TO BE A MINIMUM OF 2" CALIPER AND 8' HEIGHT, ALL UNDERSTORY TREES 1 1/2" CALIPER, 6' HEIGHT AND SHRUBS 18", 3 GAL. CONTAINER AT TIME OF INSTALLATION.
  - NO FENCING SHALL BE PLACED WITHIN BUFFER AREAS UNLESS INSTALLED AT ONE TIME FOR THE ENTIRE LENGTH OF THE BUFFER OR STREETScape. NEITHER INDIVIDUAL LOT OWNERS NOR THE H.O.A. SHALL INSTALL FENCES IN A PIECEMEAL FASHION. PRIOR TO PLACING A FENCE IN A BUFFER OR STREETScape, THE FENCE SHALL BE SUBMITTED TO AND APPROVED BY THE TOWN OF KNIGHTDALE.
  - PLANT MATERIAL LOCATED WITHIN A REQUIRED SIGHT DISTANCE MAINTENANCE EASEMENT SHALL BE MAINTAINED AT A HEIGHT LESS THAN 24 INCHES OR LIMBED UP TO A MINIMUM HEIGHT OF SIX FEET.
  - ALL PLANT BEDS TO BE MULCHED WITH A MINIMUM OF 3" OF CLEAN PINE STRAW OR SHREDED HARDWOOD BARK AT THE DIRECTION OF THE DEVELOPER. ALL PLANT GROUPINGS SHALL BE MULCHED AS ONE BED.
  - RESIDENTIAL LANDSCAPING:
    - EACH SINGLE-FAMILY OR DUPLEX LOT SHALL CONTAIN A MINIMUM OF ONE (1) CANOPY TREE FOR EACH TWO THOUSAND (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 LOT AREA. THE LOCATION OF PLANTING TO ACCOUNT FOR PHYSICAL CONDITIONS MAY BE ADJUSTED BY THE ADMINISTRATOR.
    - THE USE OF EXISTING TREES MEETING THE FOLLOWING STANDARDS TO SATISFY THIS REQUIREMENT IS ENCOURAGED. EXISTING LARGE SHADE TREES OVER SIX (6) INCHES IN CALIPER AS MEASURED AT DBH (DIAMETER BREST HEIGHT) MAY BE COUNTED TOWARDS FULFILLING THIS REQUIREMENT.
    - REQUIRED STREET TREES MAY NOT BE COUNTED TOWARDS THE FULFILLMENT OF THIS RESIDENTIAL LANDSCAPING REQUIREMENT. APART FROM REQUIRED STREET TREES, ALL OTHER TREES REQUIRED UNDER THIS CHAPTER SHALL BE PLANTED WITHIN THE PRIVATE LOT.
  - 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 16.88 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.

a. 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: 4/15/2014  
Town Engineer

These plans are approved by the Town of Knightdale and serve as construction plans for this project.

By: *[Signature]* Date: 4.16.14  
Administrator



K:\09\09-0250\020251\_3-Meyers-Lake-Knightdale\_Plan-Set-1 & 2\020251\_LANDSCAPE\_PLAN.dwg - Thursday, February 06, 2014 11:28:39 AM - PFEIFFER, KURT

No.	Revision	Date	By
1	RESPONSE TO 1st REVIEW COMMENTS	11/22/13	KAP
2	RESPONSE TO 2nd REVIEW COMMENTS	02/05/14	KAP

Designer	W&R	Scale	1" = 100'
Drawn By	GAL	Date	07/08/2013
Checked By	KAP	Job No.	02090251.0

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE      WAKE COUNTY      NORTH CAROLINA

**OVERALL LANDSCAPE PLAN**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

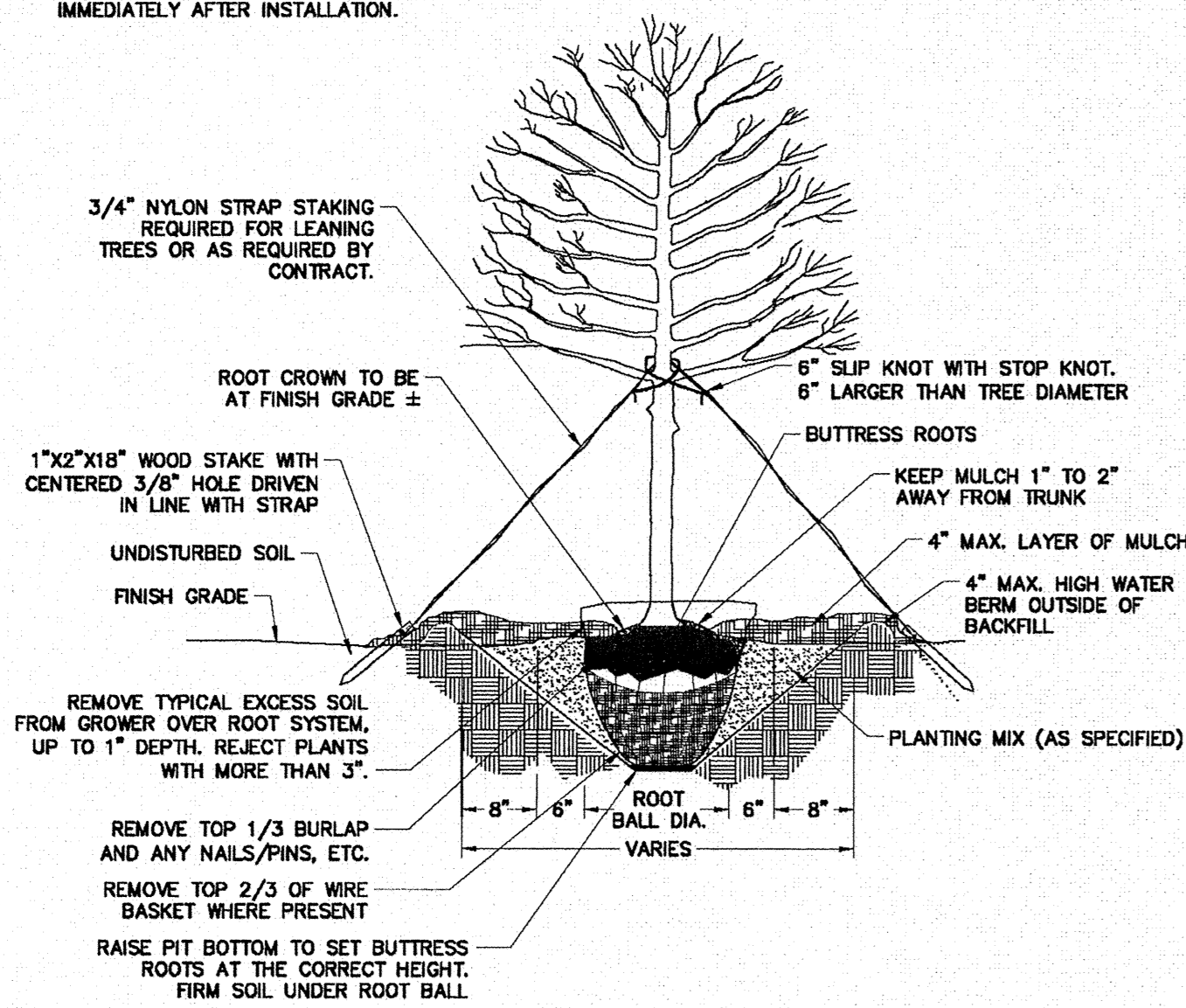
115 MacKenan Drive Cary, North Carolina 27511    tel: 919-469-3340    www.wITHERSRAVENEL.com    License No. C-0832

Sheet No.  
**31 of 38**





- NOTES:**
1. REMOVE WIRE OR NYLON TWINE FROM BALL.
  2. SOAK ROOT BALL AND PLANT PIT IMMEDIATELY AFTER INSTALLATION.

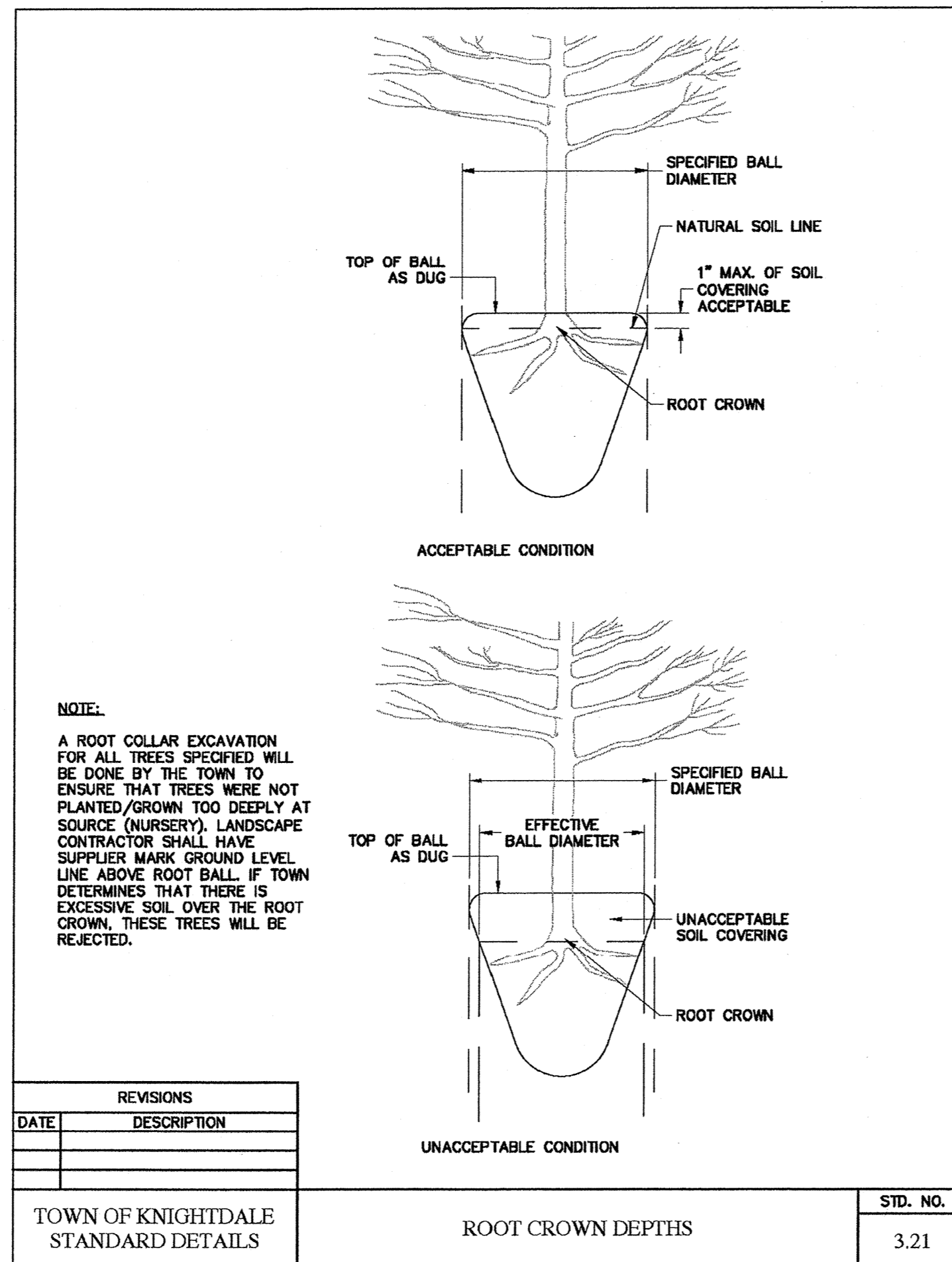


ALL TREES SHALL MEET AMERICAN STANDARD FOR NURSERY STOCK (AMSI, 1990, PART 1, "SHADE AND FLOWERING TREES")

FOR EXAMPLE: CALIPER	HEIGHT (RANGE)	MAX. HEIGHT	MIN. ROOT BALL DIA.	MIN. ROOT BALL DEPTH
2"	12-14'	16'	24"	16"
3"	14-16'	18'	32"	21"

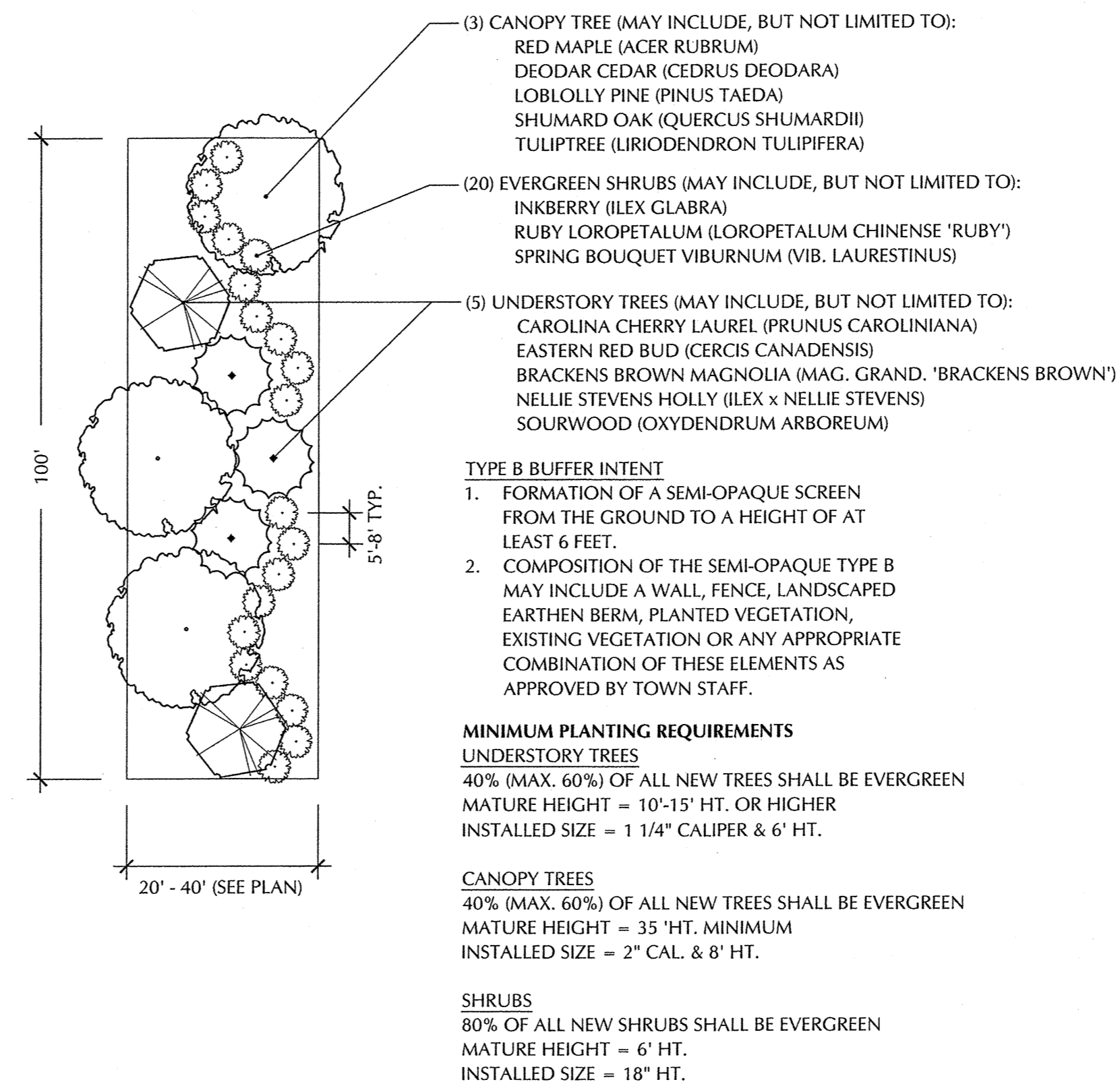
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	TREE PLANTING (FOR SINGLE AND MULTI-STEM TREES)	STD. NO. 3.25
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DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	ROOT CROWN DEPTHS	STD. NO. 3.21
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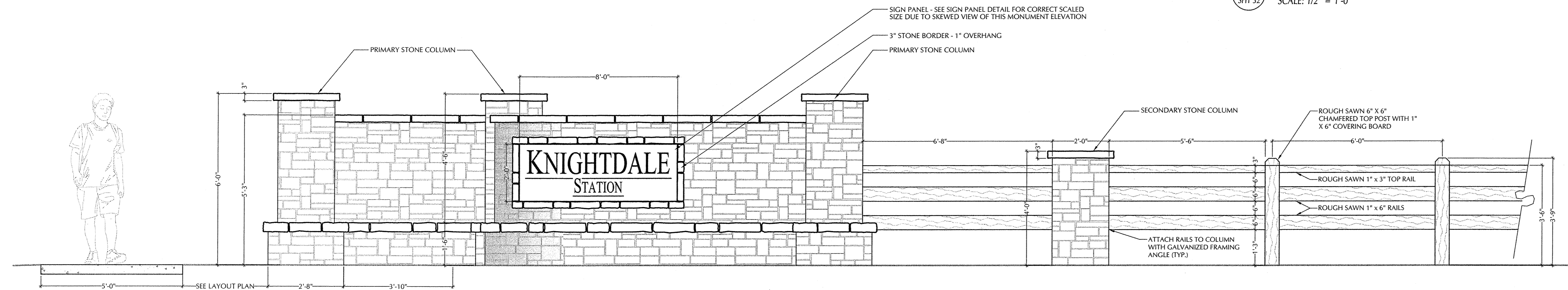


TYPE B SEMI-OPAQUE BUFFER DETAIL  
NOT TO SCALE

- LANDSCAPE MAINTENANCE**
- THE OWNERS OF THE PROPERTY AND THEIR AGENTS, HEIRS OR ASSIGNS SHALL BE RESPONSIBLE FOR THE INSTALLATION, PRESERVATION AND MAINTENANCE OF ALL PLANTINGS AND PHYSICAL FEATURES SHOWN ON THIS PLAN. THE OWNERS SHALL BE RESPONSIBLE FOR ANNUAL MAINTENANCE OF THE VEGETATION TO INCLUDE BUT NOT BE LIMITED TO:
- LAWN AREA**
1. THE LAWN AREA WILL BE MOWED AS NEEDED TO PROVIDE A NEAT AND UNIFORMLY FINISHED LAWN.
  2. FOR AREAS INACCESSIBLE TO MOWERS, A STRING TRIMMER WILL BE USED TO CUT GRASS TO SAME HEIGHT AS MOWER.
  3. CURB, SIDEWALK, AND BED EDGES WILL BE MECHANICALLY EDGED AS NEEDED TO PROVIDE A NEAT AND UNIFORM APPEARANCE.
  4. ALL DEBRIS WILL BE REMOVED FROM TURF PRIOR TO MOWING AND FROM TURF AND PAVEMENT AREAS FOLLOWING EDGING.
  5. THE ENTIRE LAWN WILL BE CORE AERIFIED IN THE FALL.
  6. SEEDING AND FERTILIZATION WILL BE PERFORMED IN CONJUNCTION WITH AERIFICATION.
  7. THE LAWN AREA WILL BE OVERSEED WITH A HYBRID FESCUE BLEND (IF DEVELOPER CHOOSES A FESCUE VARIETY TURF DURING INITIAL INSTALLATION) AT A RATE OF 75 POUNDS PER ACRE.
  8. THE TURF WILL BE FERTILIZED THREE TIMES DURING THE YEAR (MARCH, SEPTEMBER, AND NOVEMBER). A SLOW RELEASE NITROGEN PRODUCT WILL BE USED AT A RATE OF 1-2 POUNDS OF NITROGEN PER 100 SQUARE FEET.
  9. A PRE-EMERGENT CRABGRASS CONTROL WILL BE APPLIED TO THE LAWN WHEN SOIL TEMPERATURES REACH 48 DEGREES.
- PLANT BEDS AND SMALL ORNAMENTAL TREES**
1. ALL PLANT BEDS WILL BE SPRAYED AND WEEDED BY HAND TO MAINTAIN THEM FREE OF WEEDS AT ALL TIMES.
  2. TREE AND SHRUB FERTILIZERS SHALL ONLY BE APPLIED AS RECOMMENDED BY A SOIL SAMPLE ANALYSIS.
  3. PRUNE ONLY DEAD, DAMAGED AND/OR BROKEN BRANCHES AT INSTALLATION. PRUNING AFTER THE FIRST YEAR SHALL FOLLOW ANSI A-300 STANDARDS.
  4. MULCH SHALL BE APPLIED TO A DEPTH OF 2"-3" AND SHALL NOT BE PLACED WITHIN 3" FROM ANY TREE OR SHRUB ROOT CROWN. MULCH TYPES TO BE SELECTED BY OWNER, HOWEVER SHREDDED BARK OR HARDWOOD MULCH SHALL BE USED AGAINST ALL BUILDING FOUNDATIONS. ALL PLANT BEDS AND TREE SAUCERS SHALL BE REFRESHED WITH NEW MULCH ANNUALLY.
  5. FORMAL HEDGES WILL BE TRIMMED TO AN INVERT 'V' SHAPE TO ENCOURAGE LOW LIMB STRUCTURE AND DENSE GROWTH.
  6. PRE-EMERGENT WEED CONTROL SHALL BE APPLIED (IF NECESSARY) IN FEBRUARY. CHEMICALS FOR INSECT & DISEASE MAY BE APPLIED FOR SPECIFIC PROBLEMS ONLY.
- LEAVES AND NATURAL AREAS**
1. ALL LEAVES WILL BE REMOVED FROM THE LAWN AREAS WEEKLY AND FOUR TIMES A YEAR FROM THE PLANT BEDS.
  2. NATURAL AREAS WILL BE MAINTAINED FREE OF BRUSH AND WEEDS WITHIN THE FIRST 10 FEET OF ANY NATURAL AREA.

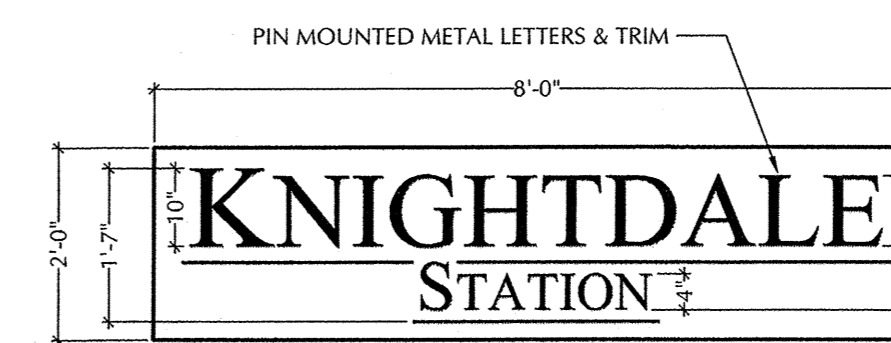
**NOTES:**

1. THE ENTRANCE MONUMENT SHOWN BELOW IS A CONCEPTUAL EXAMPLE OF THE TYPE OF MONUMENT THAT COULD BE PROPOSED FOR THE PROJECT ENTRANCES. SPECIFIC LAYOUT, SIZE, MATERIALS, COLORS, ETC. IS SUBJECT TO CHANGE AND THE FINAL DESIGN SHALL BE APPROVED UNDER A SEPARATE PROCESS.
2. THIS DETAIL REPRESENTS THE AN EXAMPLE OF THE COMPLETE MONUMENT DESIGN FOR THE KNIGHTDALE BOULEVARD ENTRANCE. INTERIOR SUBDIVISION ENTRANCES, AT A MINIMUM, WOULD BE COMPRISED OF THE MAIN MONUMENT WITH SIGN ONLY. WOOD FENCING AND ADDITIONAL COLUMNS SHALL BE OPTIONAL BASED ON LOCATION AND FIELD CONDITIONS AT THE DISCRETION OF THE DEVELOPER.



1 CONCEPTUAL ENTRANCE MONUMENT ELEVATION  
SHT 32 SCALE: 1/2" = 1'-0"

2 SIGN PANEL DETAIL  
SHT 32 SCALE: 1/2" = 1'-0"



SIGN COPY AREA - 16 SQ. FT. (8'-0" x 2'-0")  
TEXT SHALL BE PIN MOUNTED LETTERS ON SQUARE CUT STONE BACKGROUND (NOTE: FONT AND SUBDIVISION IDENTIFICATION MAY VARY PER ENTRANCE)

CONTRACTOR TO SUBMIT SHOP DRAWING FROM SIGN MAKER TO OWNER AND LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL

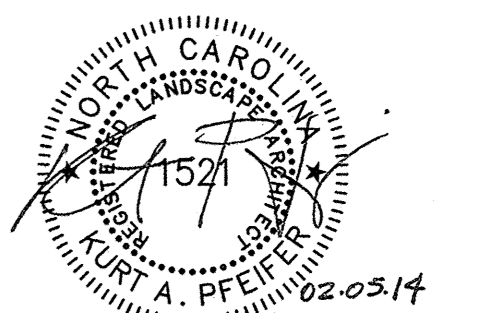
**SIGNAGE HAS NOT BEEN APPROVED**

a. **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: 4/15/2014  
Town Engineer

These plans are approved by the Town of Knightdale and serve as construction plans for this project.

By: *[Signature]* Date: 4.16.14  
Administrator



No.	Revision	Date	By
1	RESPONSE TO 1st REVIEW COMMENTS	11/22/13	KAP
2	RESPONSE TO 2nd REVIEW COMMENTS	02/05/14	KAP

Designer	W&R	Scale	1" = 100'
Drawn By	GAL	Date	07/08/2013
Checked By	KAP	Job No.	02090251.0

KNIGHTDALE STATION  
PHASE R1 & R2  
TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

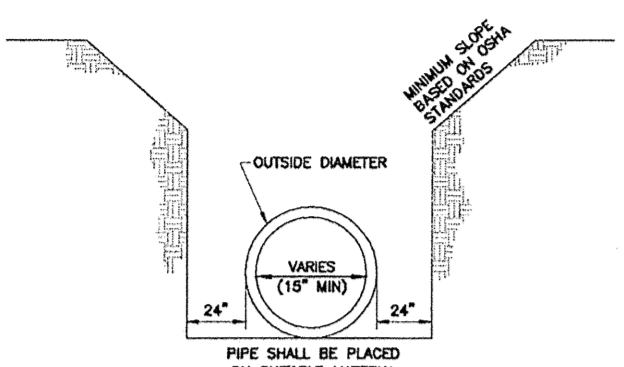
LANDSCAPE DETAILS AND NOTES

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS  
115 MacKenan Drive Cary, North Carolina 27511 tel: 919-469-3340 www.withersravenel.com License No. C-0832

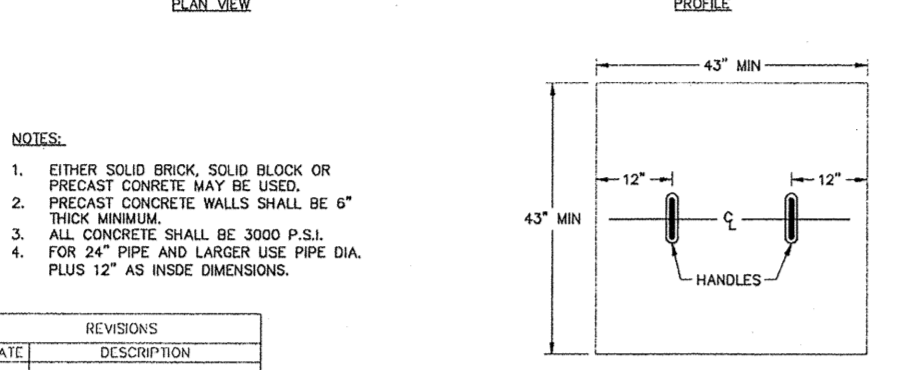
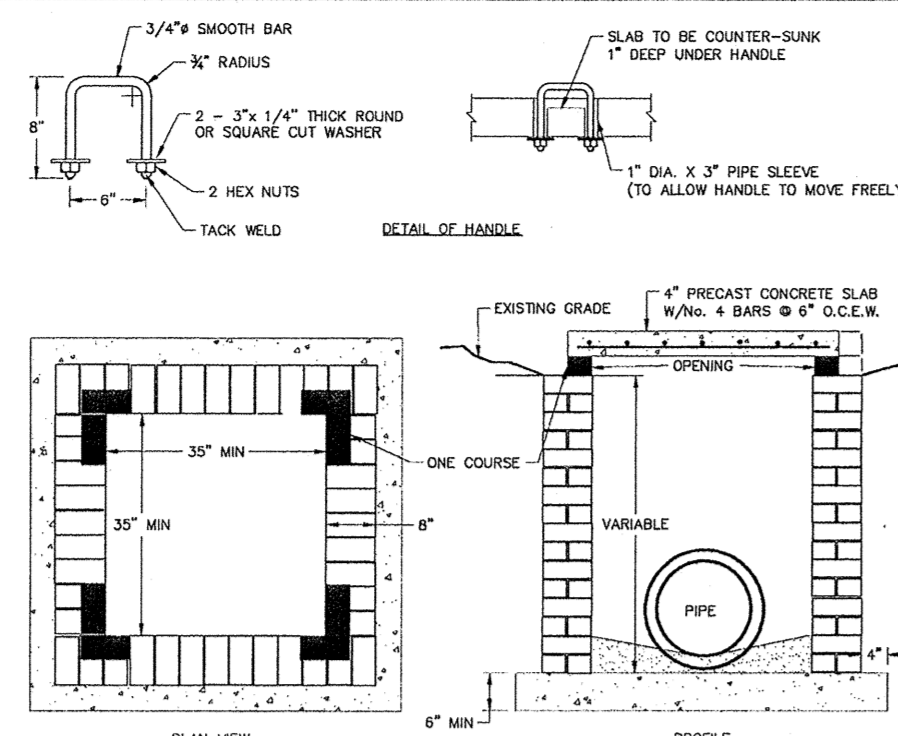


NOTES:

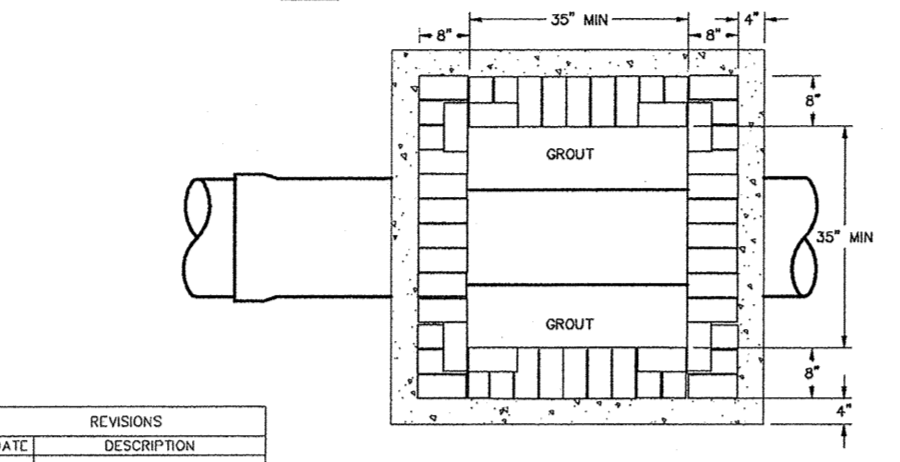
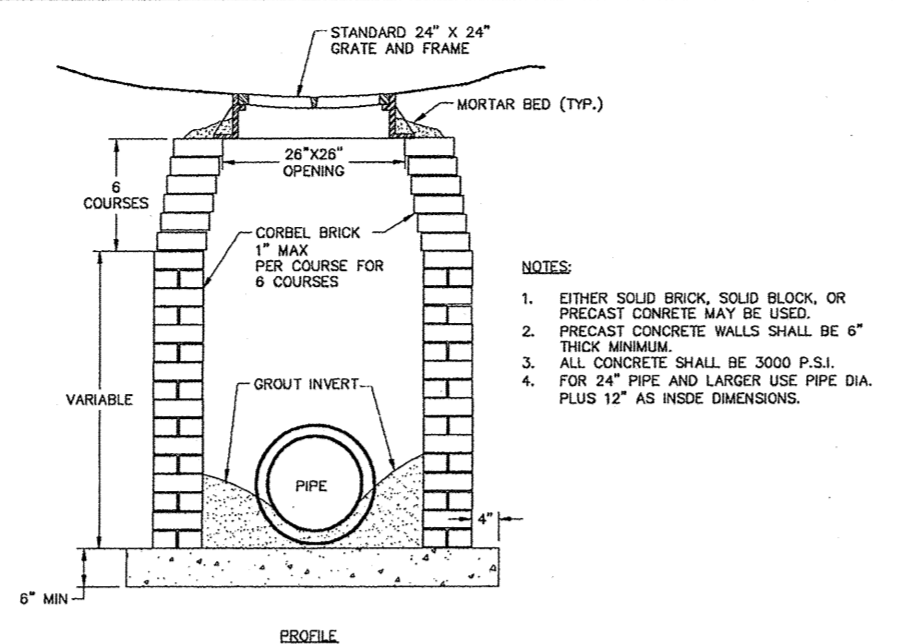
- A MINIMUM OF 24" FROM OUTSIDE DIAMETER OF PIPE TO SIDE OF TRENCH MUST BE ALLOWED FOR COMPACTION OF FILL MATERIAL. BACKFILLING OF TRENCHES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER THE PIPE IS LAID. THE FILL AROUND THE PIPE SHALL BE PLACED IN LAYERS NOT TO EXCEED 6" UNDER NO CIRCUMSTANCES SHALL WATER BE PERMITTED TO RISE IN UNPROTECTED TRENCHES. BACKFILL SHALL BE PLACED LOOSE AND THOROUGHLY COMPACTED INTO PLACE.
- ALL BACKFILL MATERIAL SHALL HAVE AN IN PLACE COMPACTED DENSITY OF AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DENSITY.
- THE FINAL 24" OF BACKFILL MATERIAL SHALL BE COMPACTED TO 100% OF THE STANDARD PROCTOR MAXIMUM DENSITY.
- ALL TRENCHING OPERATIONS SHALL MEET OSHA STANDARDS.
- BACKFILL MATERIAL BENEATH ROADWAY SHALL BE SELECT BACKFILL MATERIAL.



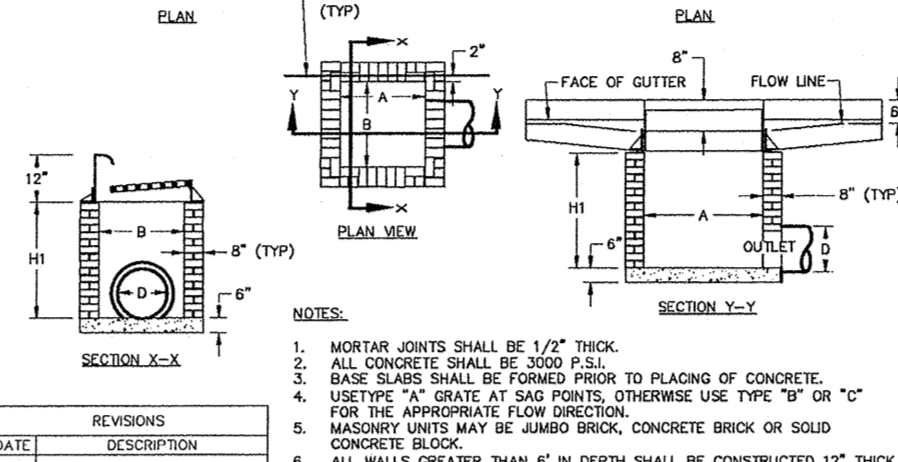
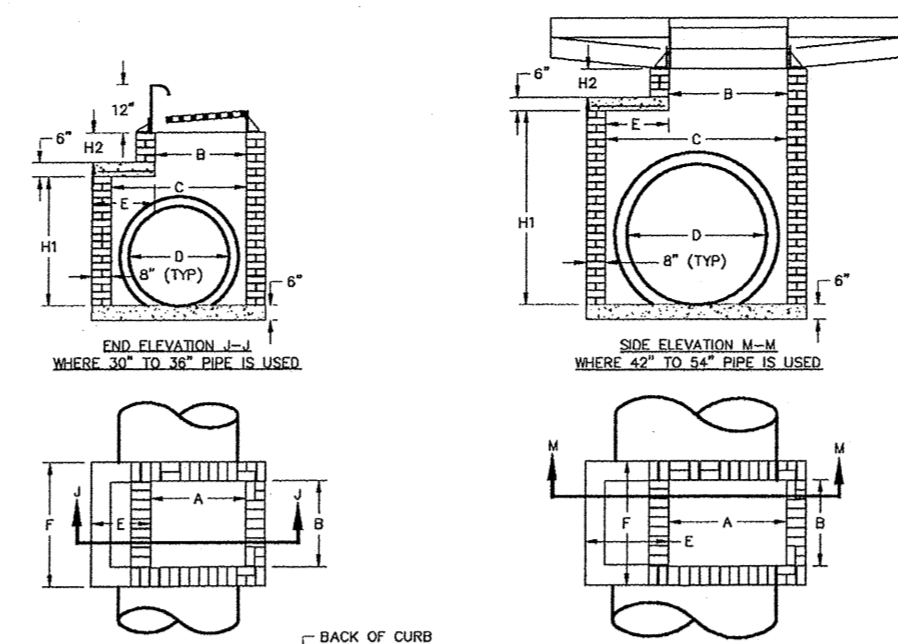
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		TRENCH FOR STORM DRAIN PIPES	5.02



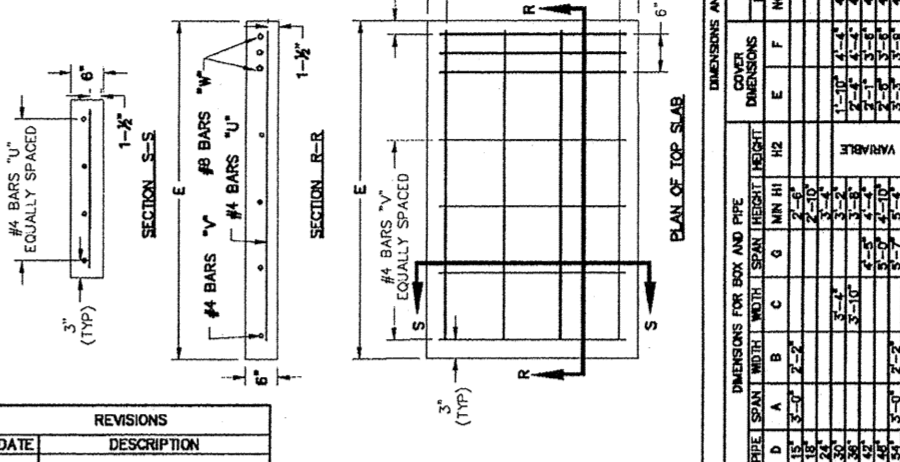
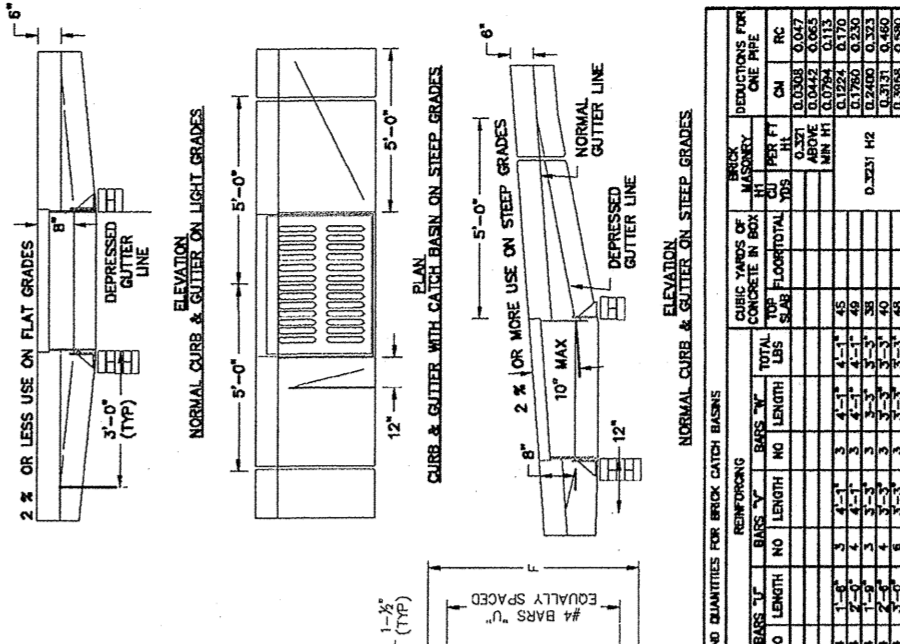
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD YARD INLET WITH CONCRETE SLAB	5.03



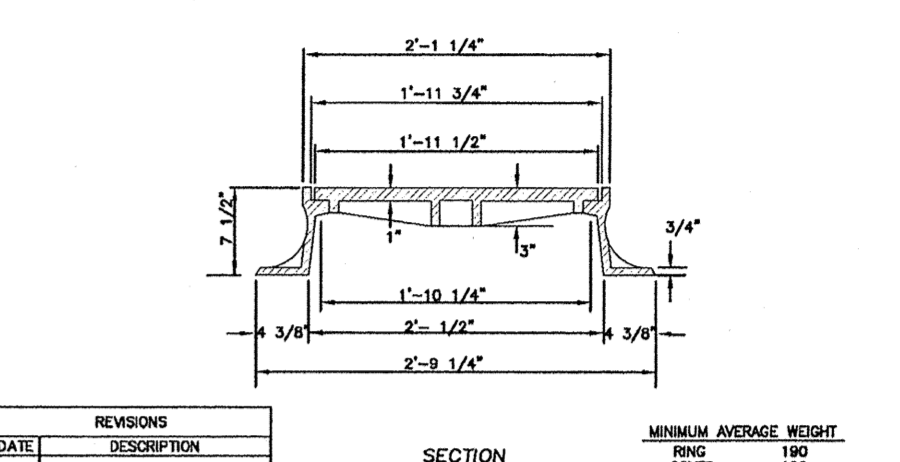
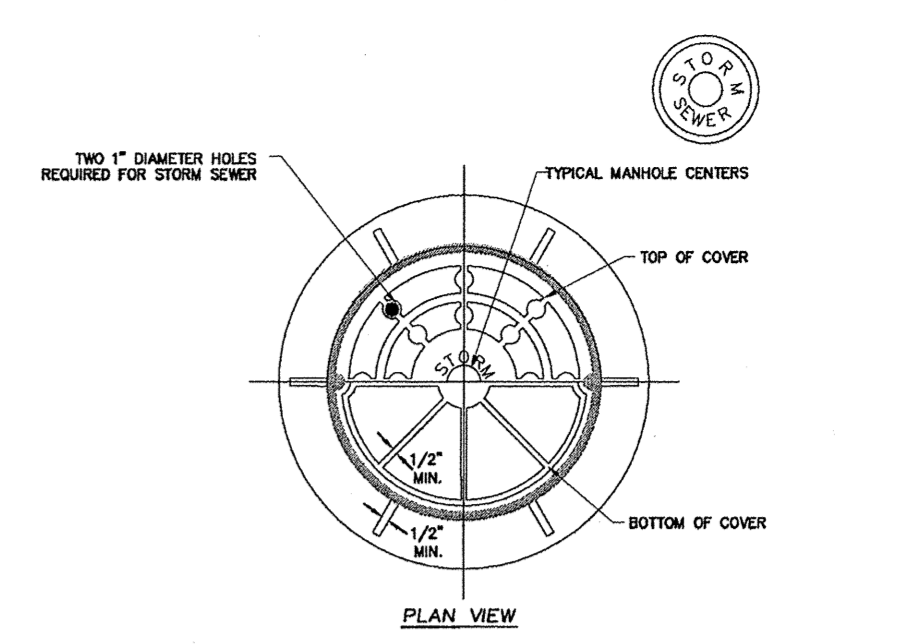
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TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD DROP INLET WITH GRATE AND FRAME	5.04



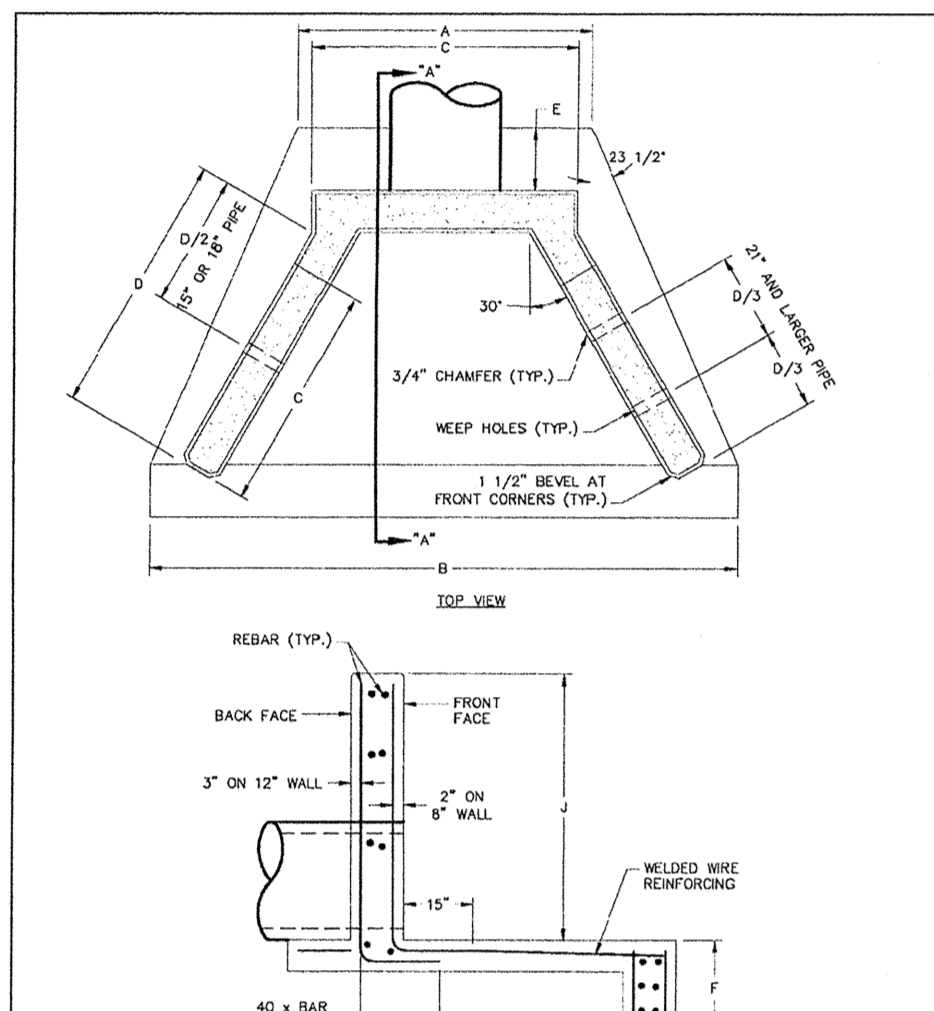
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD CURB INLET	5.05



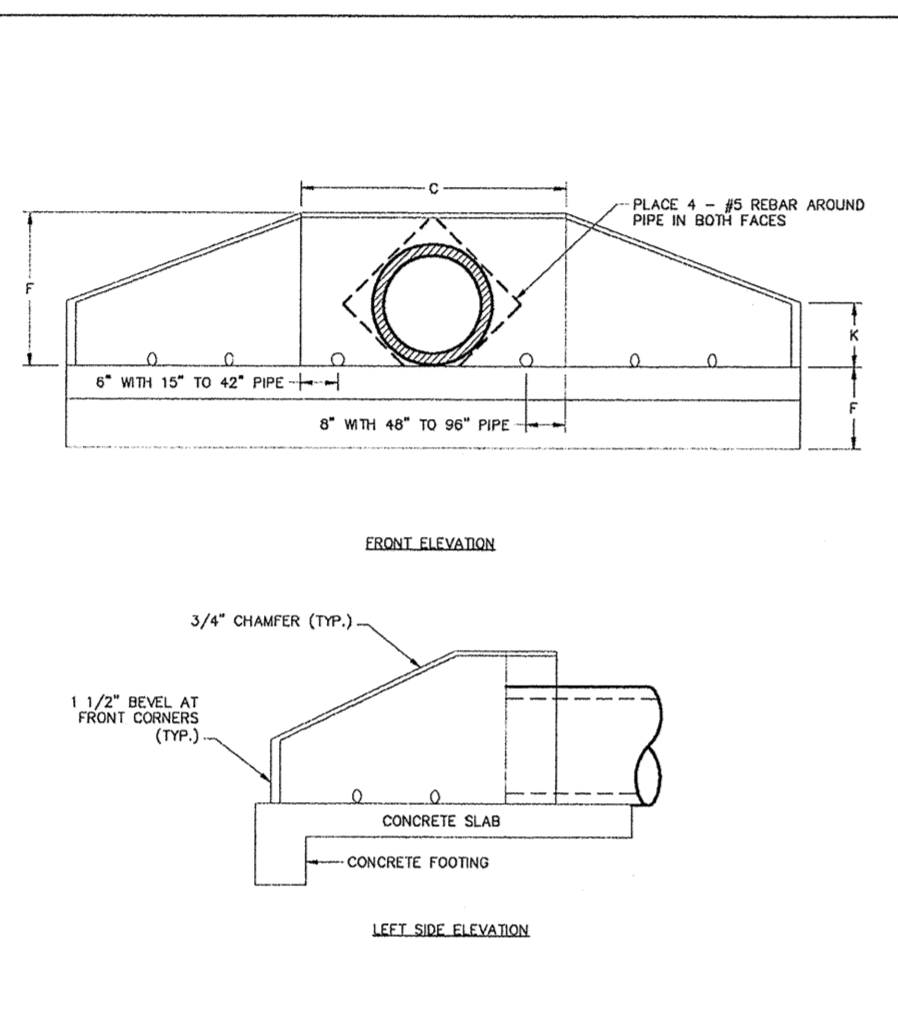
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD CURB INLET	5.05



REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD MANHOLE RING & COVER	5.10



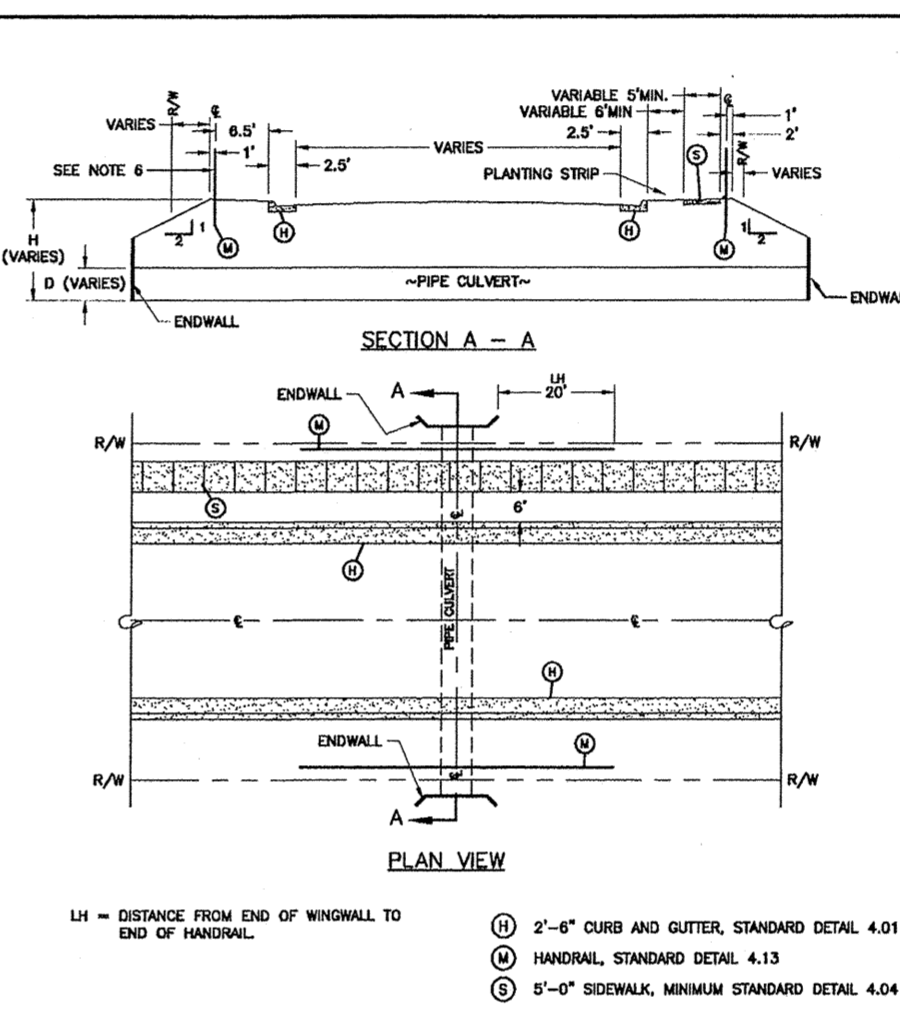
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD REINFORCED CONCRETE HEADWALL WITH WINGWALLS	5.06



REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD REINFORCED CONCRETE HEADWALL WITH WINGWALLS	5.06

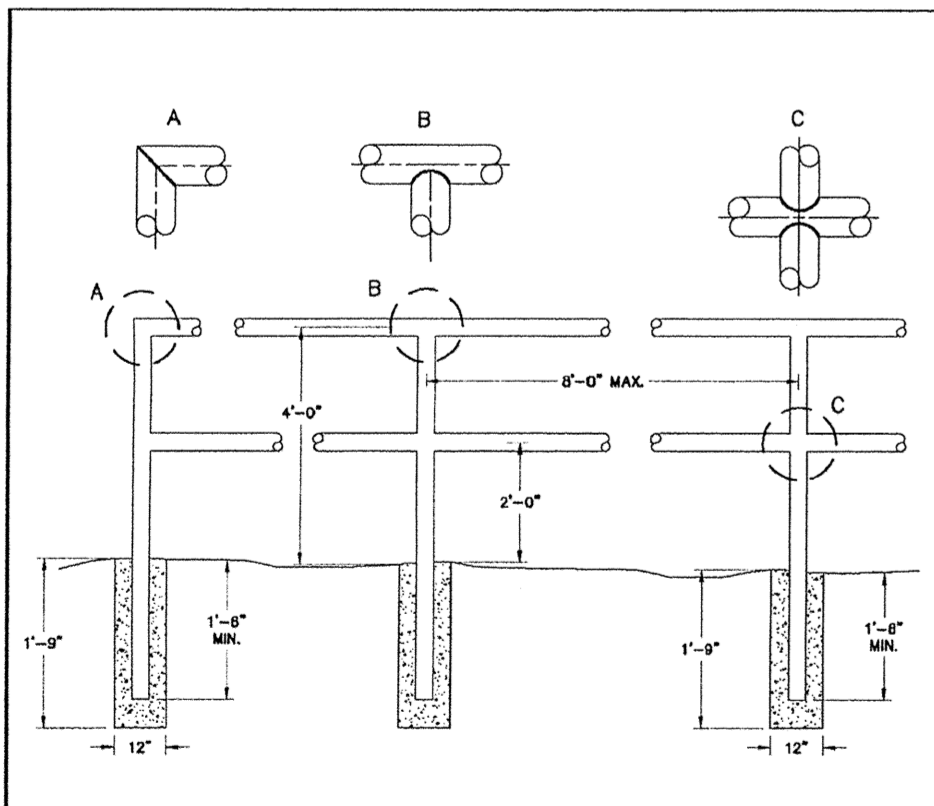
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		DIMENSIONS FOR HEADWALL WITH WINGWALLS	5.09

REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		DIMENSIONS FOR HEADWALL WITH WINGWALLS	5.09



REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		CULVERT CROSSING ON RESIDENTIAL AND COMMERCIAL STREETS	5.01

REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		CULVERT CROSSING ON RESIDENTIAL AND COMMERCIAL STREETS	5.01



REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		TYPICAL HANDRAIL	4.13

K:\03\08-0250\080251-1-bvrs-108-scottsdale\_Pn\_1\_A\_2\CAD\PLAN-81\_1.dwg, Wed, Feb 6, 2014, 2:17:05PM, WITHERS & RAVENEL, INC.

No.	Revision	Date	By	Designer	W&R	Scale	SEE SHEET
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI				
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI				

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

**STORM DRAINAGE DETAILS**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

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Sheet No. **35** of **38**

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: 2/5/2014  
TOWN ENGINEER

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

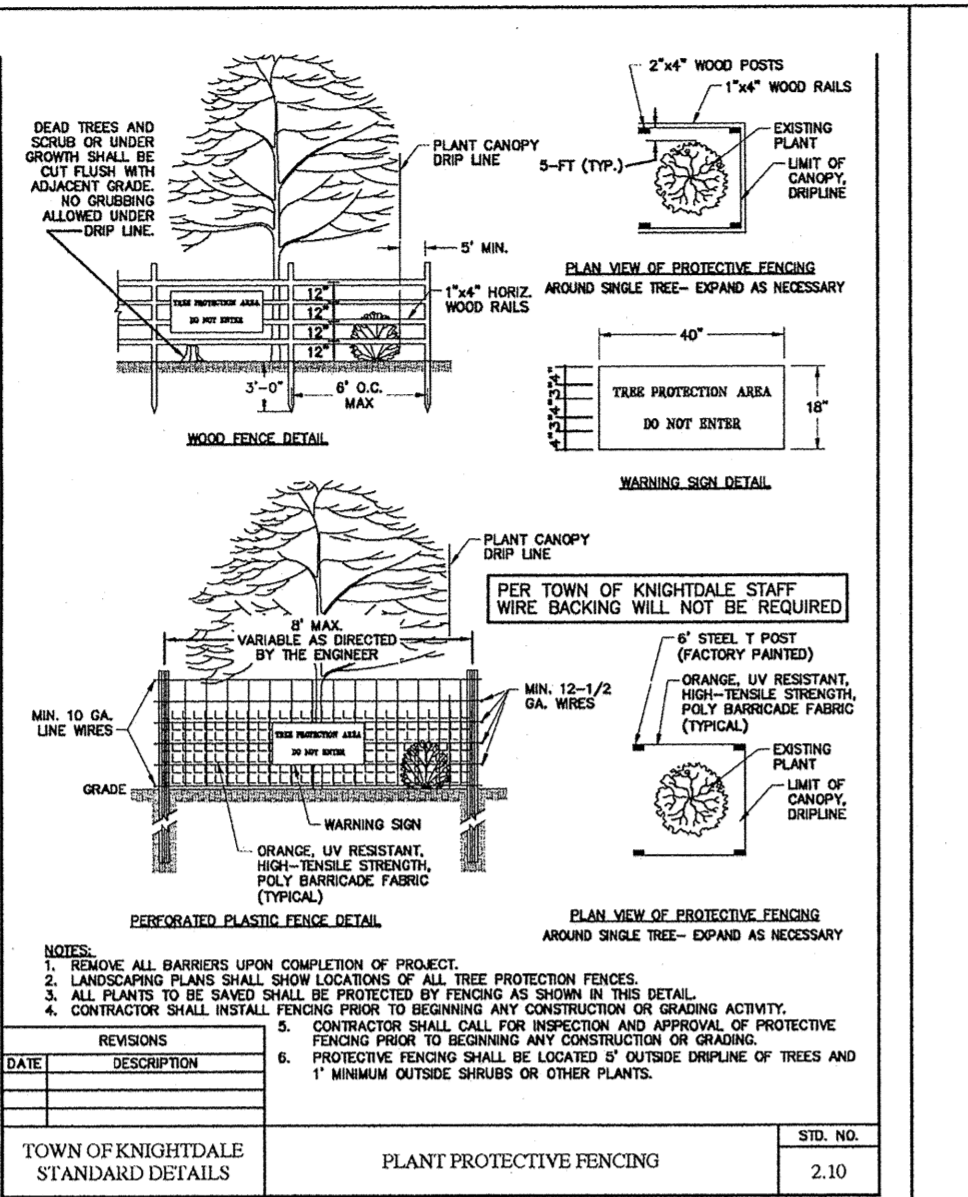
BY: *[Signature]* DATE: 2-16-14  
ADMINISTRATOR



SEEDING SCHEDULE		
SEEDING PERIOD	SEEDING TYPE	APPLICATION RATE (LBS/1000)
AUGUST 15 - NOVEMBER 01	TALL FESCUE	300
NOVEMBER 01 - MARCH 01	TALL FESCUE AND AMBRIZZO RYE	200
MARCH 01 - APRIL 15	TALL FESCUE	25
APRIL 15 - JUNE 30	TALL FESCUE AND HALLED COMMON BERMUDAGRASS	25
JULY 01 - AUGUST 15	TALL FESCUE AND "BROWN TOP" MILLET OR "SODIUM-SODIUM HYBRIDS"	30
MARCH 01 - JUNE 01	SENECA LEYDENZA (SHARPEED) AND TALL FESCUE OR	80
MARCH 01 - APRIL 15	WEEPING LOVEGRASS OR	120
MARCH 01 - JUNE 30	HALLED COMMON BERMUDAGRASS	25
JUNE 01 - SEPTEMBER 01	"BROWN TOP" MILLET OR "SODIUM-SODIUM HYBRIDS"	30
SEPTEMBER 01 - MARCH 01	SENECA LEYDENZA (SHARPEED) AND TALL FESCUE OR	70
NOVEMBER 01 - MARCH 01	AMBRIZZO RYE	25

REMARKS: - SEEDS ACCORDING TO OPTIMUM SEASON FOR BEST ESTABLISHMENT. VEGICULTURE DO NOT ALLOW TEMPORARY COVERS TO GROW OVER 12" IN HEIGHT BEFORE REMOVAL. SEEDS SHALL BE SHEDDED TO PREVENT OVERSEEDING. SOIL CONSERVATION SERVICE FOR ADDITIONAL INFORMATION CONCERNING OTHER ALTERNATIVES FOR VEGETATION OF SLOPED AREAS. THE ABOVE VEGETATION RATES ARE THOSE WHICH DO WELL UNDER LOCAL CONDITIONS. OTHER SEEDING RATE COMBINATIONS ARE POSSIBLE.

GROUND COVER: - WHENEVER LAND DISTURBANCE ACTIVITY IS UNDERTAKEN ON A SLOPE, THE SLOPE SHOULD BE COVERED WITH A GROUND COVER SUPPORTIVE TO RESTORATION. GROUND COVER SHOULD BE APPLIED WITHIN 14 DAYS OF COMPLETION OF DISTURBANCE. SLOPES SHALL BE PLANTED OR COVERED WITHIN 14 DAYS OF COMPLETION OF DISTURBANCE. SLOPES SHALL BE PLANTED OR COVERED WITHIN 14 DAYS OF COMPLETION OF DISTURBANCE. SLOPES SHALL BE PLANTED OR COVERED WITHIN 14 DAYS OF COMPLETION OF DISTURBANCE.



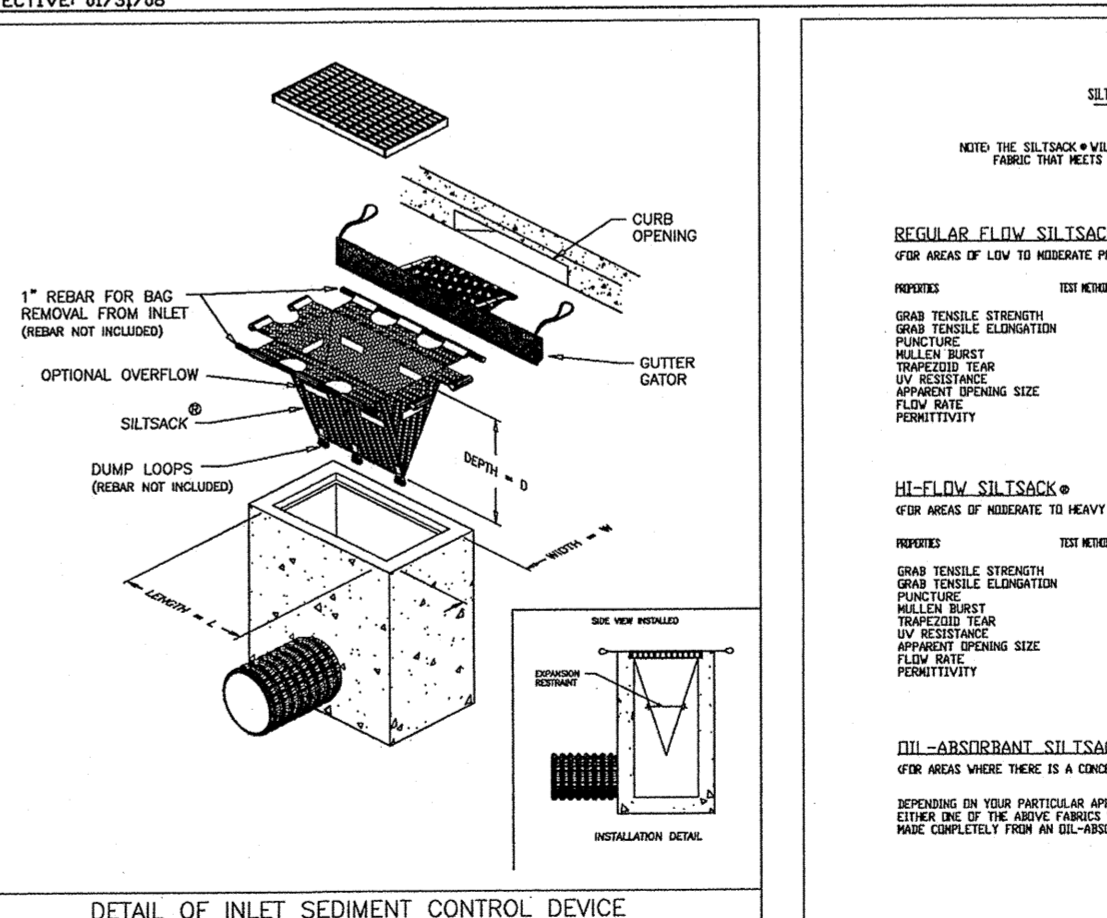
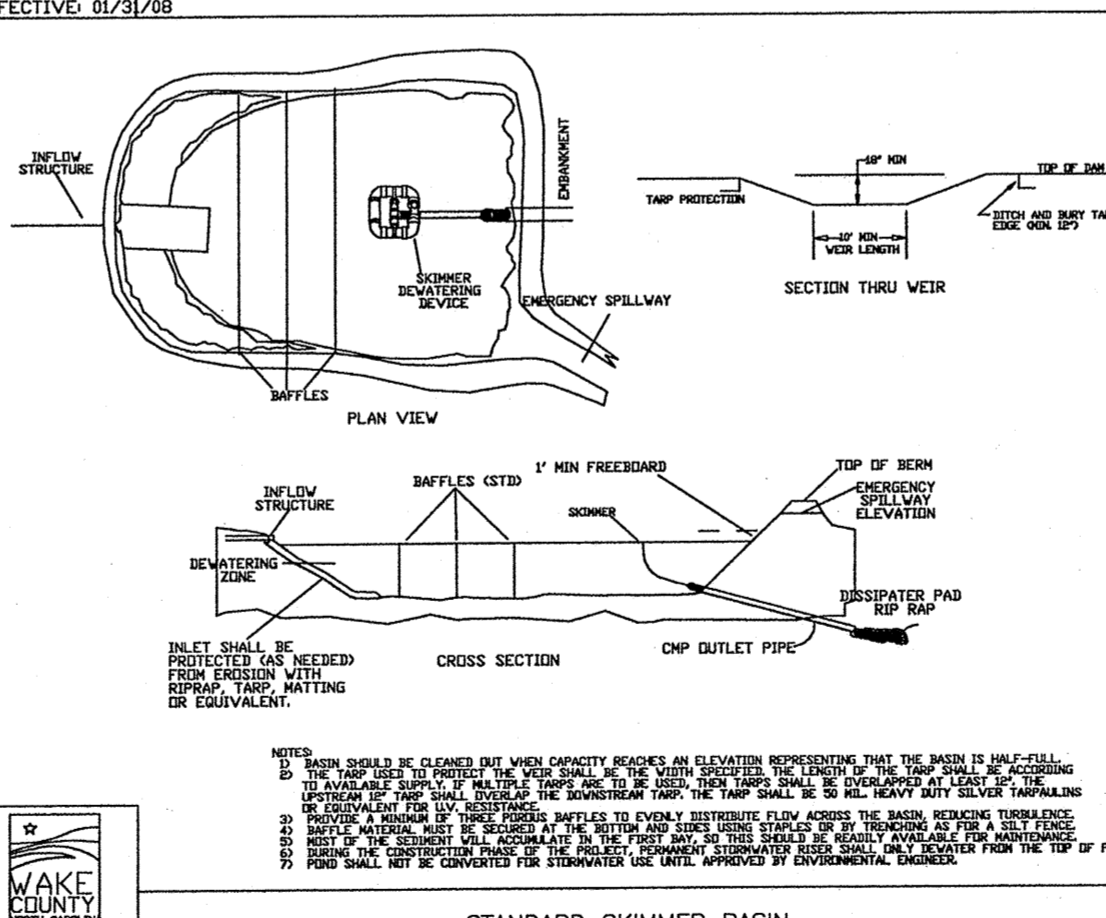
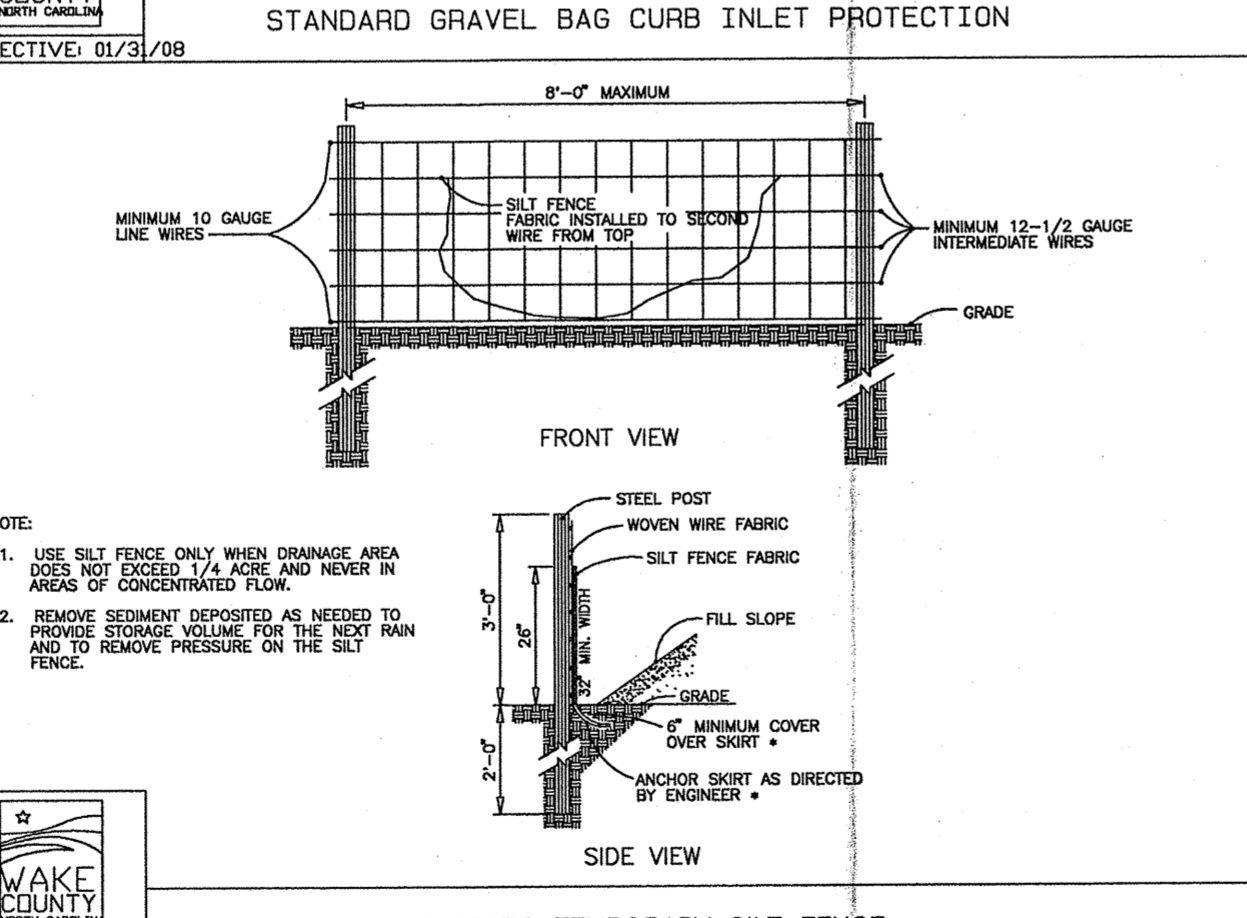
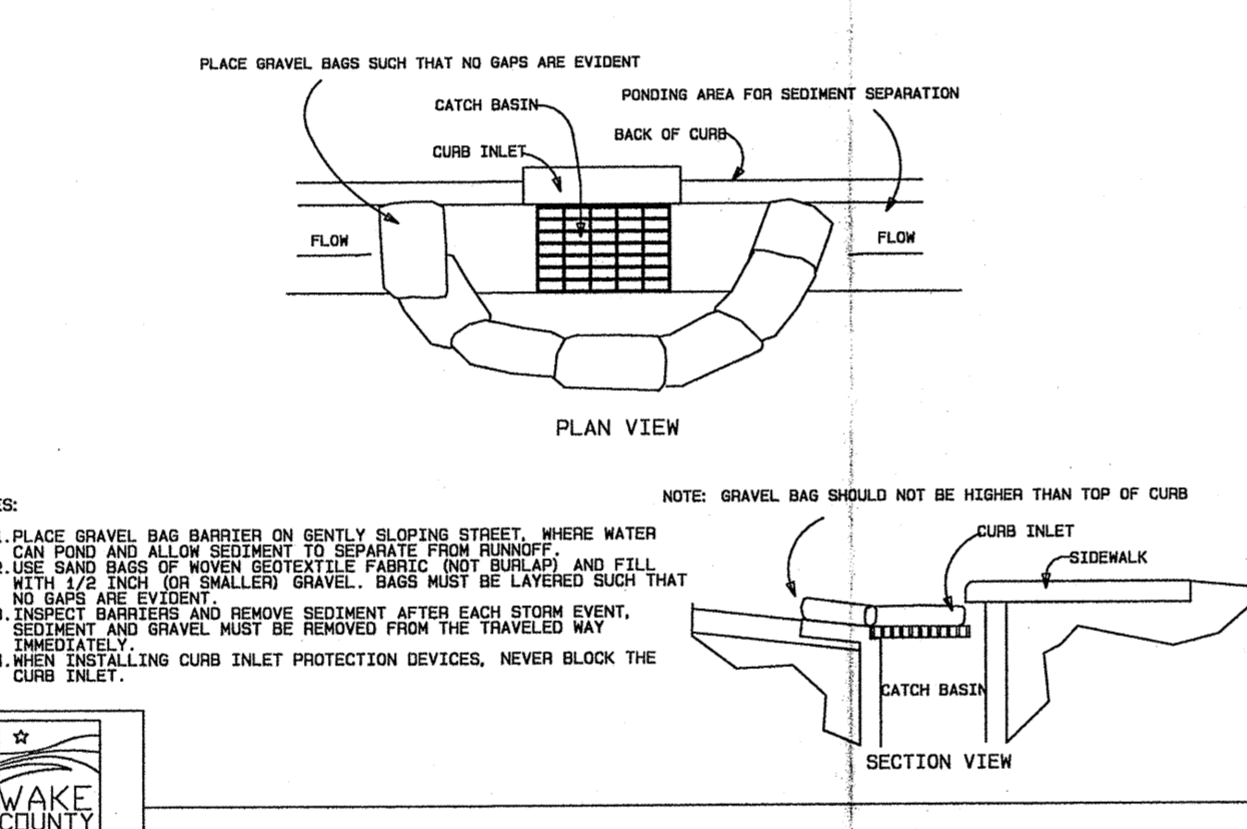
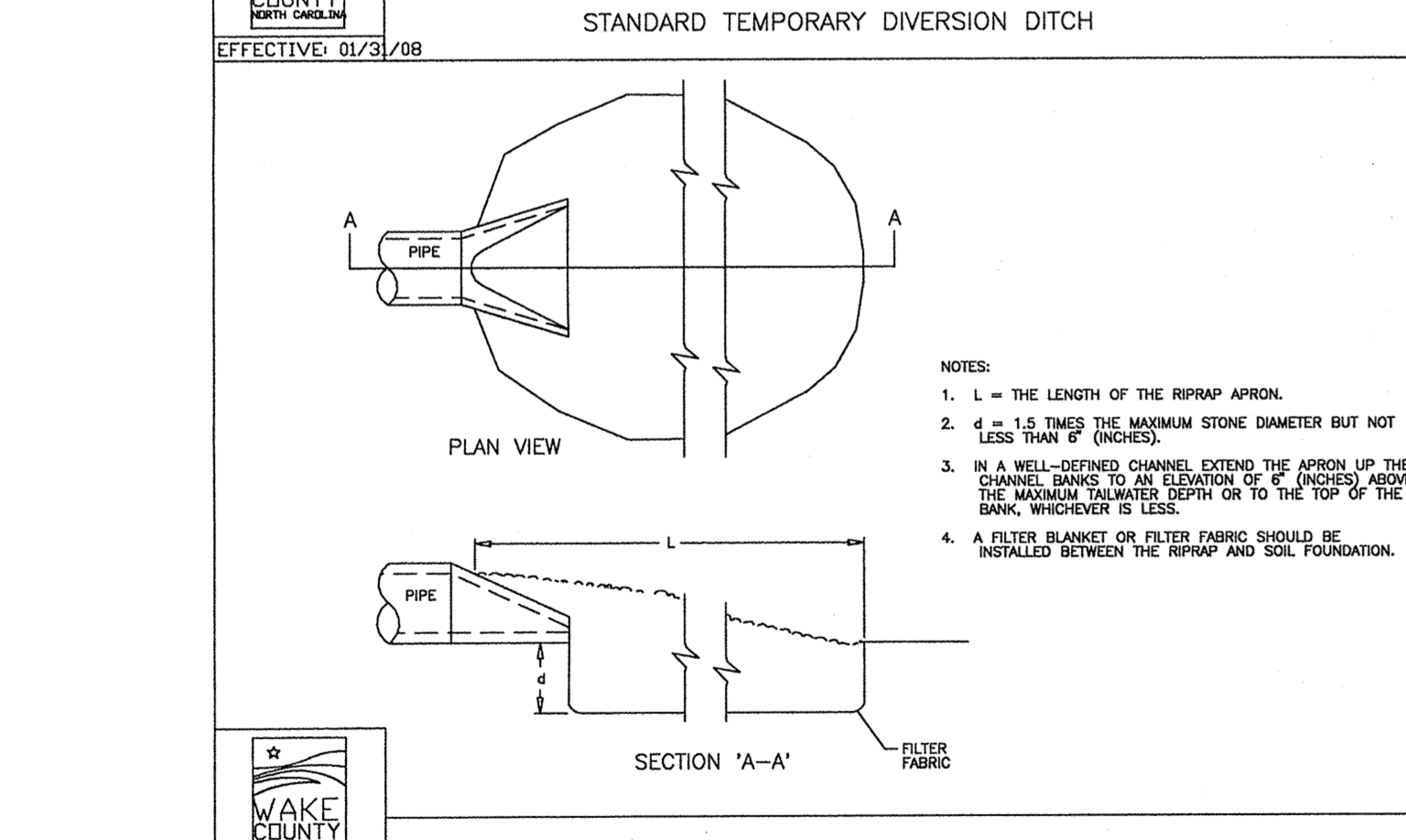
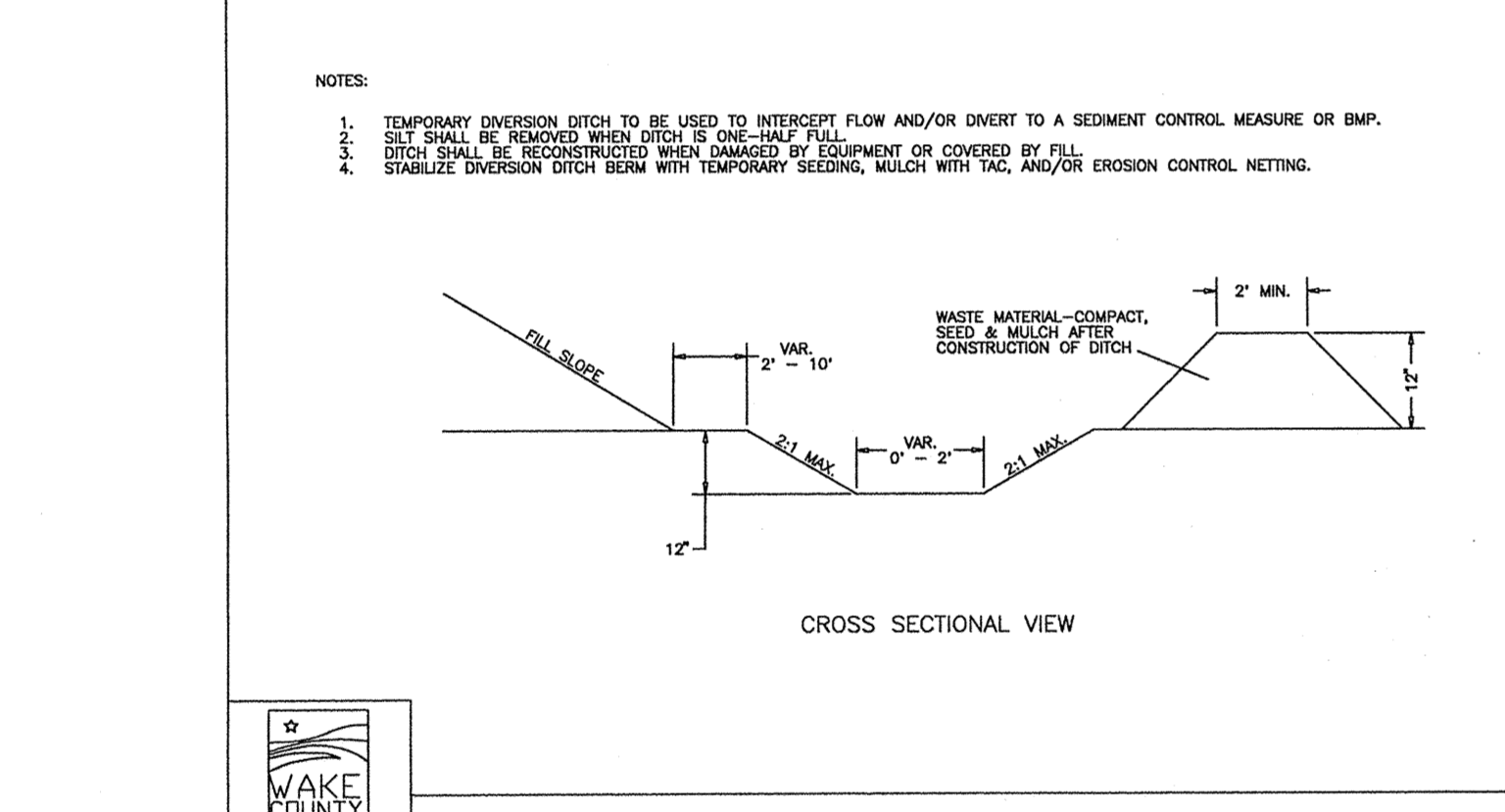
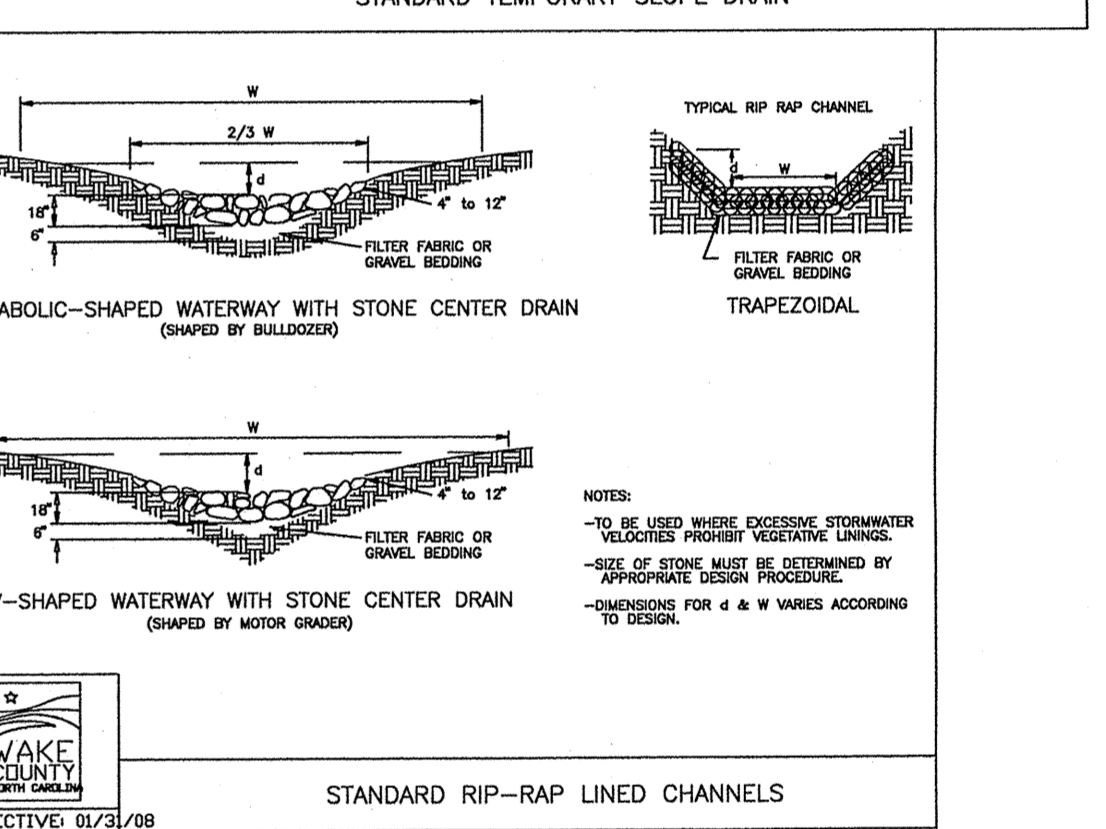
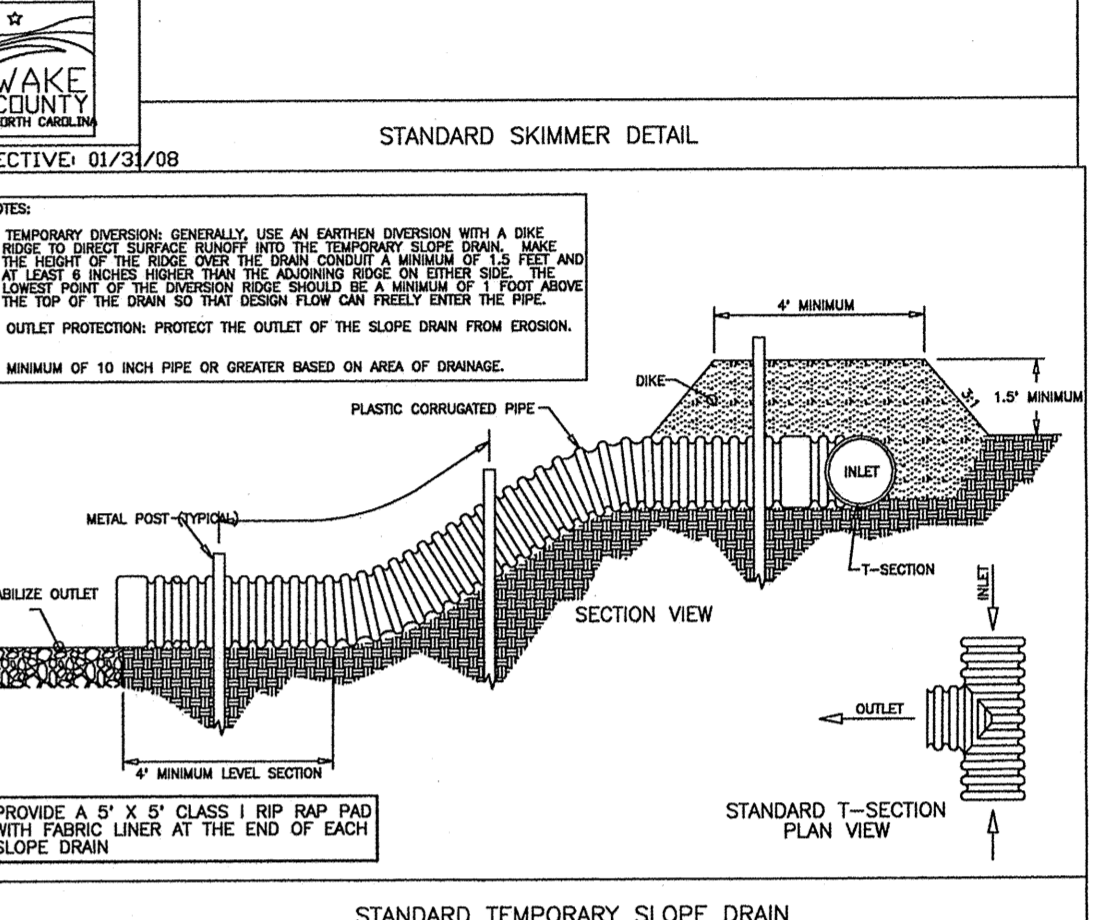
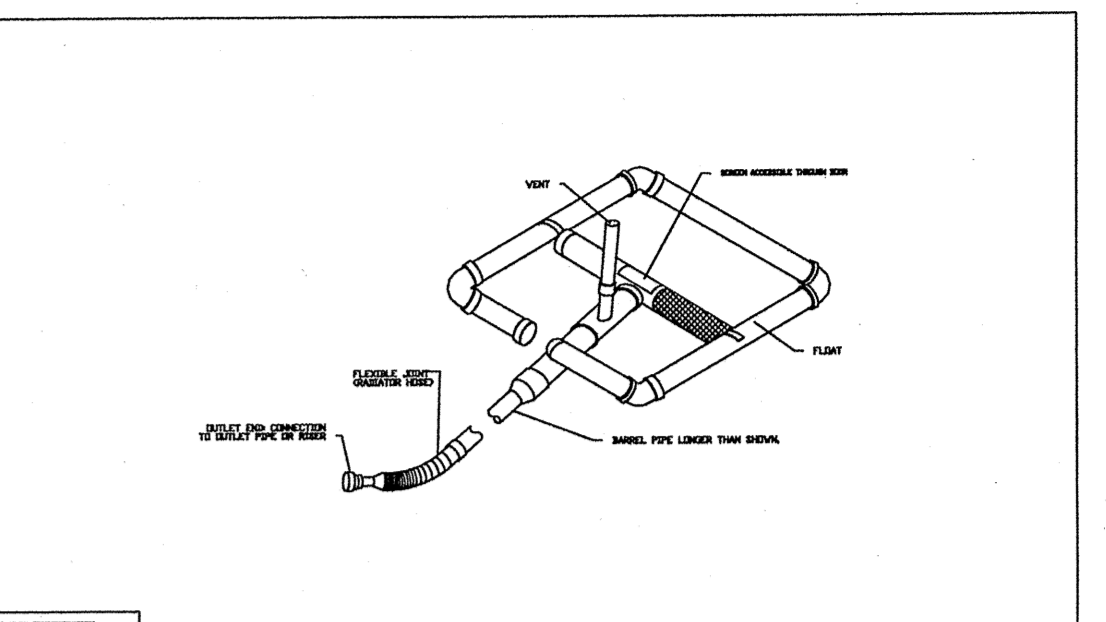
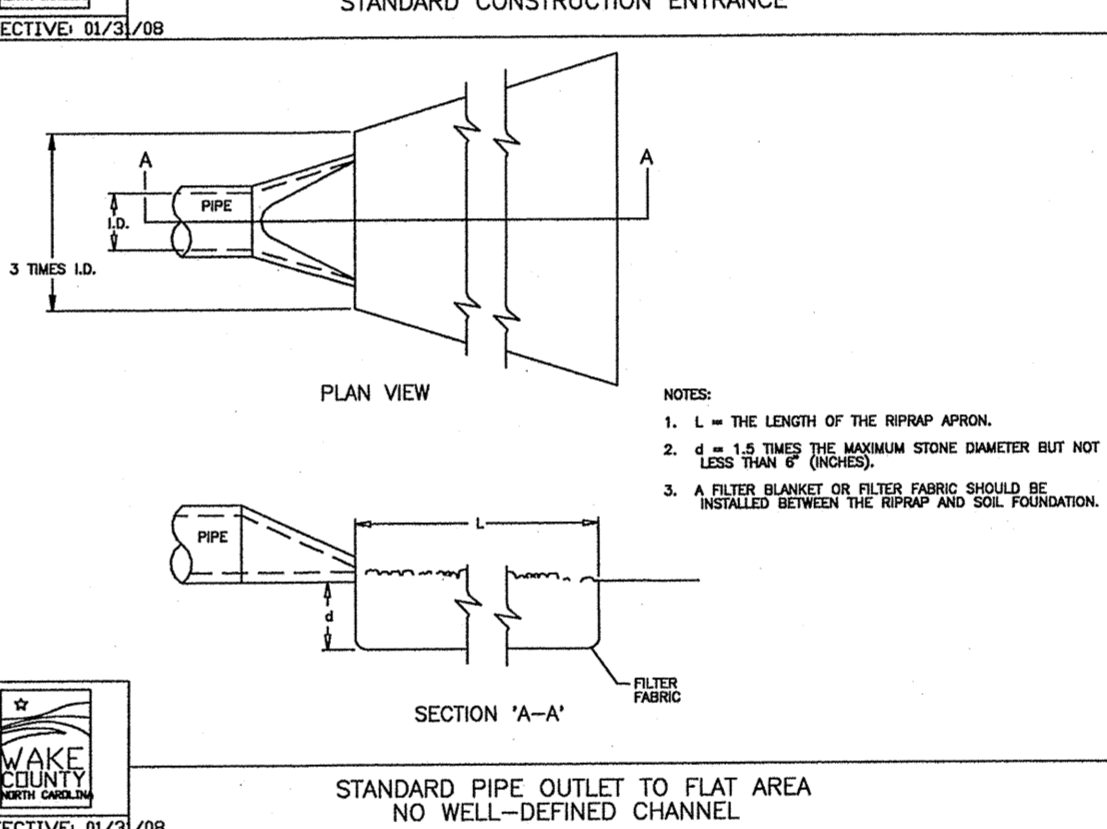
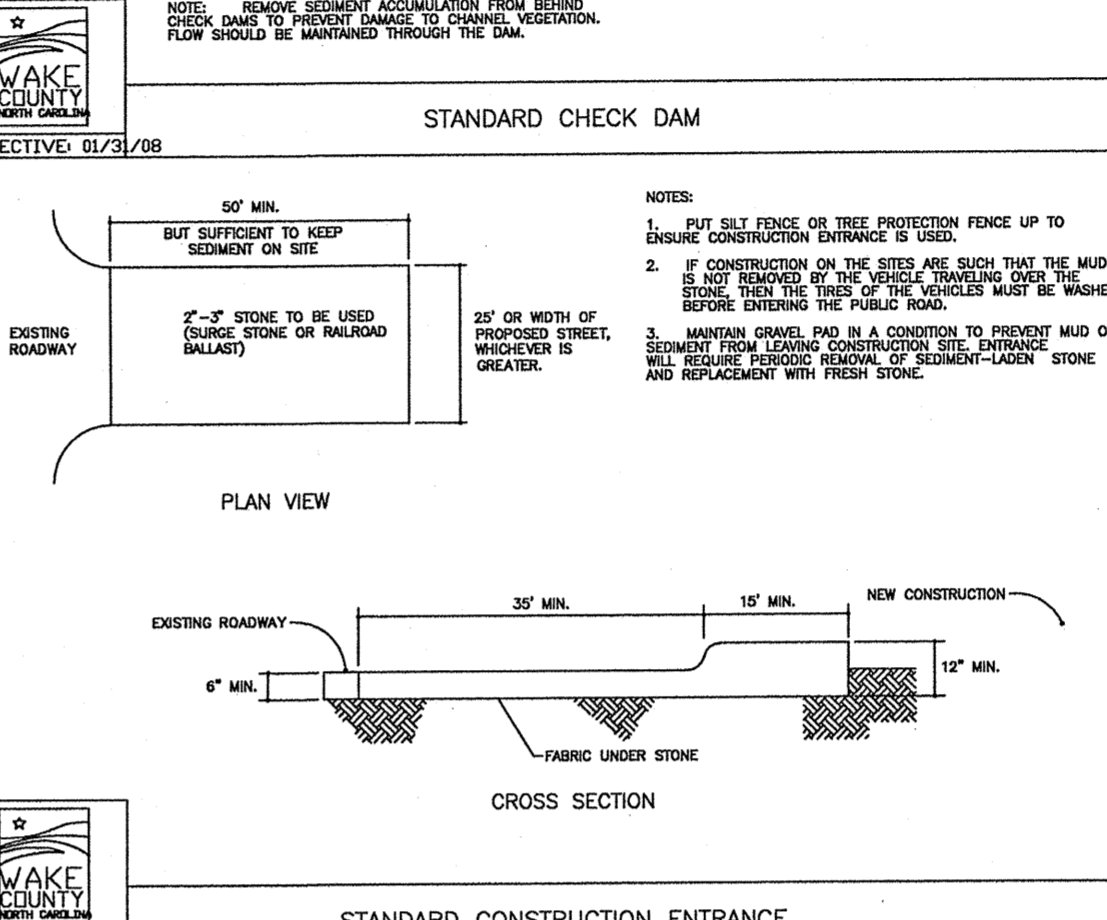
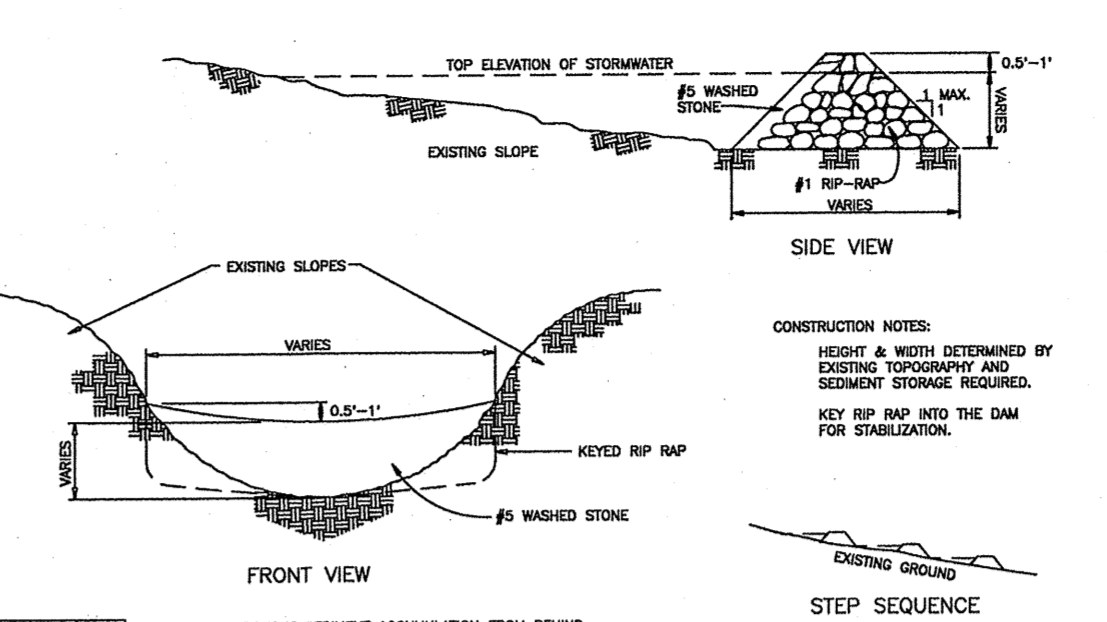
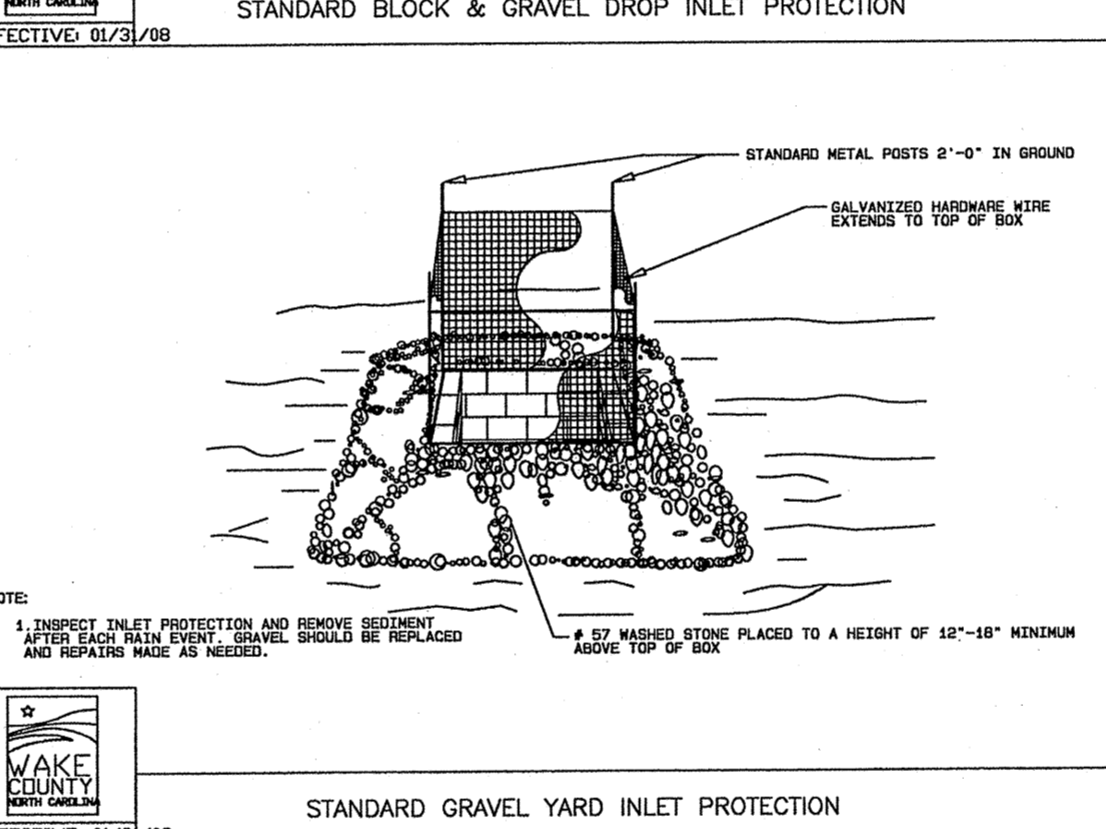
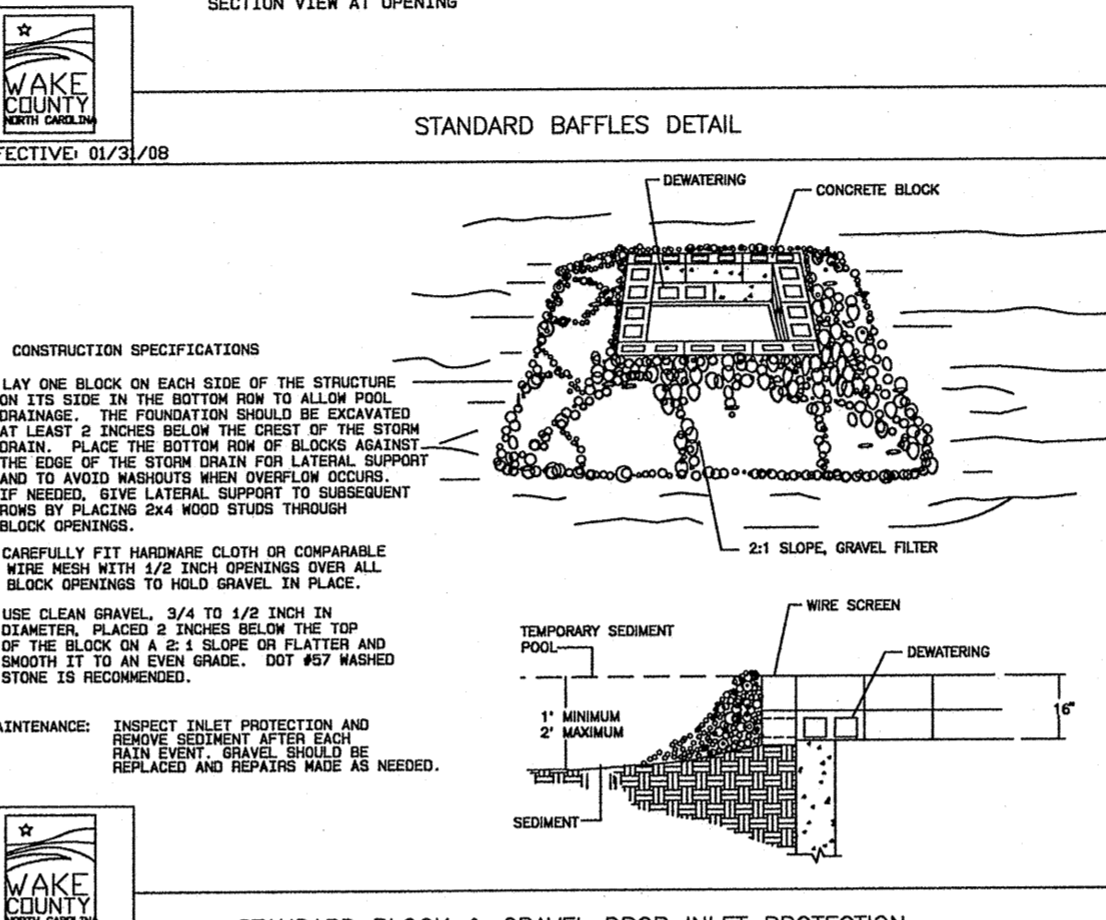
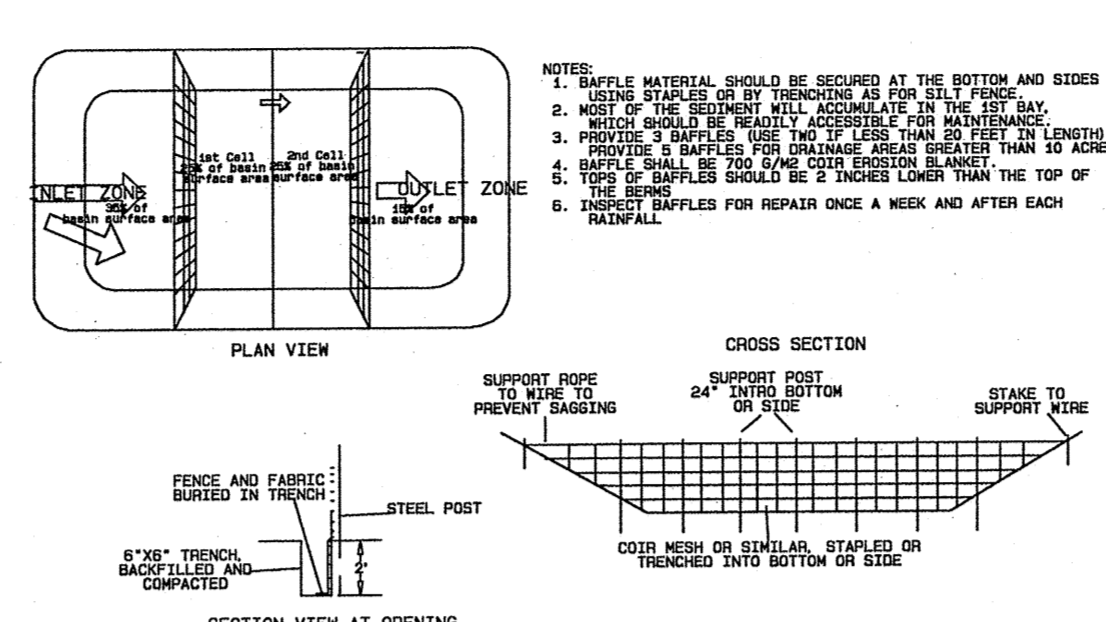
Effective September 1, 2008  
Soil stockpiles shall be located on the approved plan and shall adhere to the following requirements:

**Design Criteria**

- A 25-foot temporary maintenance and access easement shall be shown around all proposed stockpiles (erosion control measures surrounding the stockpile shall be shown at the outer limit of this easement).
- Stockpile footprints shall be setback a minimum of 25' from adjacent property lines.
- Aisle shall be provided on the approved plan that stockpile height shall not exceed 35 feet.
- Stockpile slopes shall be 2:1 or flatter.
- Approved BMPs shall be shown on a plan to control any potential sediment loss from a stockpile.
- Stockpiling materials adjacent to a ditch, drainage, watercourse, wetland, stream buffer, or other body of water shall be avoided unless an alternative location is demonstrated to be unavailing.
- Any concentrated flow likely to affect the stockpile shall be diverted to an approved BMP.
- On-site soil or borrow areas must be in compliance with Wake County UDO and State Regulations. All soil areas over an acre are required to have an approved sediment control plan. Development/Contractor shall notify Wake County of any off-site disposal of soil, prior to disposal. Fill of FEMA Floodways and Non-encroachment Areas are prohibited except as otherwise provided by subsection 14.19.2 of the Wake County Unified Development Ordinance (ordinances and permits required).

**Maintenance Requirements to be Noted on the Plan**

- Seeding or covering stockpiles with traps or mats is required and will reduce erosion problems. Traps should be placed at the top of the slope to keep water from running underneath the plastic.
- If a stockpile is to remain for longer than the project is complete (builds, etc.), the financial responsible party must notify Wake County of a new responsible party for that stockpile.
- The approved plan shall provide for the use of staked seeding and mulching on a continual basis while the stockpile is in use.
- Establish and maintain a vegetative buffer at the top of the slope (where practical).



SITE AREA DESCRIPTION	GROUND STABILIZATION	
	STABILIZATION TIME FRAME	STABILIZATION TIME FRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES FLATTER THAN 3:1	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50 FEET IN LENGTH.
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE (EXCEPT FOR PERIMETERS AND HQW ZONES)

Extensions of time may be approved by the permitting authority based on weather or other site-specific conditions that make compliance impracticable. (Section 11.8C(2)(d))

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.

DATE: 4/5/2014  
TOWN ENGINEER

DATE: 4/16/14  
ADMINISTRATOR

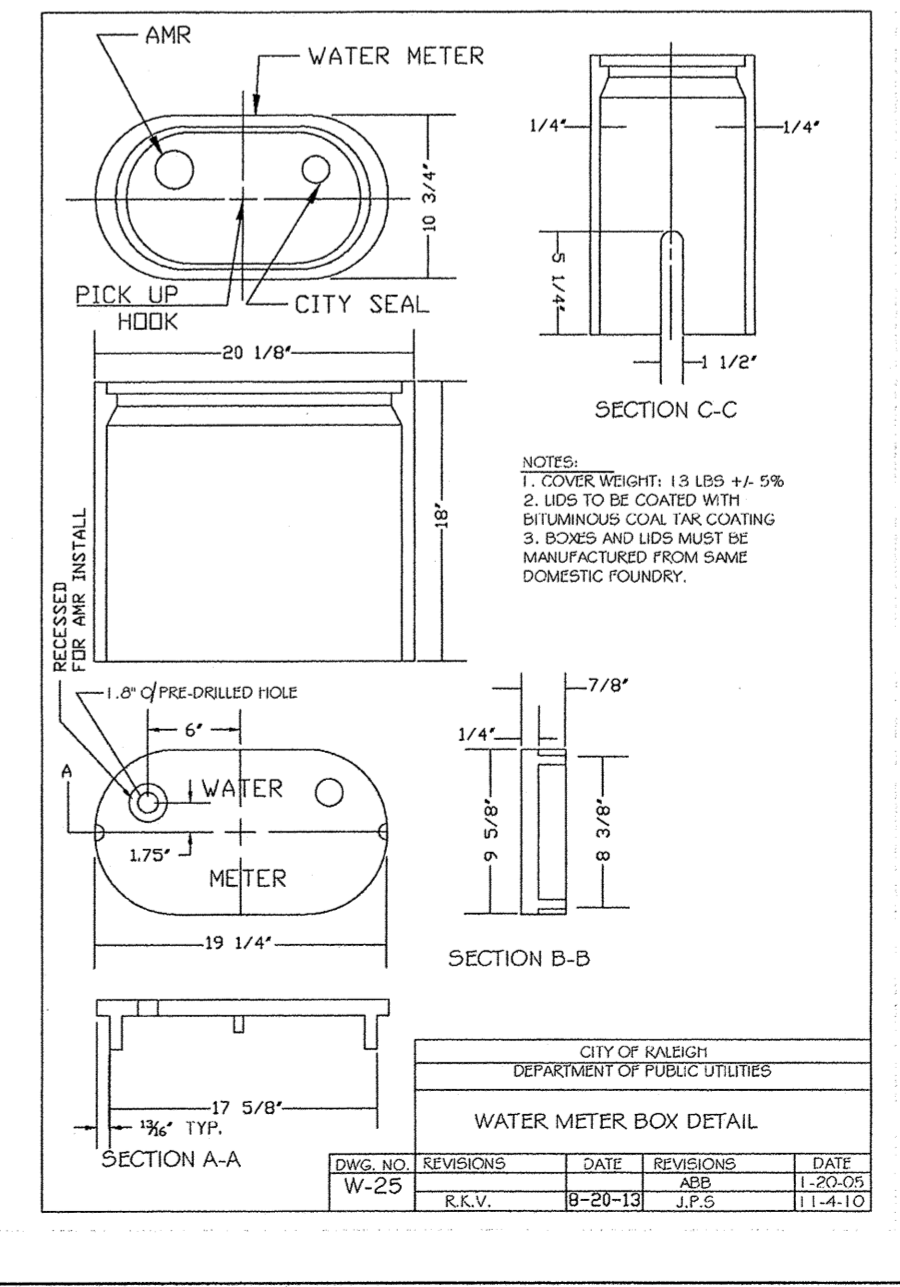
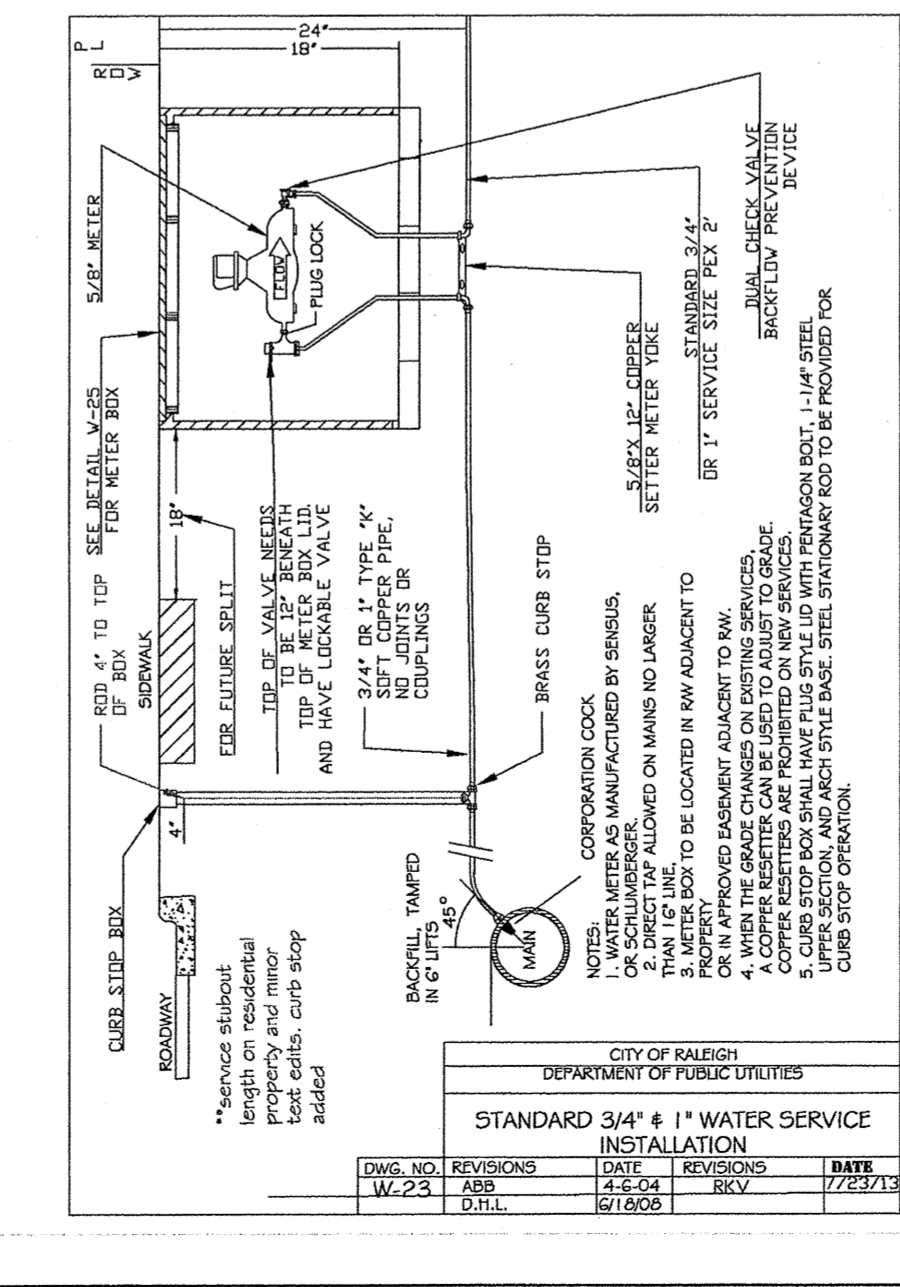
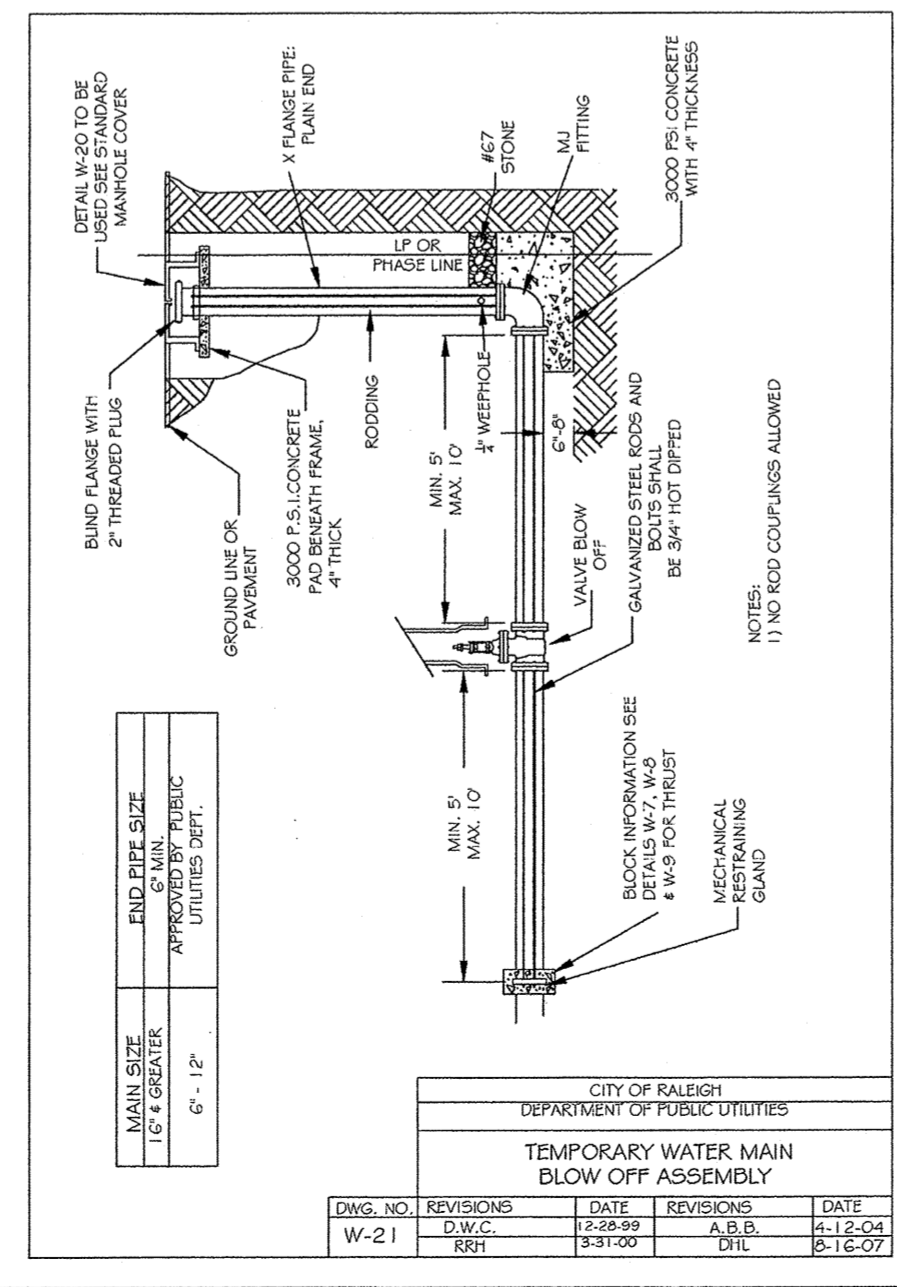
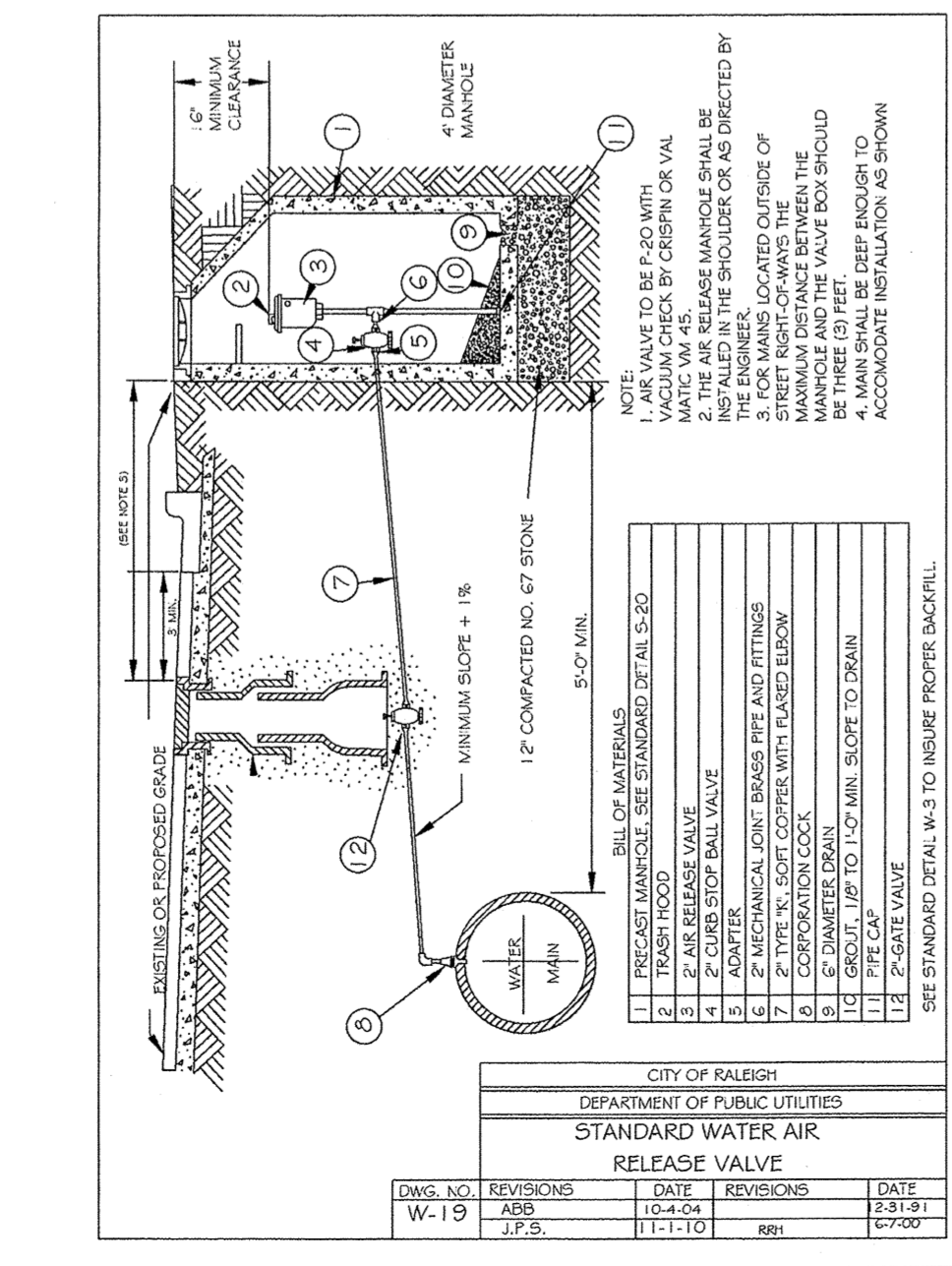
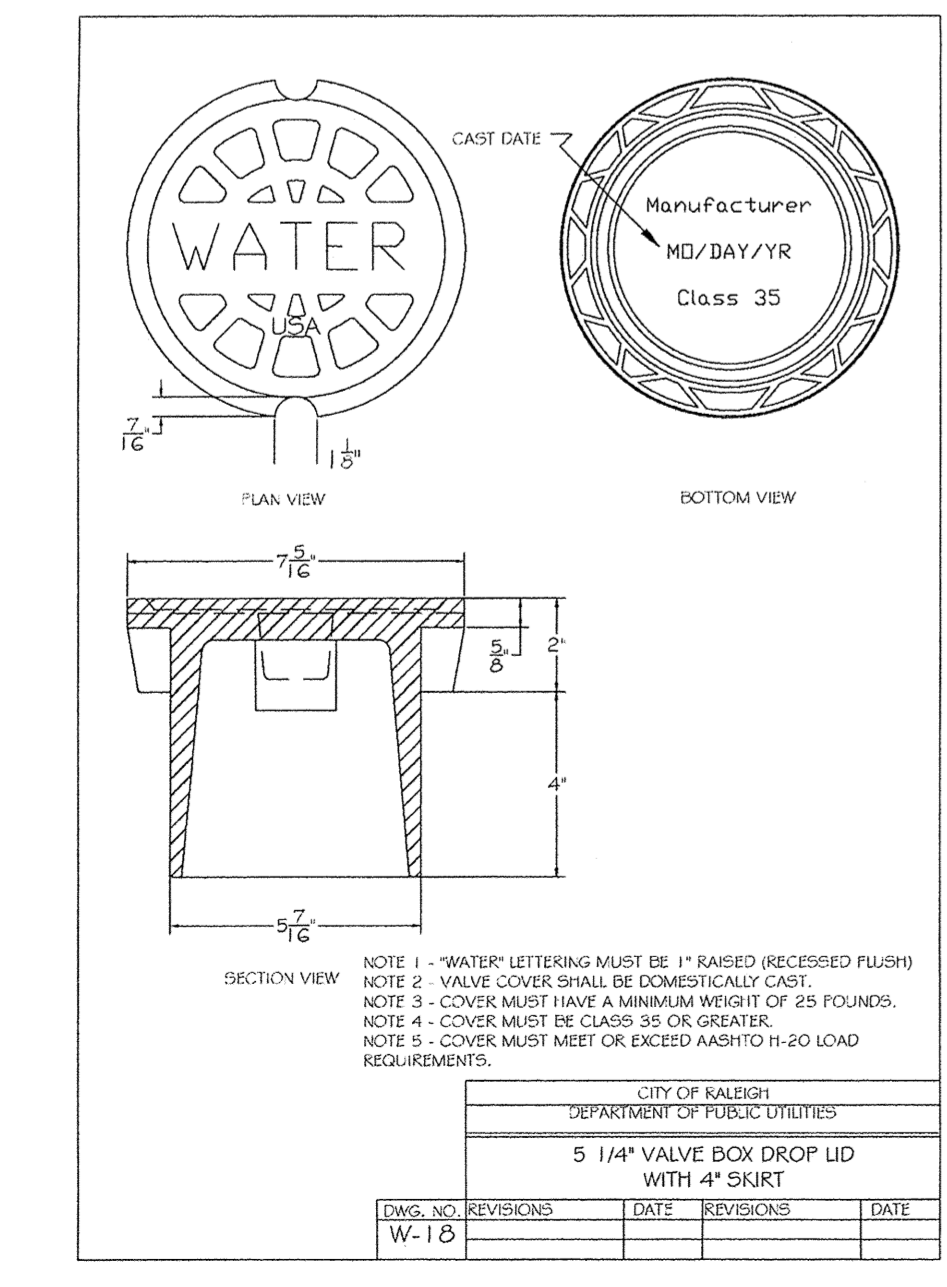
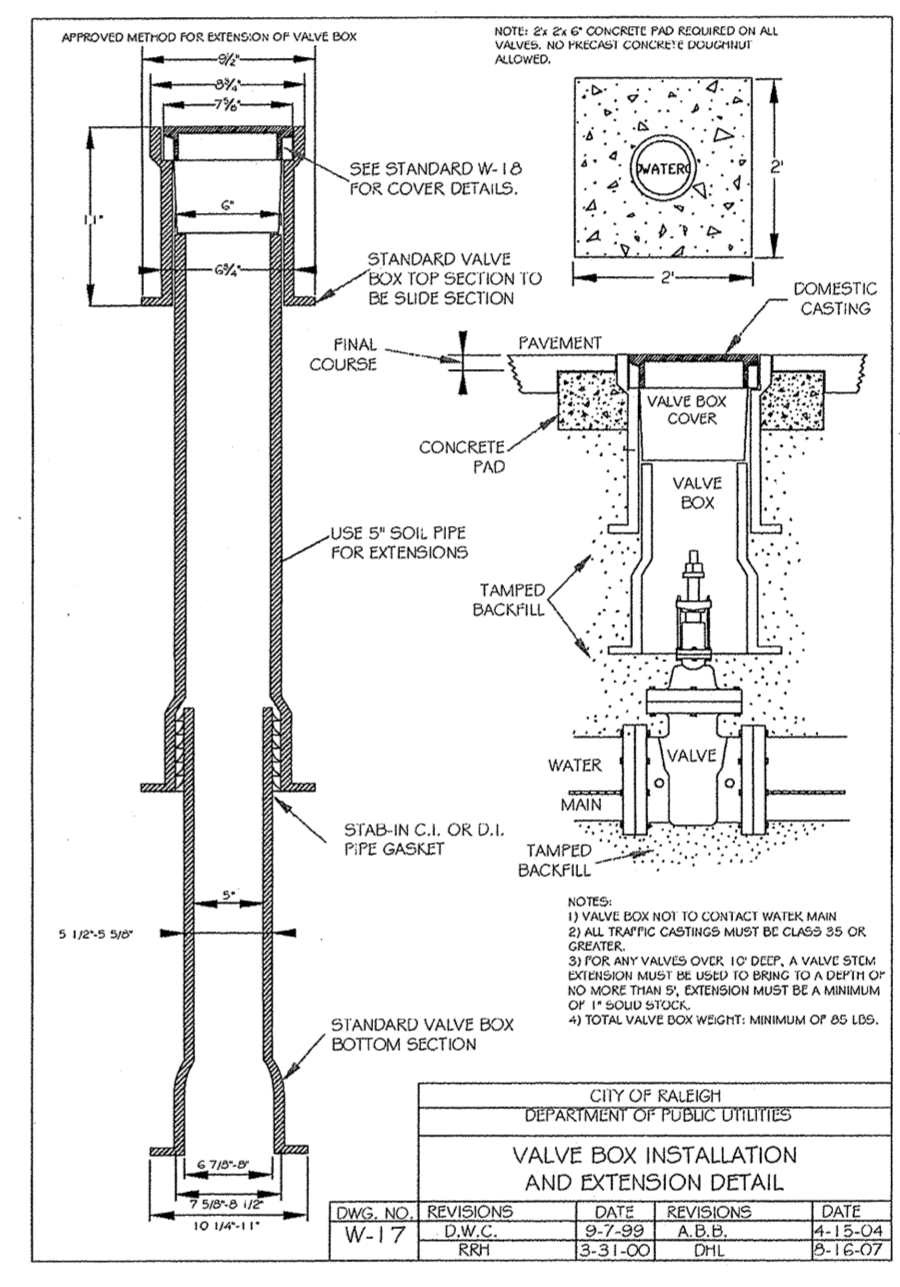
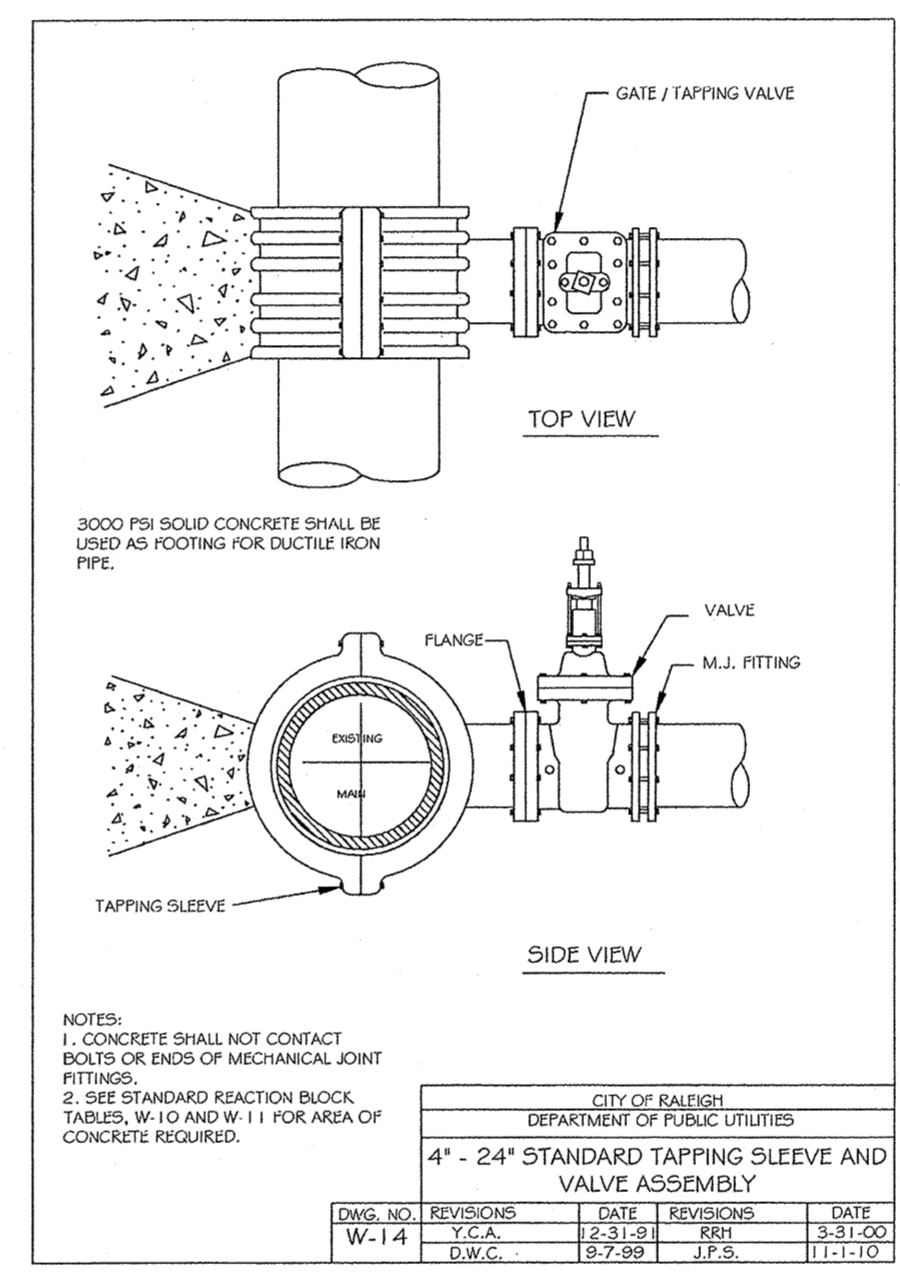
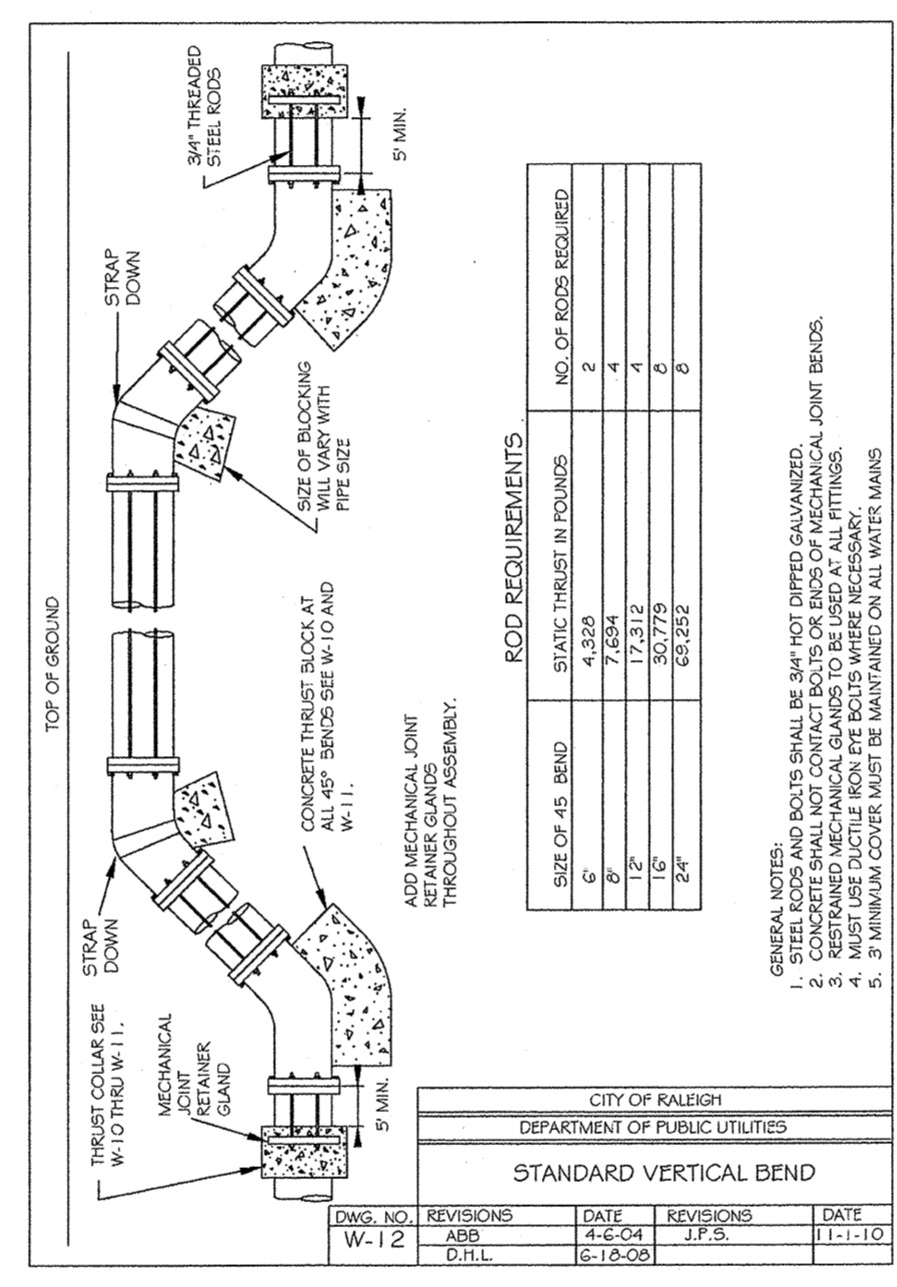
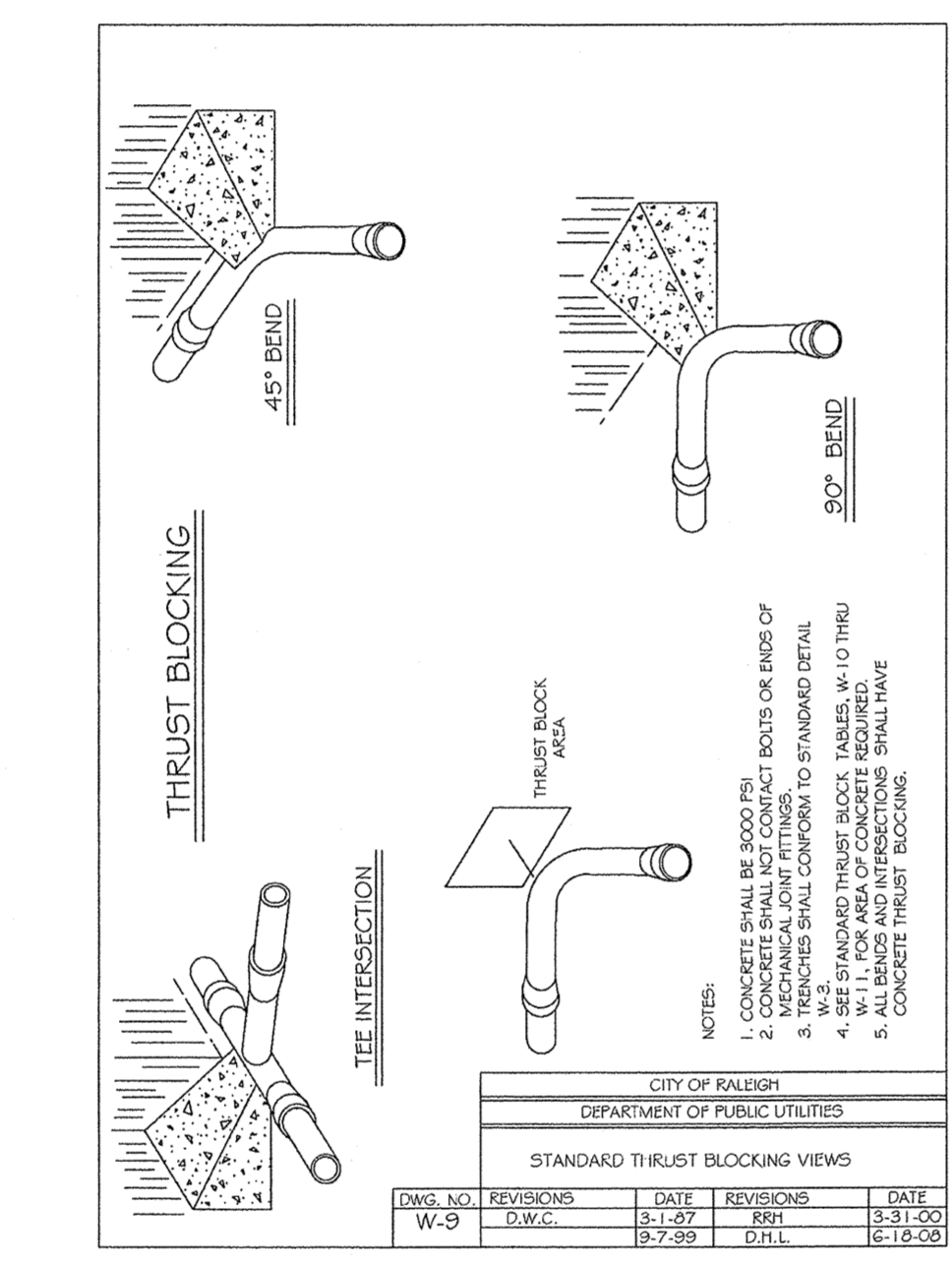
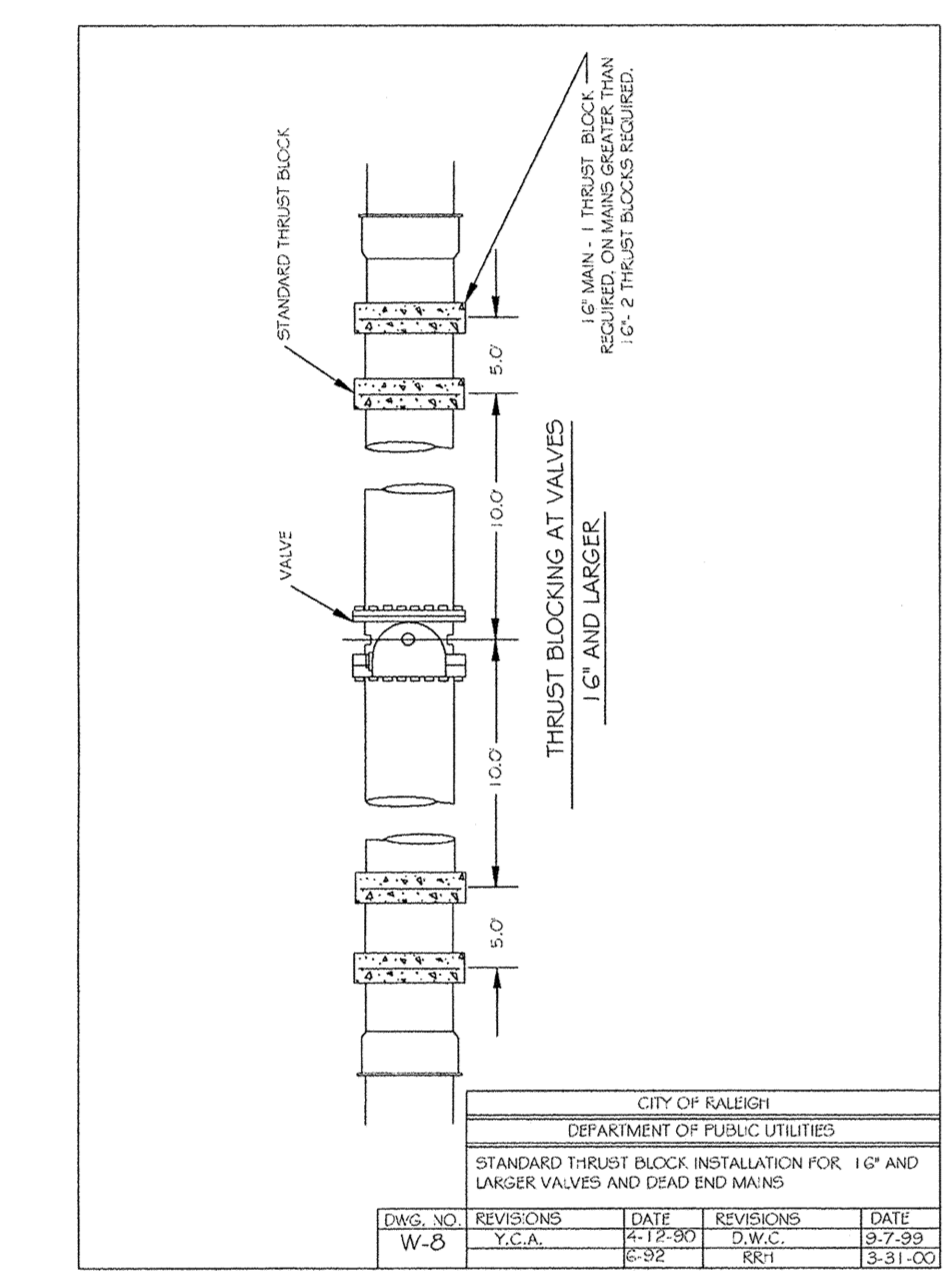
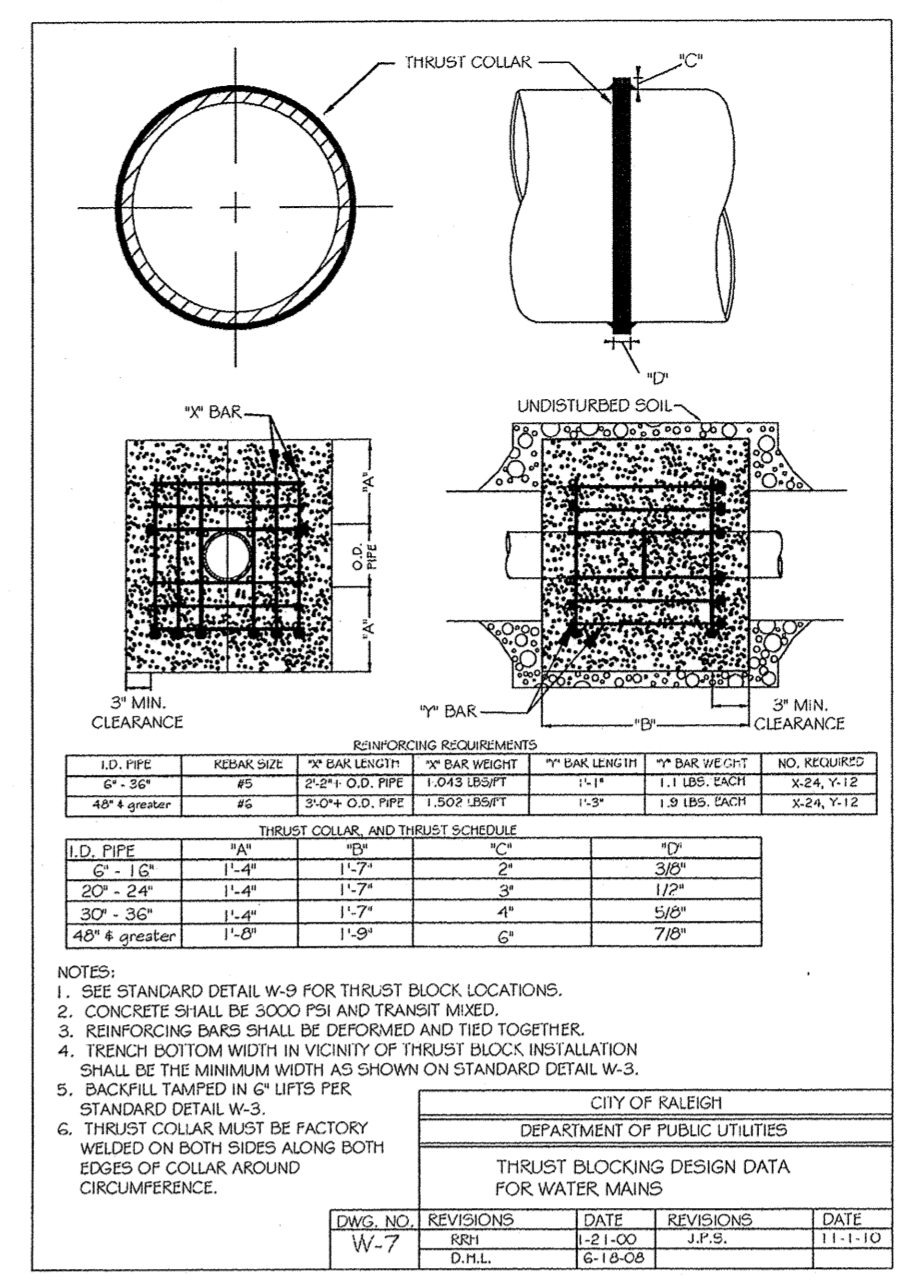
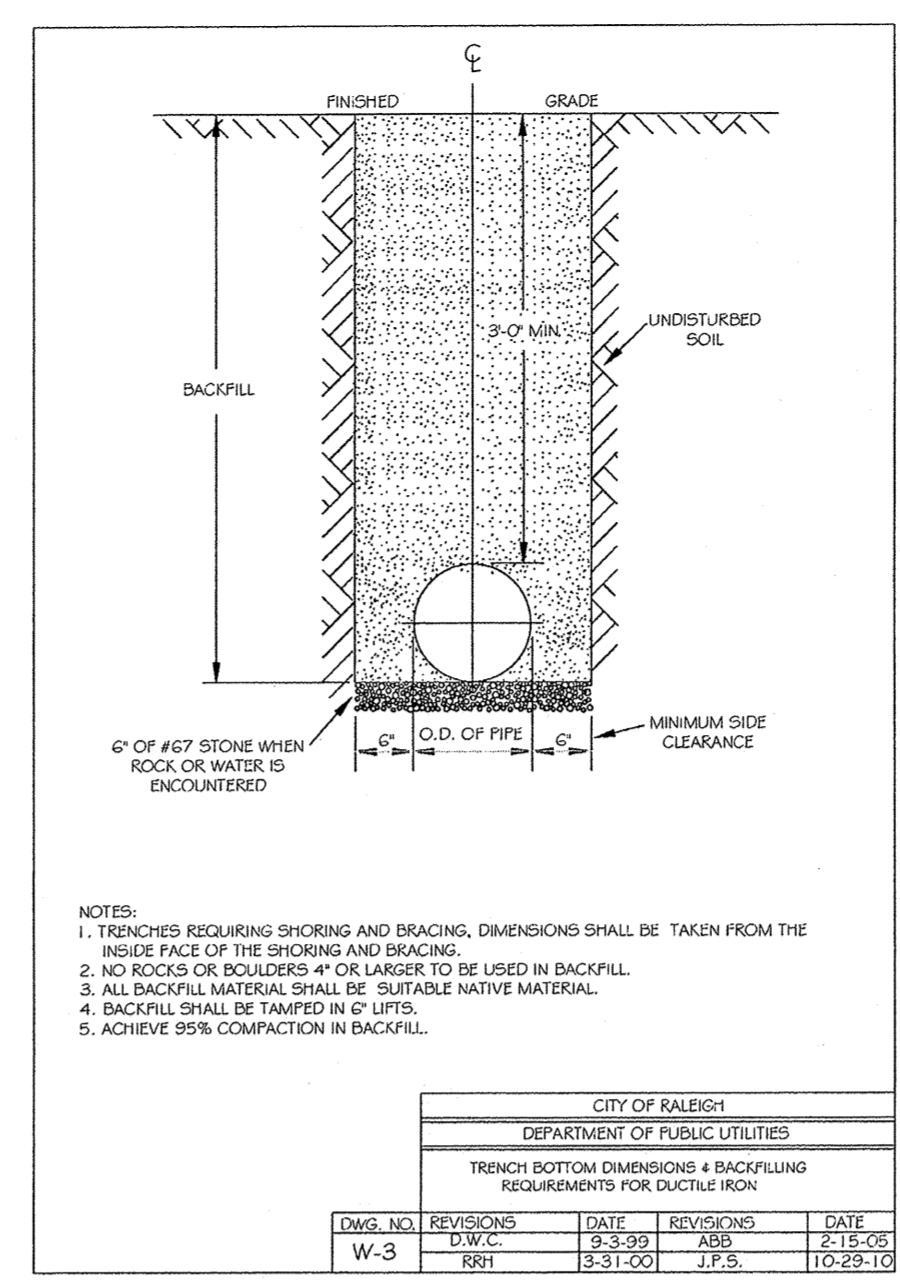
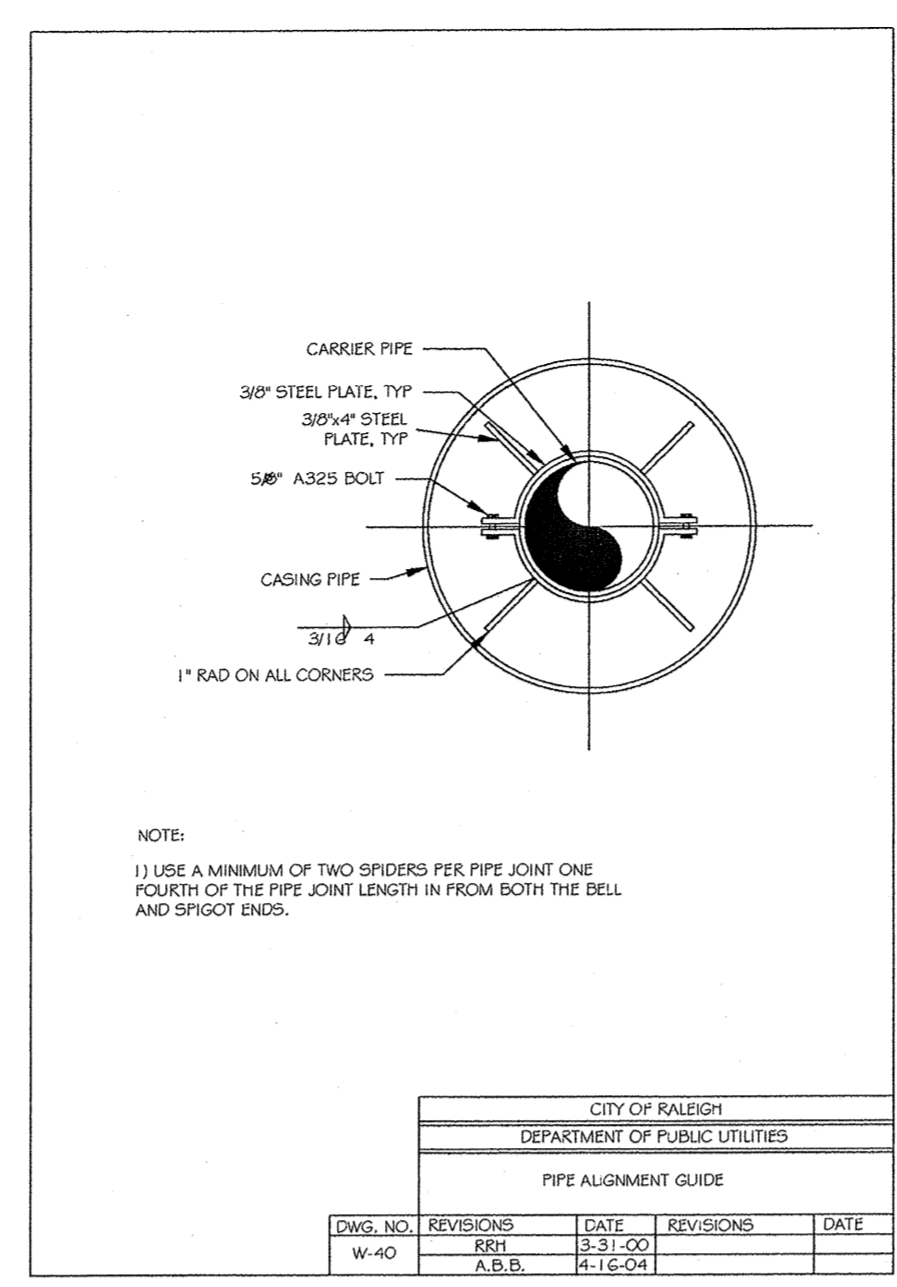
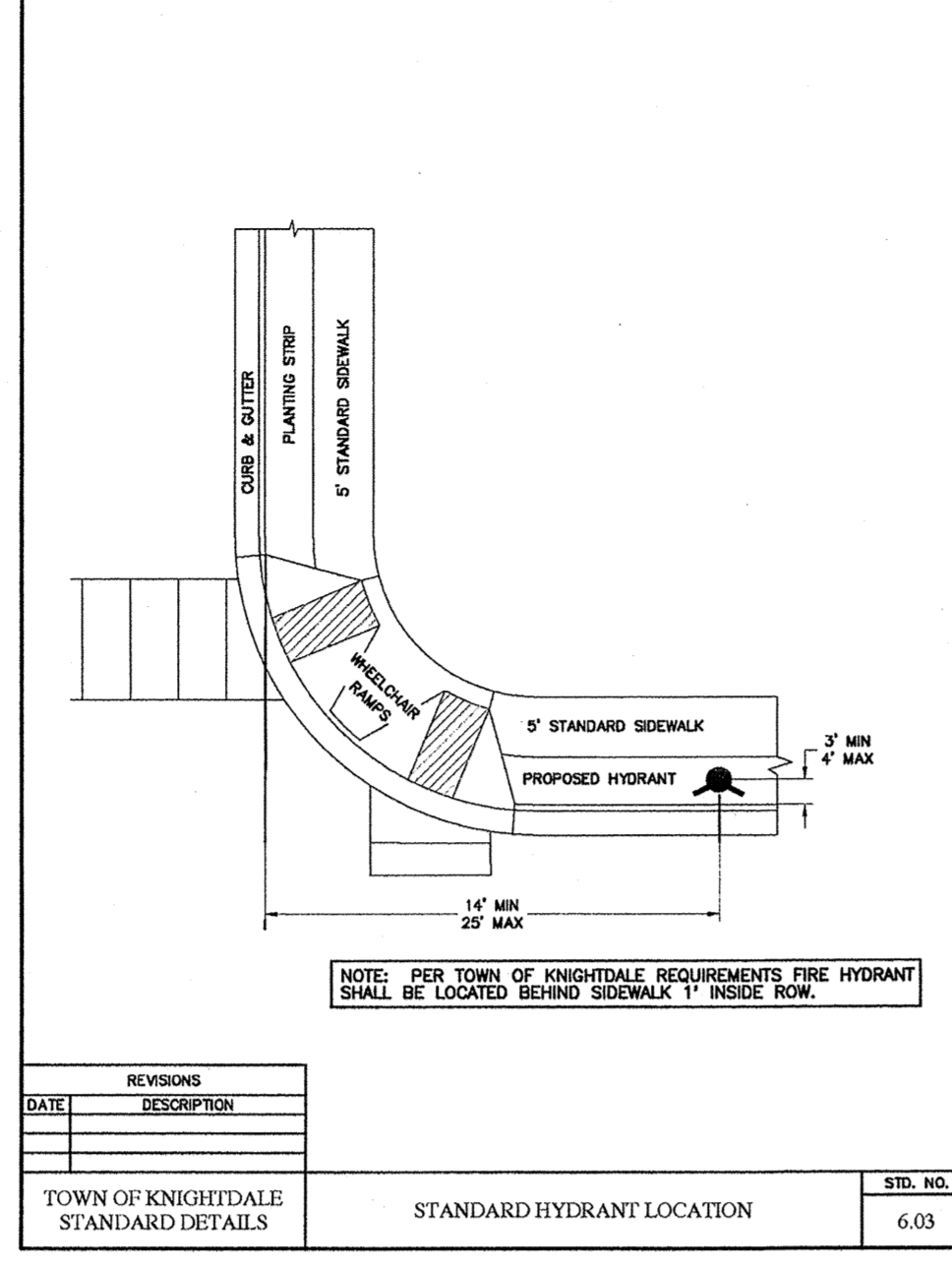
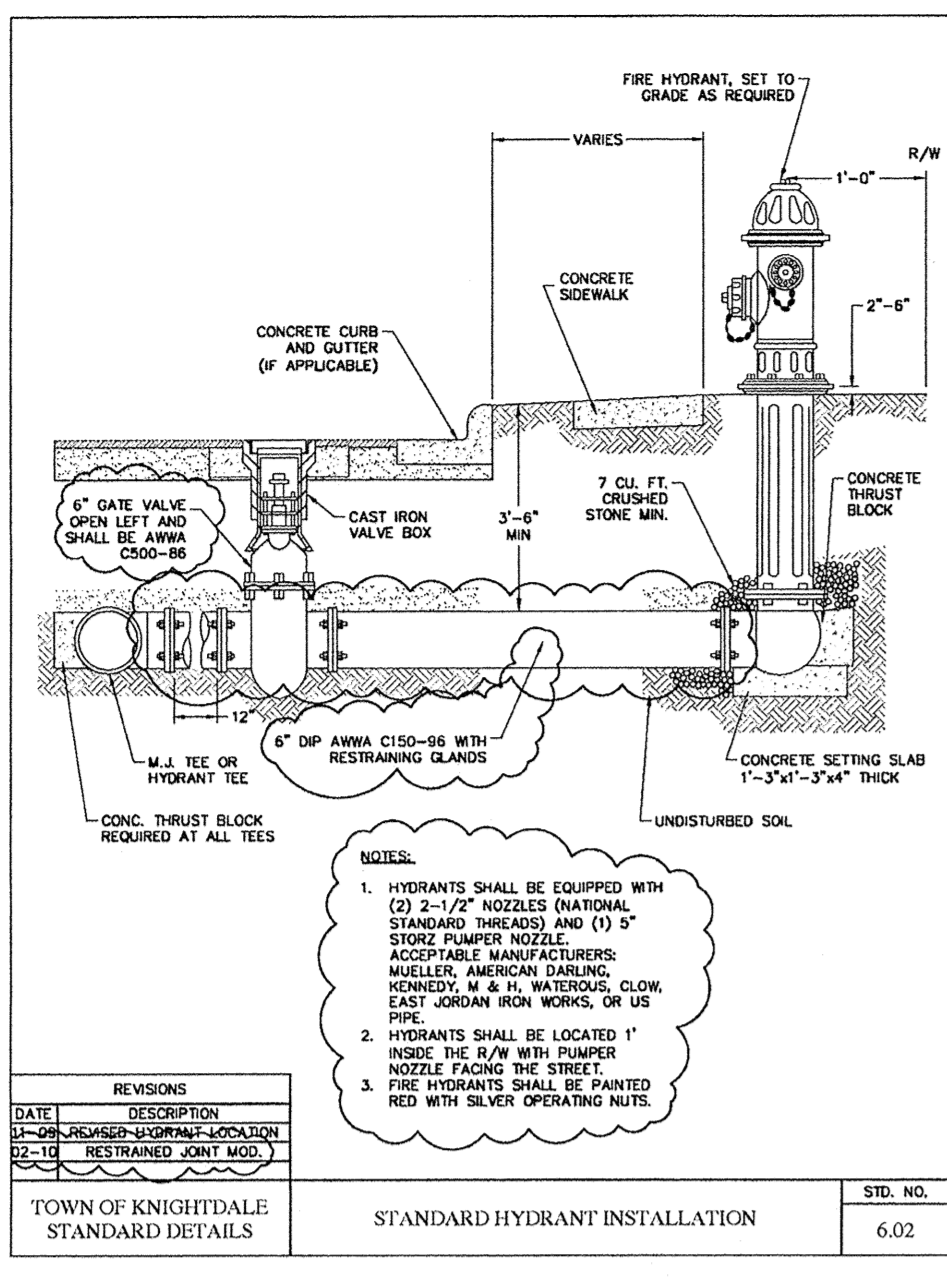
No.	Revision	Date	By	Designer	W&R	Scale	SEE SHEET
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI				
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI				
3	WAKE COUNTY EC SUBMITTAL	03/04/14	JCI				
4	WAKE COUNTY EC COMMENTS & BMP #1 & #2 REVISIONS	04/02/14	JCI				

KNIGHTDALE STATION  
PHASE R1 & R2  
WAKE COUNTY  
NORTH CAROLINA

EROSION CONTROL DETAILS

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS  
115 MacKenzie Drive Cary, North Carolina 27511 tel: 919-469-3340 www.wITHERSANDRAVENEL.COM License No. C-0832

Sheet No. **36** of **38**



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.

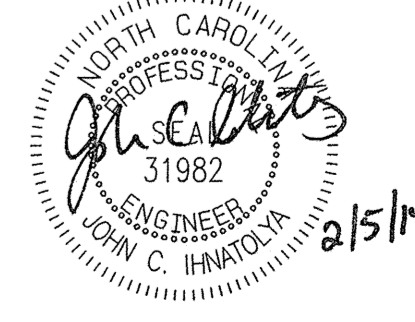
DATE: 3/5/2014

TOWN ENGINEER

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

DATE: 4.10.14

ADMINISTRATOR



No.	Revision	Date	By	Designer	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI	W&R	SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI	JCI	01/29/14

Checked By: JCI Job No: 020902513

**KNIGHTDALE STATION PHASE R1 & R2**

TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

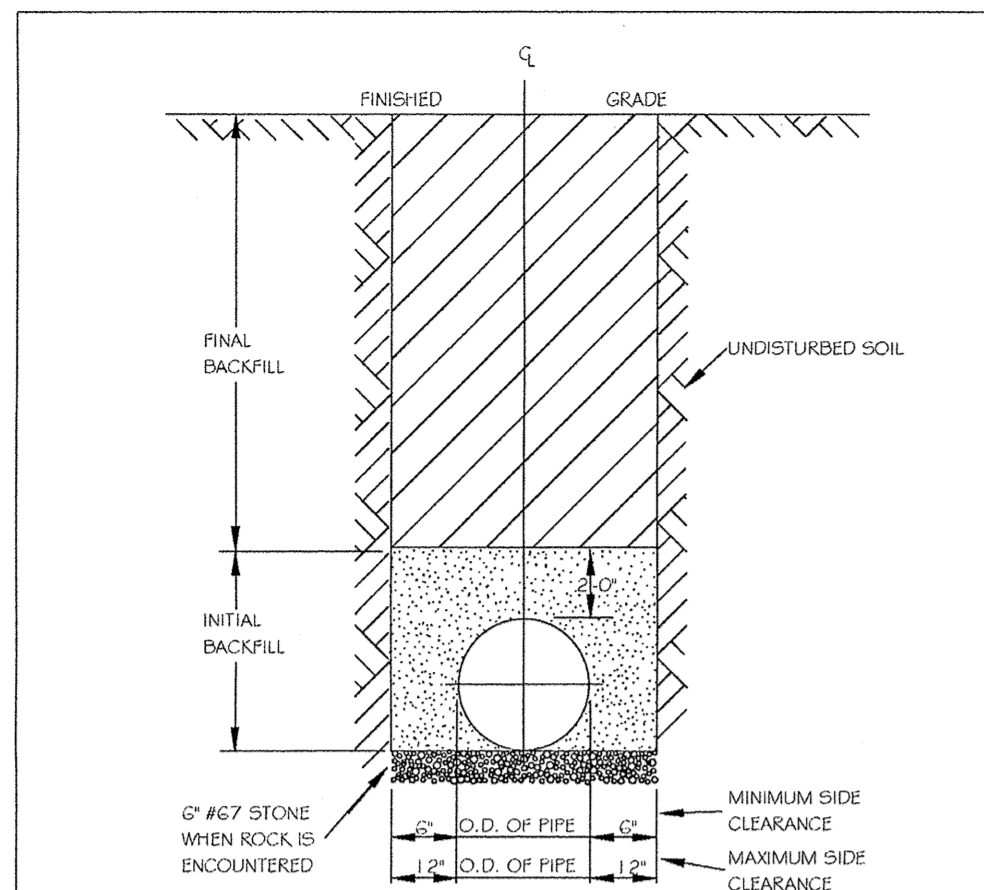
**WATER UTILITY DETAILS**

**WITHERS & RAVENEL**

ENGINEERS | PLANNERS | SURVEYORS

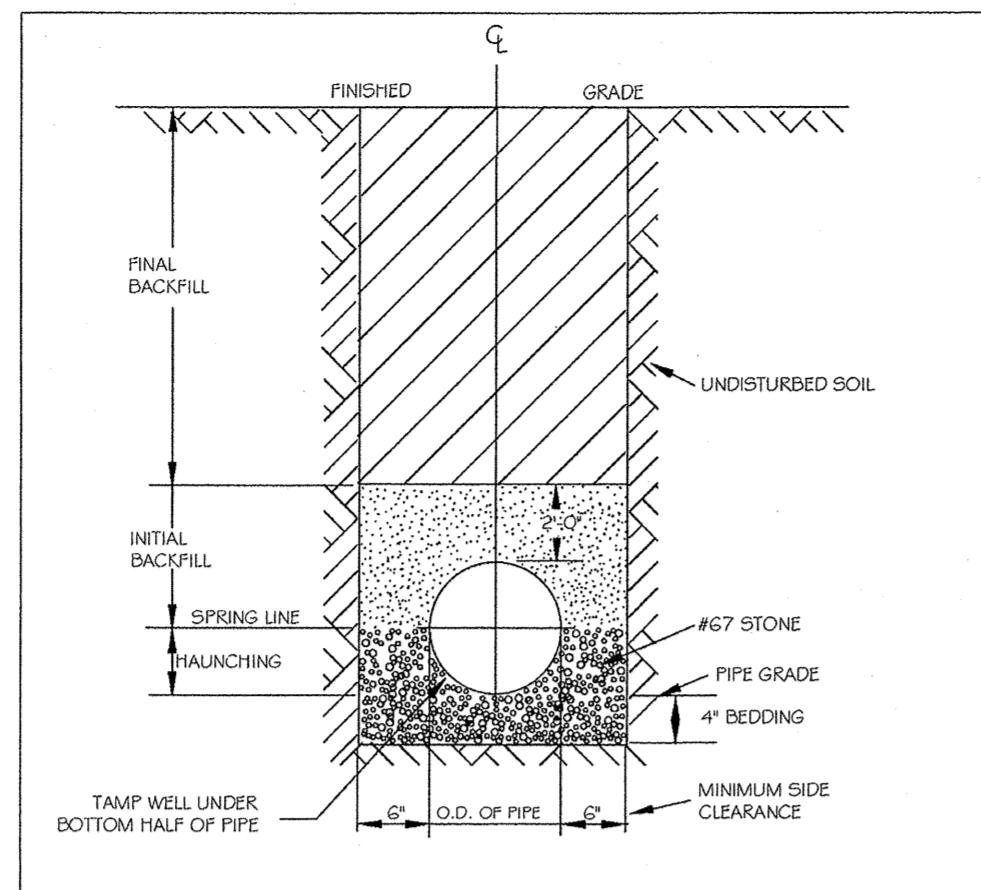
115 MacKenzie Drive Cary, North Carolina 27511 tel: 919-469-3340 www.wITHERSANDRAVENEL.COM License No. C-0632

Sheet No. 37 of 38



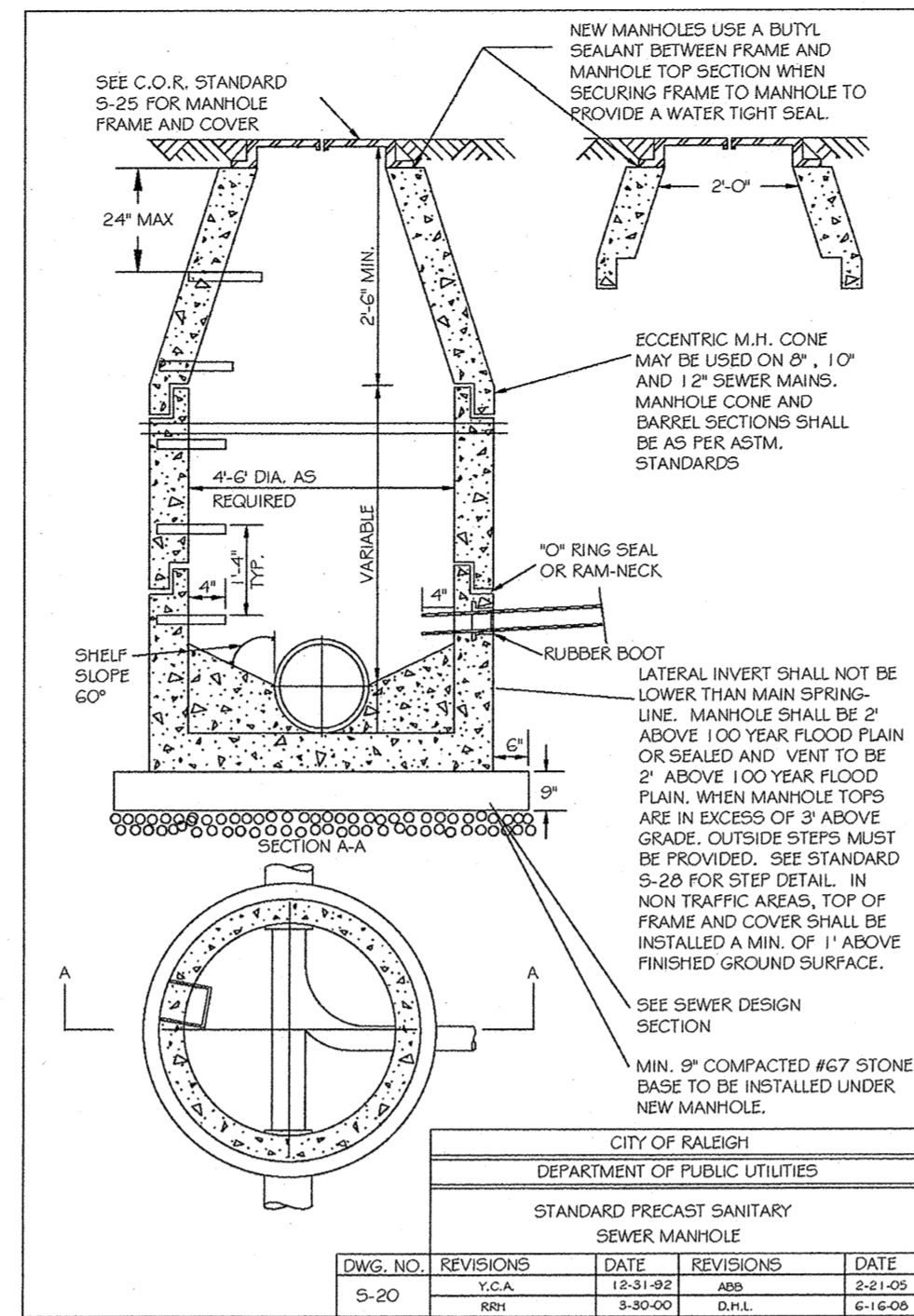
- NOTES:
1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
  2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
  3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
  4. BACKFILL SHALL BE TAMPED IN 6" LIFTS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.
  5. ACHIEVE 80% COMPACTION IN NON-TRAFFIC AREAS, AND 90% COMPACTION IN TRAFFIC AREAS.
  6. IF IN EASEMENT 4" TOPSOIL, AND 12" CLEAN SELECT FILL MAY BE REQUIRED.
  7. NO BOULDERS 6" IN DIAMETER OR GREATER ALLOWED IN FINAL BACKFILL.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS & BACKFILLING REQUIREMENTS FOR DUCTILE IRON				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-4		D.W.C.		
		RR1		3-30-00

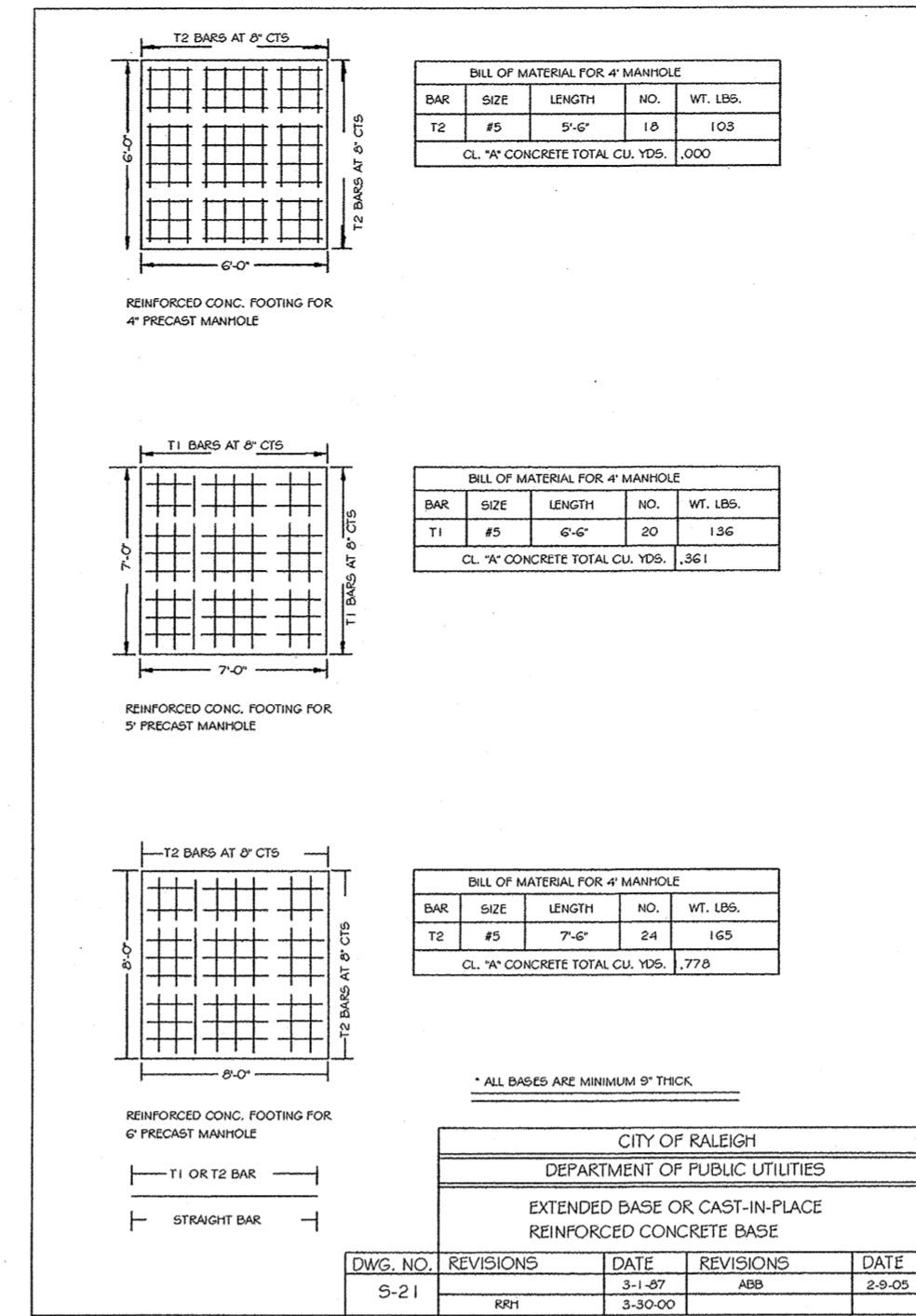


- NOTES:
1. FOR TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
  2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
  3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
  4. BACKFILL SHALL BE TAMPED IN 6" LIFTS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.

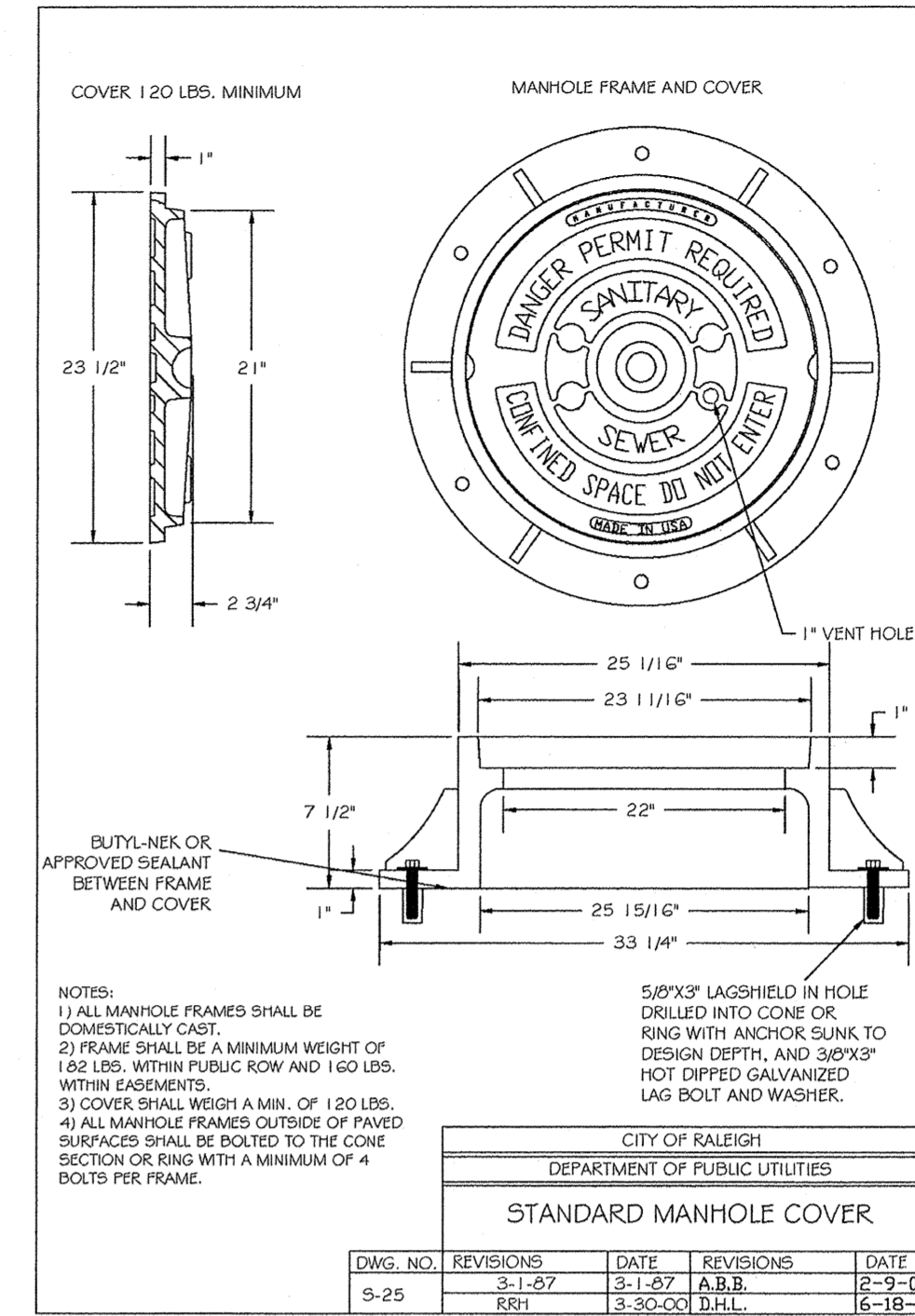
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DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS AND BACKFILLING REQUIREMENTS FOR PVC GRAVITY SEWER MAIN				
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		RR1		3-30-00



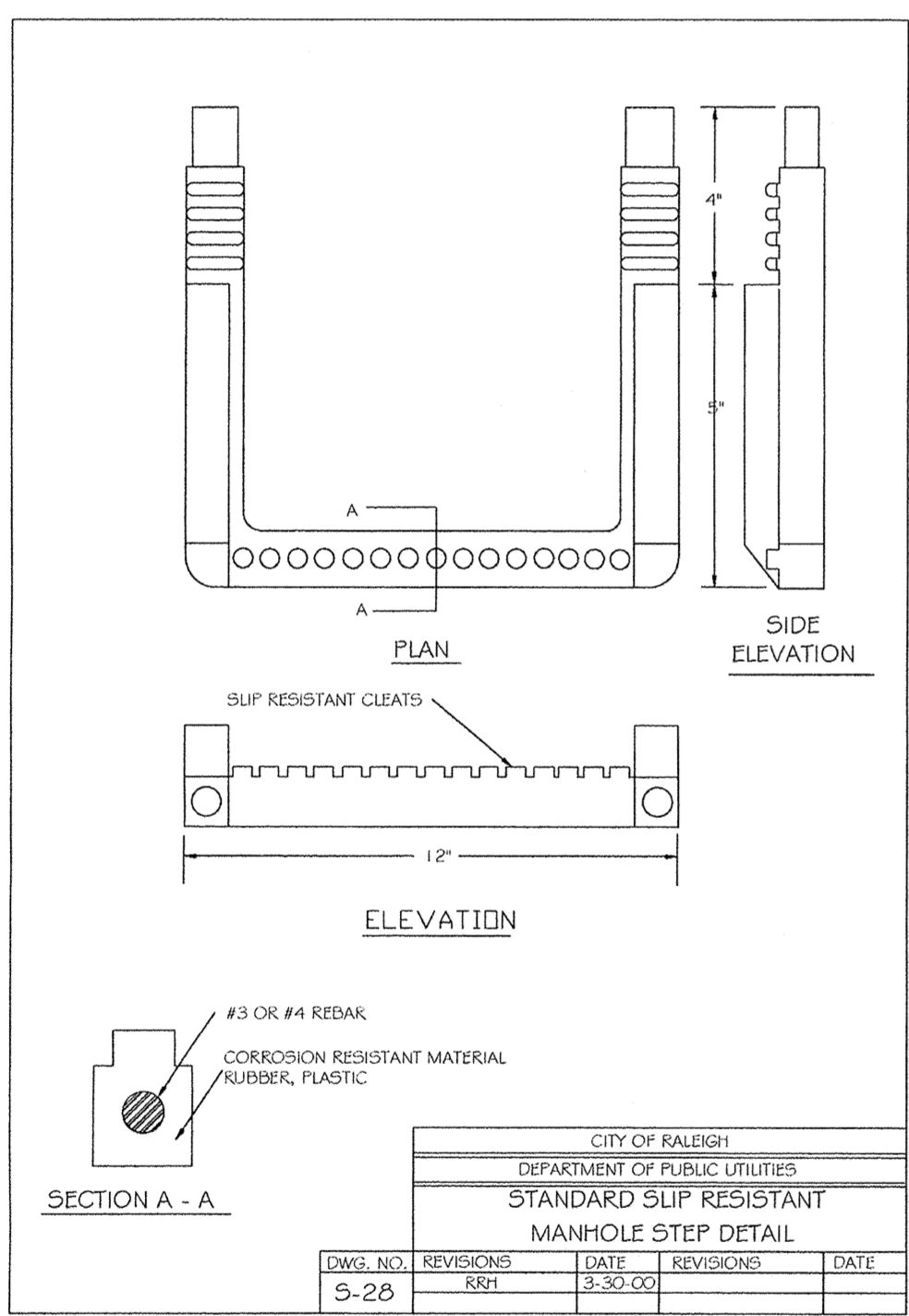
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DEPARTMENT OF PUBLIC UTILITIES				
STANDARD PRECAST SANITARY SEWER MANHOLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-20		Y.C.A.		
		RR1		3-30-00
		D.H.L.		6-16-08



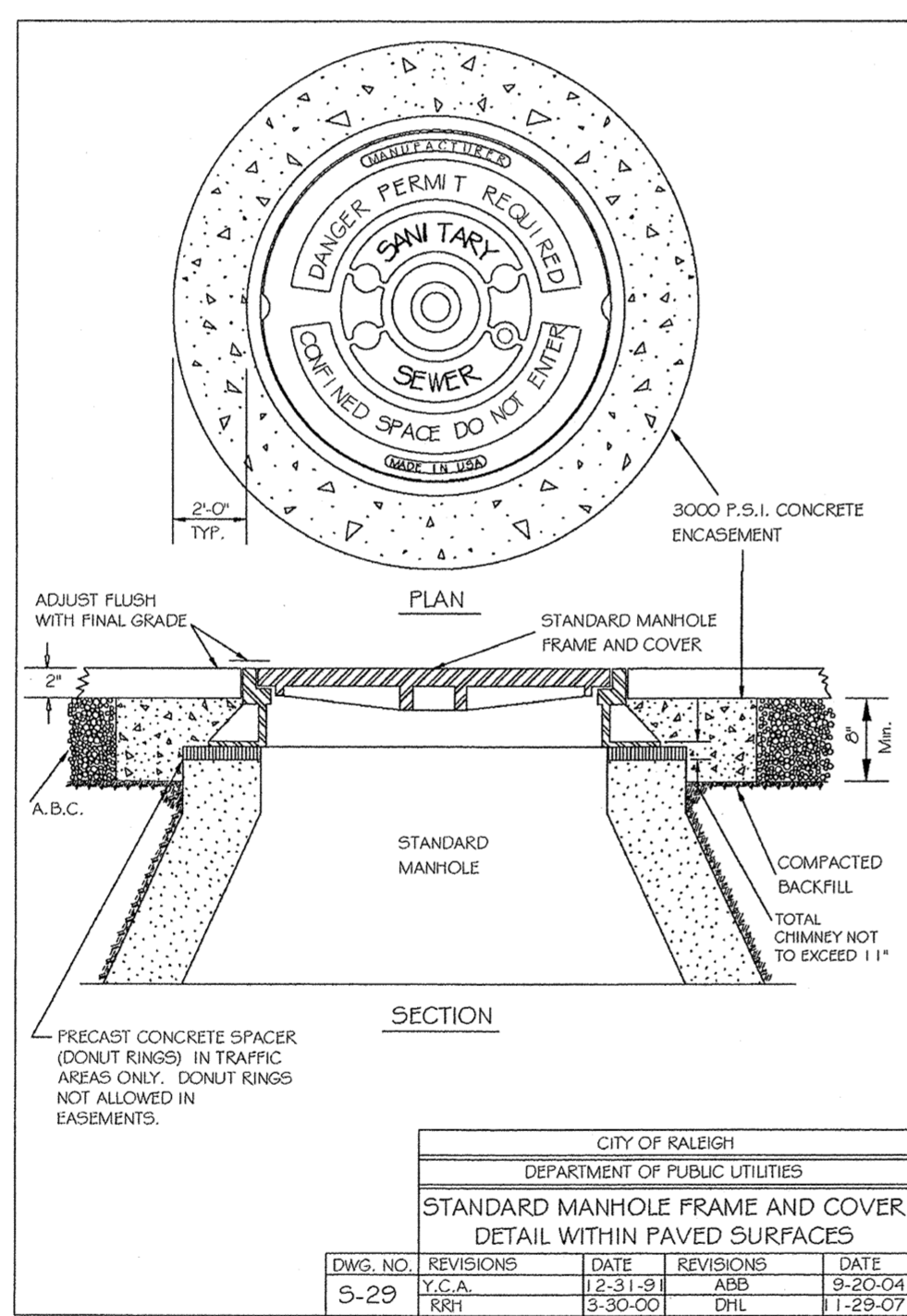
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
EXTENDED BASE OR CAST-IN-PLACE REINFORCED CONCRETE BASE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-21		D.W.C.		
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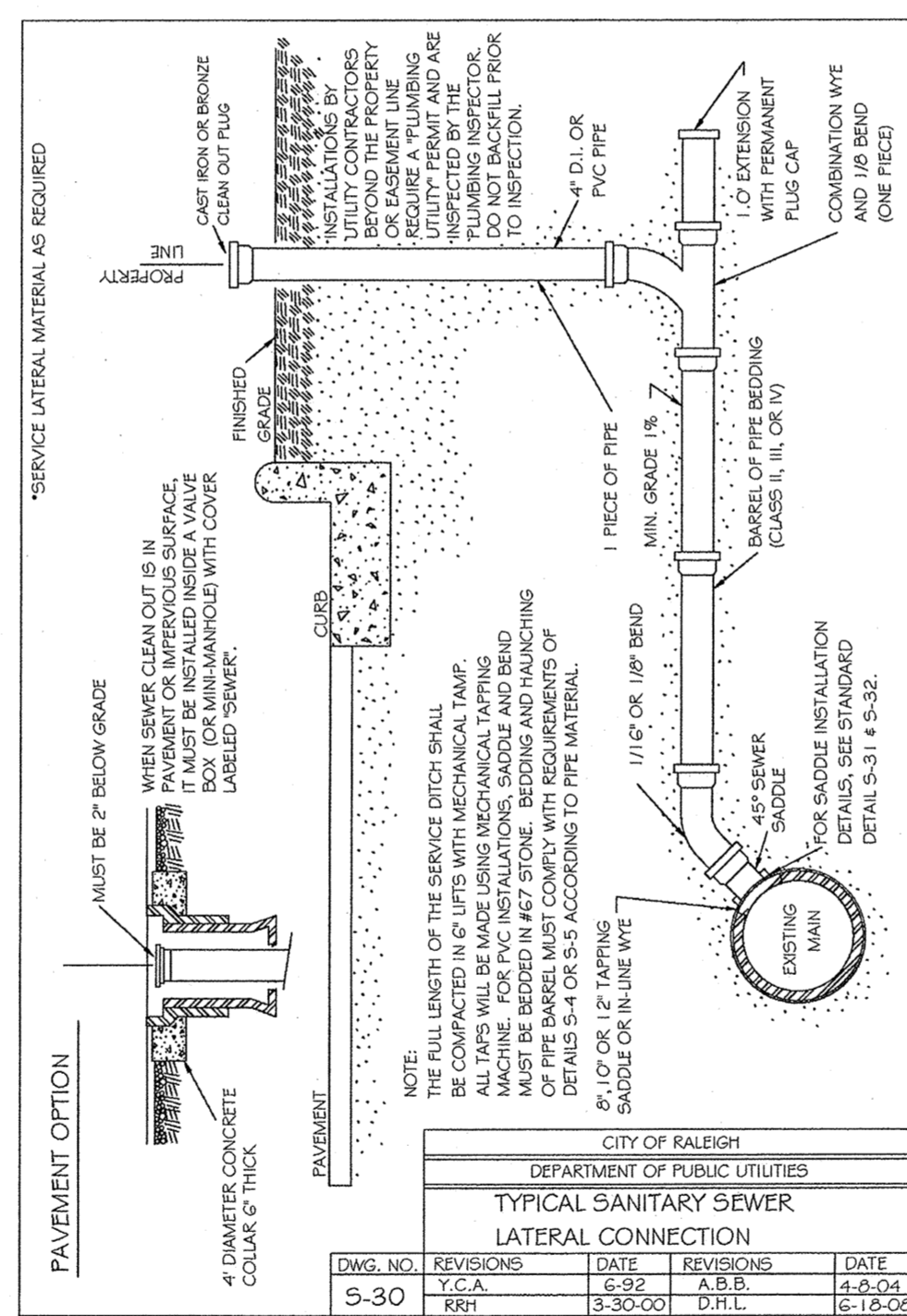
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DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE COVER				
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S-25		3-1-07		
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		D.H.L.		6-18-08



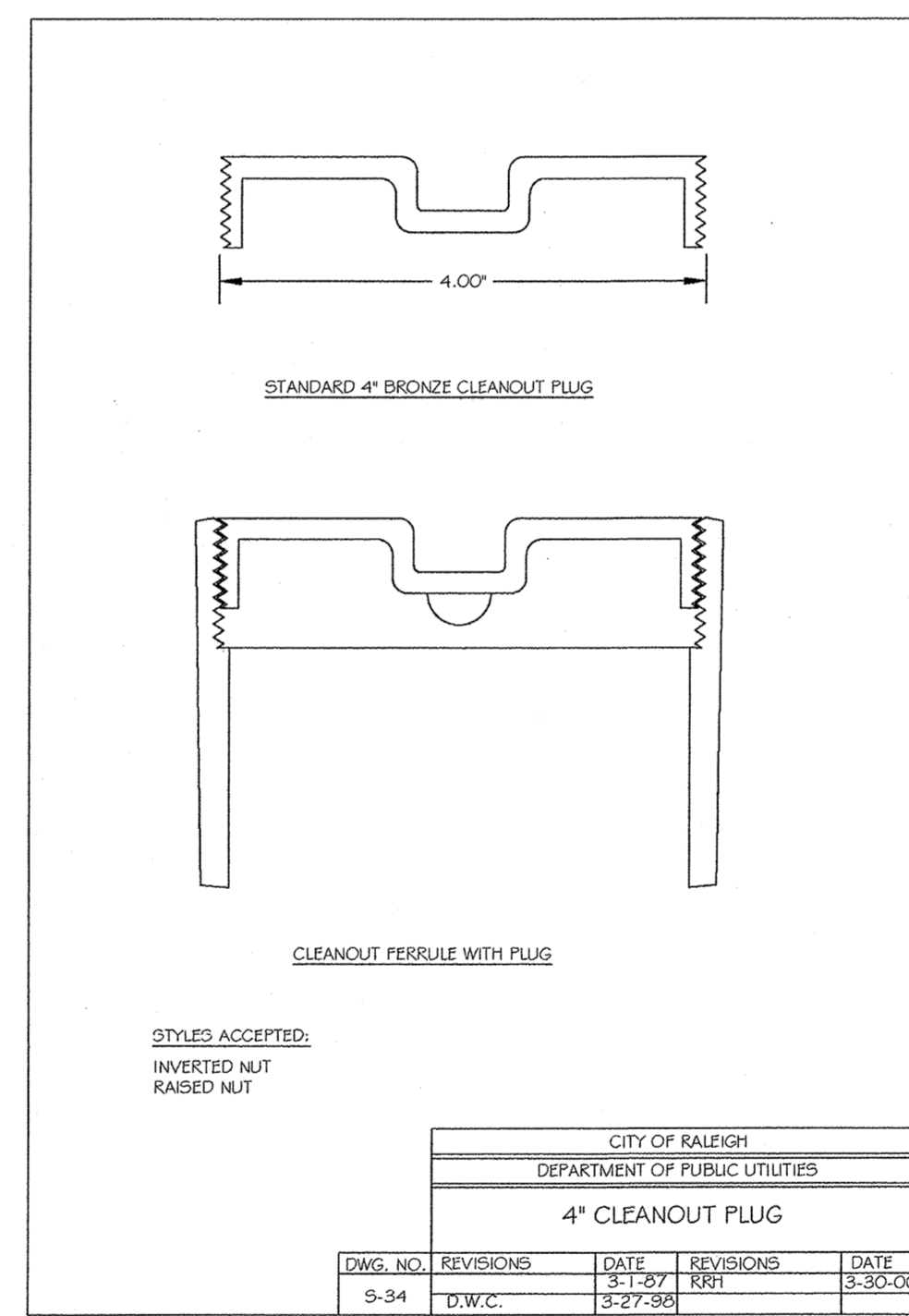
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DEPARTMENT OF PUBLIC UTILITIES				
STANDARD SLIP RESISTANT MANHOLE STEP DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-28		RR1		3-30-00



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE FRAME AND COVER DETAIL WITHIN PAVED SURFACES				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-29		Y.C.A.		
		RR1		3-30-00
		D.H.L.		11-29-07



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL SANITARY SEWER LATERAL CONNECTION				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-30		Y.C.A.		
		RR1		3-30-00
		D.H.L.		6-16-08



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
4\"/>				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-34		D.W.C.		
		RR1		3-27-96

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: 3/5/2014  
TOWN ENGINEER

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

BY: *[Signature]* DATE: 4/10/14  
ADMINISTRATOR

JOHN C. HANTON  
REGISTERED PROFESSIONAL ENGINEER  
31982  
2/5/14

K:\03\03-0250\030251-3-Draws\csh-knightdale-ph.1 & 2-COA-PLAN-SET.dwg, 6/11/2014 11:38:10 AM, WITHERS & RAVENEL, INC.

No.	Revision	Date	By	Designer	Scale
1	RESPONSE TO 1ST REVIEW COMMENTS	11/22/13	JCI	W&R	SEE SHEET
2	RESPONSE TO 2ND REVIEW COMMENTS	02/05/14	JCI		

**KNIGHTDALE STATION  
PHASE R1 & R2**

TOWN OF KNIGHTDALE      WAKE COUNTY      NORTH CAROLINA

**SEWER UTILITY DETAILS**

**WITHERS & RAVENEL**  
ENGINEERS | PLANNERS | SURVEYORS

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Sheet No. **38** of **38**