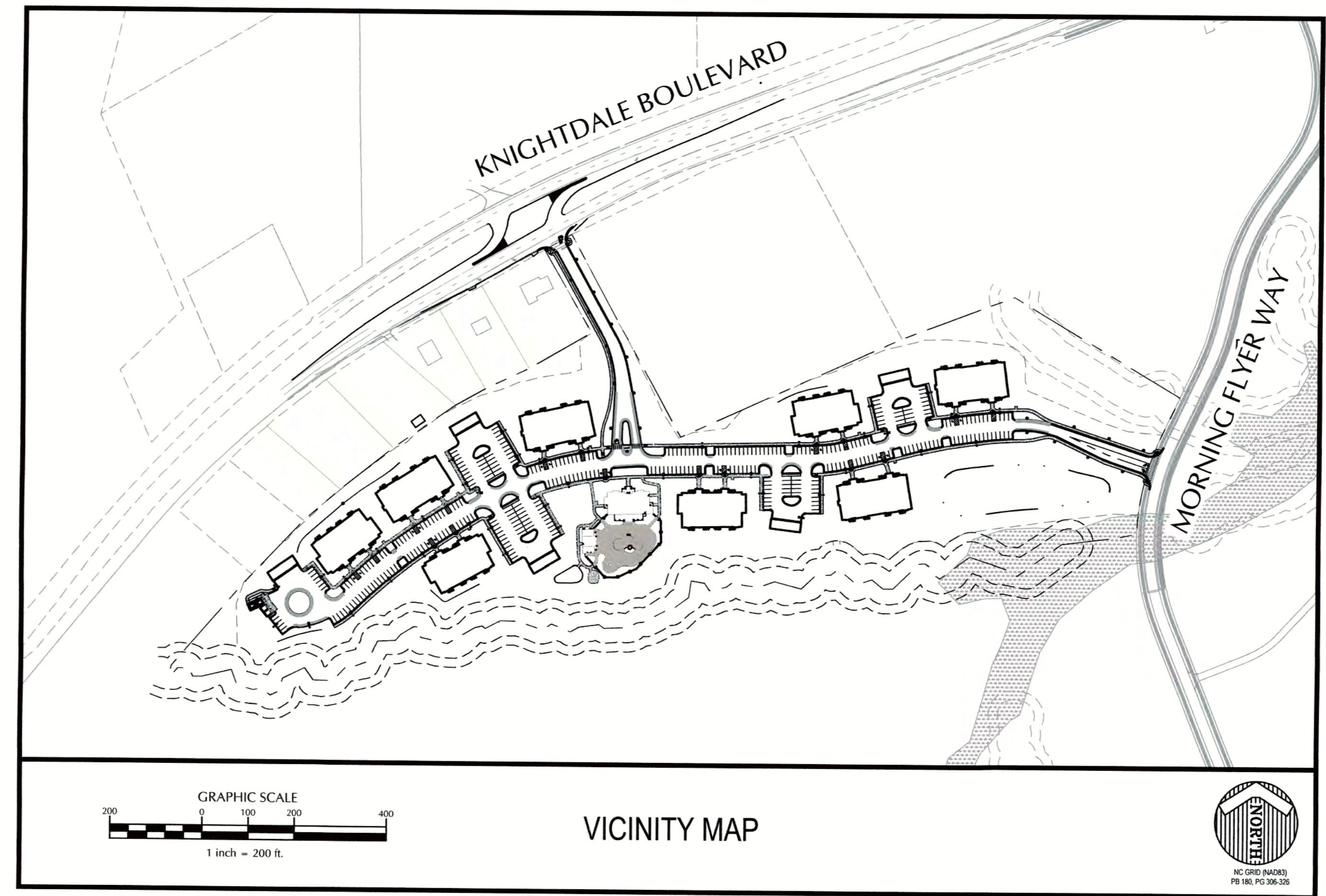


CONSTRUCTION DRAWINGS FOR THE COTTAGES AT KNIGHTDALE STATION

TOWN OF KNIGHTDALE, NC WAKE COUNTY, NC
 1st SUBMITTAL: JUNE 3, 2016 1st SUBMITTAL: AUGUST 9 2016
 2nd SUBMITTAL: SEPTEMBER 9, 2016 2nd SUBMITTAL: NOVEMBER 15, 2016
 3rd SUBMITTAL: DECEMBER 28, 2016 PERMIT SET: FEBRUARY 15, 2017
 4th SUBMITTAL: MARCH 14, 2017

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2.3	SITE PLAN EAST
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3.2	GRADING & DRAINAGE CENTRAL
3.3	GRADING & DRAINAGE EAST
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5.4	SANITARY SEWER PLAN AND PROFILE
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L2.2	LIGHTING PLAN CENTRAL
L2.3	LIGHTING PLAN EAST



Private Sewer Collection / Extension System
 The City of Raleigh consents to the connection to its public sewer system and extension of the private sewer collection system as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
 City of Raleigh Public Utilities Department Permit # S-4281 (P)
 Authorization to Construct Keith A. Jew
 Date 3/24/17

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-4280
 Authorization to Construct Keith A. Jew
 Date 3/24/17

SITE DATA TABLE	
COTTAGES AT KNIGHTDALE STATION	
CONSTRUCTION DRAWING SUBMITTAL	
ADDRESS : 0 KNIGHTDALE BOULEVARD	
PIN : 1754-87-7981	
FEMA ID: 3720175400J	
PROPERTY LOCATION: ST. MATHEWS TOWNSHIP	
ZONING DISTRICT: UR12	
OVERLAY DISTRICT: N/A	
EXISTING USE: VACANT	
PROPOSED USE: APARTMENTS	
OWNER: KNIGHTDALE INVESTORS LLC	
PO BOX 3557	
CARY, NC 27519	
PROJECT ACREAGE: 21.81± ACRES	
DEED BOOK AND PAGE: 011717, 01216	
DENSITY: 12 DU/ACRE MAX - 262 DU MAX	
24 DU/BUILDING	
192 DU PROPOSED	
BUILDING INFORMATION:	
MAXIMUM HEIGHT:	3 STORY
MINIMUM DWELLING UNIT SIZE:	800 SF
PARKING:	
REQUIRED SPACES:	360 SPACES
(1 SPACE PER BEDROOM, 360 BEDROOMS)	
PROVIDED:	362 SPACES
(357 SPACES, 5 - 5 SPACE GARAGES)	
HANDICAP PARKING (INCLUDED IN PARKING ABOVE):	
1 ACCESSIBLE SPACES REQUIRED	
18 ACCESSIBLE SPACES PROVIDED	
ALL ARE VAN ACCESSIBLE	
BICYCLE PARKING:	
REQUIRED:	20 SPACES
PROVIDED:	20 SPACES

TOWN APPROVED STANDARDS SHALL CONTROL IN THE EVENT OF A CONFLICT OR INCONSISTENCY BETWEEN THESE CONSTRUCTION DRAWINGS AND THE TOWN OF KNIGHTDALE'S APPROVED STANDARDS FOR THIS PROJECT, THE APPROVED STANDARDS SHALL CONTROL. TOWN OF KNIGHTDALE APPROVED STANDARDS SHALL MEAN ALL DEVELOPMENT DOCUMENTS NECESSARY FOR APPROVAL FOR THE PROPERTY INCLUDING, BUT NOT LIMITED TO, ANY SPECIAL USE PERMIT, SUBDIVISION PLAN, SITE PLAN, SUBDIVISION PLAT(S), PHASING SCHEDULE, DEVELOPMENT AGREEMENT, UTILITY ALLOCATION AGREEMENT, ANNEXATION AGREEMENT, THE TOWN OF KNIGHTDALE STANDARD SPECIFICATION AND DETAIL MANUAL AND APPLICABLE PROVISIONS OF THE NORTH CAROLINA STATE BUILDING CODE.

INFRASTRUCTURE QUANTITIES:	
4" DIP PRIVATE WATERLINE =	1,800 LF
8" DIP PRIVATE FIRE LINE =	1,990 LF
8" DIP PUBLIC SEWER =	1,538 LF
8" DIP PRIVATE SEWER =	197 LF
8" PVC PUBLIC SEWER =	196 LF
6" DIP PRIVATE SEWER =	74 LF

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
 THIS DRAWING 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: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
 BY: [Signature] DATE: 4-28-17
 ADMINISTRATOR

THESE IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING DRAWINGS AND WITH THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.
 I, LOFTEE SMITH, PE, CERTIFY THAT THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE HAVE BEEN THOROUGHLY CHECKED AND FOUND TO BE APPLICABLE TO THIS PROJECT.
 BY: [Signature] PE
 DATE: 5/3/17

ATTENTION CONTRACTORS
 THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.
 FAILURE TO NOTIFY BOTH CITY DEPARTMENTS IN ADVANCE OF BEGINNING CONSTRUCTION WILL RESULT IN THE ISSUANCE OF MONETARY FINES AND REQUIRE REINSTALLATION OF ANY WATER OR SEWER FACILITIES NOT INSPECTED AS A RESULT OF THIS NOTIFICATION FAILURE.
 FAILURE TO CALL FOR INSPECTION, INSTALL A DOWNSTREAM PLUG, HAVE PERMITTED PLANS ON 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.

PREPARED BY:

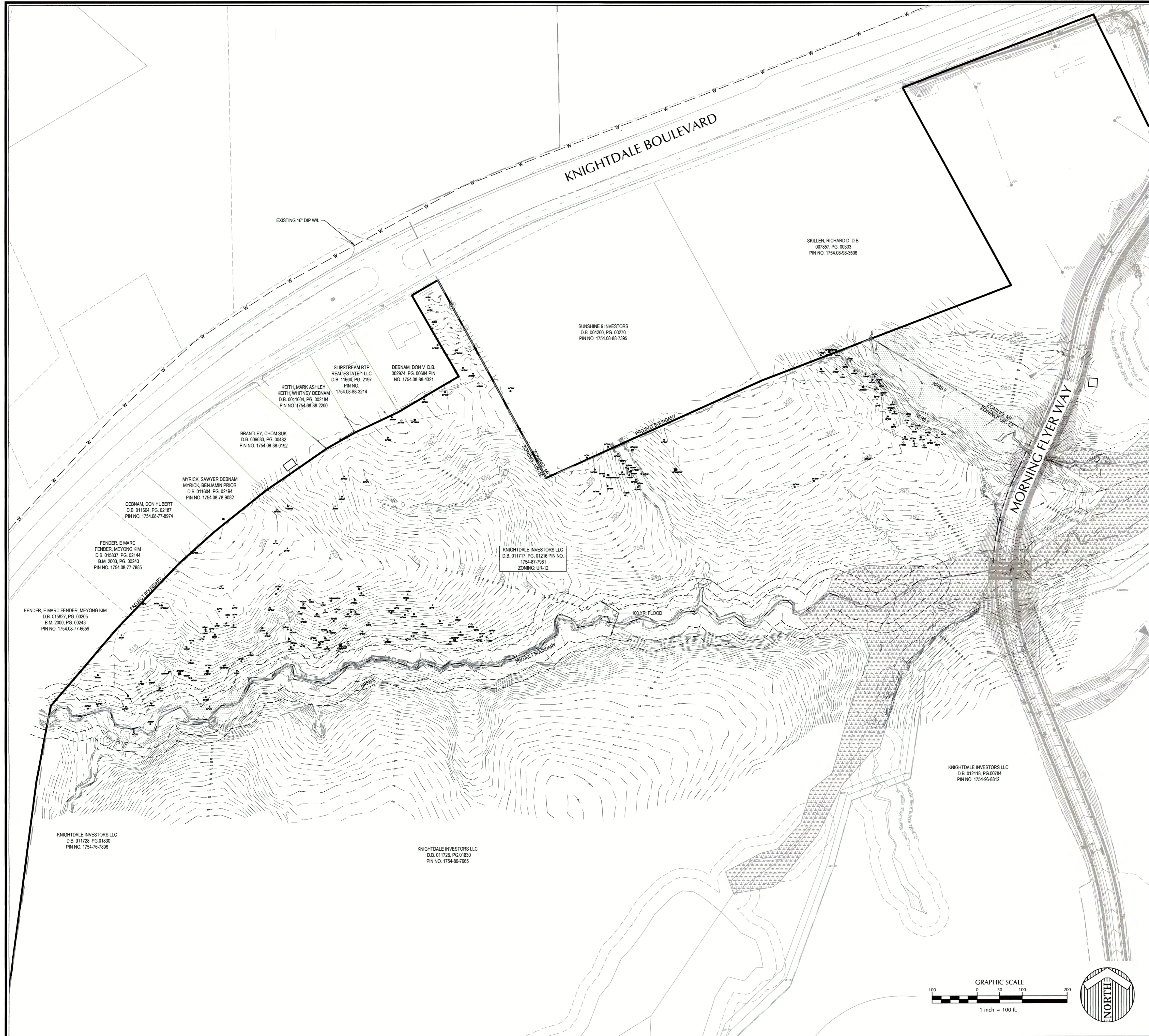
WithersRavenel
 Engineers | Planners
 131 1/2 S. Wilmington Street | Raleigh, NC 2601 | t: 919.469.3340 | license #: C-0832
 www.withersravenel.com

DEVELOPER/OWNER

Caviness & Cates, LLC
 639 Executive Place, Suite 400
 Fayetteville, NC 28305
 ATTN: WATSON CAVINESS

DESCRIPTION	EXISTING	PROPOSED
1' CONTOUR INTERVAL	---	---
5' CONTOUR INTERVAL	---	---
PROPERTY LINE	---	---
ROADWAY CENTERLINE	---	---
RIGHT OF WAY LIMITS	---	---
EASEMENT LINE	---	---
CURB & GUTTER	---	---
SANITARY SEWER FACILITIES	SS	SS
STORM SEWER FACILITIES	SS	SS
WATERLINE	W	W
FIRE HYDRANT ASSEMBLY	FD	FD
FENCING STRUCTURE	XX	XX
WOODSLINE	---	N/A
WATERWAYS	---	---
TREE PROTECTION FENCE	N/A	TP
# PARKING SPACES	N/A	#
FIBER OPTIC LINE	FO	---
POOL DRAIN	---	---





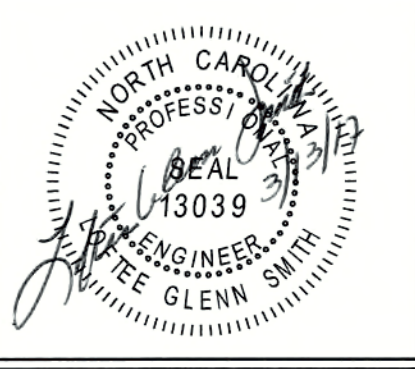
- EXISTING CONDITION NOTES:**
1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL CONFORM TO TOWN OF KNIGHTDALE STANDARDS AND SPECIFICATIONS.
 2. BOUNDARY AND EXISTING SITE INFORMATION BY WITHERSRAVENEL.
 3. TOPOGRAPHIC INFORMATION WITHERSRAVENEL.
 4. WETLAND AND NEUSE RIVER BUFFER DELINEATIONS WERE DETERMINED BY WITHERSRAVENEL.
 5. THE ZONING BOUNDARIES INTERPOLATED FROM WAKE COUNTY IMAPS AND SHOULD BE CONSIDERED APPROXIMATE.
 6. PROPERTY IS NOT LOCATED IN 100 YEAR FLOODPLAIN AS SHOWN ON FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAPS #3720175300J (EFFECTIVE DATE MAY 2, 2006). PROPERTY IS LOCATED WITHIN FLOOD ZONE X.



THE COTTAGES AT KNIGHTDALE STATION
KNIGHTDALE, NORTH CAROLINA

EXISTING CONDITIONS PLAN

Job No.	02160032	Drawn By	CDT
Date	04/03/2016	Designer	WR



Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

Sheet No.
1.0

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION HELD HARMLESS: N/A
PUBLIC UTILITIES: K.A. Jew 3/24/16
FORMWASER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN-FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: 4-21-2017
DEVELOPMENT SERVICES ENGINEER







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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

K:\16\16-0001\160012-Knightdale Station Cottages\CADD\011 - EXISTING CONDITIONS.dwg, Sunday, March 13, 2017 3:15:27 PM - TOWNSEND, CHARLIE

TREE LEGEND

TREE DESCRIPTION

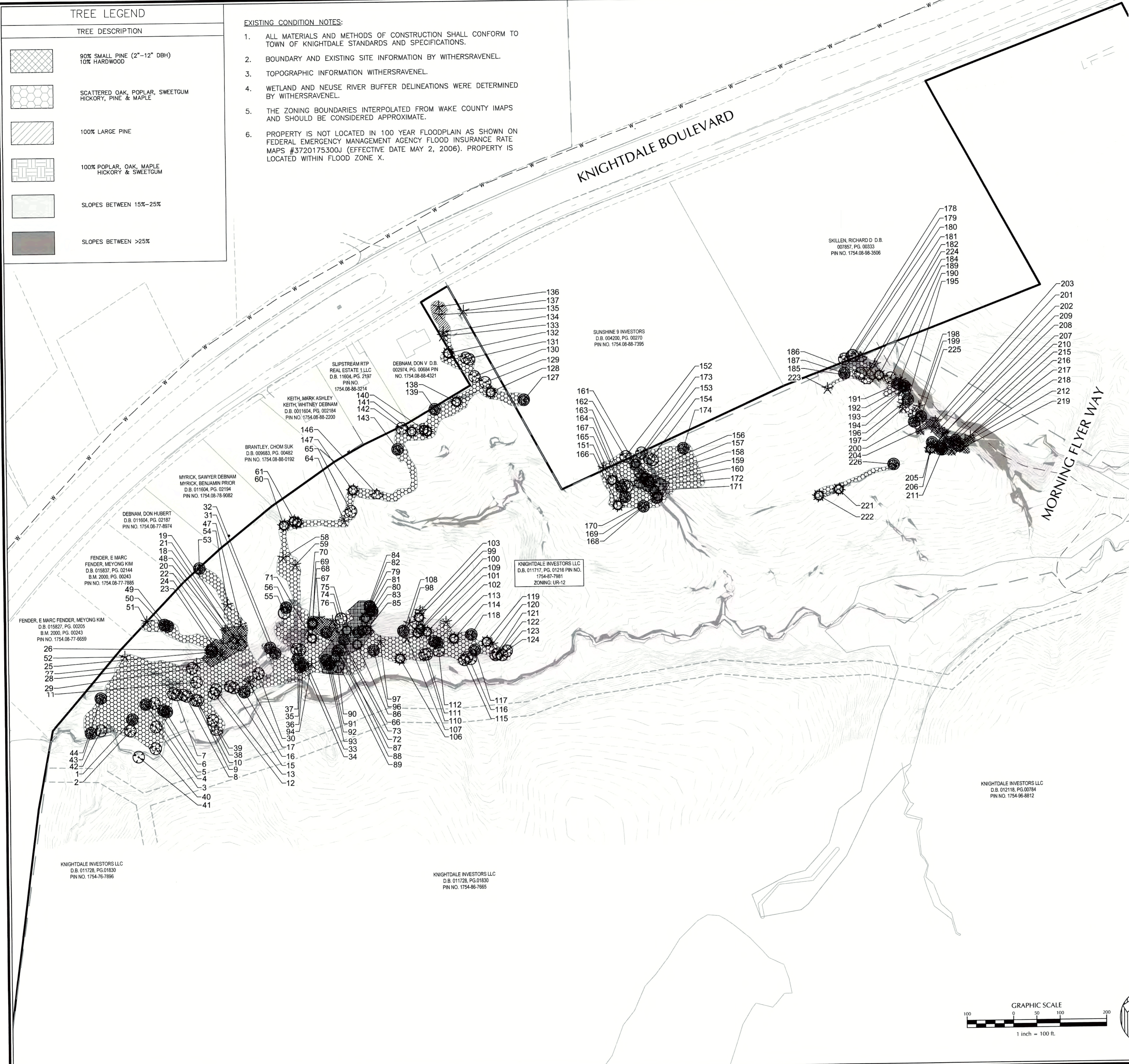
-  90% SMALL PINE (2"-12" DBH)
10% HARDWOOD
-  SCATTERED OAK, POPLAR, SWEETGUM
HICKORY, PINE & MAPLE
-  100% LARGE PINE
-  100% POPLAR, OAK, MAPLE
HICKORY & SWEETGUM
-  SLOPES BETWEEN 15%-25%
-  SLOPES BETWEEN >25%

EXISTING CONDITION NOTES:

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL CONFORM TO TOWN OF KNIGHTDALE STANDARDS AND SPECIFICATIONS.
2. BOUNDARY AND EXISTING SITE INFORMATION BY WITHERSRAVENEL.
3. TOPOGRAPHIC INFORMATION WITHERSRAVENEL.
4. WETLAND AND NEUSE RIVER BUFFER DELINEATIONS WERE DETERMINED BY WITHERSRAVENEL.
5. THE ZONING BOUNDARIES INTERPOLATED FROM WAKE COUNTY IMAPS AND SHOULD BE CONSIDERED APPROXIMATE.
6. PROPERTY IS NOT LOCATED IN 100 YEAR FLOODPLAIN AS SHOWN ON FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAPS #3720175300J (EFFECTIVE DATE MAY 2, 2006). PROPERTY IS LOCATED WITHIN FLOOD ZONE X.

KNIGHTDALE BOULEVARD

MORNING FLYER WAY



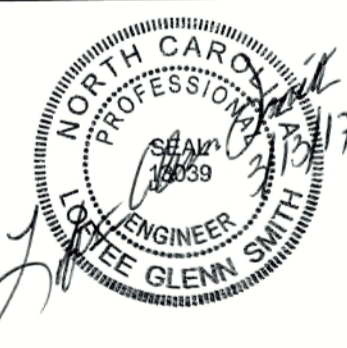
Existing Tree Inventory		Existing Tree Inventory		Existing Tree Inventory		Existing Tree Inventory	
Point	Description	Point	Description	Point	Description	Point	Description
1	12" OAK	60	26" GUM	122	12" POP	190	12" PN
2	14" POP	61	14" TWGUM	123	12" POP	191	12" OAK
3	20" POP	64	24" PN	124	12" POP	192	12" OAK
4	14" OAK	65	24" POP	127	34" OAK	193	12" HK
5	12" POP	66	12" PN	128	26" GUM	194	24" PN
6	10" TPOAK	67	12" PN	129	24" POP	195	18" OAK
7	8" TWPOAK	68	12" GUM	130	22" POP	196	12" PN
8	8" TWPOAK	69	12" GUM	131	12" TWPOAK	197	12" PN
9	12" POP	70	14" PN	132	24" GUM	198	18" PN
10	14" POP	71	12" GUM	133	28" PN	199	8" TWMP
11	12" POP	72	14" OAK	134	24" PN	200	12" OAK
12	8" TRPOAK	73	12" PN	135	24" PN	201	12" PN
13	12" POP	74	12" SOURWOOD	136	24" PN	202	14" PN
14	12" POP	75	14" GUM	137	24" PN	203	18" PN
15	12" TWPOAK	76	12" OAK	138	24" GUM	204	12" PN
16	16" OAK	77	12" OAK	139	28" OAK	205	12" OAK
17	12" HK	78	12" OAK	140	12" TWGUM	206	14" GUM
18	12" POP	79	12" OAK	141	24" GUM	207	12" OAK
19	16" PN	80	12" OAK	142	30" POP	208	14" PN
20	12" POP	81	12" GUM	143	24" OAK	209	14" PN
21	14" PN	82	12" GUM	144	24" OAK	210	14" OAK
22	12" PN	83	12" GUM	145	24" MPL	211	12" OAK
23	16" PN	84	12" OAK	146	24" MPL	212	14" PN
24	12" HK	85	12" GUM	147	24" GUM	213	14" PN
25	12" POP	86	12" GUM	148	16" PN	214	18" OAK
26	16" OAK	87	14" POP	149	20" POP	215	18" OAK
27	12" PN	88	14" OAK	150	12" GUM	216	18" OAK
28	14" PN	89	12" GUM	151	10" TWPOAK	217	12" PN
29	12" POP	90	12" POP	152	12" MPL	218	12" PN
30	12" POP	91	14" POP	153	14" GUM	219	12" PN
31	12" OAK	92	12" OAK	154	12" POP	220	24" GUM
32	12" OAK	93	12" OAK	155	14" GUM	221	24" GUM
33	18" POP	94	12" PN	156	12" POP	222	24" PN
34	14" POP	95	12" OAK	157	14" POP	223	24" PN
35	14" OAK	96	12" PN	158	10" TWGUM	224	24" PN
36	12" OAK	97	14" PN	159	14" OAK	225	24" OAK
37	12" OAK	98	12" PN	160	12" POP	226	24" OAK
38	24" MPL	99	12" GUM	161	14" POP		
39	24" POP	100	12" GUM	162	14" POP		
40	36" POP	101	12" GUM	163	10" TWGUM		
41	24" POP	102	12" GUM	164	14" OAK		
42	24" POP	103	14" PN	165	12" GUM		
43	30" OAK	104	14" PN	166	14" GUM		
44	24" OAK	105	12" GUM	167	16" OAK		
45	24" PN	106	20" GUM	168	14" OAK		
46	24" PN	107	14" PN	169	18" POP		
47	24" PN	108	16" OAK	170	12" GUM		
48	24" PN	109	12" GUM	171	12" GUM		
49	12" TWGUM	110	12" POP	172	12" POP		
50	24" PN	111	14" POP	173	12" POP		
51	18" TRPN	112	12" POP	174	24" OAK		
52	28" PN	113	12" POP	175	14" POP		
53	24" OAK	114	12" TWGUM	176	12" SOURWOOD		
54	24" PN	115	12" GUM	177	14" MPL		
55	12" SOURWOOD	116	12" POP	178	18" MPL		
56	12" OAK	117	10" TWPOAK	179	18" PN		
57	24" PN	118	12" GUM	180	14" GUM		
58	24" PN	119	12" OAK	181	16" GUM		
59	24" PN	120	12" OAK	182	12" MPL		
		121	12" PN	183	18" POP		
				184	12" OAK		
				185	12" POP		
				186	12" POP		
				187	12" POP		
				188	12" POP		
				189	12" POP		
				190	12" POP		
				191	12" POP		
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				222	12" POP		
				223	12" POP		
				224	12" POP		
				225	12" POP		
				226	12" POP		



THE COTTAGES AT KNIGHTDALE STATION
ENVIRONMENTAL SURVEY

ENVIRONMENTAL SURVEY

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



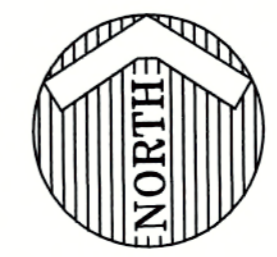
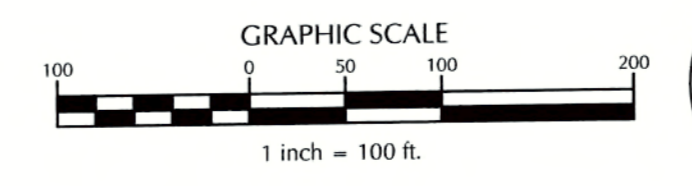
Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

Sheet No. 1.1

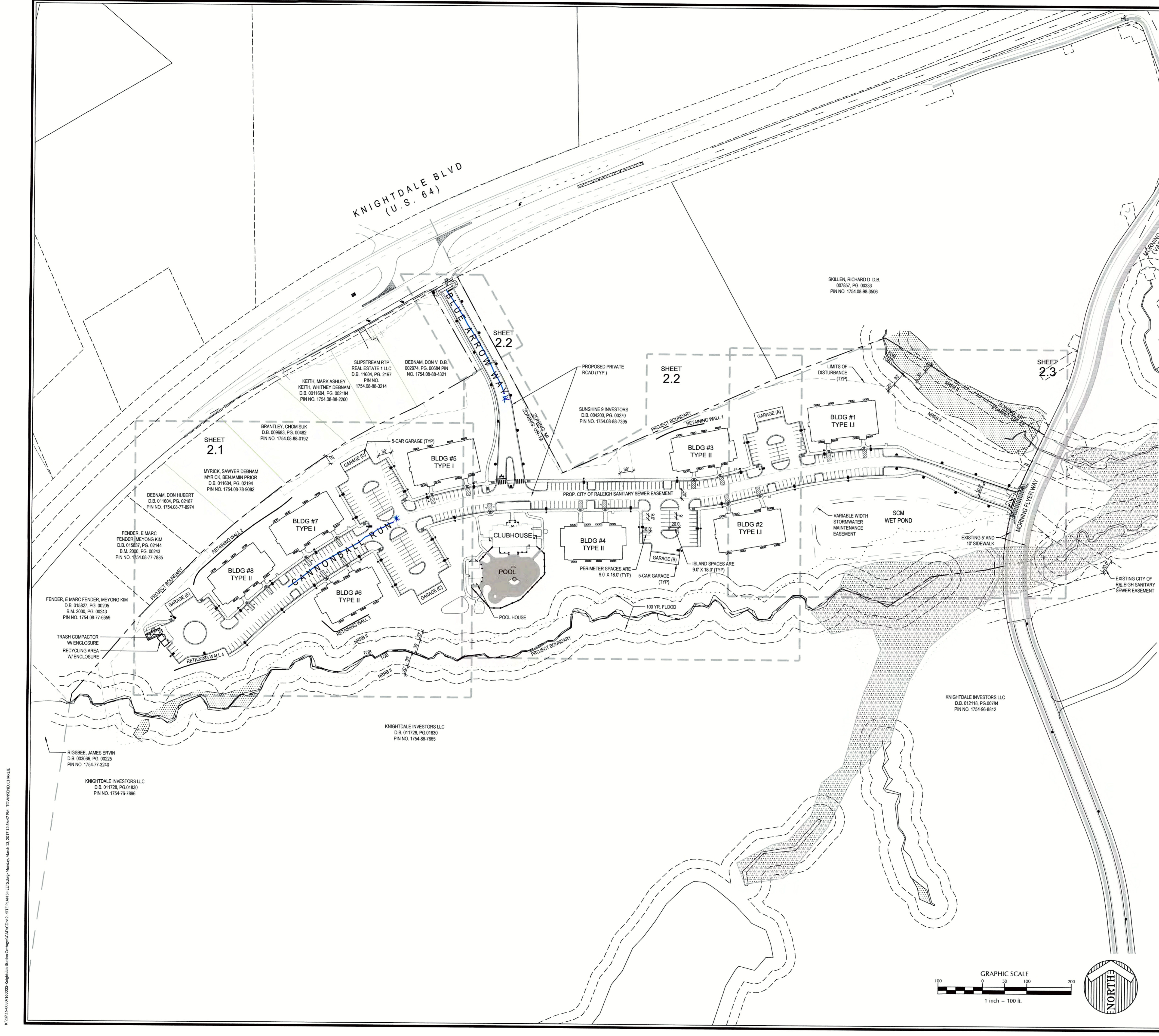
CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

- TRANSPORTATION FIELD SERVICES: N/A
- PUBLIC UTILITIES: N/A
- GEOTECHNICAL: N/A
- PLANNING/ZONING: N/A
- HR: N/A
- URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
THIS DRAWING 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: *S.M. All* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
BY: *Chad C...* DATE: 4-28-17
ADMINISTRATOR



K:\1614-00001\00023-Knightdale Station Cottages\CD\CD\11 - ENVIRONMENTAL SURVEY.dwg - Sunday, March 12, 2017 3:17:05 PM - TOWNING, CHAMBER



- DEVELOPMENT NOTES:**
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE CONSTRUCTION DETAILS.
 - THE CLUBHOUSE SHALL BE AT LEAST 1,200 SF AND INCLUDE MEN'S AND WOMEN'S CHANGING ROOM/RESTROOMS WITH SHOWERS, MECHANICAL ROOM, SEPARATE CHEMICAL STORAGE ROOM AND A COMMUNITY MEETING SPACE.
 - ALL BICYCLE PARKING SHALL BE LOCATED WITHIN BUILDING BREEZEWAYS UNLESS OTHERWISE NOTED.

SITE DATA TABLE

COTTAGES AT KNIGHTDALE STATION
SITE PLANS

ADDRESS: 0 KNIGHTDALE BOULEVARD
PIN: 1754-87-7881

PROPERTY LOCATION: ST. MATHEWS TOWNSHIP
ZONING DISTRICT: UR12
EXISTING USE: VACANT
PROPOSED USE: APARTMENTS

OWNER: KNIGHTDALE INVESTORS LLC
PO BOX 3557
CARY, NC 27519

DEEDED ACREAGE: 32.43± ACRES
PROJECT ACREAGE: 21.80± ACRES
DEED BOOK AND PAGE: 011717, 01216

DENSITY: 12 DU/ACRE MAX - 262 DU MAX
24 DUBUILDING
192 DU PROPOSED

BUILDING INFORMATION:
MAXIMUM HEIGHT: 45'
MINIMUM DWELLING UNIT SIZE: 800 SF

PARKING:
REQUIRED SPACES: 360 SPACES (1 SPACE PER BEDROOM, 360 BEDROOMS)
PROVIDED: 382 SPACES (357 SPACES, 5 - 5 SPACE GARAGES)

HANDICAP PARKING (INCLUDED IN PARKING ABOVE):
1 ACCESSIBLE SPACES REQUIRED
18 ACCESSIBLE SPACES PROVIDED
ALL ARE VAN ACCESSIBLE

BICYCLE PARKING:
REQUIRED: 20 SPACES
PROVIDED: 20 SPACES

IMPERVIOUS AREA:
PRE: 0 SF, 0% OF SITE AREA
POST: 326,055.25 SF, 34.3% OF SITE AREA

SETBACKS:
LOT WIDTH: N/A
FRONT SETBACK: 0 FT MIN; 25 FT MAX
SITE SETBACK: 10 FT BETWEEN BUILDINGS
REAR SETBACK: N/A
ACCESSORY STRUCTURE SETBACK: 5 FT
MAXIMUM HEIGHT: 3 STORIES

- PAVEMENT MARKING NOTES:**
- ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC, EXCEPT PARKING STALLS MAY BE LATEX PAINT.
 - ALL PAVEMENT MARKINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARDS & SPECIFICATIONS.
 - PREMARKINGS SHALL BE APPROVED BY TOWN OF KNIGHTDALE PRIOR TO COMPLETION.
- 4. Cross walks shall be provided internal on-site connecting ADA ramps showing safe pedestrian walkways.*
- CITY OF RALEIGH
- All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.
- TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: K.A. Joo 3/24/17
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S.M. DL* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4-28-17
ADMINISTRATOR

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

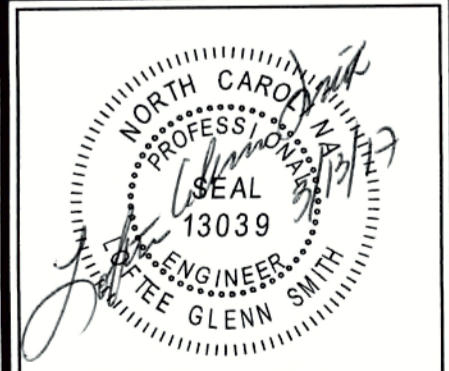
K:\1614-00003\00003\Knightdale Station Cottages\CAD\CAD\02 - SITE PLAN SHEETS.dwg - Monday, March 13, 2017 12:56:47 PM - TOWNSEND CHANUE

**THE COTTAGES AT
KNIGHTDALE STATION**

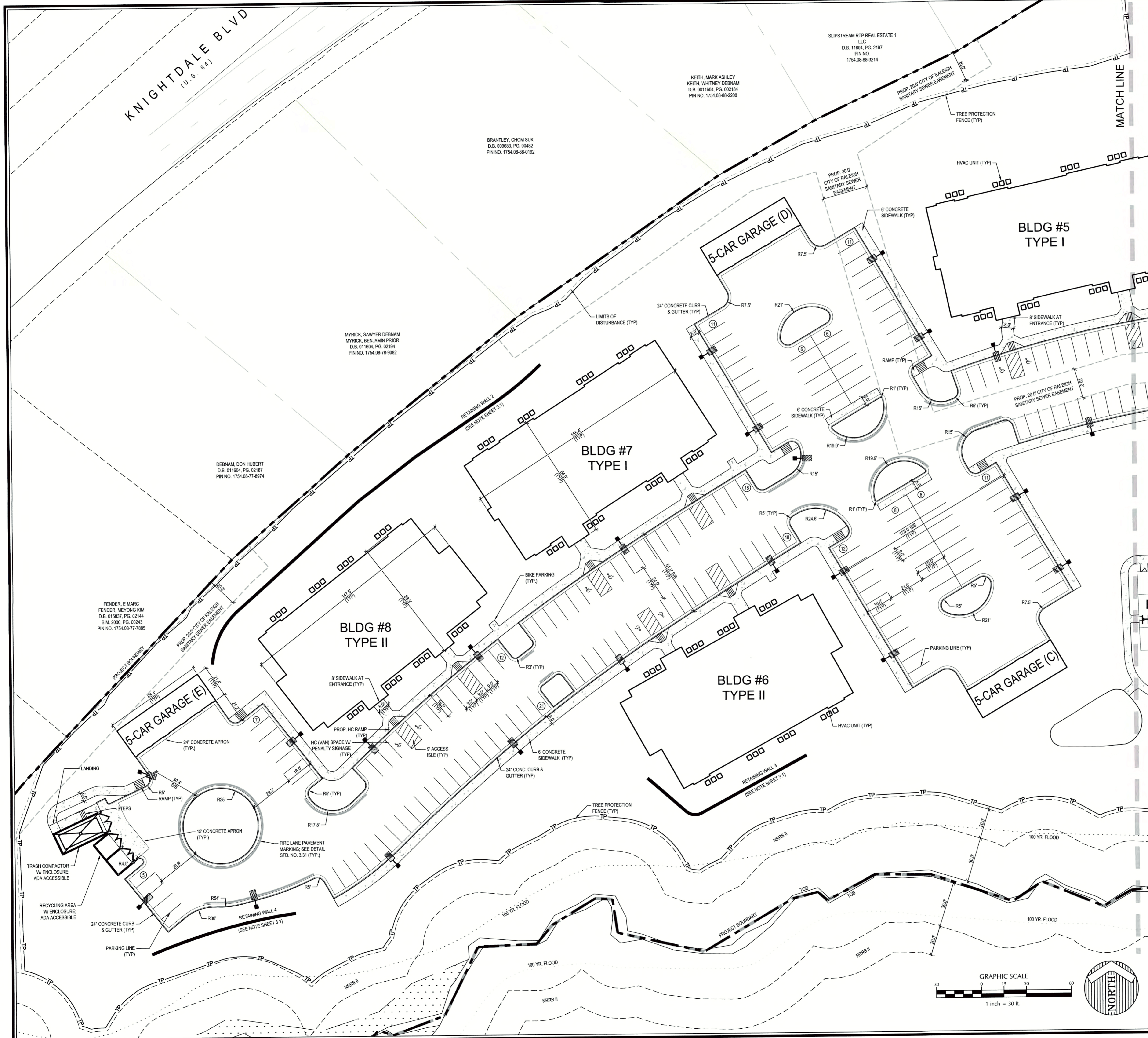
KNIGHTDALE, NORTH CAROLINA

SITE PLAN WEST

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions	Description	Date
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

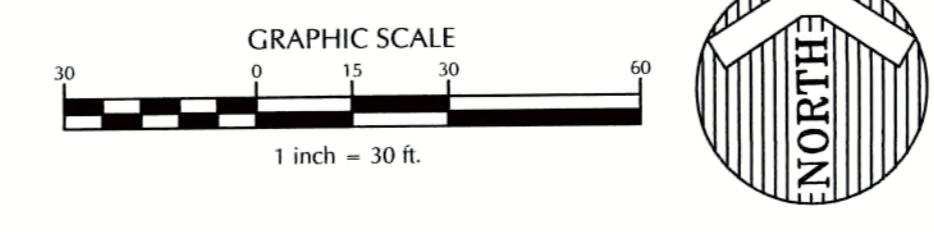
TRANSFORMATION FIELD SERVICES N/A
PUBLIC UTILITIES K.O. JAW 3/24/17
STORMWATER N/A
PLANNING/ENGINEERING N/A
FHIC N/A
URBAN FORESTRY N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
THIS DRAWING 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.

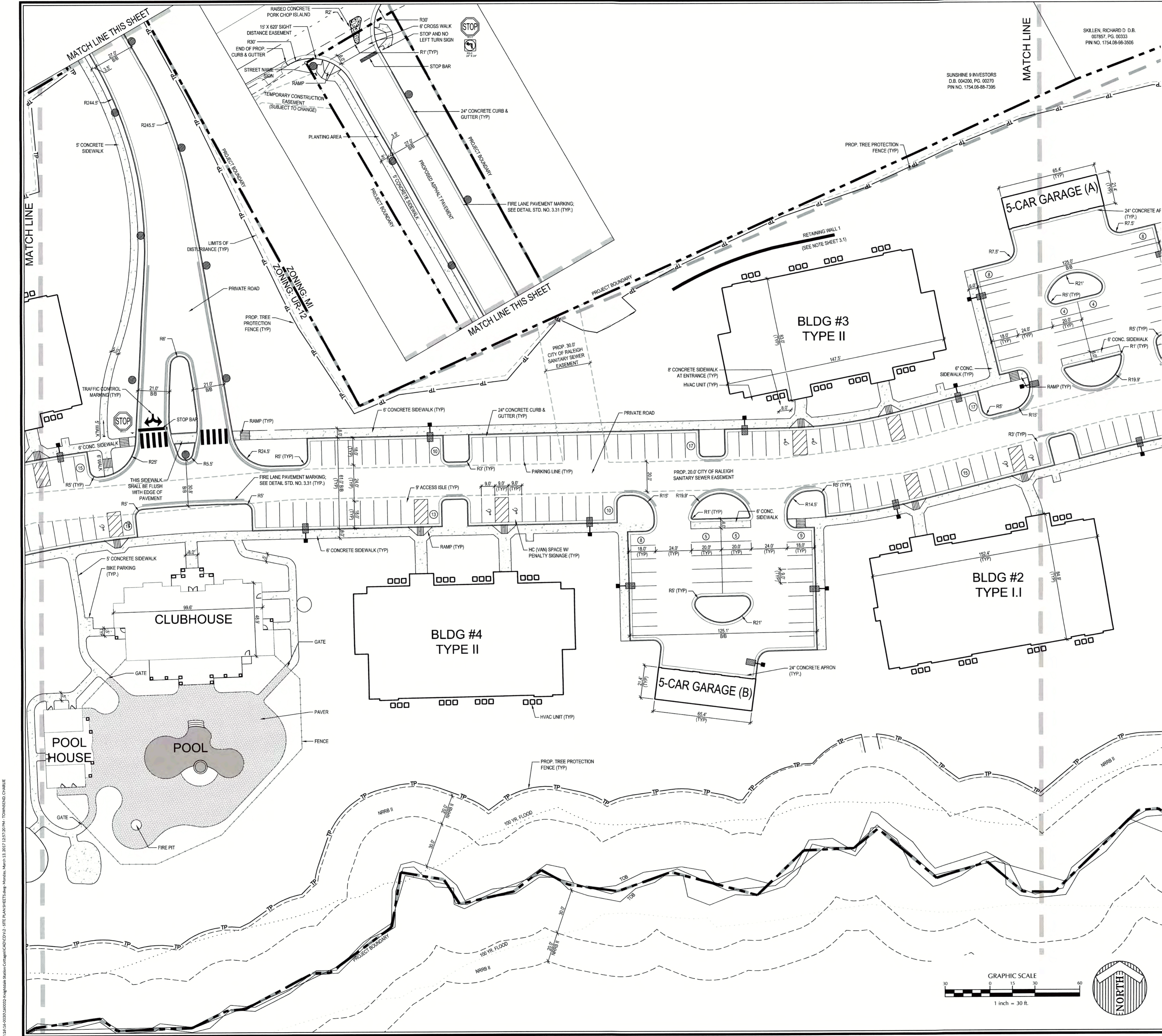
BY: S. Hall DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

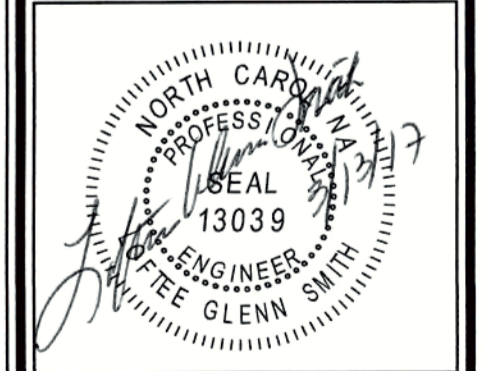
BY: John C. ... DATE: 4-28-17
ADMINISTRATOR



K:\1416\020160032\Knightdale Station\Conceptual\CD\2.1 - SITE PLAN WEST.dwg Author: Murch, March 13, 2017 12:57:05 PM - TOWNSEND, CHARLIE



Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions	
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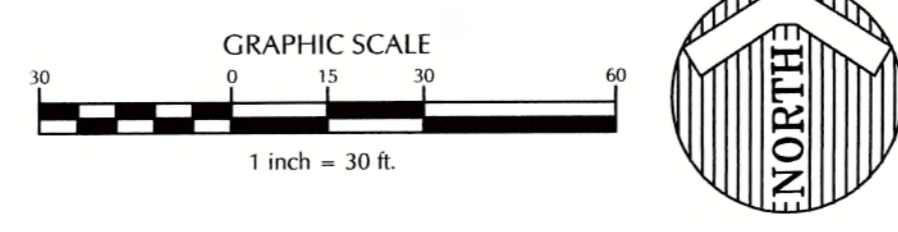
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BY: S. Hall DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: Glenn Smith DATE: 4-28-17
ADMINISTRATOR



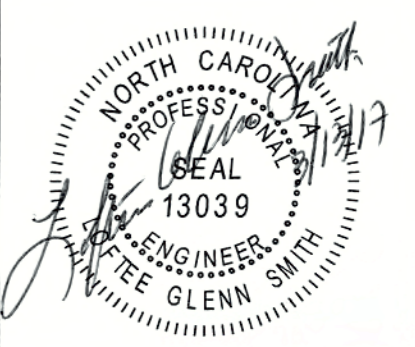
K:\1616\0002160032\Knightdale Station Cottages\CAD\CDT\16 - SITE PLAN SETS\Snap - Monday, March 13, 2017 11:27:20 PM - TOWNSEND.CHAMBERLAIN

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

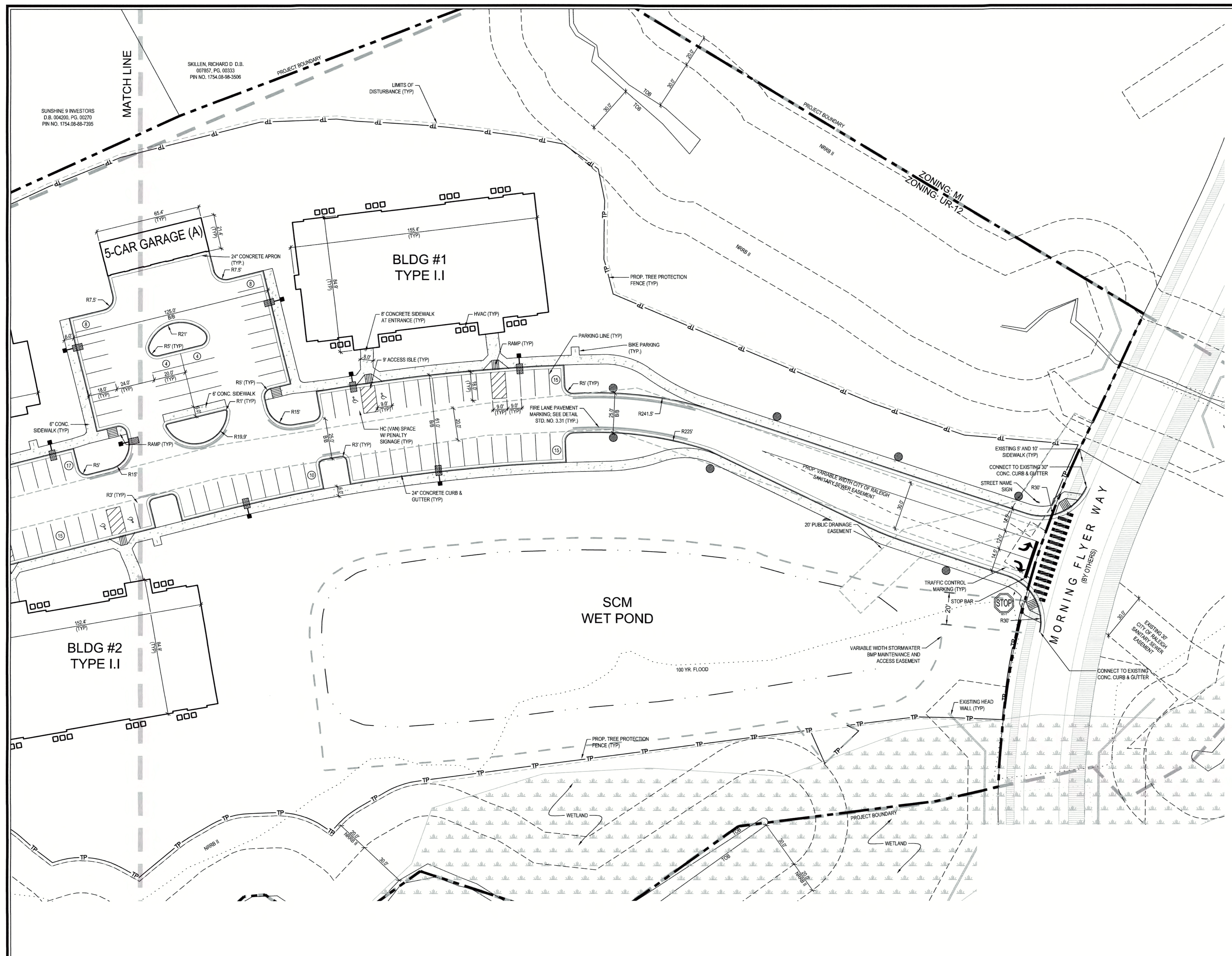
SITE PLAN EAST

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



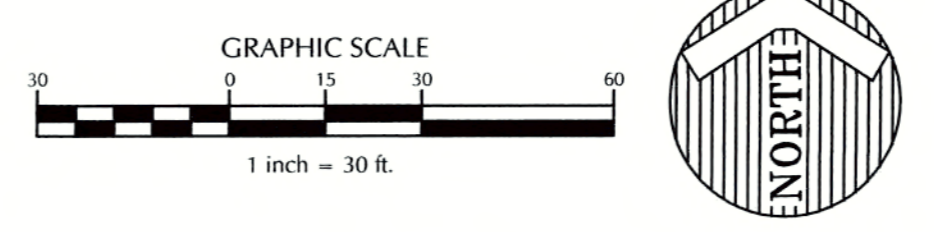
Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

Sheet No.	2.3
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CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/TRAFFIC SERVICES: N/A
PUBLIC UTILITIES: K.A. Glenn 3/22/19
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

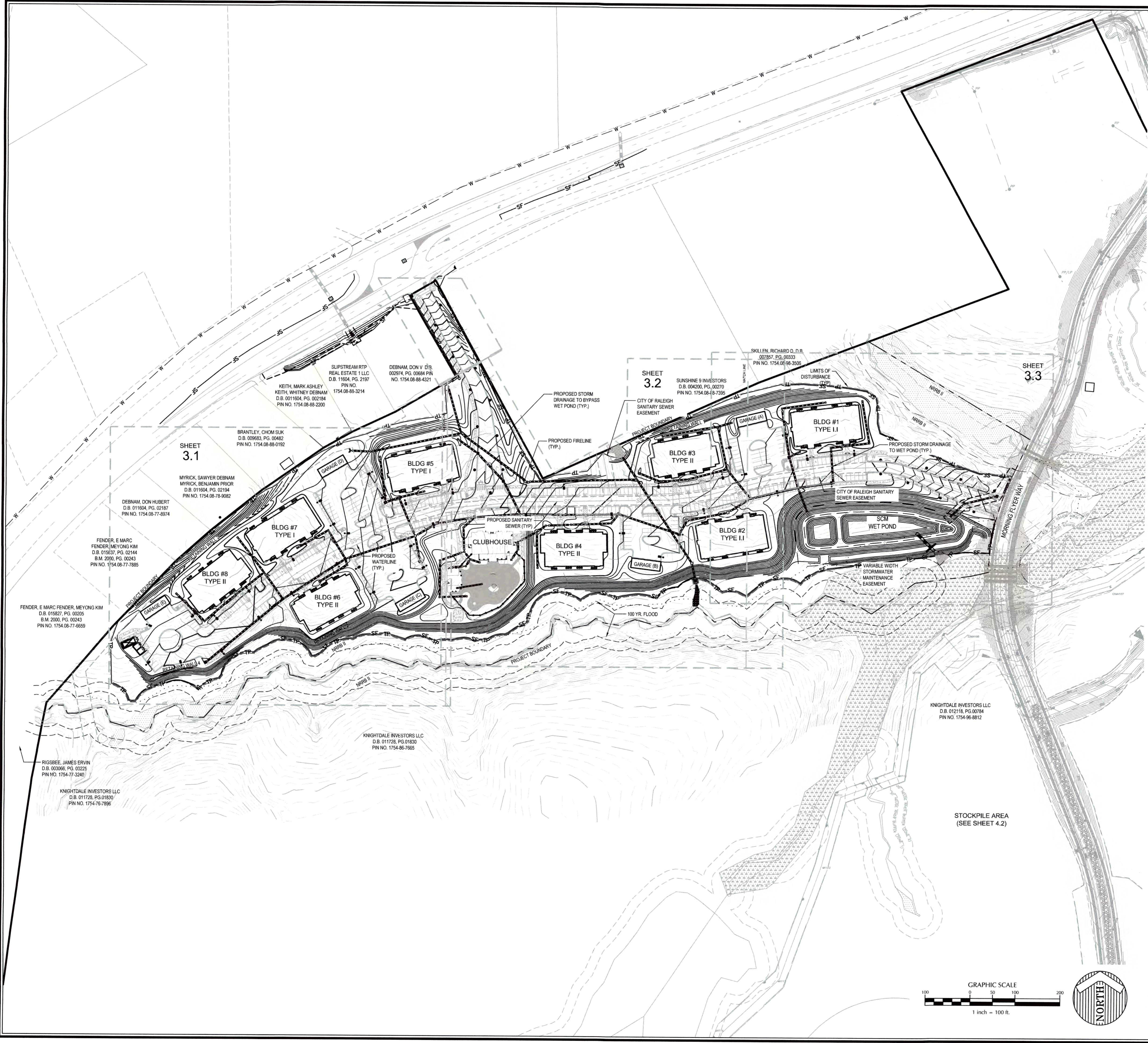
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BY: Sarah Bell DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

K:\16-0000160032-Knightdale Station-CottageCAD\CDT13-SITE PLAN SHEETS.dwg - Monday, March 13, 2017 12:56:05 PM - TOWNSEND CHARLIE



EROSION CONTROL NOTES

1. ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
2. BOUNDARY SURVEY PERFORMED BY WITHERS & RAVENEL, INC.
3. THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720174400J WITH AN EFFECTIVE DATE OF MAY 2, 2006.
4. RECEIVING WATERCOURSE: UNNAMED TRIBUTARY OF THE NEUSE RIVER.
5. 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.
6. 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.
7. ALL STORM DRAINAGE PIPE SHALL HAVE A MINIMUM COVER OF 1 FOOT TO THE PIPE CROWN IN NON-TRAFFIC AREAS.
8. STORM SEWER PIPE ENDS SHALL BE FURNISHED WITH REINFORCED CONCRETE PIPE FLARED END SECTION UNLESS OTHERWISE SPECIFIED ON PLANS.
9. 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 - 48 INCH PIPE, AND ONE-FOURTH THE DIAMETER FOR PIPE GREATER THAN 48 INCHES.
10. 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.
11. STORM PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
12. A PRECONSTRUCTION MEETING MAY BE REQUIRED FOR THIS CONSTRUCTION.
13. GRAVEL CONSTRUCTION ENTRANCE PADS SHALL BE CONSTRUCTED AT EACH POINT OF CONSTRUCTION ACCESS TO THE 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 UDO OR NC 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.
14. 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, SO AS TO CUT, RATHER THAN TEAR, ROOTS.
15. 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.
16. 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 6.3).
17. CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING LOT CLEARING WILL BE MINIMIZED.
18. CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL STRUCTURES DURING THE LIFE OF THE PROJECT.
19. CONTRACTOR SHALL CONSTRUCT DIVERSION DITCHES AS NECESSARY TO ENSURE ALL SEDIMENT IS DIRECTED INTO EROSION CONTROL MEASURES.
20. TOPSOIL SHALL BE WASTED OFF-SITE OR AT APPROVED STOCKPILE AREA ON SITE.
21. ALL STORM DRAINAGE PIPE SHALL BE PROTECTED DURING CONSTRUCTION IN ACCORDANCE WITH TOWN OF KNIGHTDALE DETAILS AND SPECIFICATIONS.
22. CONTRACTOR SHALL PROVIDE RIP RAP DISSIPATOR PADS AT STORM DRAINAGE PIPE DISCHARGE POINTS AS REQUIRED TO ENSURE POSITIVE DRAINAGE.
23. 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.
24. ALL EROSION CONTROL MEASURES SHALL BE COMPLETED IN ACCORDANCE WITH THE TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND CONSTRUCTION DETAILS MANUAL (SECTION 2.09) 28. STABILIZATION SHALL BE IN ACCORDANCE WITH NPDES STORMWATER DISCHARGE PERMIT (SEE TABLE ON EC DETAILS SHEET).

CONSTRUCTION SEQUENCE

1. SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE WATERSHED MANAGER, DEBRA TANNER (919-842-7142), OBTAIN A LAND-DISTURBING PERMIT.
2. INSTALL GRAVEL CONSTRUCTION PAD, TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS, OR OTHER MEASURES AS SHOWN ON THE APPROVED PLAN. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. SEED TEMPORARY DIVERSIONS, BERMS, AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
3. CALL 919-842-7142 FOR AN ONSITE INSPECTION BY THE WATERSHED MANAGER TO OBTAIN A CERTIFICATE OF COMPLIANCE.
4. 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.
5. STABILIZE SITE AS AREAS ARE BROUGHT UP TO FINISH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC.
6. AT THE POINT WHEN THE MAJOR PORTION OF THE SITE WORK IS COMPLETE AND STABILIZED, AND WITH THE PERMISSION OF THE WATERSHED MANAGER, THE SKIMMER BASIN SHALL BE REMOVED. THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN A LEGAL MANNER. THE AREA SHALL BE BACK FILLED IN LIFTS NO GREATER THAN 8" THICK AND COMPACTED TO 100% PROCTOR DENSITY. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THE REMAINING EROSION CONTROL MEASURES ON A DAILY BASIS.
7. WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE STABILIZED COMPLETELY, CALL 919-842-7142 FOR AN INSPECTION BY THE WATERSHED MANAGER.
8. 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 TANNER (919-842-7142), OBTAIN A CERTIFICATE OF COMPLETION.

NOTE: THE TOWN OF KNIGHTDALE DOES NOT ALLOW THE USE OF WAFFLE BOXES WITHIN PUBLIC RIGHT OF WAY.

CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES	N/A
PUBLIC UTILITIES	K.L. JEN 3/24/17
STORMWATER	N/A
PLANNING/ENGINEERING	N/A
FIRE	N/A
URBAN FORESTRY	N/A

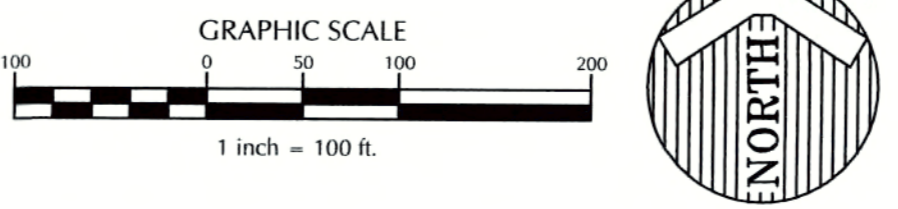
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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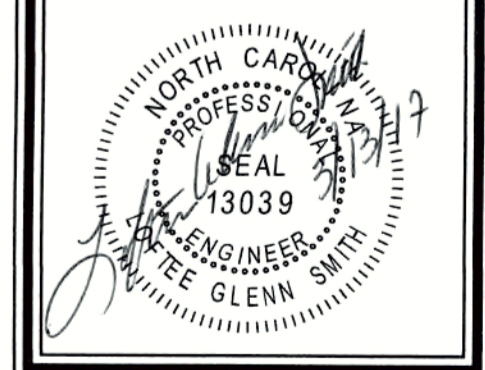
BY: *S. Hill* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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BY: *John C. ...* DATE: 4-28-17
ADMINISTRATOR

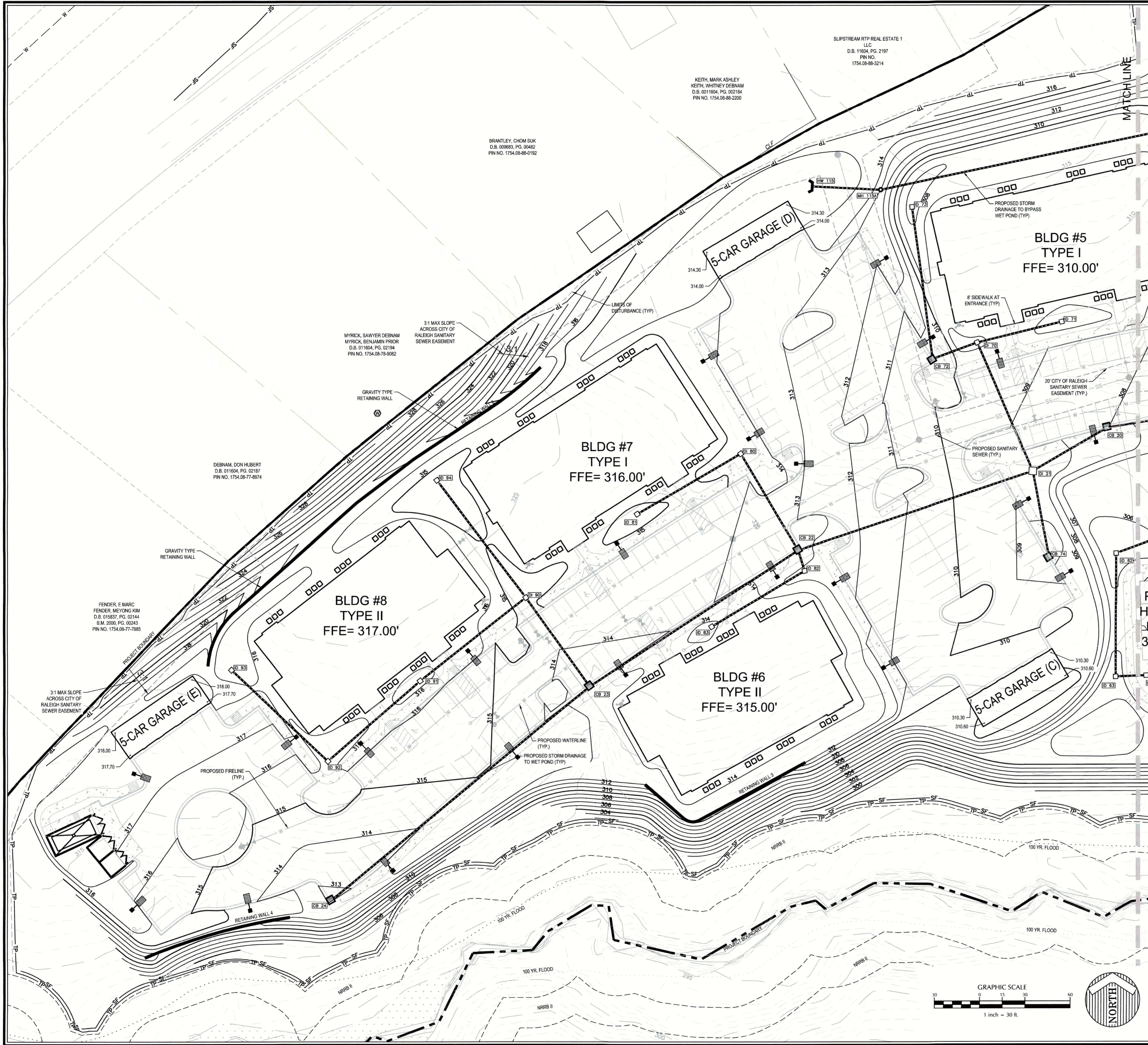


Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions		
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

K:\174\0001\0002\Agg\Main\Station Cottages\CD\02160032.dwg - GRADING & DRAINAGE SHEETS - Monday, March 13, 2017 12:28:53 PM - TOWNSEND, CHARLE



RETAINING WALL NOTES:

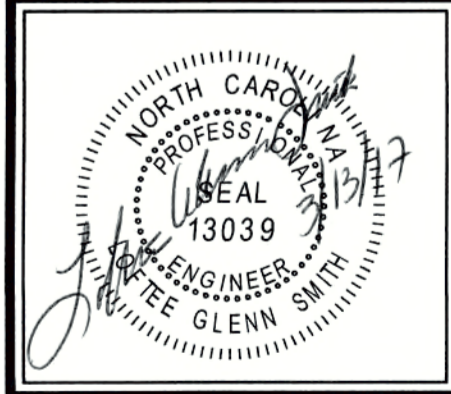
1. THE RETAINING WALL INFORMATION SHOWN ON THESE PLANS IS FOR GENERAL LOCATION AND GENERAL DIMENSIONS ONLY. WITHERSRAVENEL IS NOT RESPONSIBLE FOR THE DESIGN, PERMITTING, INSPECTION OR CONSTRUCTION CERTIFICATION OF ANY RETAINING WALLS SHOWN ON THESE PLANS. RETAINING WALLS SHALL BE CONSTRUCTED BY PLANS PREPARED SEPARATELY FOR THE OWNER BY OTHER CONSULTANTS. WITHERSRAVENEL ACCEPTS NO LIABILITY FOR SUCH PLANS.
2. GEOGRIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

**GRADING & DRAINAGE
WEST**

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

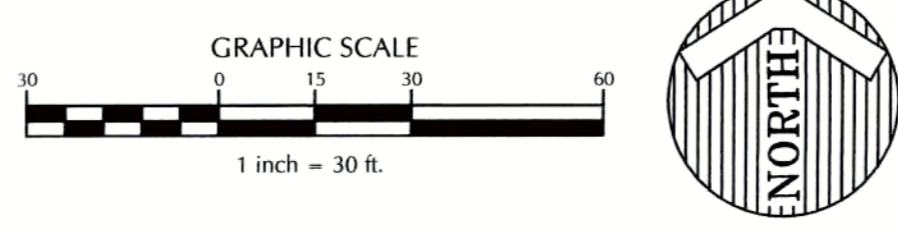
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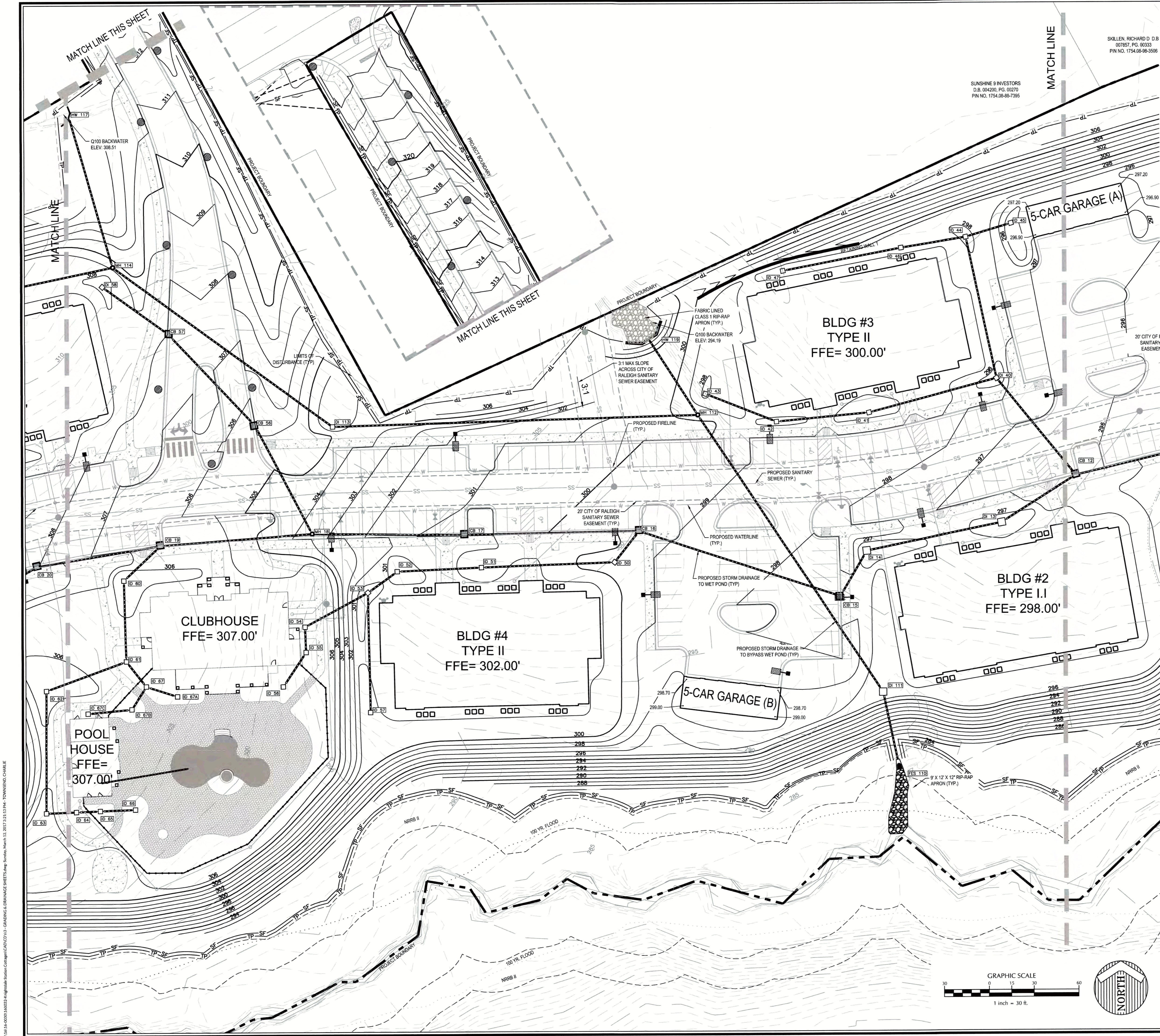
BY: *C. M. Hill* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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BY: *[Signature]* DATE: 4-28-17
ADMINISTRATOR



K:\16-0001\160032\160032-03-GRADING & DRAINAGE\DWG\160032-03-GRADING & DRAINAGE WEST.dwg, Modified: March 11, 2017 12:59:09 PM, TOWNSEND, CHARLIE



Outlet Protection Calculations	
OUTLET: FES 110	
Inputs:	
Pipe Diameter =	36 in
Slope =	5.67%
Q(10) =	21.10 cfs
V(10) =	2.99 fps
Zone =	1
Apron Materials:	
Minimum -	Stone Filling (Fine) - Cl. 'A'
Proposed -	Stone Filling (Fine) - Cl. 'A'
Apron Dimensions:	
Multiplier	3
To Protect Culvert (L1) =	9 ft
Multiplier	4
To Protect Scour (L2) =	12 ft
Width	W = 9 ft
Thickness	Th = 12 in

RETAINING WALL NOTES:

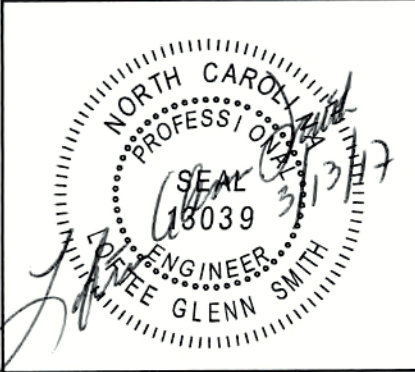
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2. GEORIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.

SKILLEN, RICHARD D. D.B.
007857, PG. 00333
PIN NO. 1754.08-98-3506

SUNSHINE 9 INVESTORS
D.B. 004200, PG. 00270
PIN NO. 1754.08-98-7395

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: See below 3/29/14
GEOTECHNICAL: N/A
PLANNING/ENGINEERING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

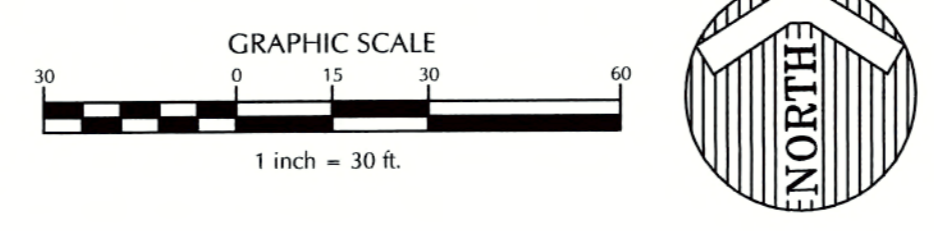
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BY: Skullen DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

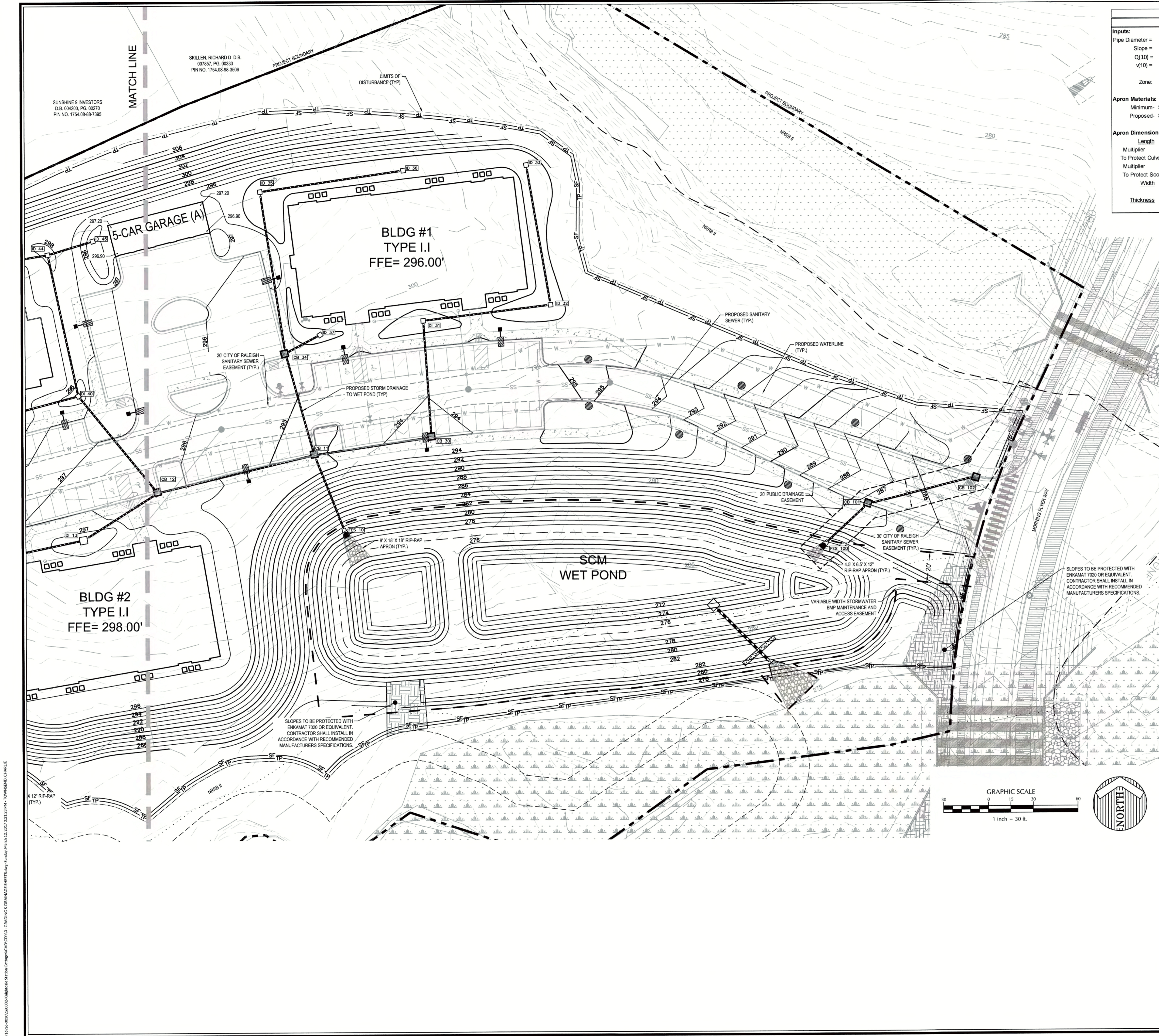
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BY: Glenn Smith DATE: 4-28-17
ADMINISTRATOR



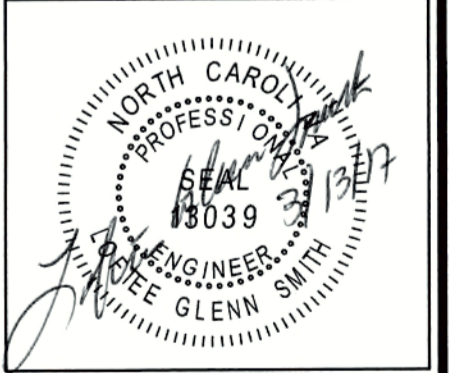
K:\174\00003\00003\Aggravated Station\Central\CD\174\00003\GRADING & DRAINAGE SHEETS\Agg_Survey_Maps\17_2017\21131.PLA, TOWNSHIP, CHARLE

Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
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4	PER TOK COMMENTS 03/01/17



OUTLET: FES 10		OUTLET: FES 100	
Inputs:			
Pipe Diameter =	36 in	Pipe Diameter =	18 in
Slope =	1.28%	Slope =	1.28%
Q(10) =	42.85 cfs	Q(10) =	6.55 cfs
v(10) =	6.06 fps	v(10) =	3.71 fps
Zone =	2	Zone =	1
Apron Materials:			
Minimum-	Stone Filling (Light) - Cl. 'B'	Minimum-	Stone Filling (Fine) - Cl. 'A'
Proposed-	Stone Filling (Light) - Cl. 'B'	Proposed-	Stone Filling (Fine) - Cl. 'A'
Apron Dimensions:			
Multiplier	3	Multiplier	3
To Protect Culvert (L1) =	9 ft	To Protect Culvert (L1) =	4.5 ft
Multiplier	6	Multiplier	4
To Protect Scour (L2) =	18 ft	To Protect Scour (L2) =	6 ft
Width	W = 9 ft	Width	W = 4.5 ft
Thickness	Th = 18 in	Thickness	Th = 12 in

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



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BY: S.M. DU DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER
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BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

K:\1616\0001\0003\Agg\Agg\Site\Site\Grading & Drainage\Grading & Drainage Sheets\Agg_Site\12_2017\312131.Plan - TOWNWKS.CHARLE

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

**STORM DRAINAGE PIPE
AND STRUCTURE TABLE**

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
CB 11	295.00	CB 12 CB 30 CB 34	285.80 282.00 285.00	279.75
CB 12	296.35	DI 13 DI 40	288.90 287.10	287.00
CB 15	297.86	CB 16	291.00	290.90
CB 16	299.65	CB 17 ID 50	292.55 296.10	292.45
CB 17	301.00	MH 18	293.85	293.75
CB 19	306.59	CB 20 ID 60	297.90 301.45	297.80
CB 20	308.04	DI 21	298.85	298.75
CB 22	313.09	CB 23 DI 80 ID 82	304.30 303.40 309.60	303.30
CB 23	313.97	CB 24 DI 90	306.10 306.10	306.00
CB 24	313.00			308.38
CB 30	294.00	DI 31	284.00	283.00
CB 34	295.19	ID 35 ID 37	290.25 291.45	287.35
CB 56	306.10	CB 57	301.35	295.85
CB 57	308.00	DI 58	302.60	302.50
CB 72	310.46	ID 73	303.65	303.40
CB 74	308.75			304.12
CB 101	287.00	CB 102	279.85	279.55
CB 102	285.60			281.35
DI 13	297.00	DI 14	289.50	289.40
DI 14	296.75	CB 15	290.35	290.25

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
DI 21	309.02	CB 22 DI 70 CB 74	301.65 299.55 303.50	299.45
DI 31	295.00	ID 32	290.35	286.86
DI 40	297.00	ID 41 ID 44	293.45 291.90	288.00
DI 58	307.75			303.12
DI 70	309.00	ID 71 CB 72	304.60 303.20	300.50
DI 80	314.60	ID 81	311.15	304.20
DI 90	314.50	ID 91 ID 94	310.65 311.00	306.90
DI 111	296.36	MH 112	286.10	286.00
DI 113	303.75	MH 114	299.50	299.40
FES 10	-0.92	CB 11	279.00	
FES 100	280.79	CB 101	279.00	
FES 110	3.92	DI 111	283.00	
HW 115	314.21			312.00
HW 117	312.19			307.00
HW 119	297.33			293.00
ID 32	295.00	ID 33	290.80	290.80
ID 33	294.75			291.75
ID 35	294.50	ID 36	290.80	290.80
ID 36	294.75			291.75
ID 37	294.75			291.75

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
ID 41	298.50	ID 42	293.90	293.90
ID 42	298.75	ID 43	294.30	294.30
ID 43	297.75			294.75
ID 44	297.75	ID 46 ID 45	294.45 292.40	292.40
ID 45	295.75			292.75
ID 46	298.75	ID 47	294.90	294.90
ID 47	298.75			295.75
ID 50	299.50	ID 51	296.25	296.25
ID 51	299.99	ID 52	296.85	296.85
ID 52	300.50	ID 53	297.15	297.15
ID 53	300.50	ID 54 ID 57	297.30 297.30	297.30
ID 54	302.36	ID 55	301.00	301.00
ID 55	305.50	ID 56	302.00	302.00
ID 56	305.50			303.00
ID 57	300.50			298.10
ID 60	305.50	ID 61	301.65	301.65
ID 61	305.50	ID 62 ID 67	302.00 302.00	302.00
ID 62	305.50	ID 63	302.30	302.30
ID 63	305.50	ID 64	303.00	303.00
ID 64	305.50	ID 65	303.10	303.10

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
ID 65	305.50	ID 66	303.20	303.20
ID 66	305.50			303.45
ID 67	305.50	ID 67B ID 67A	302.15 302.15	302.15
ID 67A	305.50			302.40
ID 67B	306.50	ID 67C	302.25	302.25
ID 67C	306.50			302.60
ID 71	308.25			305.25
ID 73	307.75			304.75
ID 81	315.00			312.00
ID 83	312.99	ID 83	309.70	309.70
ID 83	311.63			310.50
ID 91	312.28	ID 92	311.15	311.15
ID 92	312.68	ID 93	311.55	311.55
ID 93	315.50			312.50
ID 94	314.50			312.00
MH 18	303.97	CB 19 CB 56	296.75 295.00	294.90
MH 112	299.65	HW 119 DI 113	292.00 294.30	288.33
MH 114	310.28	MH 115A HW 117	301.85 303.00	301.75
MH 115A	313.00	HW 115	309.00	304.00

NOTE: ANY STORM DRAINAGE PIPES INSTALLED IN NON-VIRGIN GROUND REQUIRE ASTM CLASS 1 STRUCTURAL FILL MATERIAL TO THE BOTTOM OF THE PIPE.

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
CB 34	CB 11	287.35	285.00	15	71	3.33%	15" RCP
CB 30	CB 11	283.00	282.00	15	79	1.26%	15" RCP
CB 12	CB 11	287.00	285.80	30	108	1.11%	30" RCP
DI 40	CB 12	288.00	287.10	15	84	1.07%	15" RCP
DI 13	CB 12	289.40	288.90	30	59	0.85%	30" RCP
CB 16	CB 15	292.45	291.00	30	142	1.02%	30" RCP
ID 50	CB 16	296.25	296.10	15	26	0.57%	15" PVC
CB 17	CB 16	293.75	292.55	30	117	1.03%	30" RCP
MH 18	CB 17	294.90	293.85	30	102	1.03%	30" RCP
ID 60	CB 19	301.65	301.45	12	34	0.59%	12" PVC
CB 20	CB 19	298.75	297.90	24	84	1.02%	24" RCP
DI 21	CB 20	299.45	298.85	24	57	1.05%	24" RCP
ID 82	CB 22	309.70	309.60	12	14	0.70%	12" PVC
DI 80	CB 22	304.20	303.40	15	74	1.08%	15" RCP
CB 23	CB 22	306.00	304.30	18	165	1.03%	18" RCP
DI 90	CB 23	306.90	306.10	15	72	1.11%	15" RCP
CB 24	CB 23	308.38	306.10	15	222	1.02%	15" RCP
DI 31	CB 30	286.86	284.00	15	78	3.67%	15" RCP
ID 37	CB 34	291.75	291.45	12	26	1.14%	12" PVC
ID 35	CB 34	290.80	290.25	12	109	0.50%	12" PVC

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
CB 57	CB 56	302.50	301.35	15	85	1.36%	15" RCP
DI 58	CB 57	303.12	302.60	15	54	0.98%	15" RCP
ID 73	CB 72	304.75	303.65	12	102	1.08%	12" PVC
CB 102	CB 101	281.35	279.85	18	75	2.00%	18" RCP
DI 14	DI 13	290.25	289.50	30	92	0.81%	30" RCP
CB 15	DI 14	290.90	290.35	30	35	1.57%	30" RCP
CB 74	DI 21	304.12	303.50	15	57	1.09%	15" RCP
DI 70	DI 21	300.50	299.55	15	93	1.02%	15" RCP
CB 22	DI 21	303.30	301.65	24	164	1.01%	24" RCP
ID 32	DI 31	290.80	290.35	12	86	0.52%	12" PVC
ID 44	DI 40	292.40	291.90	12	96	0.52%	12" PVC
ID 41	DI 40	293.90	293.45	12	88	0.51%	12" PVC
CB 72	DI 70	303.40	303.20	15	31	0.64%	15" PVC
ID 71	DI 70	305.25	304.60	12	58	1.12%	12" PVC
ID 81	DI 80	312.00	311.15	12	79	1.07%	12" PVC
ID 94	DI 90	312.00	311.00	12	97	1.03%	12" PVC
ID 91	DI 90	311.15	310.65	12	89	0.56%	12" PVC
MH 112	DI 111	288.33	286.10	36	223	1.00%	36" RCP
MH 114	DI 113	301.75	299.50	36	182	1.24%	36" RCP
CB 11	FES 10	279.75	279.00	36	59	1.26%	36" RCP

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
CB 101	FES 100	279.55	279.00	18	43	1.28%	18" RCP
DI 111	FES 110	286.00	283.00	36	53	5.67%	36" RCP
MH 114	HW 117	303.00	307.00	30	105	3.82%	30" RCP
MH 112	HW 119	292.00	293.00	36	60	1.66%	36" RCP
ID 33	ID 32	291.75	290.80	12	95	1.00%	12" PVC
ID 36	ID 35	291.75	290.80	12	97	0.98%	12" PVC
ID 42	ID 41	294.30	293.90	12	62	0.64%	12" PVC
ID 43	ID 42	294.75	294.30	12	51	0.88%	12" PVC
ID 45	ID 44	292.75	292.40	12	32	1.11%	12" PVC
ID 46	ID 44	294.90	294.45	12	44	1.03%	12" PVC
ID 47	ID 46	295.75	294.90	12	81	1.06%	12" PVC
ID 51	ID 50	296.85	296.25	15	89	0.67%	15" PVC
ID 52	ID 51	297.15	296.85	15	56	0.53%	15" PVC
ID 53	ID 52	297.30	297.15	15	24	0.62%	15" PVC
ID 54	ID 53	301.00	297.30	15	48	7.74%	15" PVC
ID 54	ID 55	301.00	302.00	12	17	5.95%	12" RCP
ID 56	ID 55	303.00	302.00	12	28	3.62%	12" PVC
ID 53	ID 57	297.30	298.10	12	80	1.00%	12" RCP
ID 61	ID 60	302.00	301.65	12	54	0.65%	12" PVC
ID 67	ID 61	302.15	302.00	12	21	0.70%	12" PVC

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
ID 61	ID 62	302.00	302.30	12	57	0.53%	12" PVC
ID 62	ID 63	302.30	303.00	12	82	0.86%	12" PVC
ID 63	ID 64	303.00	303.10	12	20	0.50%	12" RCP
ID 64	ID 65	303.10	303.20	12	16	0.63%	12" RCP
ID 65	ID 66	303.20	303.45	12	24	1.06%	12" RCP
ID 67	ID 67A	302.15	302.40	12	22	1.14%	12" RCP
ID 67	ID 67B	302.15	302.25	12	18	0.55%	12" RCP
ID 67B	ID 67C	302.25	302.60	12	30	1.19%	12" RCP
ID 83	ID 82	310.50	309.70	12	72	1	

EROSION CONTROL AND STORM DRAINAGE NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
- BOUNDARY SURVEY PERFORMED BY WITHERSRAVENEL.
- WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERSRAVENEL.
- THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720175A001, 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 THE PLANS 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 10 TO 24 INCH PIPE, ONE-THIRD THE PIPE DIAMETER FOR 30 - 48 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 BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
- A PRECONSTRUCTION MEETING SHALL 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 UDD OR NC 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, SO 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 6.3).
- CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING 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 (SHEET 9.3) 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.
- 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 THIS SHEET).

Flowrate to Basin #1:

Basin Drainage Area "A": 8.13 AC

Runoff Coefficient "C":
 Disturbed earth = 0.13 AC @ C = 0.50
 Undisturbed, wooded areas = 0.00 AC @ C = 0.25
 Undisturbed, grassy areas = 0.00 AC @ C = 0.30
 Other areas = 0.00 AC @ C = 0.95

Composite C value = 0.50

Rainfall Intensity "I": $I = g/(h+T)$

Time of Concentration (Tc) Kirpich equation: $T_c = (L/3.3)^{0.385}$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

$T_c = 1.60$ min minimum = 5 min

$I = 7.22$ in/hr

Flow "Q = CIA" = **29.35 cfs**

Sediment Basin Summary

Bottom Width = 75 ft
 Bottom Length = 210 ft
 Top Width = 95 ft
 Top Length = 231 ft
 Storage Depth = 2 ft
 Dam Height = 3.5 ft
 Sideslopes = 3 :1

Sediment Basin Volume

Minimum Required Volume = 1800 cfs/ac drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 14,634 cf
 Surface Area Required = 12,787 sf

Shape is assumed to be Trapezoidal - excavation may be required

Depth of Basin = 2 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 75 ft
 Bottom Length = 210 ft

Surface Width = 87 ft
 Surface Length = 222 ft
 Bottom Area = 15750 sf

Volume Provided = 35,064 cf OK
 Surface Area Provided = 19,314 sf OK

Spillway Design - Skimmer Outlet

Volume Required = 14,634 cf
 Discharge per day (Qd) = 4878 cfd/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gH)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 2.96 in
 Skimmer Size = 3 in
 Head on Skimmer = 0.25 ft
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
 Required Capacity = 29.35 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 28 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

Basin Weir Eq'n: $Q = C * L * H^{1.5}$
 Provided Capacity = 29.70 cfs OK

Flowrate to Basin:

Basin Drainage Area "A": 4.10 AC

Runoff Coefficient "C":
 Disturbed earth = 4.10 AC @ C = 0.50
 Undisturbed, wooded areas = 0.00 AC @ C = 0.25
 Undisturbed, grassy areas = 0.00 AC @ C = 0.30
 Other areas = 0.00 AC @ C = 0.95

Composite C value = 0.50

Rainfall Intensity "I": $I = g/(h+T)$

Time of Concentration (Tc) Kirpich equation: $T_c = (L/3.3)^{0.385}$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

$T_c = 1.60$ min minimum = 5 min

$I = 7.22$ in/hr

Flow "Q = CIA" = **14.80 cfs**

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf
 Discharge per day (Qd) = 2460 cfd/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gH)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 1.28 in
 Skimmer Size = 6 in
 Head on Skimmer = 0.417 ft
 Orifice Size = 1.25 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Sediment Basin #2 Summary

Bottom Width = 53 ft
 Bottom Length = 315 ft
 Top Width = 80 ft
 Top Length = 342 ft
 Storage Depth = 3 ft
 Dam Height = 4.5 ft
 Sideslopes = 3 :1

Sediment Basin #2 Volume

Minimum Required Volume = 1800 cfs/ac drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 7,380 cf
 Surface Area Required = 6,438 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 3 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 53 ft (try to be 2X width)
 Bottom Length = 315 ft

Surface Width = 71 ft
 Surface Length = 333 ft
 Bottom Area = 16695 sf

Volume Provided = 68,007 cf OK
 Surface Area Provided = 23,643 sf OK

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf
 Discharge per day (Qd) = 2460 cfd/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gH)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 1.28 in
 Skimmer Size = 6 in
 Head on Skimmer = 0.417 ft
 Orifice Size = 1.25 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
 Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 14 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

Basin Weir Eq'n: $Q = C * L * H^{1.5}$
 Provided Capacity = 14.85 cfs OK

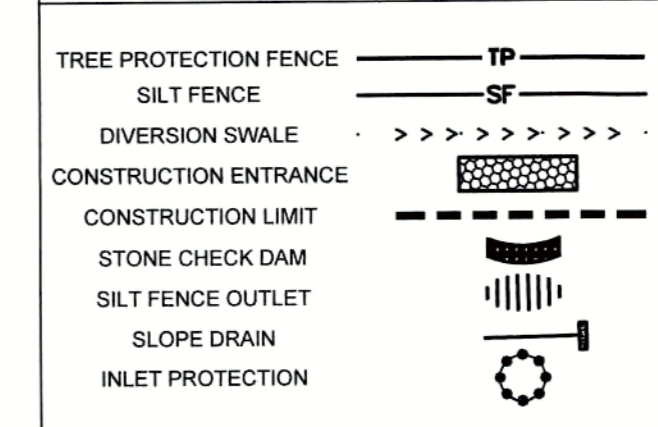
Temporary Diversion Ditch Sizing and Lining Calculations

Rainfall Intensity $I_{10yr} = 7.08$ in/hr

Location	Rational C	Drainage Area (ac)	Q _{10yr} (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lb/ft ²)	Calculated Velocity (ft/s)	Type of Lining
Basin #1 East	0.50	0.54	1.91	0.1	0.02	0.06	0.64	NAG S75
Basin #1 West	0.50	6.14	21.74	1.4	0.92	0.79	6.17	NAG C125
Basin #2 East	0.50	0.97	3.32	0.2	0.12	0.27	0.81	NAG S75
Basin #2 West	0.50	1.32	4.67	1.6	0.66	0.66	2.13	NAG S75
Stockpile Area Basin	0.50	2.95	10.44	2.2	0.67	1.18	3.19	NAG S75

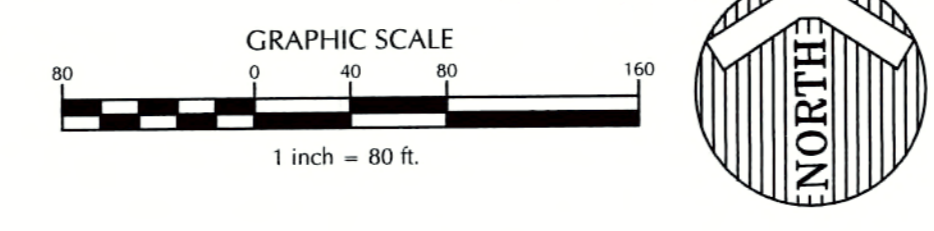
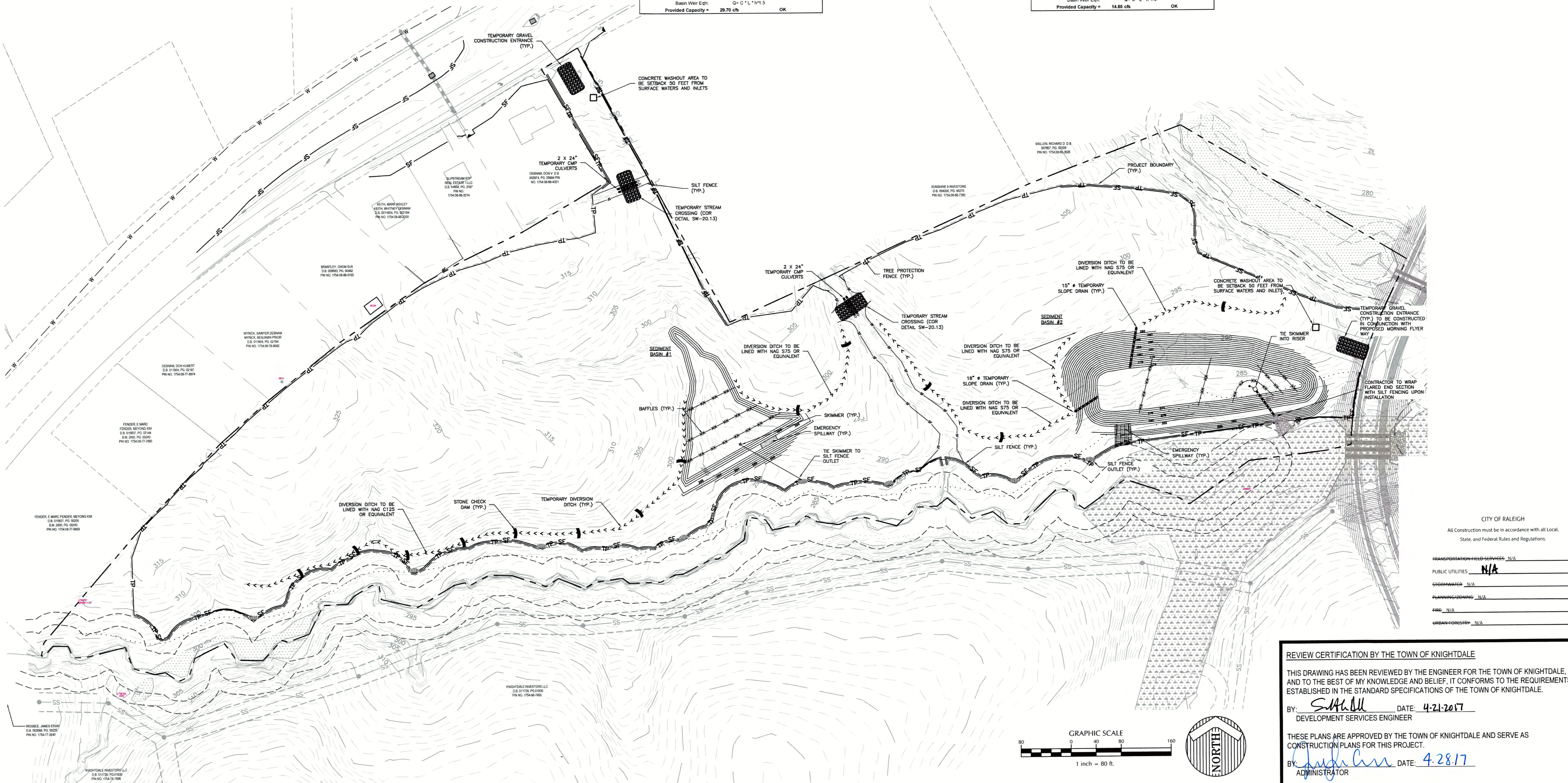
NOTES:
 All ditches are to be trapezoidal in shape: 2:1 sideslopes, bottom width of 2.0', and height of 1.0'
 Calculated Depth and Calculated Velocity Based on Erosion Output
 NAG S75: North American Green S75 or approved equal
 NAG C125: North American Green C125 or approved equal

EROSION CONTROL LEGEND



PHASE 1 CONSTRUCTION SEQUENCE:

- SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE WATERSHED MANAGER, DEBRA TANNER, 919-842-7142. OBTAIN A LAND DISTURBING PERMIT.
- INSTALL GRAVEL CONSTRUCTION PAD, TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS OR OTHER MEASURES AS SHOWN ON THE APPROVED PLAN. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. SEED TEMPORARY DIVERSIONS, BERMS AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
- CALL DEBRA TANNER, 919-842-7142 FOR AN ON-SITE INSPECTION BY THE WATERSHED MANAGER TO OBTAIN A CERTIFICATE OF COMPLIANCE.
- BEGIN CLEARING AND GRUBBING. MAINTAIN DEVICES AS NEEDED. WHEN COMPLETE, BEGIN PHASE 2 EROSION CONTROL SEQUENCE.



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S. Hall* DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: *John Cox* DATE: 4-28-17
 ADMINISTRATOR

WithersRavenel
 Engineers | Planners

131 S. Wilmington Street | Raleigh, NC 27601 | 1-919-469-3340 | license # C-0852 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

EROSION CONTROL PH. 1

Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR

CITY OF RALEIGH
 All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: N/A
 GEOTECHNICAL: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

Revisions:
 1 PER TOK COMMENTS 09/09/16
 2 PER WAKE COMMENTS 11/15/16
 3 PER TOK COMMENTS 12/28/16
 4 PER TOK COMMENTS 03/01/17

Sheet No. **4.0**

K:\16-00016\02160032-Knightdale Cottages\CD\14 - EROSION CONTROL PH.1.dwg, Saturday, March 11, 2017 3:23:14 PM - TOWNSEND, CHARLIE

EROSION CONTROL AND STORM DRAINAGE NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
- BOUNDARY SURVEY PERFORMED BY WITHERSRAVENEL.
- WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERSRAVENEL.
- THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 32017500I, WITH AN EFFECTIVE DATE OF MAY 2, 2009.
- 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 THE PLANS 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 NON TRAFFIC AREAS.
- 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, 48 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 DISCHARGE PAD AND THE NATURAL GROUND.
- STORM PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
- A PRECONSTRUCTION MEETING SHALL 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 UDO OR NC 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 STREETSAPES, THE CONTRACTOR SHALL CUT MINIMUM 2 TRENCHES ALONG LIMITS OF DISTURBANCE, SO 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 6.3.
- CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING 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 (SHEET 3.3) 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.
- 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 THIS SHEET).

Flowrate to Basin #1:

Flowrate Q = CIA

Basin Drainage Area "A": 8.13 AC

Runoff Coefficient "C":
 Disturbed earth = 0.13 AC @ c= 0.50
 Undisturbed, wooded areas = 0.00 AC @ c= 0.25
 Undisturbed, grassy areas = 0.00 AC @ c= 0.30
 Other areas = 0.00 AC @ c= 0.95

Composite C value = 0.50

Rainfall Intensity "I": (g/(h*T))

Time of Concentration (Tc) Kirpich equation: $T_c = (L^3/H)^{0.385}$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

Tc = 1.60 min minimum = 5 min

Flow "Q" = CIA"

29.35 cfs

Sediment Basin Summary

Bottom Width = 75 ft
 Bottom Length = 210 ft
 Top Width = 96 ft
 Top Length = 231 ft
 Storage Depth = 2 ft
 Dam Height = 3.5 ft
 Sideslopes = 3 :1

Sediment Basin Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 14,634 cf
 Surface Area Required = 12,767 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 2 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 75 ft
 Bottom Length = 210 ft

Surface Width = 87 ft
 Surface Length = 222 ft
 Bottom Area = 15750 sf

Volume Provided = 35,064 cf OK
 Surface Area Provided = 19,314 sf OK

Spillway Design - Skimmer Outlet

Volume Required = 14,634 cf

Discharge per day (Qd) = 4878 cf/day (assume 3 days)

Orifice Eqn: $Q = Cd \cdot (pi/4) \cdot D^2 \cdot \sqrt{2gH}$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 2.06 in
 Skimmer Size = 3 in
 Head on Skimmer = 0.25 ft
 Orifice Size = 2 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
Required Capacity = 29.35 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 28 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

Basin Weir Eqn: $Q = C \cdot L \cdot H^{1.5}$
Provided Capacity = 29.70 cfs OK

Flowrate to Basin #2:

Flowrate Q = CIA

Basin Drainage Area "A": 4.10 AC

Runoff Coefficient "C":
 Disturbed earth = 4.10 AC @ c= 0.50
 Undisturbed, wooded areas = 0.00 AC @ c= 0.25
 Undisturbed, grassy areas = 0.00 AC @ c= 0.30
 Other areas = 0.00 AC @ c= 0.95

Composite C value = 0.50

Rainfall Intensity "I": (g/(h*T))

Time of Concentration (Tc) Kirpich equation: $T_c = (L^3/H)^{0.385}$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

Tc = 1.60 min minimum = 5 min

Flow "Q" = CIA"

14.80 cfs

Sediment Basin #2 Summary

Bottom Width = 53 ft
 Bottom Length = 315 ft
 Top Width = 80 ft
 Top Length = 342 ft
 Storage Depth = 3 ft
 Dam Height = 4.5 ft
 Sideslopes = 3 :1

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 14 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

Basin Weir Eqn: $Q = C \cdot L \cdot H^{1.5}$
Provided Capacity = 14.85 cfs OK

Sediment Basin #2 Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 7,380 cf
 Surface Area Required = 6,438 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 3 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 53 ft
 Bottom Length = 315 ft (try to be 2X width)

Surface Width = 71 ft
 Surface Length = 333 ft
 Bottom Area = 10590 sf

Volume Provided = 60,507 cf OK
 Surface Area Provided = 23,643 sf OK

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf

Discharge per day (Qd) = 2460 cf/day (assume 3 days)

Orifice Eqn: $Q = Cd \cdot (pi/4) \cdot D^2 \cdot \sqrt{2gH}$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 3.26 in
 Skimmer Size = 6 in
 Head on Skimmer = 0.417 ft
 Orifice Size = 1.25 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 14 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

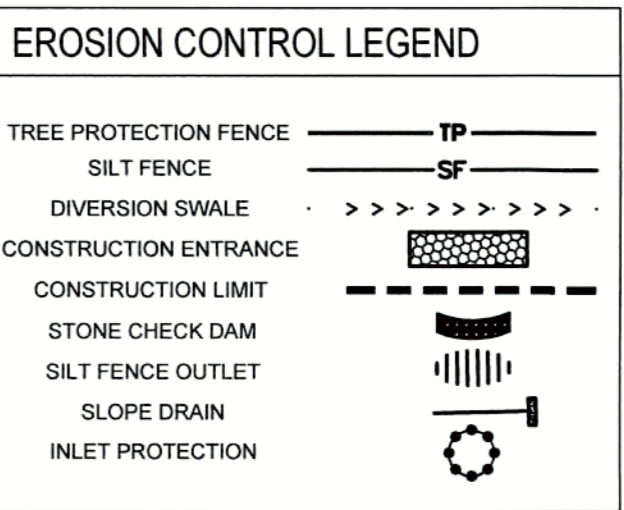
Basin Weir Eqn: $Q = C \cdot L \cdot H^{1.5}$
Provided Capacity = 14.85 cfs OK

Temporary Diversion Ditch Sizing and Lining Calculations

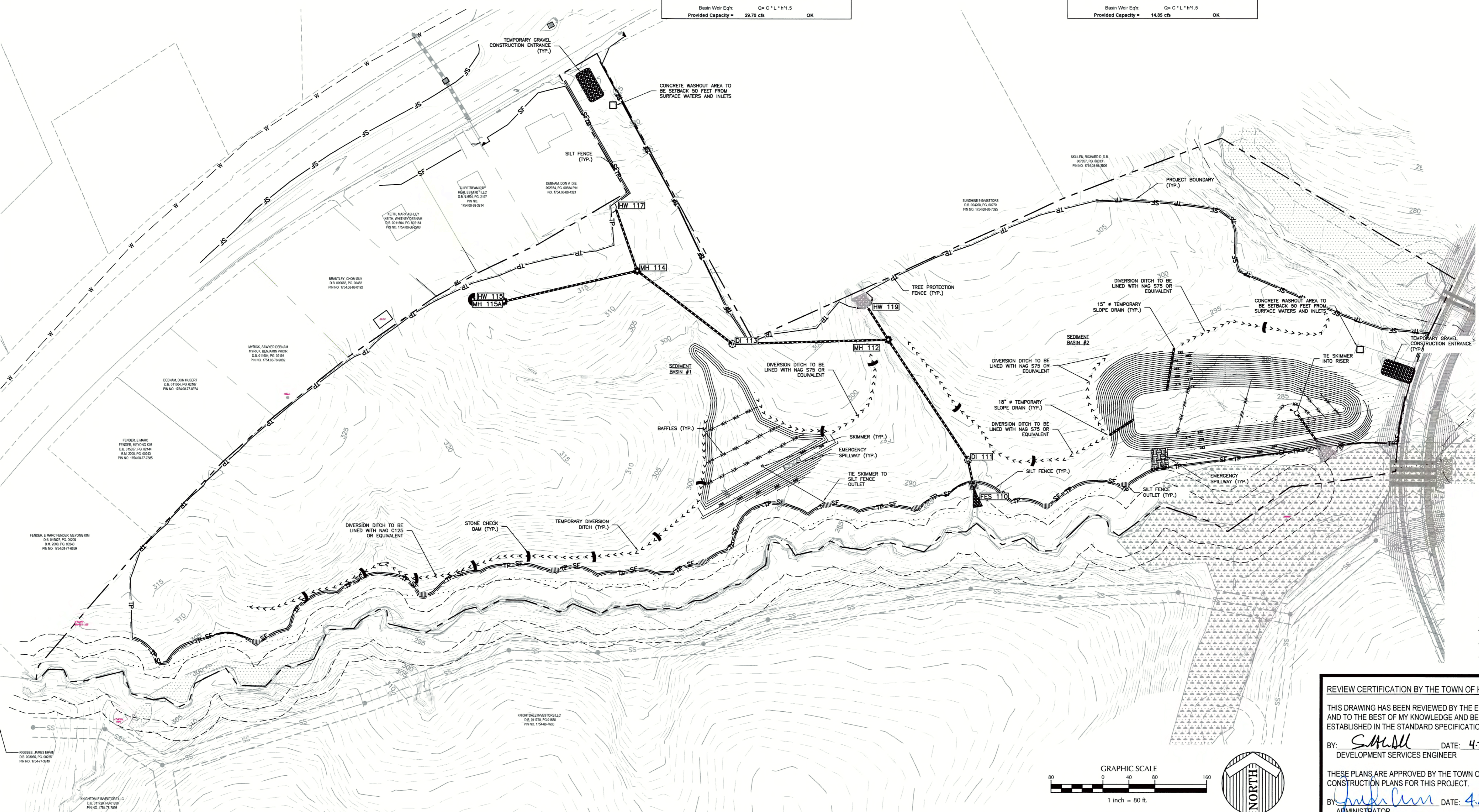
Rainfall Intensity (I_{10yr}) = 7.08 in/hr

Location	Rational C	Drainage Area (ac)	Q _{10yr} (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lb/ft ²)	Calculated Velocity (ft/s)	Type of Lining
Basin #1 East	0.50	0.54	1.81	0.1	0.93	0.16	0.64	NAG S75
Basin #1 West	0.50	6.14	21.74	1.4	0.92	0.79	6.17	NAG C125
Basin #2 East	0.50	0.67	2.02	0.2	0.72	0.07	0.81	NAG S75
Basin #2 West	0.50	1.32	4.67	1.6	0.89	0.86	2.13	NAG S75
Stockpile Area Basin	0.50	2.89	10.44	2.2	0.97	1.18	3.19	NAG S75

NOTE: All ditches are to be trapezoidal in shape, 2:1 sideslopes, bottom width of 2.0', and height of 1.0'.
 Calculated Depth and Calculated Velocity Based on Erosion Output
 NAG S75: North American Green S75 or approved equal
 NAG C125: North American Green C125 or approved equal



- PHASE 2 CONSTRUCTION SEQUENCE:**
- INSTALL CLEAN WATER BYPASS PIPE SYSTEMS: FES 110 - HW 118, MH 112 TO HW117/MH115
 - PROCEED WITH GRADING OPERATIONS.
 - MAINTAIN DEVICES.



CITY OF RALEIGH

All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: N/A
 STORMWATER: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

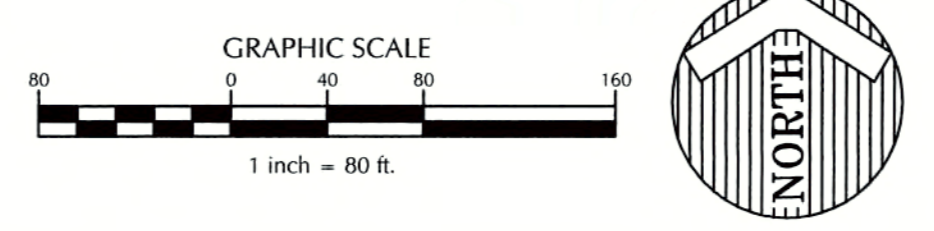
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S. M. Hill* DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4-28-17
 ADMINISTRATOR



WithersRavenel
 Engineers | Planners

131 S.W. Wilmington Street | Raleigh, NC 27601 | T: 919.469.3340 | license # C-0832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION
 KNIGHTDALE, NORTH CAROLINA

EROSION CONTROL PH. 2

Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR

REVISIONS

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. **4.1**

EROSION CONTROL AND STORM DRAINAGE NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
- BOUNDARY SURVEY PERFORMED BY WITHERSRAVENEL.
- WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERSRAVENEL.
- THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720175400, 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 THE PLANS IS BASED ON THE BEST AVAILABLE INFORMATION, BUT CAN BE CONSIDERED ONLY AS APPROXIMATE.
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- 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 MINIMUM 5:1 SLOPE. THE BENCH SHALL BEGIN AT A HEIGHT OF ONE-HALF THE PIPE DIAMETER FOR 10 TO 24 INCH PIPE, ONE-THIRD THE PIPE DIAMETER FOR 30 - 48 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 BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
- A PRE-CONSTRUCTION MEETING SHALL 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 UDO OR NC 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, SO 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 6.3).
- CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING 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 (SHEET 9.3) 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 STANDARD SPECIFICATIONS.
- 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 THIS SHEET).

Flowrate to Basin #1:

Flowrate Q = CIA

Basin Drainage Area "A": 8.13 AC

Runoff Coefficient "C": 0.50

Undisturbed earth = 8.13 AC @ c = 0.50

Undisturbed, wooded areas = 0.00 AC @ c = 0.25

Undisturbed, grassy areas = 0.00 AC @ c = 0.30

Other areas = 0.00 AC @ c = 0.35

Composite C value = 0.50

Rainfall Intensity "I": 7.22 in/hr

Time of Concentration (Tc) Kirpich equation: $T_c = (L/3.33)^{0.385}$

Flow Length (L) = 324 ft

High Point = 305 ft

Low Point = 271 ft

Change in elevation of drainage area (H) = 34 ft

Tc = 1.60 min

Flow "Q" = CIA = 29.35 cfs

Sediment Basin Summary

Bottom Width = 75 ft

Bottom Length = 210 ft

Top Width = 96 ft

Top Length = 231 ft

Storage Depth = 2 ft

Dam Height = 3.5 ft

Sideslopes = 3 : 1

Sediment Basin Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year

Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 14,634 cf

Surface Area Required = 12,787 sf

Shape is assumed to be Trapezoidal - excavation may be required

Depth of Basin = 2 ft

Sideslopes = 3 : 1 (2:1 minimum)

Bottom Width = 75 ft

Bottom Length = 210 ft

Surface Width = 87 ft

Surface Length = 222 ft

Bottom Area = 15750 sf

Volume Provided = 35,994 cf OK

Surface Area Provided = 19,314 sf OK

Spillway Design - Skimmer Outlet

Volume Required = 14,634 cf

Discharge per day (Qd) = 4878 cfd/day (assume 3 days)

Orifice Eqn: $Q = Cd * (pi/4) * D^2 * SQRT(2gH)$

Orifice Coefficient (Cd) = 0.6

Gravitational constant (g) = 32.2 ft/s²

Desired orifice Dia (D) = 2.66 in

Skimmer Size = 3 in

Head on Skimmer = 0.25 ft

Orifice Slope = 2 in (1/4 inch increments)

Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event

Required Capacity = 29.35 cfs

Discharge capacity of stone outlet:

C = 3

Bottom Width (L) = 28 ft min = 10ft

Depth of flow (H) = 0.5 ft (1' added for larger storms)

Basin Weir Eqn: $Q = C * L * H^{1.5}$

Provided Capacity = 29.70 cfs OK

Flowrate to Basin #2:

Flowrate Q = CIA

Basin Drainage Area "A": 4.10 AC

Runoff Coefficient "C": 0.50

Undisturbed earth = 4.10 AC @ c = 0.50

Undisturbed, wooded areas = 0.00 AC @ c = 0.25

Undisturbed, grassy areas = 0.00 AC @ c = 0.30

Other areas = 0.00 AC @ c = 0.35

Composite C value = 0.50

Rainfall Intensity "I": 7.22 in/hr

Time of Concentration (Tc) Kirpich equation: $T_c = (L/3.33)^{0.385}$

Flow Length (L) = 324 ft

High Point = 305 ft

Low Point = 271 ft

Change in elevation of drainage area (H) = 34 ft

Tc = 1.60 min

Flow "Q" = CIA = 14.80 cfs

Sediment Basin #2 Summary

Bottom Width = 53 ft

Bottom Length = 315 ft

Top Width = 80 ft

Top Length = 342 ft

Storage Depth = 3 ft

Dam Height = 4.5 ft

Sideslopes = 3 : 1

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event

Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:

C = 3

Bottom Width (L) = 14 ft min = 10ft

Depth of flow (H) = 0.5 ft (1' added for larger storms)

Basin Weir Eqn: $Q = C * L * H^{1.5}$

Provided Capacity = 14.85 cfs OK

Sediment Basin #2 Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year

Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 7,380 cf

Surface Area Required = 6,438 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 3 ft

Sideslopes = 3 : 1 (2:1 minimum)

Bottom Width = 53 ft

Bottom Length = 315 ft (try to be 2x width)

Surface Width = 71 ft

Surface Length = 333 ft

Bottom Area = 16995 sf

Volume Provided = 60,567 cf OK

Surface Area Provided = 23,643 sf OK

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf

Discharge per day (Qd) = 2460 cfd/day (assume 3 days)

Orifice Eqn: $Q = Cd * (pi/4) * D^2 * SQRT(2gH)$

Orifice Coefficient (Cd) = 0.6

Gravitational constant (g) = 32.2 ft/s²

Desired orifice Dia (D) = 1.28 in

Skimmer Size = 6 in

Head on Skimmer = 0.417 ft

Orifice Slope = 1.25 in (1/4 inch increments)

Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event

Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:

C = 3

Bottom Width (L) = 14 ft min = 10ft

Depth of flow (H) = 0.5 ft (1' added for larger storms)

Basin Weir Eqn: $Q = C * L * H^{1.5}$

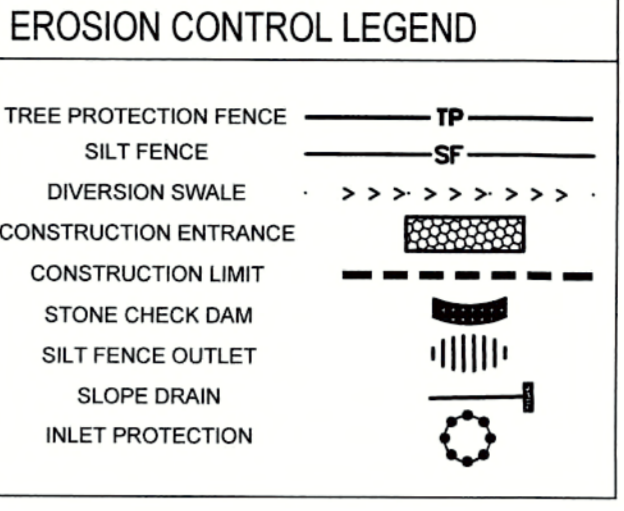
Provided Capacity = 14.85 cfs OK

Temporary Diversion Ditch Sizing and Lining Calculations

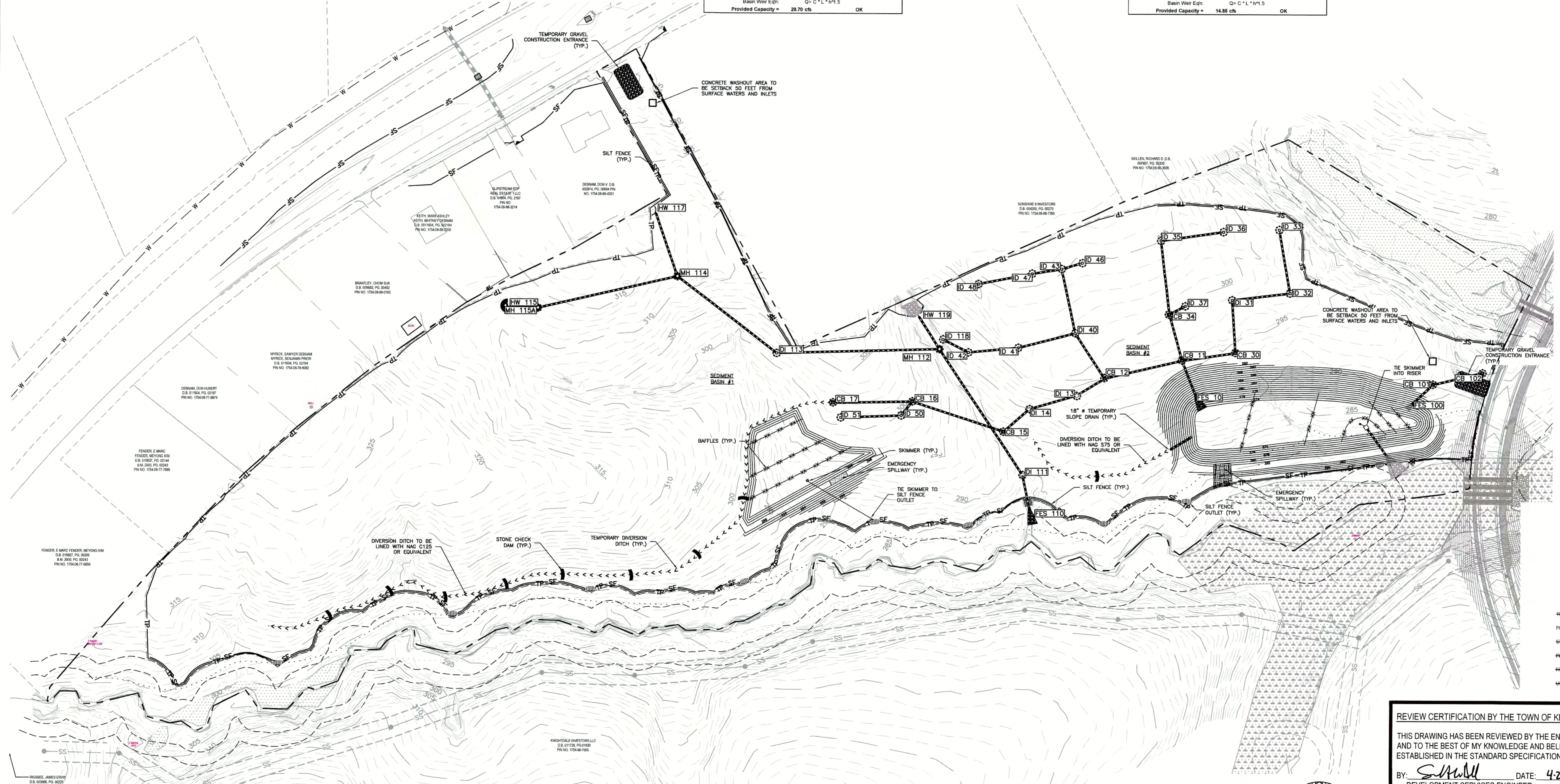
Rainfall Intensity (I₁₀) = 7.08 in/hr

Location	Rational C	Drainage Area (ac)	Q ₁₀ (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lb/ft ²)	Calculated Velocity (ft/s)	Type of Liner
Basin #1 East	0.50	0.54	1.91	0.1	0.65	0.06	0.64	NAAG S75
Basin #1 West	0.50	8.14	21.74	1.4	0.92	0.79	6.17	NAAG C125
Basin #2 East	0.50	0.57	2.02	0.2	0.72	0.07	0.81	NAAG S75
Basin #2 West	0.50	1.32	4.67	1.6	0.66	0.66	2.13	NAAG S75
Stockpile Area Basin	0.50	2.95	10.44	2.2	0.87	1.18	3.19	NAAG S75

NOTES:
All ditches are to be trapezoidal in shape 2:1 sideslopes, bottom width of 2' 0", and height of 1' 0".
Calculated Depth and Calculated Velocity Based on Erosion Output.
NAAG S75: North American Green S75 or approved equal.
NAAG C125: North American Green C125 or approved equal.



- PHASE 3 CONSTRUCTION SEQUENCE:**
- INSTALL PIPE SYSTEM FROM FES 10 TO CB 17 TO ALLOW FOR REMOVAL OF SEDIMENT BASIN #1.
 - FILL IN UPPER THIRD OF SEDIMENT BASIN #1.
 - EXTEND STORM SYSTEM TO WESTERN PROJECT LIMITS (CB 17 - CB 24).
 - CALL DEBRA TANNER, 919-842-7142, TO CONFIRM REMOVAL OF SEDIMENT BASIN #1.
 - CONTINUE GRADING AND MAINTAIN DEVICES.



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A

PUBLIC UTILITIES: N/A

STORMWATER: N/A

PLANNING/ZONING: N/A

HAZ: N/A

URBAN-FORESTRY: N/A

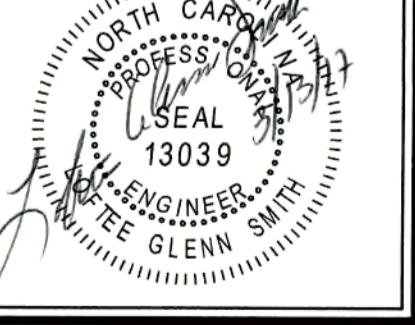
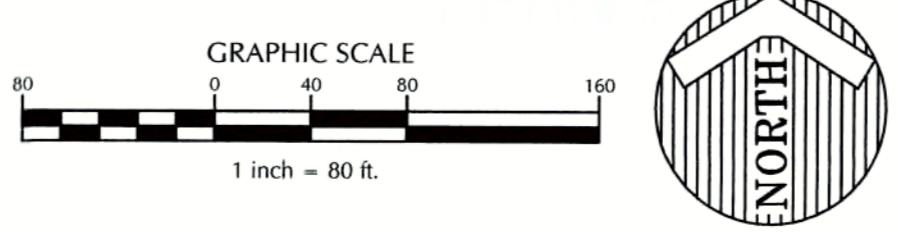
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S. Hill* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *J. Hill* DATE: 4-28-17
ADMINISTRATOR



Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. 4.2

EROSION CONTROL AND STORM DRAINAGE NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
- BOUNDARY SURVEY PERFORMED BY WITHERSRAVENEL.
- WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERSRAVENEL.
- THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720175400J, 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 THE PLANS 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 MINIMUM 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 - 48 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 BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
- A PRECONSTRUCTION MEETING SHALL 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 EQUIVALENT REMEDY PROVIDED BY THE TOWN OF KNIGHTDALE UDC OR NC 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, SO 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 6.3).
- CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING 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 GRANS PER DETAIL (SHEET 9.3) AT LOCATIONS WHERE TEMPORARY DIVERSION DITCHES DISCHARGE INTO A SKIMMER BASIN AS TO AVOID SLOPE EROSION.
- TOPSOIL SHALL BE WASTED OFF-SITE 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.
- 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 THIS SHEET).

Flowrate Q = CIA

Basin Drainage Area "A": 13.47 AC

Runoff Coefficient "C":
 Disturbed earth = 0.30 AC @ C = 0.30
 Undisturbed, wooded areas = 0.00 AC @ C = 0.28
 Undisturbed, grassy areas = 0.00 AC @ C = 0.30
 Other areas = 0.00 AC @ C = 0.35

Composite C value = 0.30

Rainfall Intensity "I":
 $I = g/(h+1)$

Time of Concentration (Tc) Kirpich equation:
 $Tc = (L^{0.77}/497.3)$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

$Tc = 1.60$ min $v_{min} = 5$ min

$I = 7.22$ in/hr

Flow "Q = CIA" = **48.63 cfs**

Sediment Basin #3 Summary

Bottom Width = 53 ft
 Bottom Length = 315 ft
 Top Width = 80 ft
 Top Length = 342 ft
 Storage Depth = 3 ft
 Dam Height = 4.5 ft
 Side Slopes = 3:1

Sediment Basin #3 Volume

Minimum Required Volume = 1800 cfsacre drainage area per year
 Minimum Required Surface Area = 435 sqft of 0.10 peak inflow

Volume Required = 24,246 cf
 Surface Area Required = 21,153 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 3 ft
 Side Slopes = 3:1 (2:1 minimum)
 Bottom Width = 53 ft
 Bottom Length = 315 ft (try to be 2X width)

Surface Width = 71 ft
 Surface Length = 333 ft
 Bottom Area = 16955 sf

Volume Provided = 60,507 cf OK
 Surface Area Provided = 23,643 sf OK

Spillway Design - Skimmer Outlet

Volume Required = 24,246 cf
 Discharge per day (Qd) = 8062 cfd/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gh)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice dia (D) = 2.22 in
 Skimmer Size = 8 in
 Head on Skimmer = 0.5 ft
 Orifice Size = 2.25 in (1/4 inch increments)
 Dewatering Time (days) = 2.9 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event.
 Required Capacity = 48.63 cfs
 21.32 cfs flow through riser
 27.31 cfs needed for design

Discharge capacity of stone outlet:
 $C = 3$
 Bottom Width (L) = 26 ft min = 10R
 Depth of low (h) = 0.5 ft (1' added for larger storms)

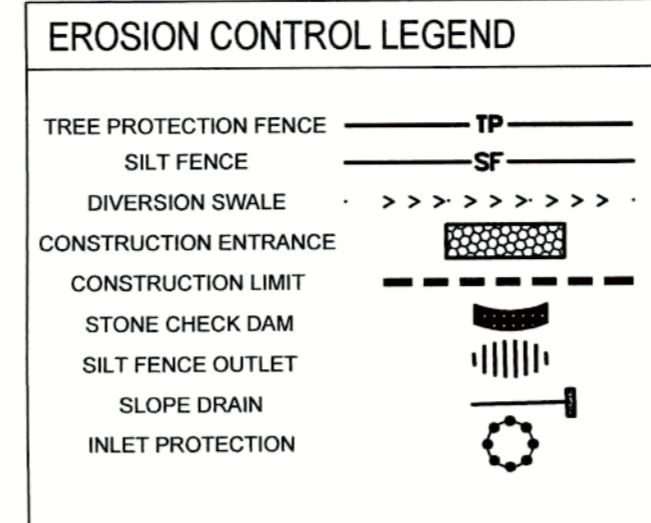
Basin Weir Eq'n: $Q = C * L * H^{1.5}$
 Provided Capacity = 27.58 cfs OK

Temporary Diversion Ditch Sizing and Lining Calculations

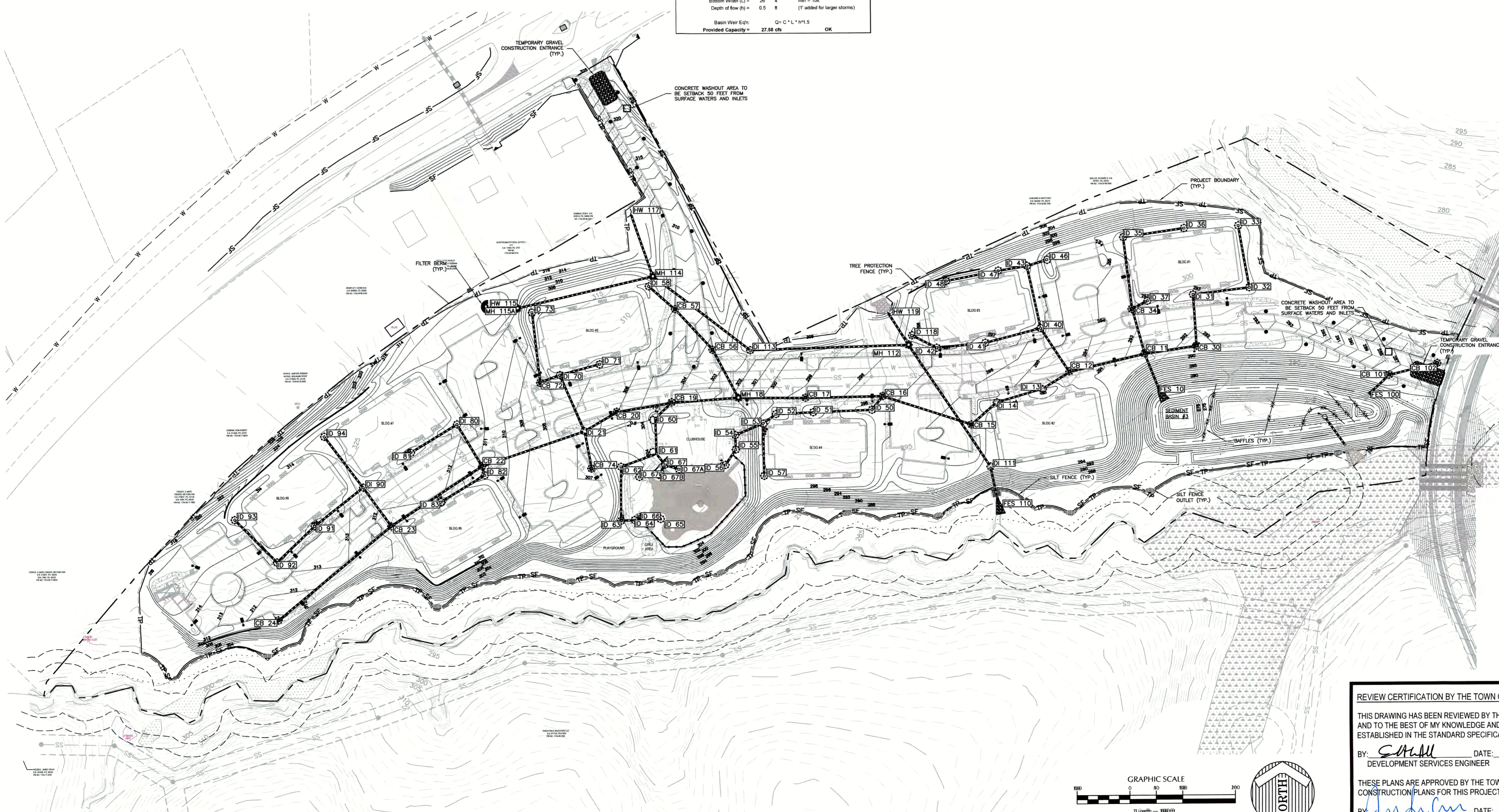
Rainfall Intensity $i_{10yr} = 7.08$ in/hr

Location	Rational C	Drainage Area (Ac)	Q _{10yr} (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lb/ft ²)	Calculated Velocity (ft/s)	Type of Liner
Basin #1 East	0.50	0.54	1.91	0.1	0.92	0.56	0.64	NAG S75
Basin #1 West	0.50	6.14	21.74	1.4	0.72	0.79	6.17	NAG C125
Basin #2 East	0.50	0.87	2.02	0.2	0.72	0.07	0.81	NAG S75
Basin #2 West	0.50	1.32	4.67	1.6	0.66	0.66	2.13	NAG S75
Stockpile Area Basin	0.50	2.58	10.44	2.2	0.87	1.18	3.19	NAG S75

NOTES:
 All ditches are to be trapezoidal in shape, 2:1 side slopes, bottom width of 2.0', and height of 1.0'.
 Calculated Depth and Calculated Velocity Based on Storm Output
 NAG S75: North American Green S75 or approved equal
 NAG C125: North American Green C125 or approved equal



- PHASE 4 CONSTRUCTION SEQUENCE:**
- ROUGH GRADE SITE, INSTALL STORM SEWER, IF SHOWN, AND PROTECT INLETS WITH BLOCK AND GRAVEL INLET CONTROLS, SEDIMENT TRAPS OR OTHER APPROVED MEASURES AS SHOWN ON THE PLAN. BEGIN CONSTRUCTION, BUILDING, ETC. ADJUST TEMPORARY DIVERSIONS AS ROUGH GRADING PROGRESSES.
 - BEGIN CONSTRUCTION, UTILITIES, BUILDING, ETC. INSTALL STORM SEWER, IF SHOWN, AND PROTECT INLETS WITH BLOCK AND GRAVEL INLET CONTROLS, SEDIMENT TRAPS OR OTHER APPROVED MEASURES AS SHOWN ON THE PLAN.
 - STABILIZE SITE AS AREAS ARE BROUGHT UP TO FINISH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC. SEED AND MULCH DENUDATED AREAS PER GROUND STABILIZATION TIME FRAMES.
 - WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE STABILIZED COMPLETELY, CALL FOR AN INSPECTION BY THE WATERSHED MANAGER.
 - IF SITE IS APPROVED, REMOVE TEMPORARY DIVERSIONS, SILT FENCE, ETC., AND SEED OUT OR STABILIZE ANY RESULTING BARE AREAS. CONVERT SEDIMENT BASIN TO A WETPOND, REMOVE SKIMMER AND INSTALL PERMANENT RISER COMPONENTS. 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. OBTAIN A CERTIFICATE OF COMPLETION.



CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: N/A
 GROUNDWATER: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

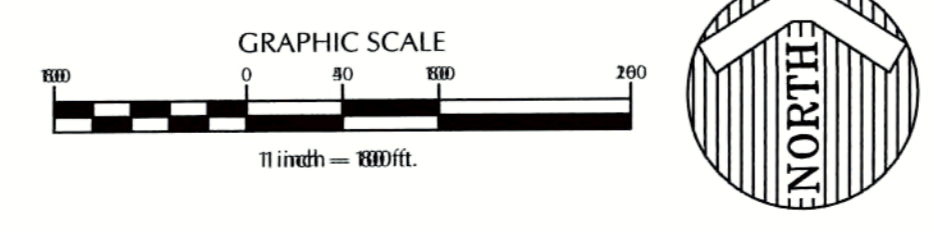
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: SAMM DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
 ADMINISTRATOR



WithersRavenel
 Engineers | Planners

131 1/2 Wilmington Street | Raleigh, NC 27601 | 919-969-2340 | License # C-08821 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

EROSION CONTROL PH. 4

Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR

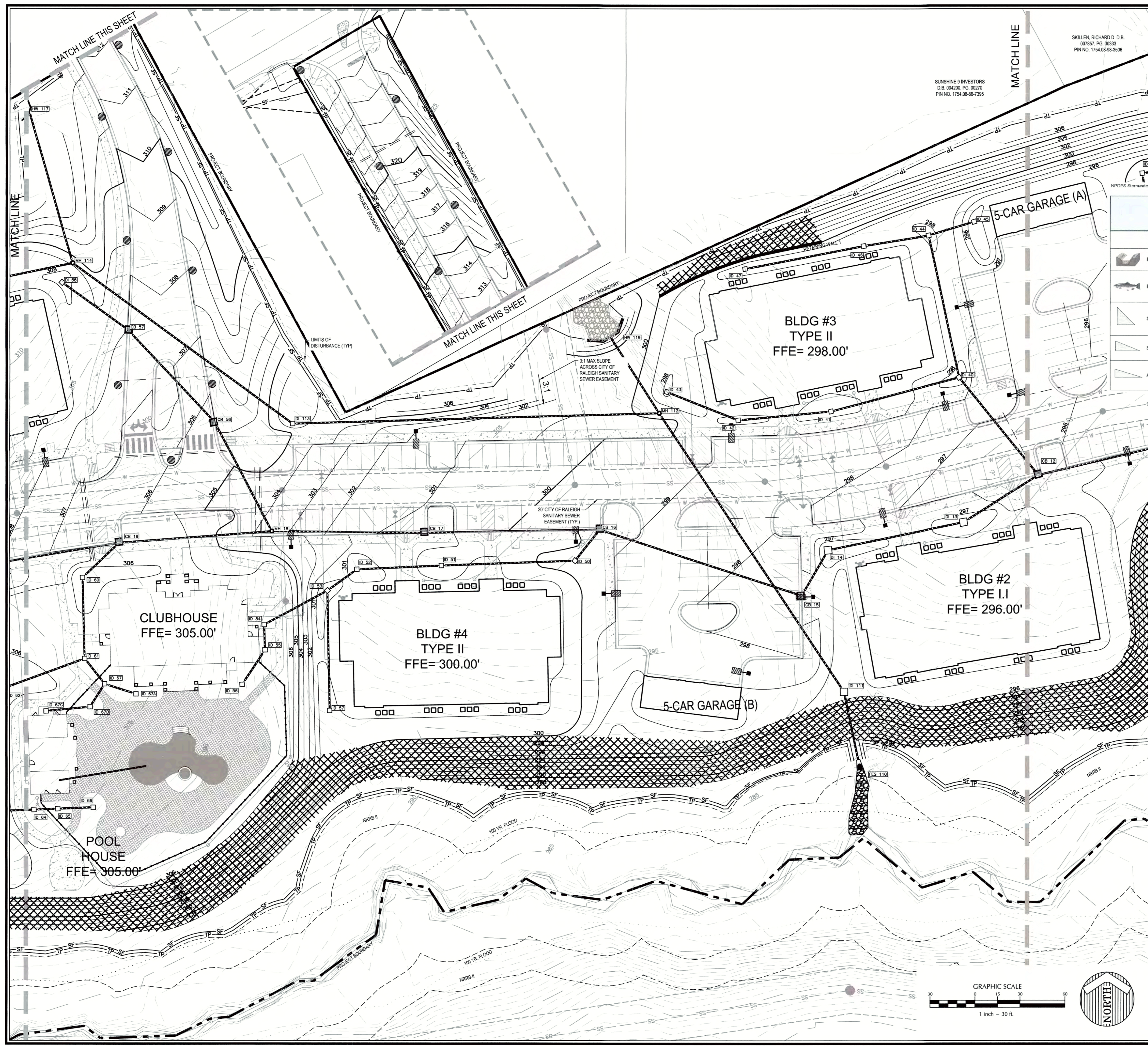
NORTH CAROLINA PROFESSIONAL SEAL 13039
 ENGINEER
 TEE GLENN SMITH

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. **4.3**

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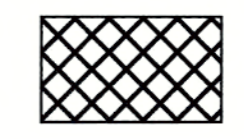


SKILLEN, RICHARD D. D.B.
007857, PG. 00233
PIN NO. 1754.08-88-3506

SUNSHINE 9 INVESTORS
D.B. 084200, PG. 00270
PIN NO. 1754.08-88-7955

RETAINING WALL NOTES:

1. THE RETAINING WALL INFORMATION SHOWN ON THESE PLANS IS FOR GENERAL LOCATION AND GENERAL DIMENSIONS ONLY. WITHERSRAVENEL IS NOT RESPONSIBLE FOR THE DESIGN, PERMITTING, INSPECTION OR CONSTRUCTION CERTIFICATION OF ANY RETAINING WALLS SHOWN ON THESE PLANS. RETAINING WALLS SHALL BE CONSTRUCTED BY PLANS PREPARED SEPARATELY FOR THE OWNER BY OTHER CONSULTANTS. WITHERSRAVENEL ACCEPTS NO LIABILITY FOR SUCH PLANS.
2. GEOGRIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.



AREA TO BE STABILIZED WITHIN 7 DAYS

STABILIZATION TIMEFRAMES (Effective Aug. 3, 2011)		
SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, 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 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

NPDES Stormwater Discharge Permit for Construction Activities (NC001)

NCDENR/Division of Energy, Mineral and Land Resources

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



Revisions	DATE
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
GEOTECHNICAL: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

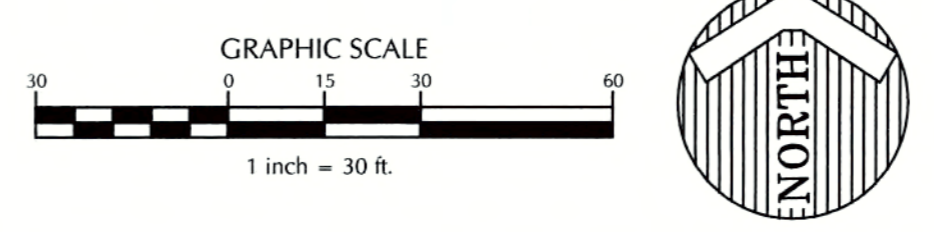
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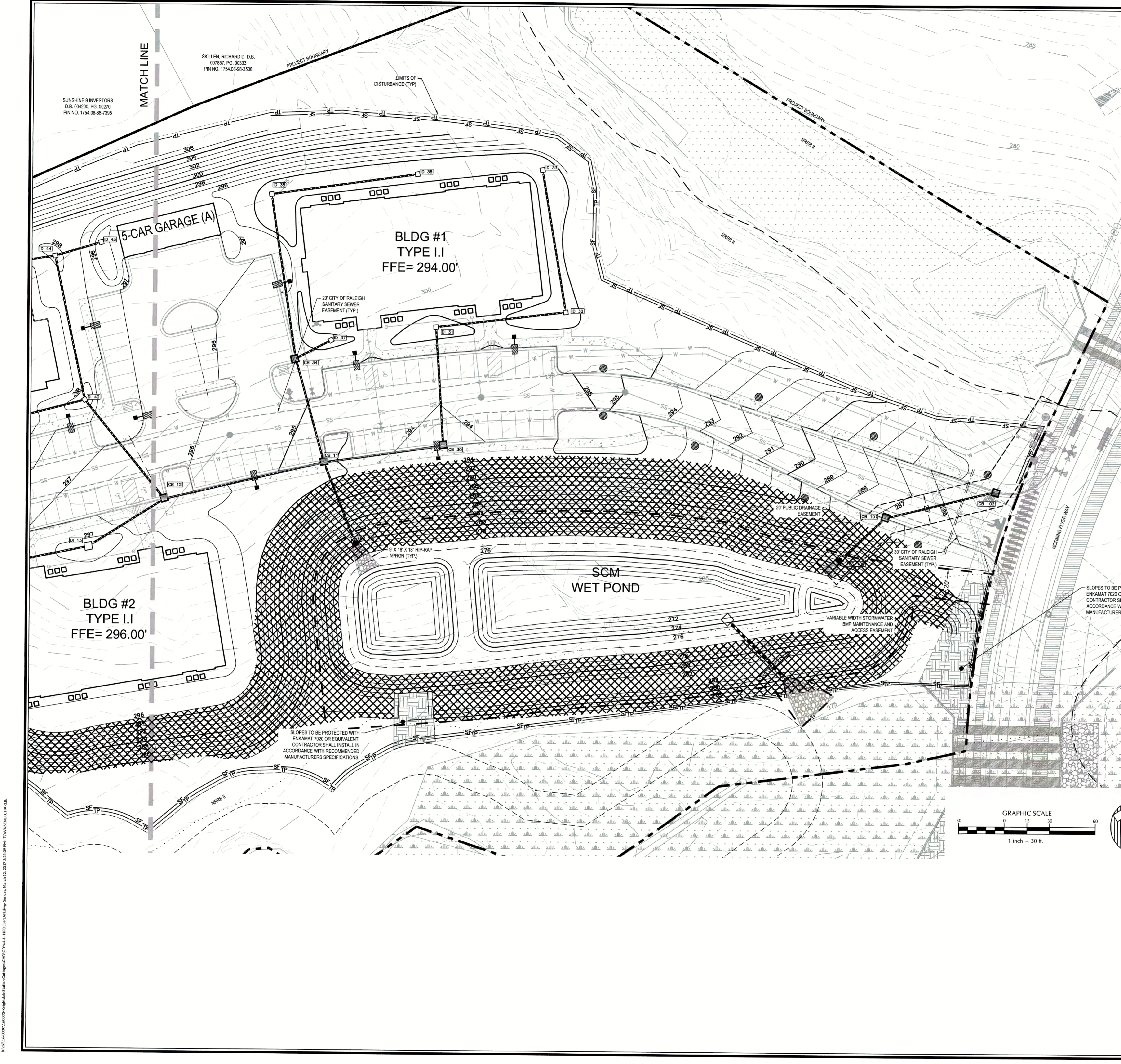
BY: SAW DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR



K:\1616\0001\000012\Knightdale Cottages\CACT\164-1-NPDES PLAN.dwg Sunday, March 12, 2017 3:25:38 PM TOWN OF KNIGHTDALE



NPDES Stormwater Discharge Permit for Construction Activities (NCGO1)

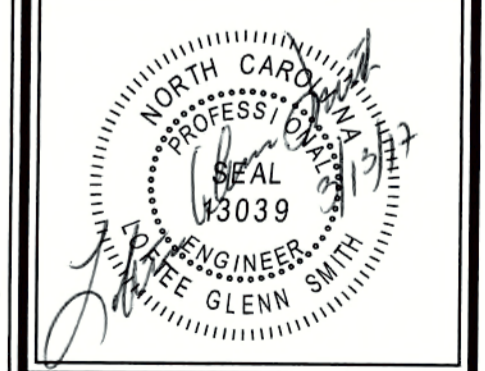
NCDENR/Division of Energy, Mineral and Land Resources

STABILIZATION TIMEFRAMES (Effective Aug. 3, 2011)		
SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, 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 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

AREA TO BE STABILIZED WITHIN 7 DAYS

NOTE: REFER TO SHEET L1.3 FOR BMP PLANTING & STABILIZATION SCHEDULE

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES N/A
PUBLIC UTILITIES N/A
STORMWATER N/A
PLANNING/ZONING N/A
FIRE N/A
URBAN FORESTRY N/A

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

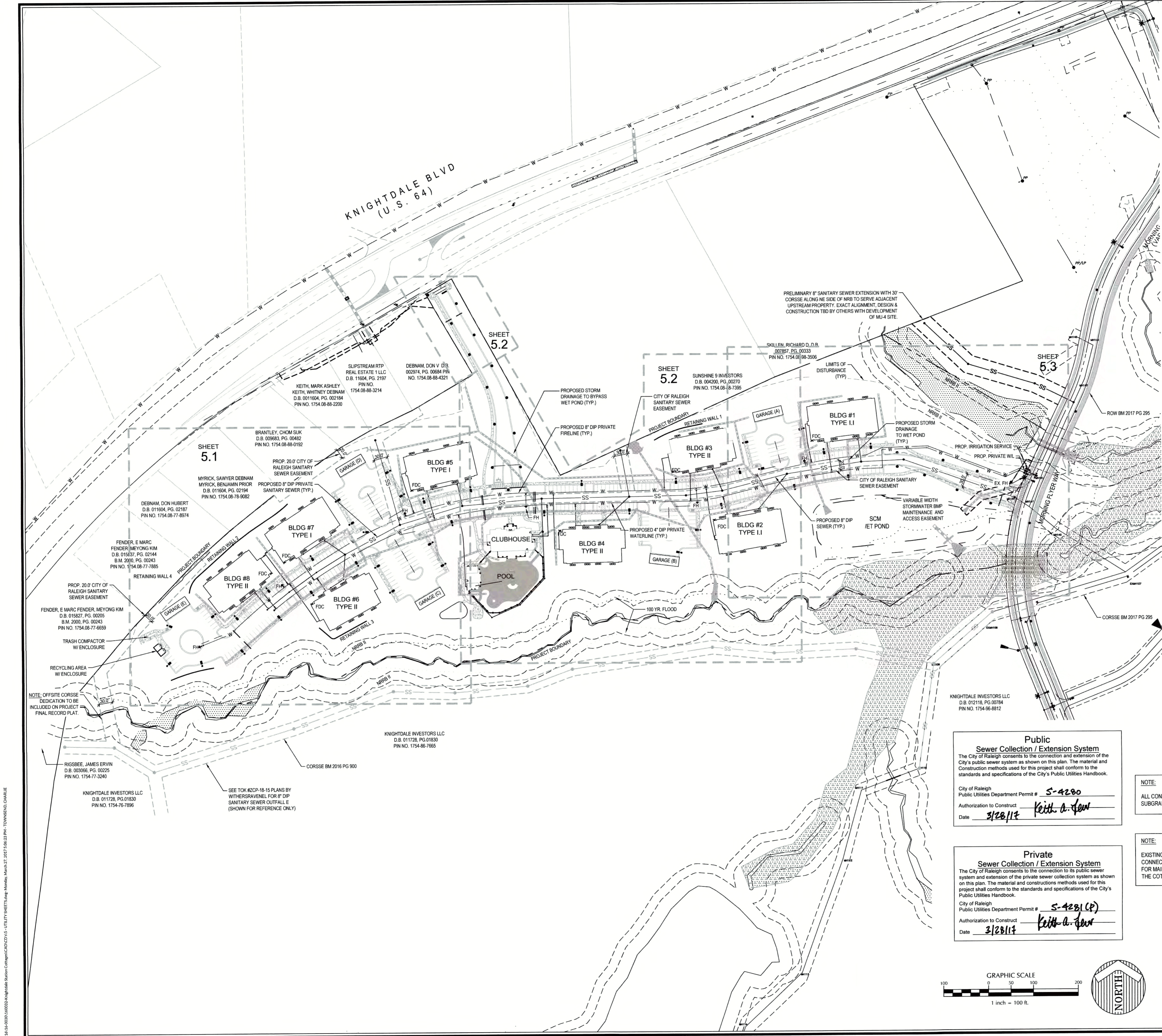
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By: S. A. Hill DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

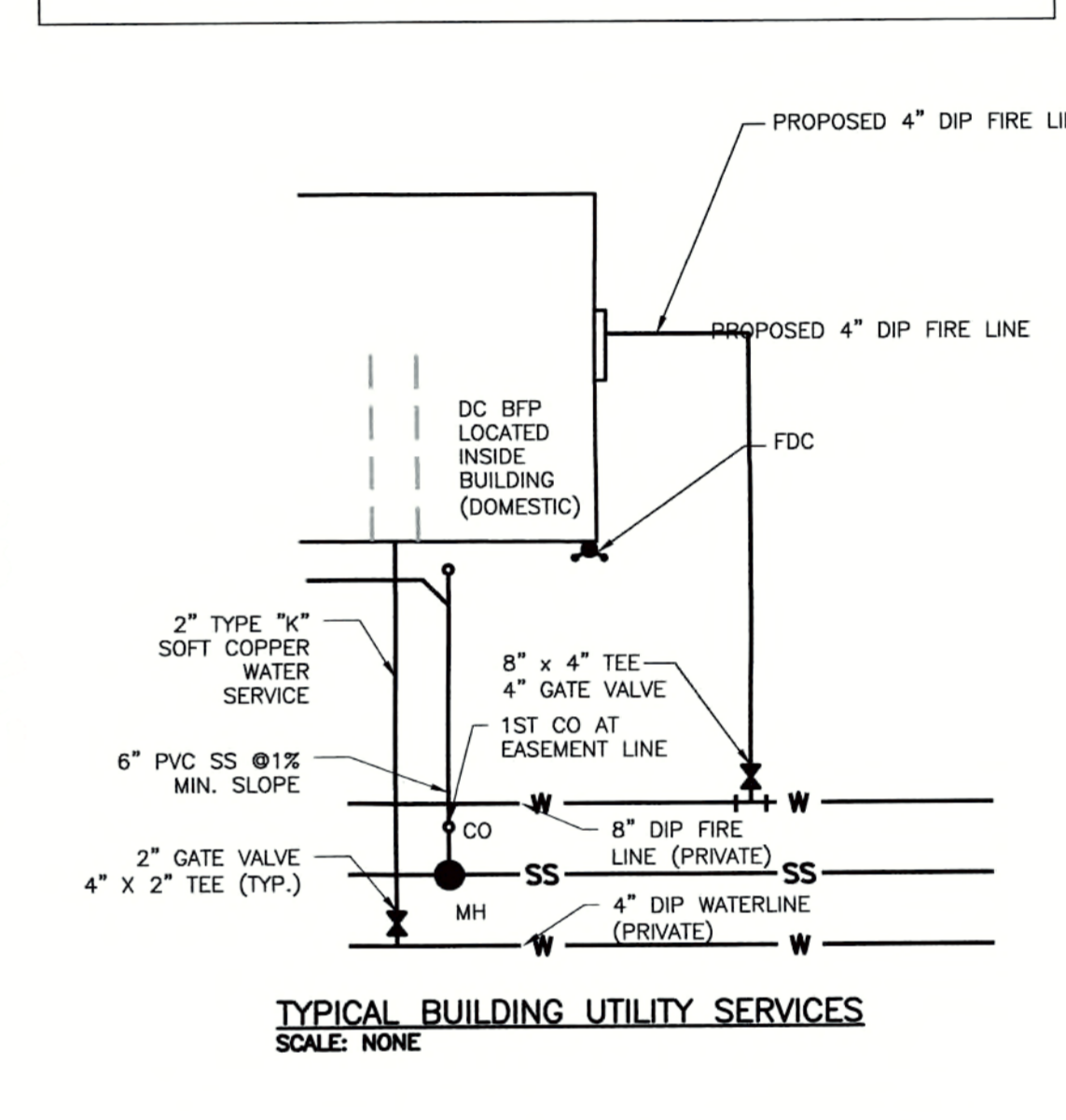
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

By: [Signature] DATE: 4-28-17
ADMINISTRATOR

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- STANDARD UTILITY NOTES (AS APPLICABLE):**
1. ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS REFERENCE: CORPUS HANDBOOK, CURRENT EDITION.
 2. UTILITY SEPARATION REQUIREMENTS:
 - a) 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, PERIODIC SANITARY SEWER PIPES 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.
 - b) WHEN INSTALLING WATER & RCP SEWER MAINS, THE HORIZONTAL SEPARATION BETWEEN UTILITIES SHALL BE 10'. IF THIS SEPARATION CANNOT BE MAINTAINED DUE TO EXISTING CONDITIONS, THE VARIATION ALLOWED IS THE WATER MAIN IN A SEPARATE TRENCH WITH THE ELEVATION OF THE WATER MAIN AT LEAST 18" ABOVE THE TOP OF THE SEWER & MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR.
 - c) WHERE IT IS IMPOSSIBLE TO OBTAIN PROPER SEPARATION, OR ANYTIME A SANITARY SEWER PASSES OVER A WATERMAIN, DIP MATERIALS OR STEEL ENCASUREMENT EXTENDED 12" ON EACH SIDE OF CROSSING MUST BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS.
 - d) 50' MINIMUM HORIZONTAL SEPARATION IS REQUIRED BETWEEN ALL SANITARY SEWER & STORM SEWER FACILITIES, UNLESS DIP MATERIAL IS SPECIFIED FOR SANITARY SEWER.
 - e) MAINTAIN 8" MIN. VERTICAL SEPARATION AT ALL WATERMAIN & RCP STORM DRAIN CROSSINGS; MAINTAIN 24" MIN. VERTICAL SEPARATION AT ALL SANITARY SEWER & RCP STORM DRAIN CROSSINGS. WHERE ADEQUATE SEPARATIONS CANNOT BE ACHIEVED, SPECIFY DIP MATERIALS & A CONCRETE CRADLE HAVING 6" MIN. CLEARANCE (PER CORPUS DETAILS W-41 & S-49).
 - f) ALL OTHER UNDERGROUND UTILITIES SHALL CROSS WATER & SEWER FACILITIES WITH 18" MIN. VERTICAL SEPARATION REQUIRED.
 3. ANY NECESSARY FIELD REVISIONS ARE SUBJECT TO REVIEW & APPROVAL OF AN AMENDED PLAN &/OR PROFILE BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT PRIOR TO CONSTRUCTION.
 4. CONTRACTOR SHALL MAINTAIN CONTINUOUS WATER & SEWER SERVICE TO EXISTING RESIDENCES & BUSINESSES THROUGHOUT CONSTRUCTION OF PROJECT. ANY NECESSARY SERVICE INTERRUPTIONS SHALL BE PRECEDED BY A 24 HOUR ADVANCE NOTICE TO THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT.
 5. 3.0' MINIMUM COVER IS REQUIRED ON ALL WATER MAINS & SEWER FORCE MAINS; 4.0' MINIMUM COVER IS REQUIRED ON ALL REUSE MAINS.
 6. IT IS THE DEVELOPER'S RESPONSIBILITY TO ABANDON OR REMOVE EXISTING WATER & SEWER SERVICES NOT BEING USED IN REDEVELOPMENT OF A SITE UNLESS OTHERWISE DIRECTED BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT. THIS INCLUDES ABANDONING TAP AT MAIN & REMOVAL OF SERVICE FROM ROW OR EASEMENT PER CORPUS HANDBOOK PROCEDURES.
 7. INSTALL 4" DIP WATER SERVICE WITH WETTER LOCATED AT ROW OR WITHIN A 2' X 2' WATERLINE EASEMENT IMMEDIATELY ADJACENT. NOTE: IT IS THE APPLICANT'S RESPONSIBILITY TO PROPERLY SIZE THE WATER SERVICE FOR EACH CONNECTION TO PROVIDE ADEQUATE FLOW & PRESSURE.
 8. INSTALL 4" PVC SEWER SERVICES @ 1% MINIMUM GRADE WITH CLEANOUTS LOCATED AT ROW OR EASEMENT LINE & SPACED EVERY 75' LINEAR FEET MAXIMUM.
 9. PRESSURE REDUCING VALVES ARE REQUIRED ON ALL WATER SERVICES EXCEEDING 80 PSI. BACKFLOW VALVES ARE REQUIRED ON ALL SANITARY SEWER SERVICES HAVING BUILDING DRAINS LOWER THAN 12" ABOVE THE NEXT UPSTREAM MANHOLE.
 10. ALL ENVIRONMENTAL PERMITS APPLICABLE TO THE PROJECT MUST BE OBTAINED FROM NCDOUG, USACE, & OR FEMA FOR ANY RIPARIAN BUFFER, WETLAND & OR FLOODPLAIN IMPACTS (RESPECTIVELY) PRIOR TO CONSTRUCTION.
 11. NCOTD (RALEIGH) ENCROACHMENT AGREEMENTS ARE REQUIRED FOR ANY UTILITY WORK (INCLUDING MAIN EXTENSIONS & SERVICE TAPS) WITHIN STATE OR RALEIGH ROW PRIOR TO CONSTRUCTION.
 12. GREASE INTERCEPTOR / OIL WATER SEPARATOR SIZING CALCULATIONS & INSTALLATION SPECIFICATIONS SHALL BE APPROVED BY THE CORPUS PROGRAM COORDINATOR PRIOR TO ISSUANCE OF A BUILDING PERMIT. CONTACT TIM BEASLEY AT (919) 996-2334 OR TIMOTHY.BEASLEY@RALEIGH.GOV FOR MORE INFORMATION.
 13. CROSS CONNECTION CONTROL PROTECTION DEVICES ARE REQUIRED BASED ON DEGREE OF HEALTH HAZARD INVOLVED AS LISTED IN APPENDIX B OF THE RULES GOVERNING PUBLIC WATER SYSTEMS IN NORTH CAROLINA. THESE GUIDELINES ARE THE MINIMUM REQUIREMENTS. THE DEVICES SHALL MEET AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) STANDARDS OR BE ON THE UNIVERSITY OF SOUTHERN CALIFORNIA APPROVAL LIST. THE DEVICES SHALL BE INSTALLED AND TESTED (BOTH INITIAL AND PERIODIC TESTING THEREAFTER) IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS OR THE LOCAL CROSS CONNECTION CONTROL PROGRAM, WHICHEVER IS MORE STRINGENT. CONTACT JOANNE HARTLEY AT (919) 996-5232 OR JOANNE.HARTLEY@RALEIGH.GOV FOR MORE INFORMATION.



ATTENTION CONTRACTORS

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER MAIN SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.

FAILURE TO NOTIFY BOTH CITY DEPARTMENTS IN ADVANCE OF BEGINNING CONSTRUCTION WILL RESULT IN THE ISSUANCE OF MONETARY FINES AND REQUIRE REINSTALLATION OF ANY WATER OR SEWER FACILITIES NOT INSPECTED AS A RESULT OF THIS NOTIFICATION FAILURE.

FAILURE TO CALL FOR INSPECTION, INSTALL A DOWNSTREAM PLUG, HAVE PERMITTED PLANS ON 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.

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-4280**

Authorization to Construct
Date **3/28/17** *Keith A. Jew*

Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # **S-4281 (P)**

Authorization to Construct
Date **3/28/17** *Keith A. Jew*

NOTE:
ALL CONDUIT SHALL BE 4" SCH. 40 PVC, 12" MIN. COVER TO SUBGRADE, 6" MIN. HORIZONTAL SEPARATION.

NOTE:
EXISTING DOWNSTREAM UTILITIES TO WHICH THIS PROJECT CONNECTS SHALL BE ACCEPTED BY THE CITY OF RALEIGH FOR MAINTENANCE PRIOR TO THE RELEASE OF 1ST CO FOR THE COTTAGES AT KNIGHTDALE STATION

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES	N/A
PUBLIC UTILITIES	<i>K.A. Jew 3/28/17</i>
STORMWATER	N/A
PLANNING/ENGINEERING	N/A
FIRE	N/A
URBAN FORESTRY	N/A

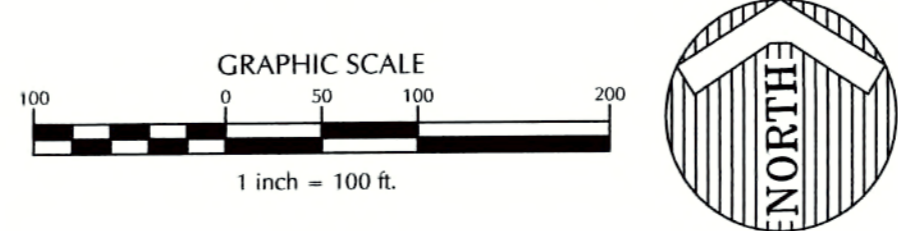
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *Sarah All* DATE: **4-21-2017**
DEVELOPMENT SERVICES ENGINEER

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

BY: *John Smith* DATE: **4-28-17**
ADMINISTRATOR



WithersRavenel
Engineers | Planners

131 1/2 S Wilmington Street | Raleigh, NC 27601 | P: 919-669-3540 | License # C-6832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

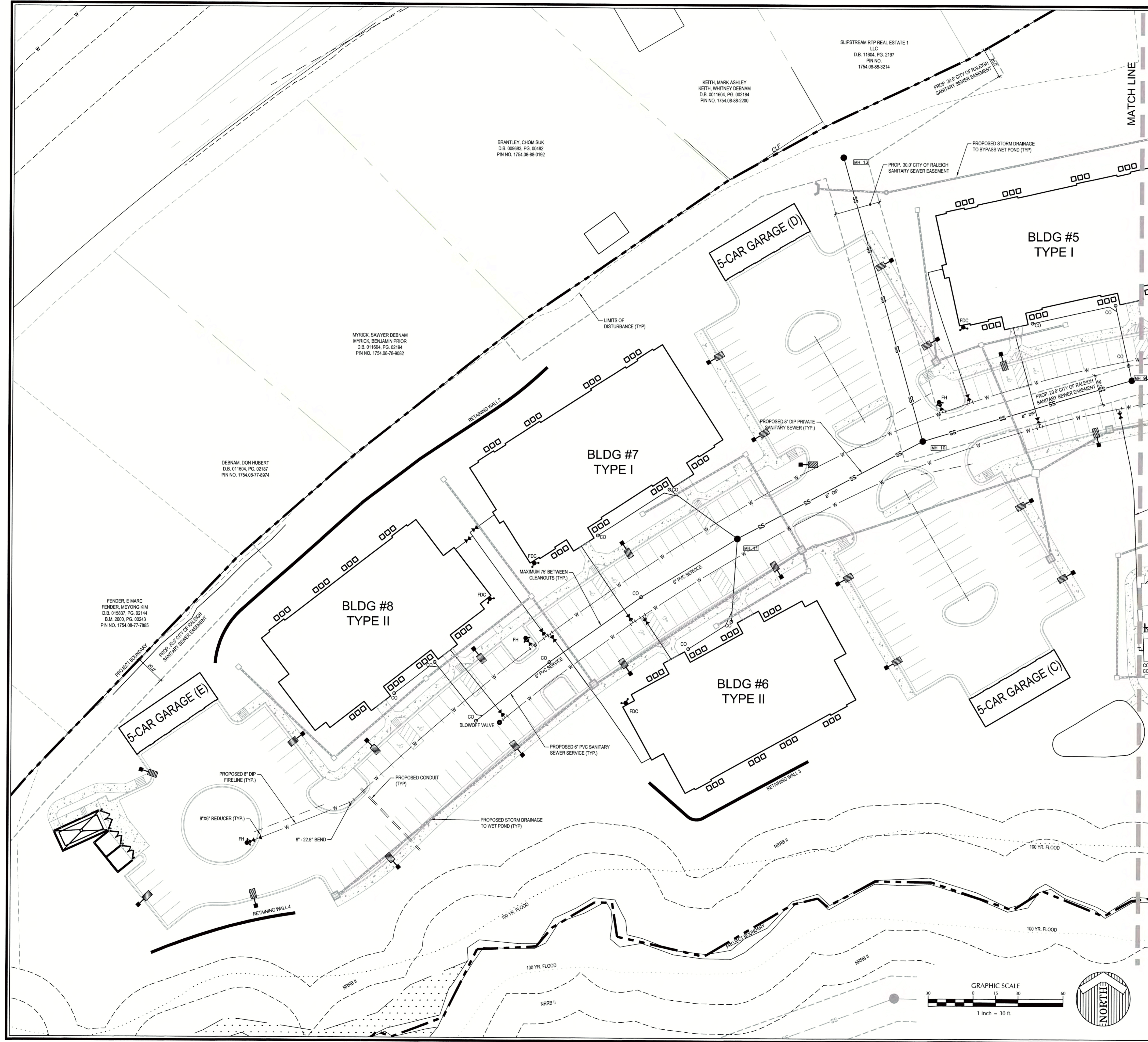
OVERALL UTILITY PLAN

Job No. 02160032 | Drawn By CDT
Date 06/03/2016 | Designer WR

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. **5.0**



ATTENTION CONTRACTORS

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Public Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4280
Authorization to Construct Keith A. Dew
Date 3/24/17

Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4281(P)
Authorization to Construct Keith A. Dew
Date 3/24/17

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/ROAD SERVICES: N/A
PUBLIC UTILITIES: K.A. Dew 3/24/17
STORMWATER: N/A
PLANNING/POURING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: SMH DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

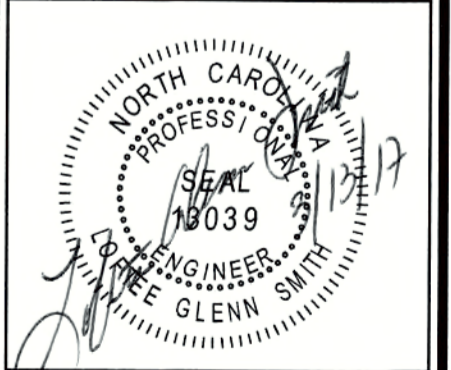
WithersRavenel
Engineers | Planners

13175 S.Wilmington Street | Raleigh, NC 27601 | 1-919-469-2340 | License # C-0832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION
KNIGHTDALE, NORTH CAROLINA

UTILITY PLAN WEST

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR

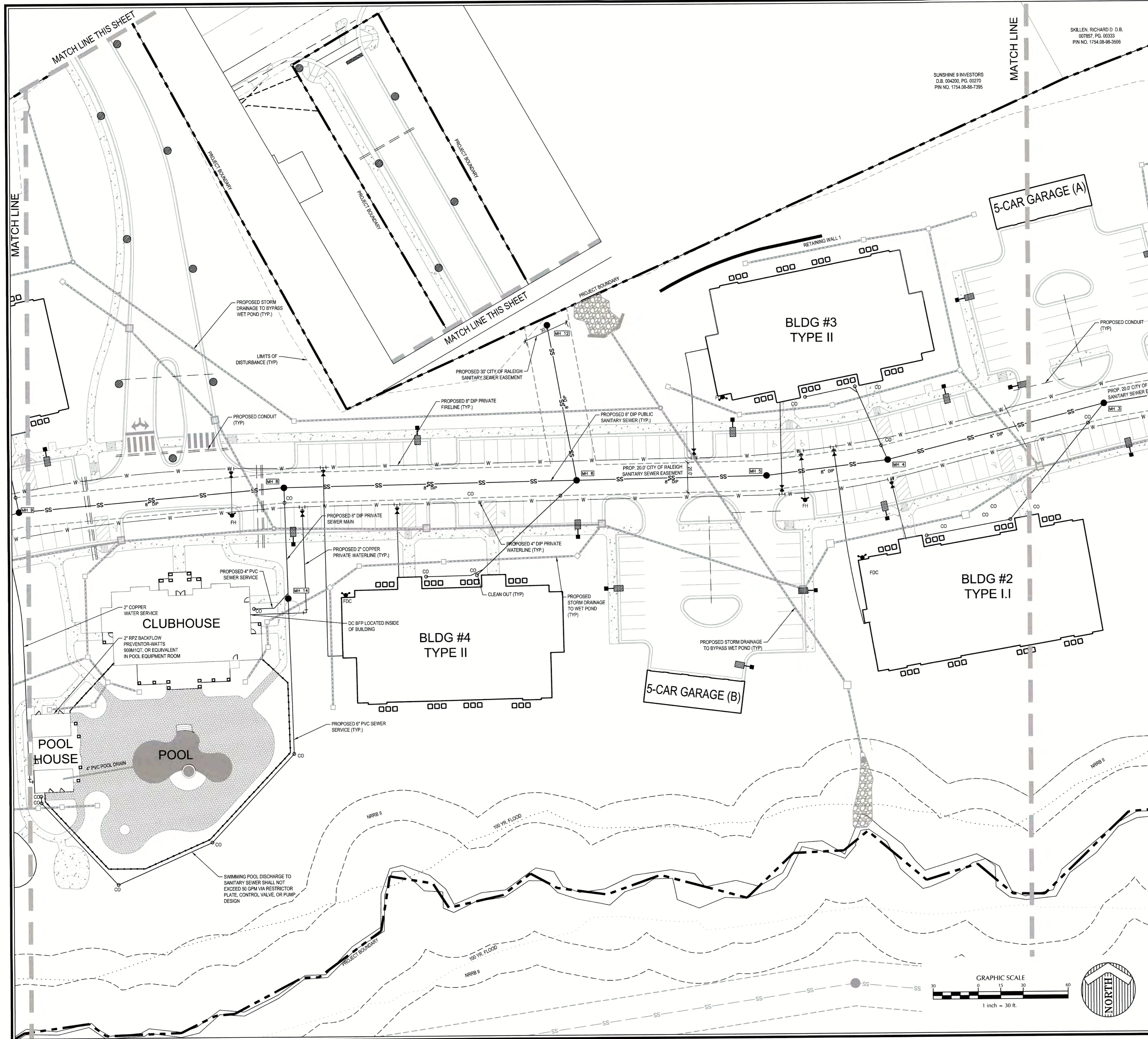


Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. **5.1**

K:\16-00001\00025-Knightdale Station\Drawings\CADD\CD\15-UTILITY SHEETS\Eng-Main\15-2017-5.1(1).DWG - TOWNSEND.CHAMBERLAIN



SKILLEN, RICHARD D. D.B.
007857, PG. 00333
PIN NO. 1754-08-88-3506

SUNSHINE 9 INVESTORS
D.B. 004280, PG. 00279
PIN NO. 1754-08-88-7565

ATTENTION CONTRACTORS

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.

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Public Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4280
Authorization to Construct Keith A. Dew
Date 3/24/17

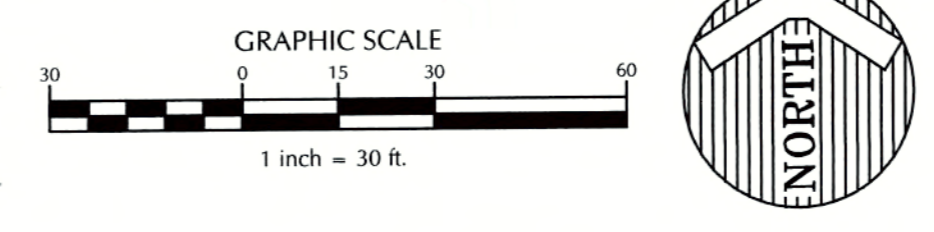
Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4281(P)
Authorization to Construct Keith A. Dew
Date 3/24/17

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSFORMATION FIELD SERVICES N/A
PUBLIC UTILITIES K.A. Dew 3/24/17
STORMWATER N/A
PLANNING/GRADING N/A
FHPC N/A
URBAN FORESTRY N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: S.M. Hill DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: John C. ... DATE: 4.28.17
ADMINISTRATOR

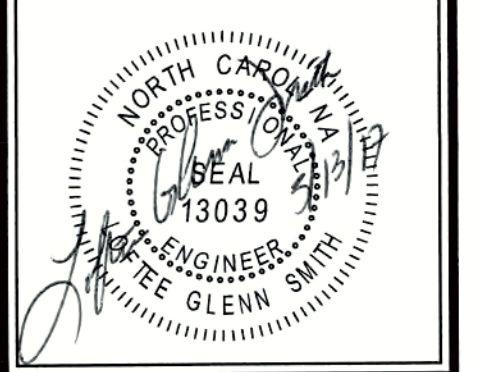
WithersRavenel
Engineers | Planners

131 1/2 S. Wilmington Street | Raleigh, NC 27601 | T: 919-469-3340 | License #: C-0832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

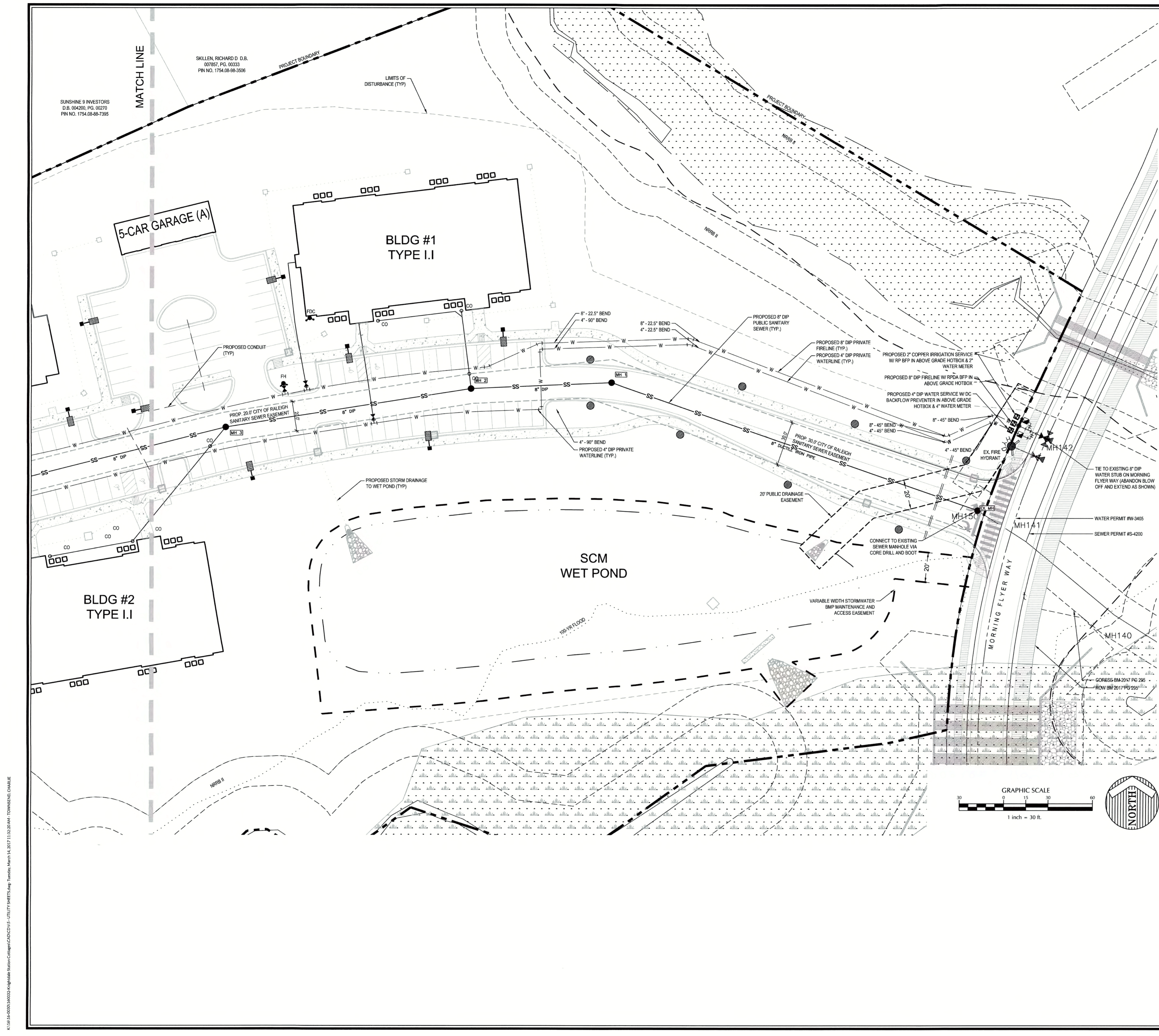
UTILITY PLAN CENTRAL

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

K:\1616-00001\000032 Knightdale Station Cottages\CD\05 - UTILITY SHEETS.dwg - Sunday, March 12, 2017 3:29:48 PM - TOWNSEND, CHARLIE



ATTENTION CONTRACTORS

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Public Sewer Collection / Extension System

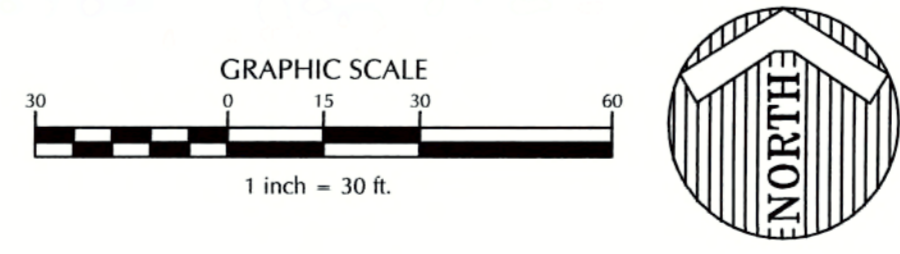
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # **S-4280**
Authorization to Construct
Date **3/22/17** *Keith A. Dew*

Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # **S-4281(P)**
Authorization to Construct
Date **3/22/17** *Keith A. Dew*



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/FREEDOMWAYS: N/A
PUBLIC UTILITIES: **K.A. Dew 3/22/17**
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN/FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S.A. Hill* DATE: **4-21-2017**
DEVELOPMENT SERVICES ENGINEER

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

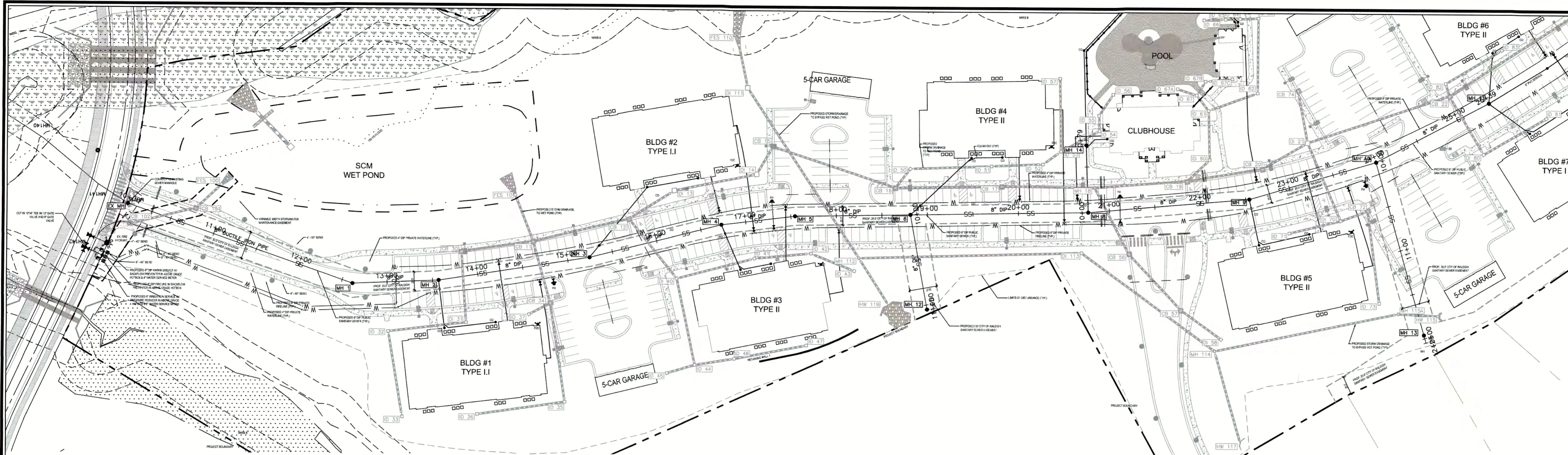
BY: *Chris Carr* DATE: **4-28-17**
ADMINISTRATOR

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR

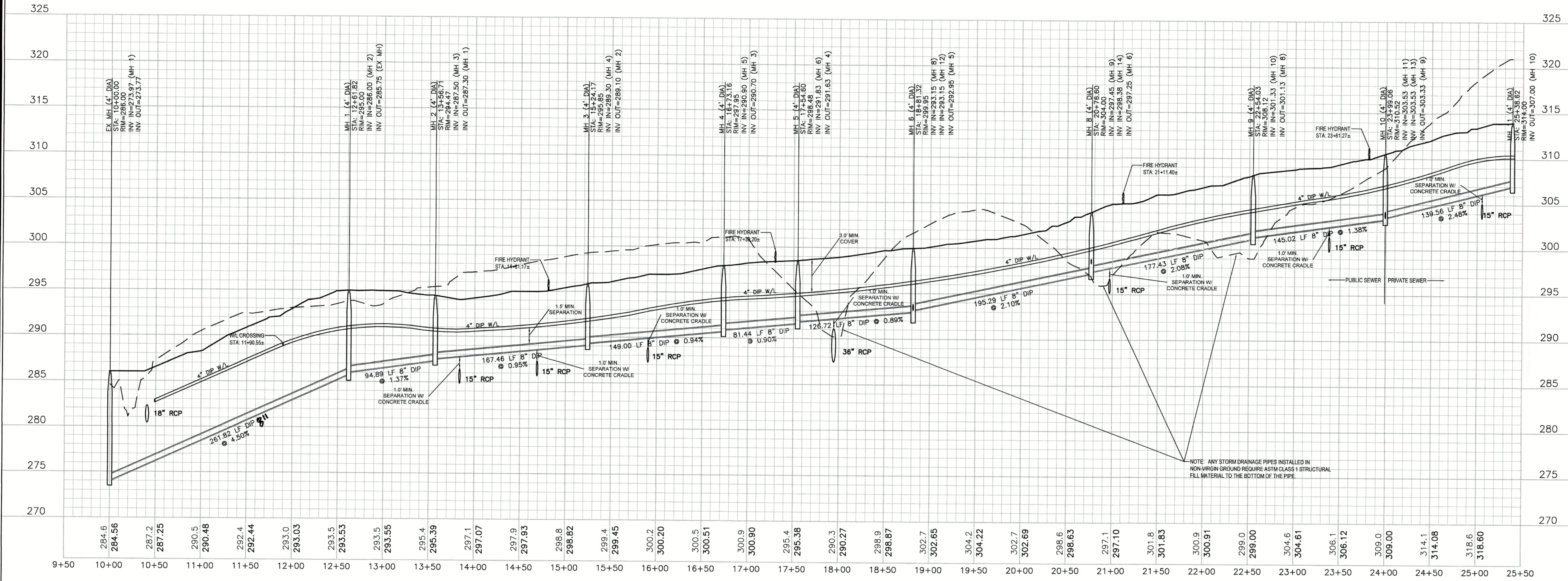


Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

K:\16-0000\02160032-Knightdale Station-Cottages\CD\03-UTILITY SHEETS.dwg Tuesday, March 14, 2017 11:32:26AM TOWNSEND, CHARLIE



SANITARY SEWER PROFILE



ATTENTION CONTRACTORS

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.

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Private Sewer Collection / Extension System

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

City of Raleigh
Public Utilities Department Permit # **S-4281(P)**
Authorization to Construct
Date **3/24/17** *Keith A. Jew*

Public Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # **S-4280**
Authorization to Construct
Date **3/24/17** *Keith A. Jew*

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/FIELD SERVICES N/A
PUBLIC UTILITIES _____
SEWER/WATER N/A
PLANNING/ZONING N/A
FIRE N/A
URBAN FORESTRY N/A

NOTE:
ALL STORM DRAINAGE SHALL MAINTAIN MINIMUM 1.0' CLEARANCE BELOW SANITARY SEWER

GRAPHIC SCALE
1 inch = 60 ft.

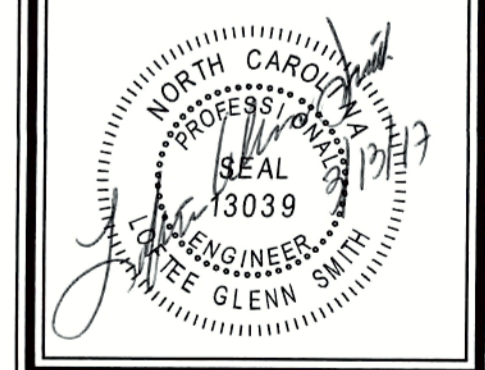
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: *Chris Hill* DATE: **4-21-2017**
DEVELOPMENT SERVICES ENGINEER

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

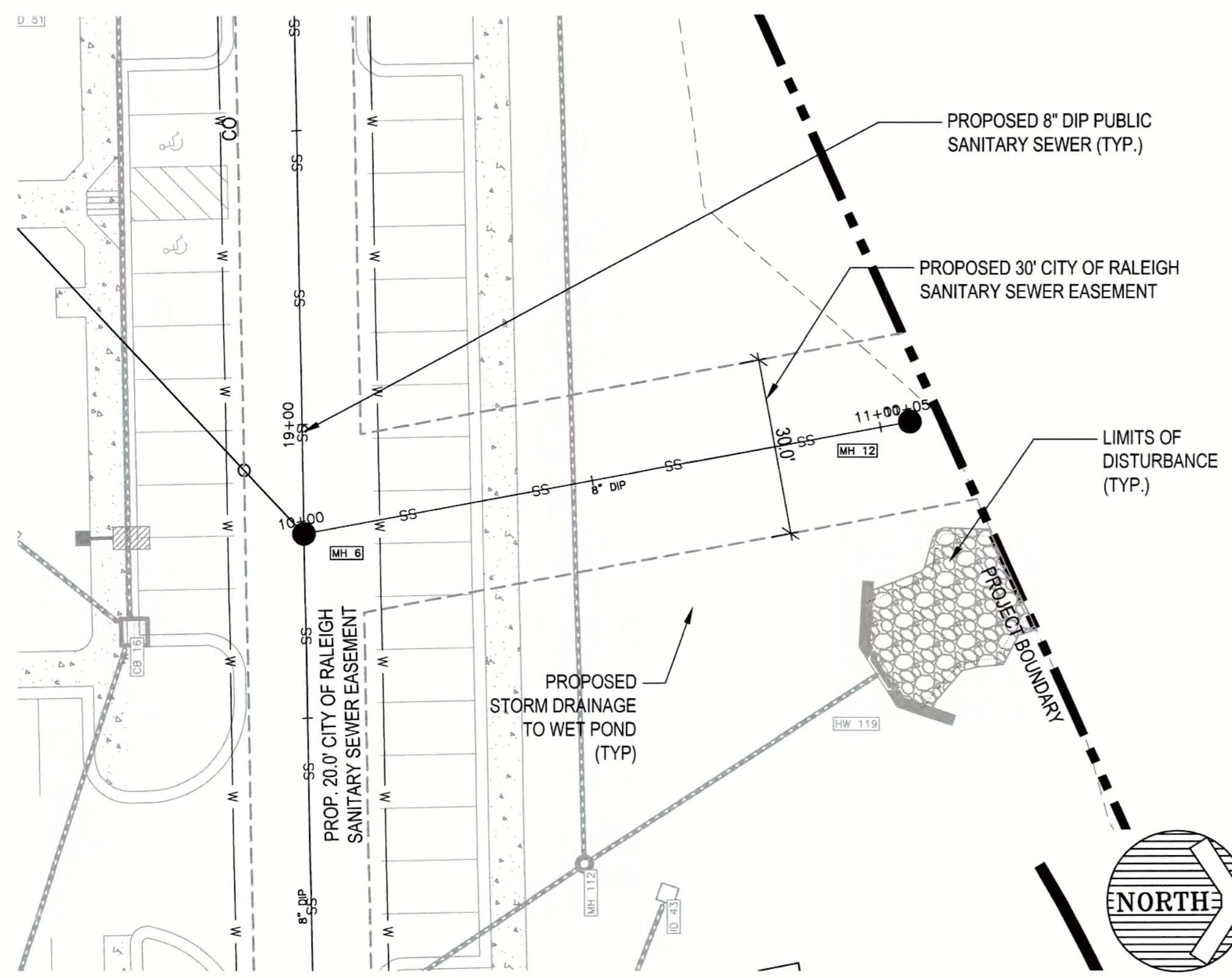
BY: *Chris Hill* DATE: **4-28-17**
ADMINISTRATOR



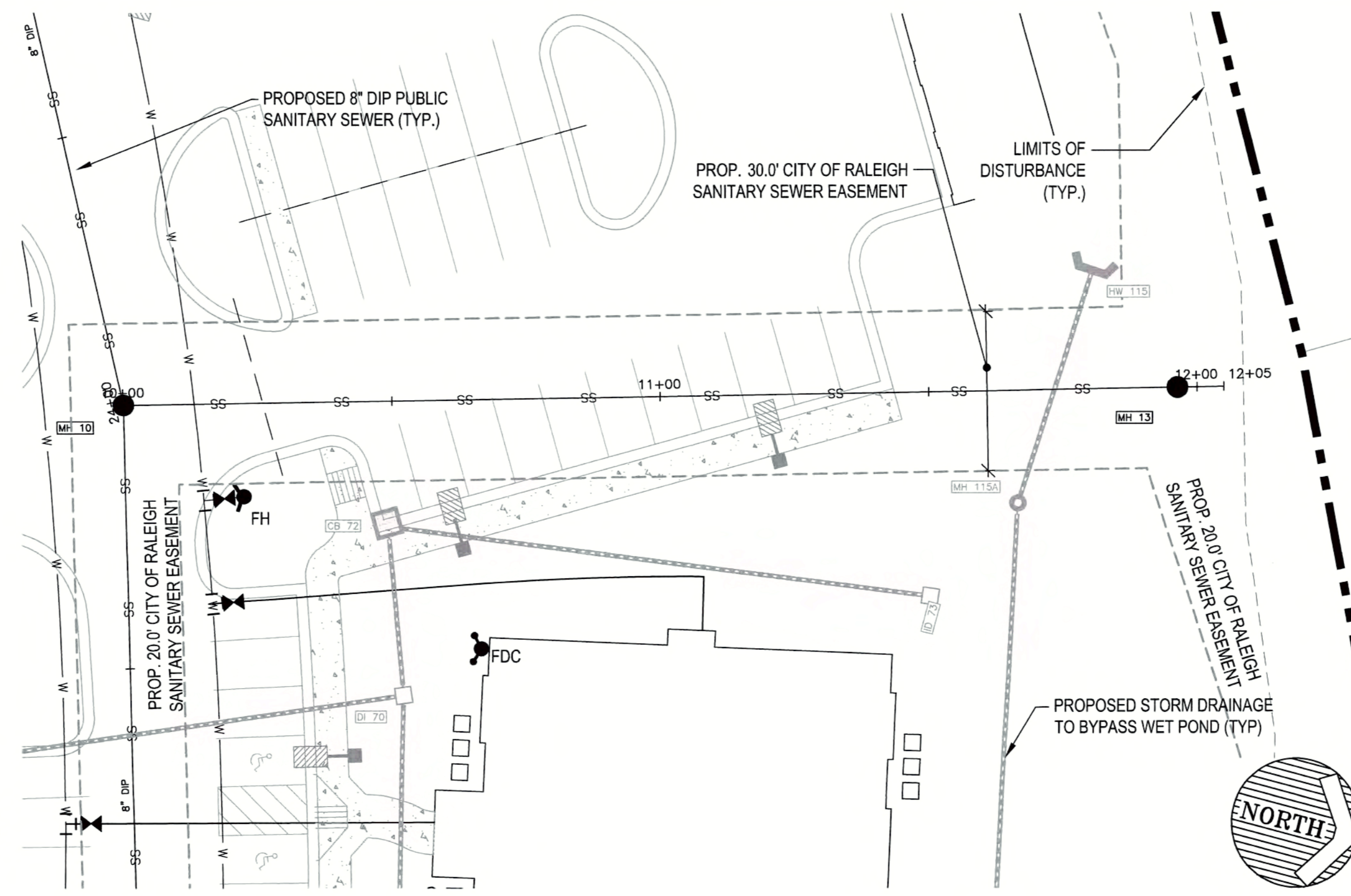
Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

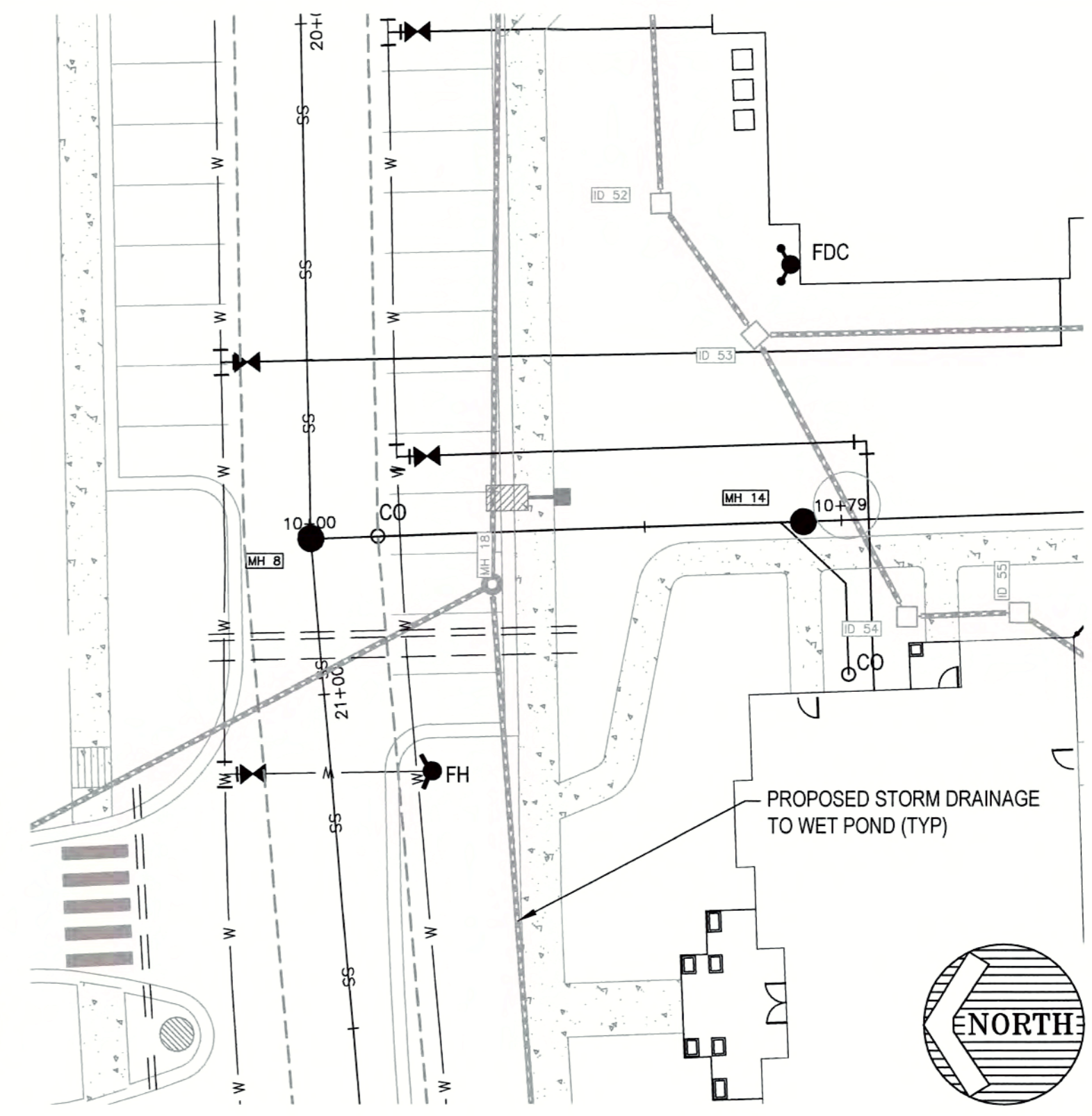
K:\18\18-0001\0003\Knightdale Station\Coll\CD\CD\15 - UTILITY PLAN PROFILE.dwg, Monday, March 13, 2017 1:02:56 PM - TOWNSEND, CHARLIE



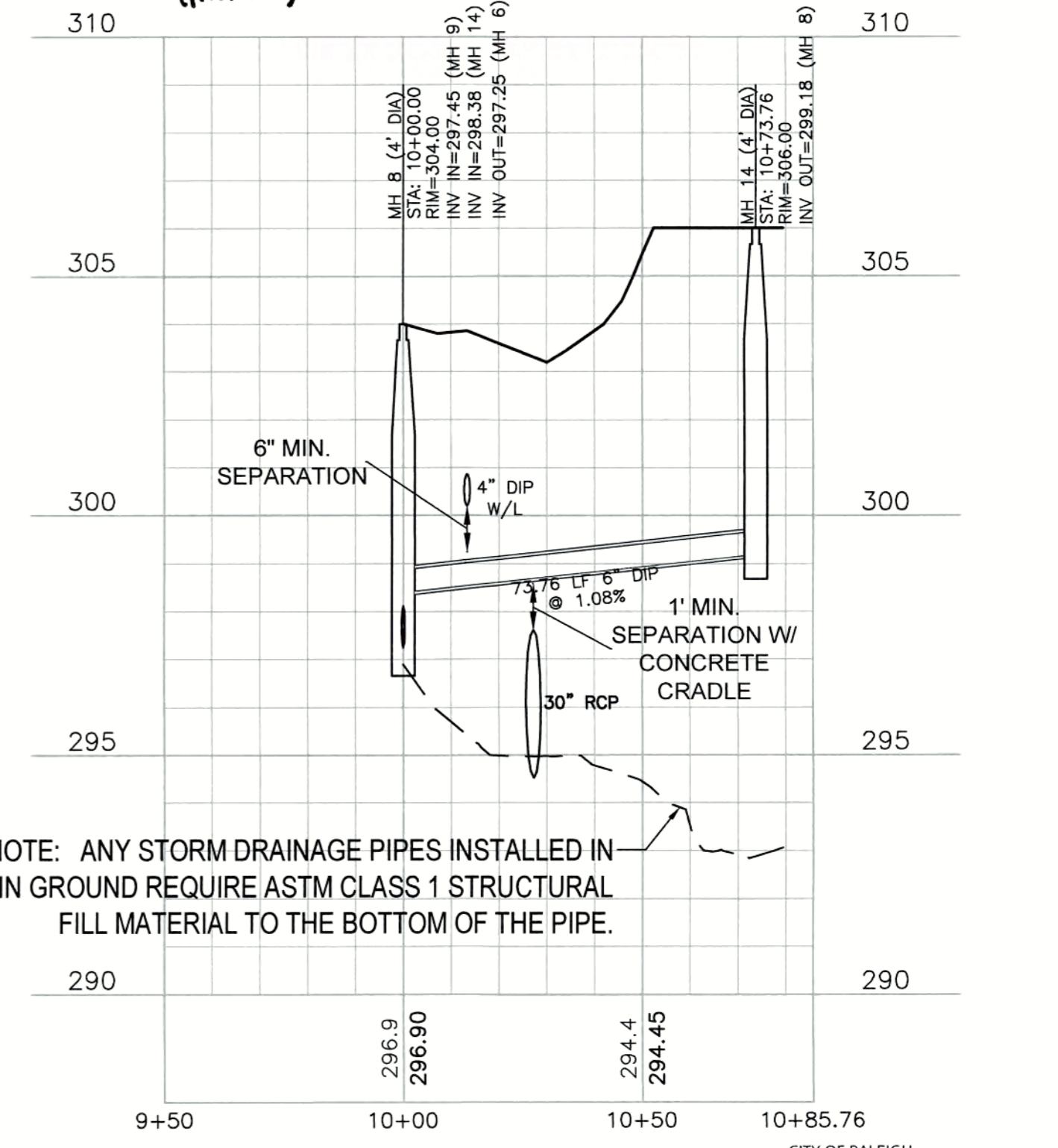
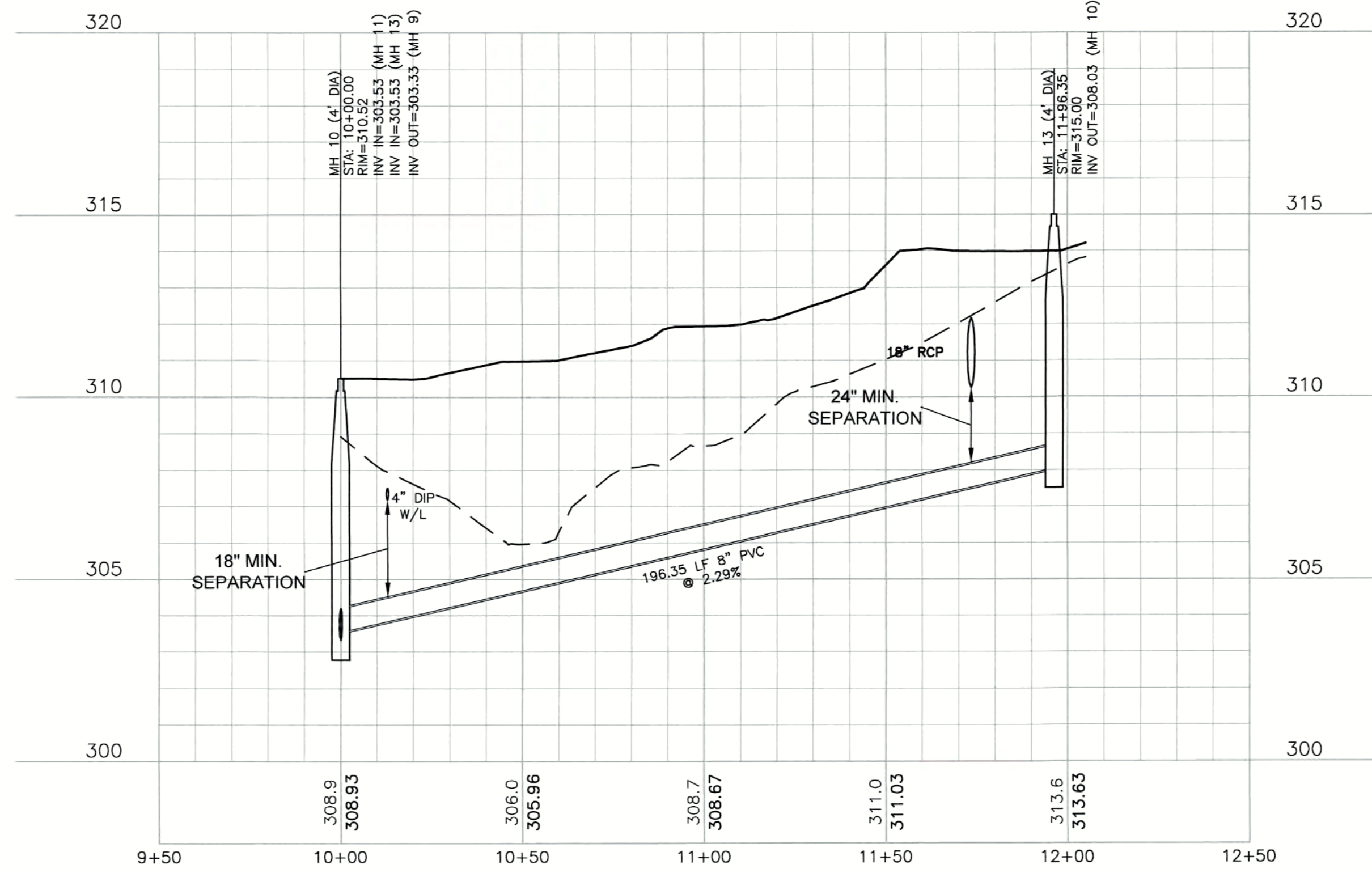
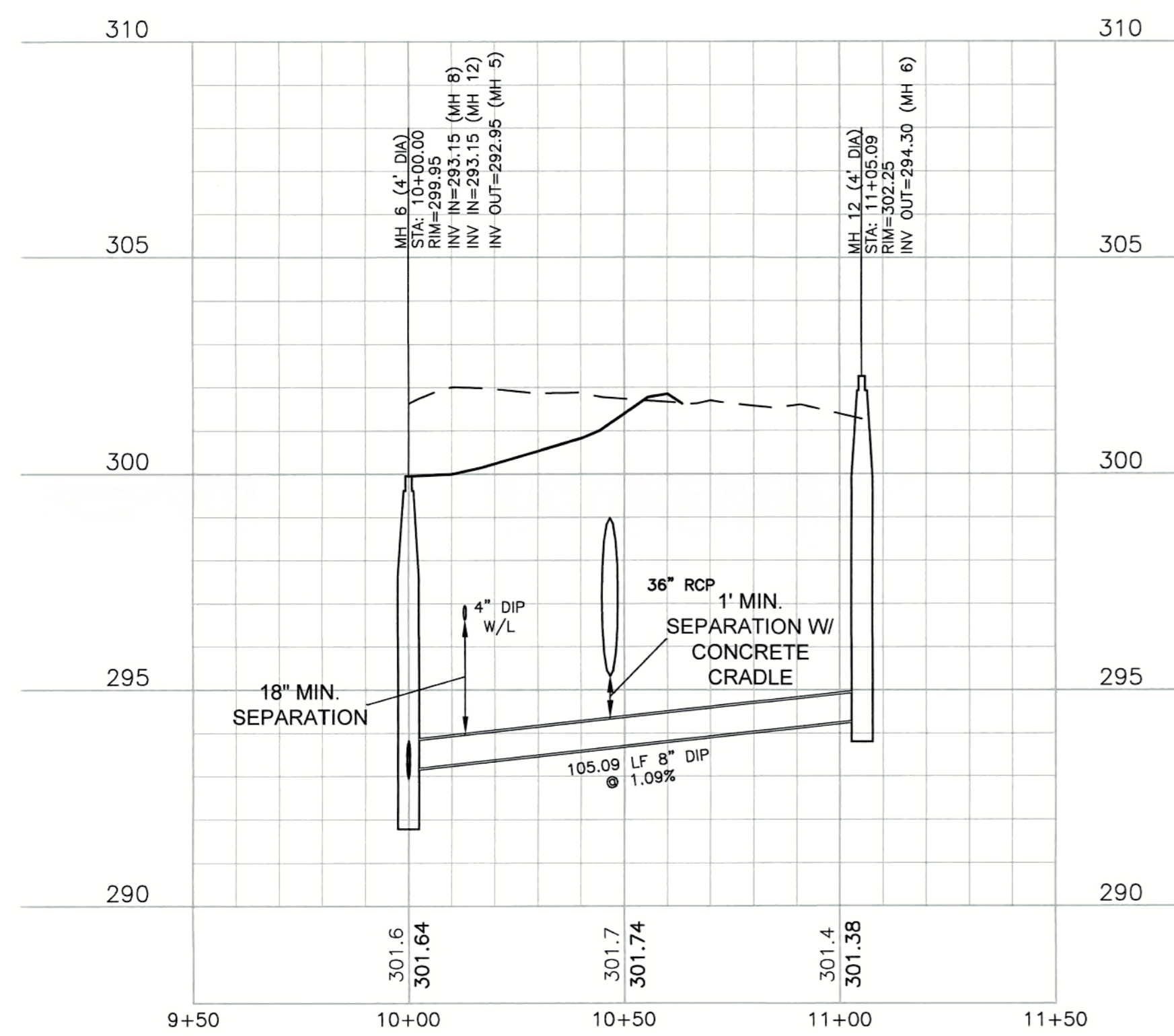
MH 6 TO MH 12 SANITARY SEWER



MH10 TO MH13 SANITARY SEWER



POOL HOUSE EXTENSION (private)



NOTE: ANY STORM DRAINAGE PIPES INSTALLED IN NON-VIRGIN GROUND REQUIRE ASTM CLASS 1 STRUCTURAL FILL MATERIAL TO THE BOTTOM OF THE PIPE.

ATTENTION CONTRACTORS

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Private Sewer Collection / Extension System

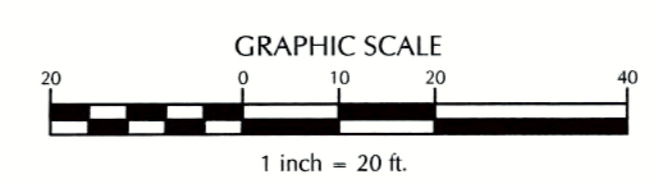
The City of Raleigh consents to the connection to its public sewer system and extension of the private sewer collection system as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # S-4281 (P)
Authorization to Construct Keith A. Jew
Date 3/24/17

Public Sewer Collection / Extension System

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City of Raleigh
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Date 3/24/17



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: [Signature] DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

WithersRavenel
Engineers | Planners

131 1/2 Wilmington Street | Raleigh, NC 27601 | 919-469-3540 | License # C-0832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION
KNIGHTDALE, NORTH CAROLINA

SANITARY SEWER PLAN AND PROFILE

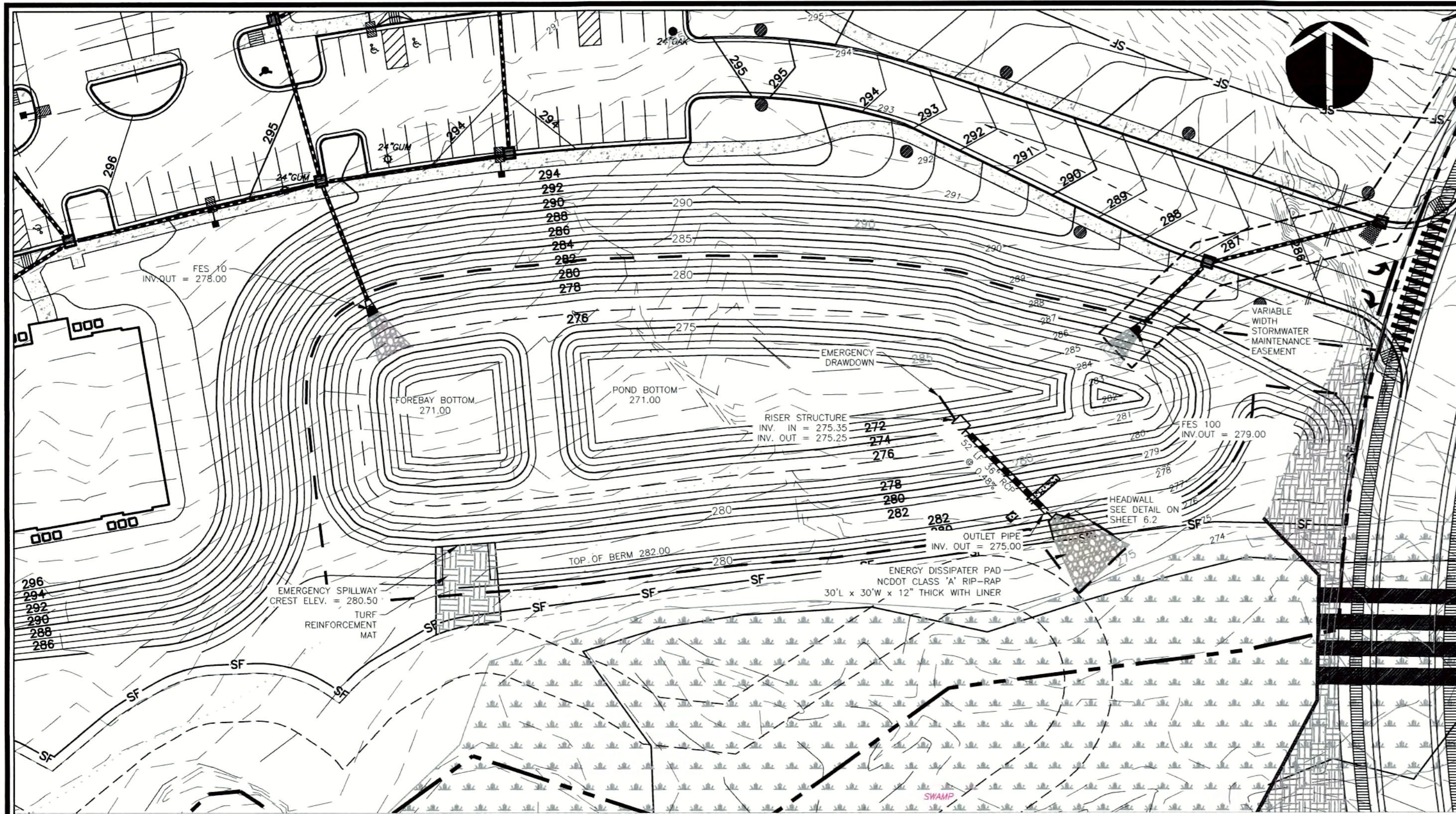
Job No.	02160032	Drawn By	CDT
Date	05/03/2016	Designer	WR

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No.
5.5

K:\1616\02016\020160032\Knightdale Station\DWG\Sanitary\Sheet 12.dwg 12:28:17 PM 4/24/17 TOWNSEND, CHARLIE

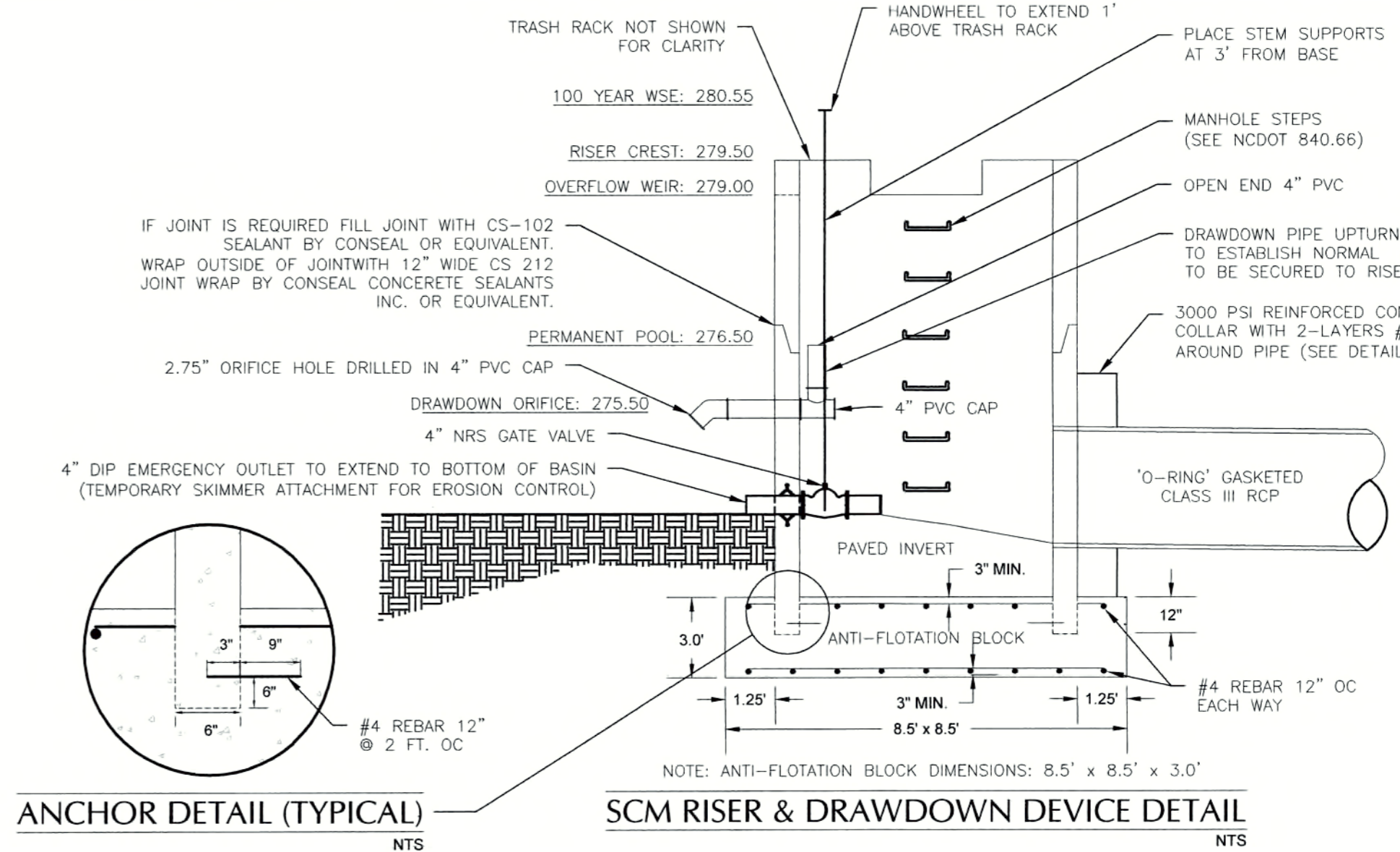


SCM#1 - WETPOND - PLAN VIEW
1" = 40'

SCM #1 DESIGN DETAILS		
COMPONENT	DIMENSIONS	ELEV.
TOP OF BERM	10' WIDE	282.00
EMERGENCY SPILLWAY CREST	12' WIDE	280.50
RISER CREST ELEVATION	5' ID x 5' ID RCP BOX	279.50
OVERFLOW WEIR	(3) 2' x 6"	279.00
NORMAL POOL		19,980 SQFT
DRAWDOWN ORIFICE *	2.75" DRILLED INTO 4" PVC	275.50
POND BOTTOM		5,395 SQFT
OUTLET PIPE INVERT UP	52 LF 36" RCP	275.25
OUTLET PIPE INVERT DOWN		275.00

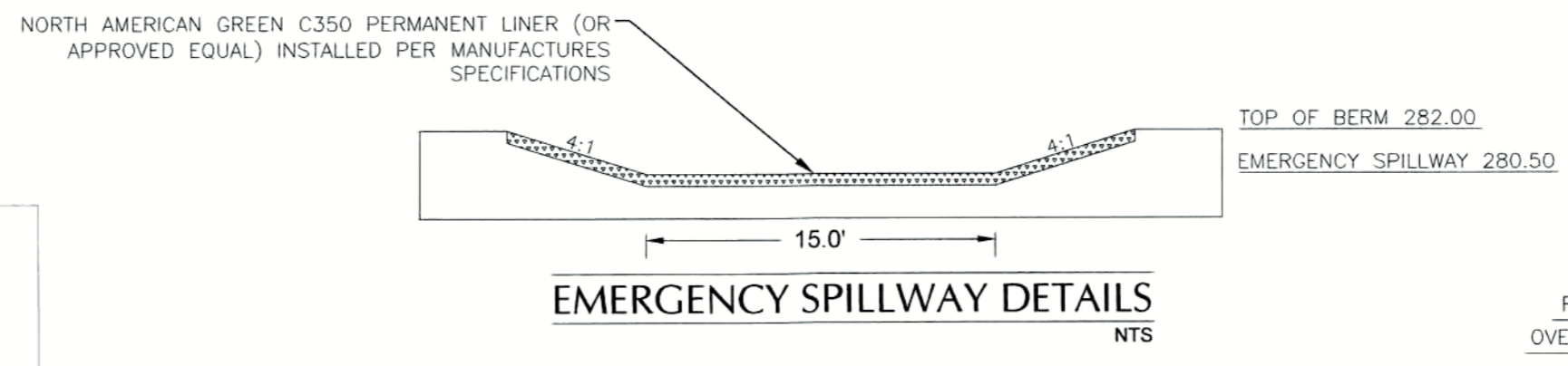
*DRAWDOWN PIPE TO TURN UP 1" INSIDE STRUCTURE TO ESTABLISH PERMANENT POOL

SCM #1 VOLUME DETENTION SUMMARY	
PRE-DEVELOPMENT	0.438 AC-FT
POST-DEVELOPMENT	1.849 AC-FT
VOLUME TO BE DETAINED	1.411 AC-FT
VOLUME PROVIDED	1.450 AC-FT

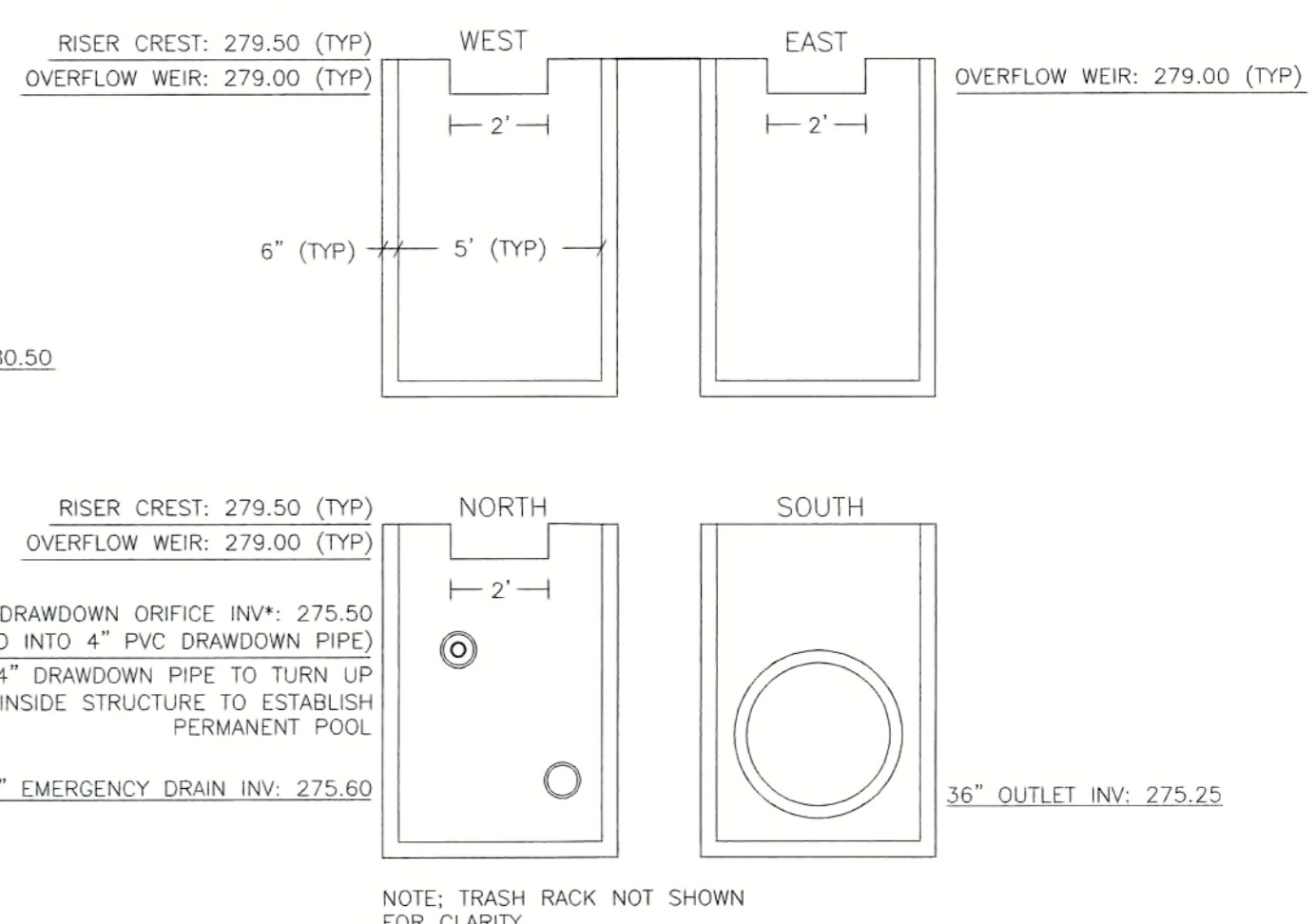


ANCHOR DETAIL (TYPICAL)
NTS

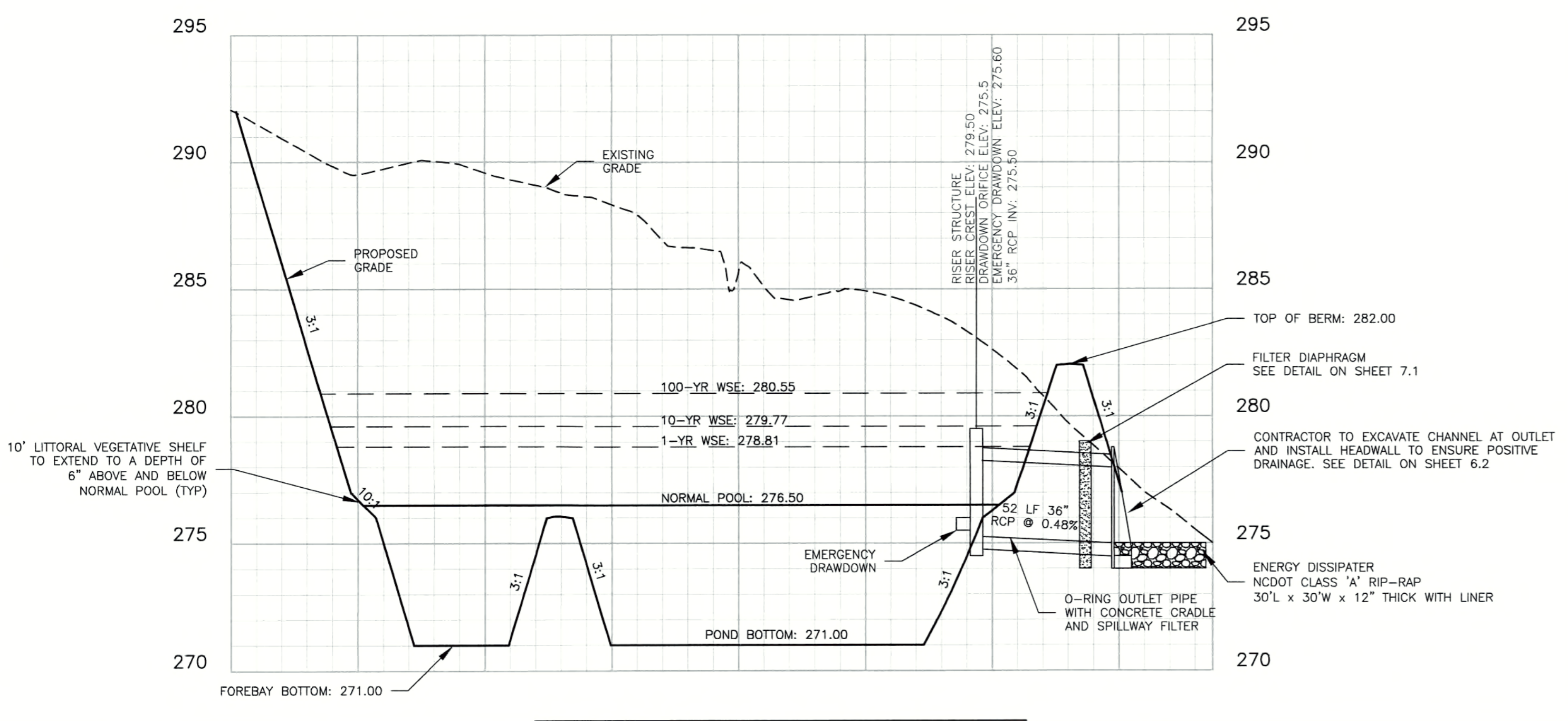
SCM RISER & DRAWDOWN DEVICE DETAIL
NTS



EMERGENCY SPILLWAY DETAILS
NTS



RISER DETAILS
NTS



SCM #1 - WETPOND - PROFILE VIEW
HORZ: 1" = 40'
VERT: 1" = 4'

STORMWATER SCM NOTES:

- PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGN ENGINEER FOR RESOLUTION.
- ALL CONSTRUCTION TO BE IN ACCORDANCE WITH ALL TOWN OF KNIGHTDALE STANDARDS AND SPECIFICATIONS
- GEOTECHNICAL ENGINEER SHALL EVALUATE SOILS ON SITE FOR STABILITY OF DAM CONSTRUCTION AND SLOPE STABILITY. PROFESSIONAL CERTIFICATION OF EMBANKMENT CONSTRUCTION IS REQUIRED FOR AS-BUILT CERTIFICATION.
- DAM TO BE CONSTRUCTED PER THE FOLLOWING SPECIFICATIONS UNLESS SUPERSEDED BY GEOTECHNICAL ENGINEER'S RECOMMENDATIONS:
 - BORROW MATERIALS FOR USE AS EMBANKMENT FILL SHALL BE FREE OF ORGANICS, ROOTS AND OTHER WOODY VEGETATION OR ORGANIC DEBRIS. MATERIALS SHALL CONSIST OF SOILS WHICH CLASSIFY AS SC, SM, CL, CL-CR AND ML IN ACCORDANCE WITH THE UNIFIED CLASSIFICATION SYSTEM OR AS APPROVED BY THE GEOTECHNICAL ENGINEER WITH A MAXIMUM PARTICLE SIZE SHALL OF 3" OR LESS IN MEAN DIAMETER.
 - FILL SHALL BE PLACED IN 8" (MAXIMUM) LIFTS UNDER THE SUPERVISION OF THE GEOTECHNICAL ENGINEER. FILL SHALL BE BROUGHT UP BY BENCHING INTO THE EXISTING SLOPE. THE MAXIMUM HEIGHT OF 2FT SHALL BE USED FOR EACH BENCH LIFT TAKING CARE TO REMOVE ROOT STRUCTURES AS THE FILL PROCEEDS. SURFACE OF EACH LIFT SHALL BE SCARIFIED PRIOR TO PLACEMENT OF THE NEXT LIFT IN ORDER TO EFFECTIVELY TIE THE FILL LIFTS TOGETHER.
 - ALL COMPACTION SHALL BE TESTED BY THE SAND CONE METHOD (ASTM D-1586) OR NUCLEAR METHOD AT A RATE OF AT LEAST ONE TEST PER 5,000 SF PER ONE FOOT OF COMPACTED FILL THICKNESS IN GENERAL AREA FILLS AND ONE TEST PER 50 LINEAL FEET PER LIFT ALONG THE BARREL. THE MINIMUM COMPACTION SHOULD BE 95% OF THE MAXIMUM STANDARD PROCTOR DENSITY (ASTM D-698) AT MOISTURE CONTENTS VARYING FROM 2 PERCENT BELOW TO 3 PERCENT ABOVE OPTIMUM MOISTURE CONTENT TO WITHIN 3FT OF THE FINAL GRADE.
 - THE GEOTECHNICAL ENGINEER SHALL VERIFY PIPE BEDDING, RISER BEDDING, PIPE JOINT INTEGRITY AND PROPER COMPACTION AROUND THE PIPE, RISER AND ANTI-SEEP COLLAR.
- IF DURING CONSTRUCTION, THE SEASONAL HIGH WATER TABLE IS IDENTIFIED WITHIN 6 INCHES OF THE PROPOSED NORMAL POOL ELEVATION BY THE GEOTECHNICAL ENGINEER, THE INSTALLATION OF A CLAY LINER IS NOT NECESSARY. IF THE SEASONAL HIGH WATER TABLE IS IDENTIFIED OUTSIDE OF THE ABOVE LIMITS OR NOT ENCOUNTERED, IT IS RECOMMENDED THAT A CLAY LINER BE INSTALLED TO MAINTAIN NORMAL POOL ELEVATION, SUITABLE HABITAT FOR LITTORAL SHELF VEGETATION, AND DESIGN AESTHETICS. CONSULT ENGINEER AND OWNER REGARDING THE INSTALLATION OF A CLAY LINER PRIOR TO SCM CONVERSION.
- DURING CONSTRUCTION, THE SCM IS TO BE USED AS AN EROSION CONTROL DEVICE. THE FOREBAY WILL NOT BE REQUIRED WHILE SCM IS ACTING AS AN EROSION CONTROL DEVICE.
- ALL PERMANENT STRUCTURES (I.E. RISER BOX, OUTLET PIPES, CONCRETE CRADLES, SPILLWAY FILTER, ETC.) ARE TO BE INSTALLED WITH THE INITIAL DAM CONSTRUCTION.
- CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE DESIGN ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ORDERING STRUCTURES.
- ONCE THE SITE HAS BEEN STABILIZED, CONTRACTOR SHALL OBTAIN APPROVAL BY EROSION CONTROL INSPECTOR IN ORDER TO REMOVE EROSION CONTROL DEVICES.
- ONCE ALL SEDIMENT AND EROSION CONTROL DEVICES HAVE BEEN REMOVED, THE SCM SHALL BE CONVERTED TO A PERMANENT SCM.
 - ALL SEDIMENT SHALL BE REMOVED AND DISPOSED OF PROPERLY.
 - FOREBAY AND VEGETATED SHELF SHALL BE CONSTRUCTED PER THE LANDSCAPING PLAN.
 - VEGETATED SHELF SHALL BE PLANTED PER PLANT SCHEDULE ON SHEET L1.3.
 - TOWN OF KNIGHTDALE REQUIRES FINAL CERTIFICATION OF SCM BY PROFESSIONAL ENGINEER.
- STOCKPILED TOPSOILS USED IN PLANTING AREAS SHALL CONTAIN AT LEAST 10% ORGANIC MATERIAL. PROFESSIONAL CERTIFICATION OF PLANTING SOIL MATERIALS IS REQUIRED.
- FOLLOWING SCM CONVERSION TO A PERMANENT SCM, THE TOWN OF KNIGHTDALE WILL BE PROVIDED AS-BUILT PLANS OF THE SCM.
- CONTACT TOWN OF KNIGHTDALE FOR FINAL CERTIFICATION OF SCM ONCE CONSTRUCTION HAS BEEN COMPLETED.

CLAY LINER SPECIFICATIONS

THE CLAY LINER FOR THE WET POND SHALL BE AT LEAST 8" 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 8 INCHES. A MINIMUM OF 4 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.

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/FIELD SERVICES	N/A
PUBLIC UTILITIES	N/A
STORMWATER	N/A
PLANNING/DESIGN	N/A
FIRE	N/A
URBAN FORESTRY	N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: Sarah DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

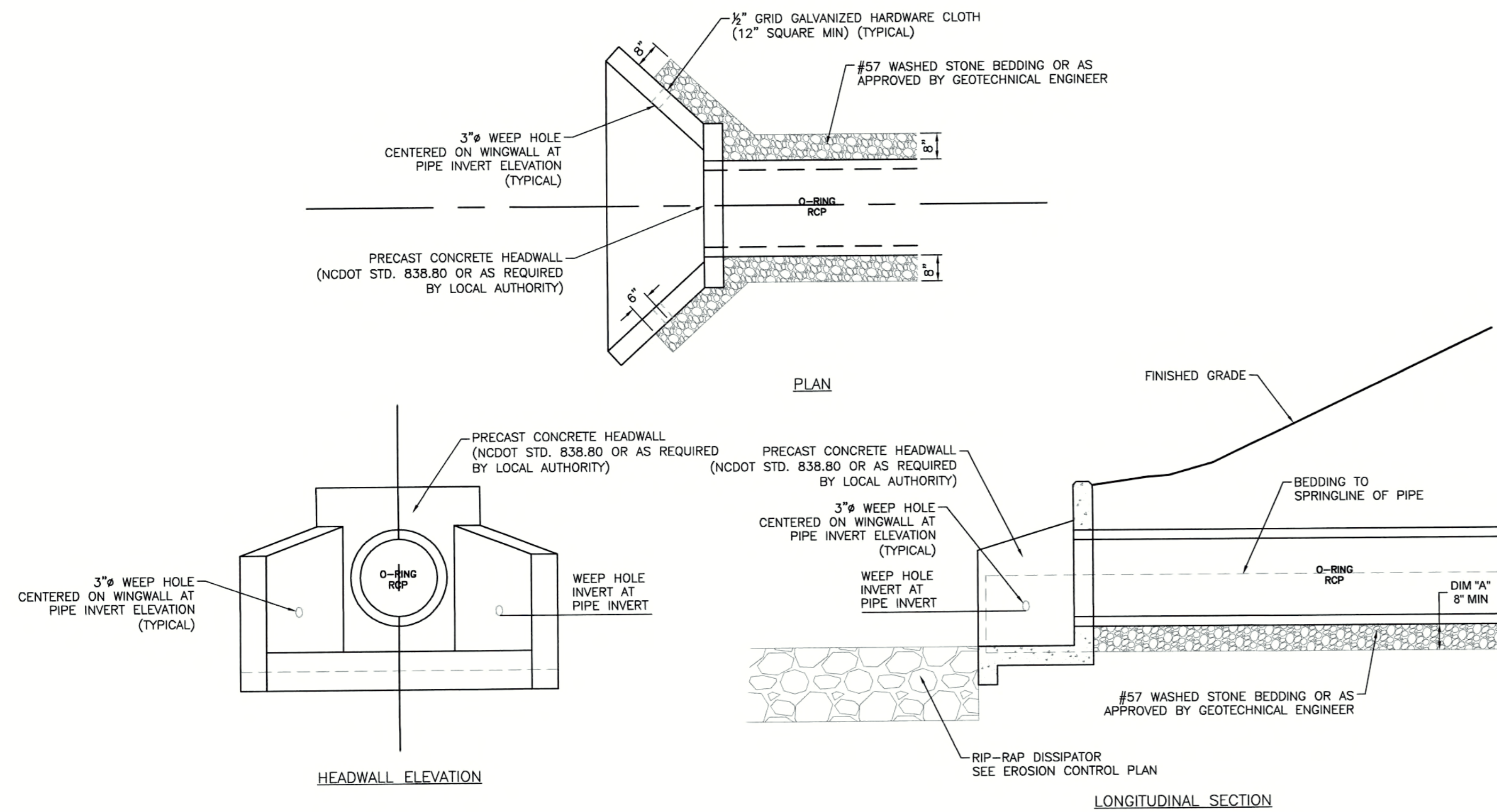
BY: John DATE: 4-28-17
ADMINISTRATOR

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



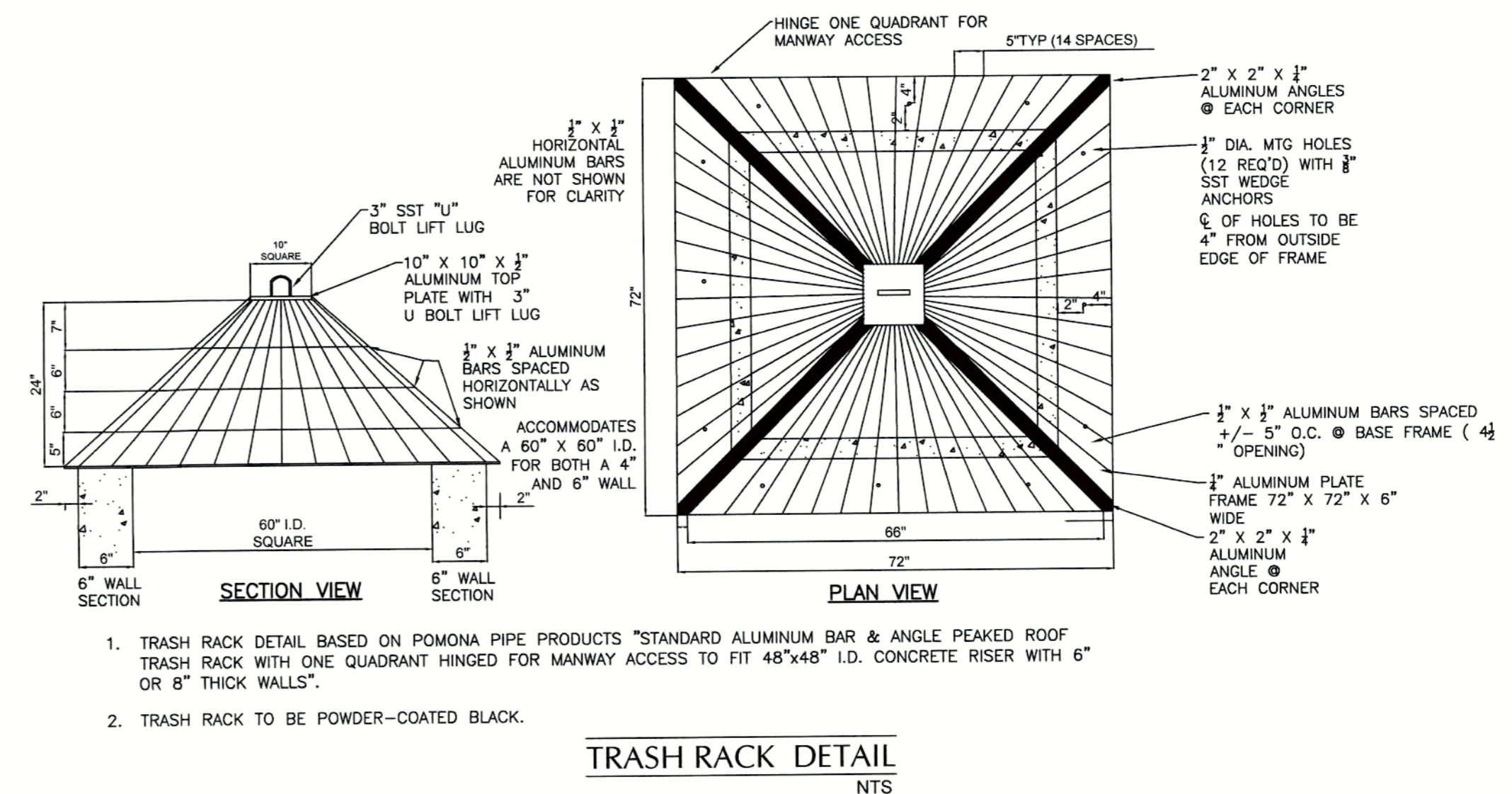
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2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

K:\1616-0000\160032-Knightdale Station-Cottages-CAD\CAD\17-Detail\SCM.dwg Sunday, March 12, 2017 3:31:40 PM - TOWNSEND CHABLE



**OUTLET PIPE FILTER DIAPHRAGM
OUTLET DETAIL (PRECAST HEADWALL)**

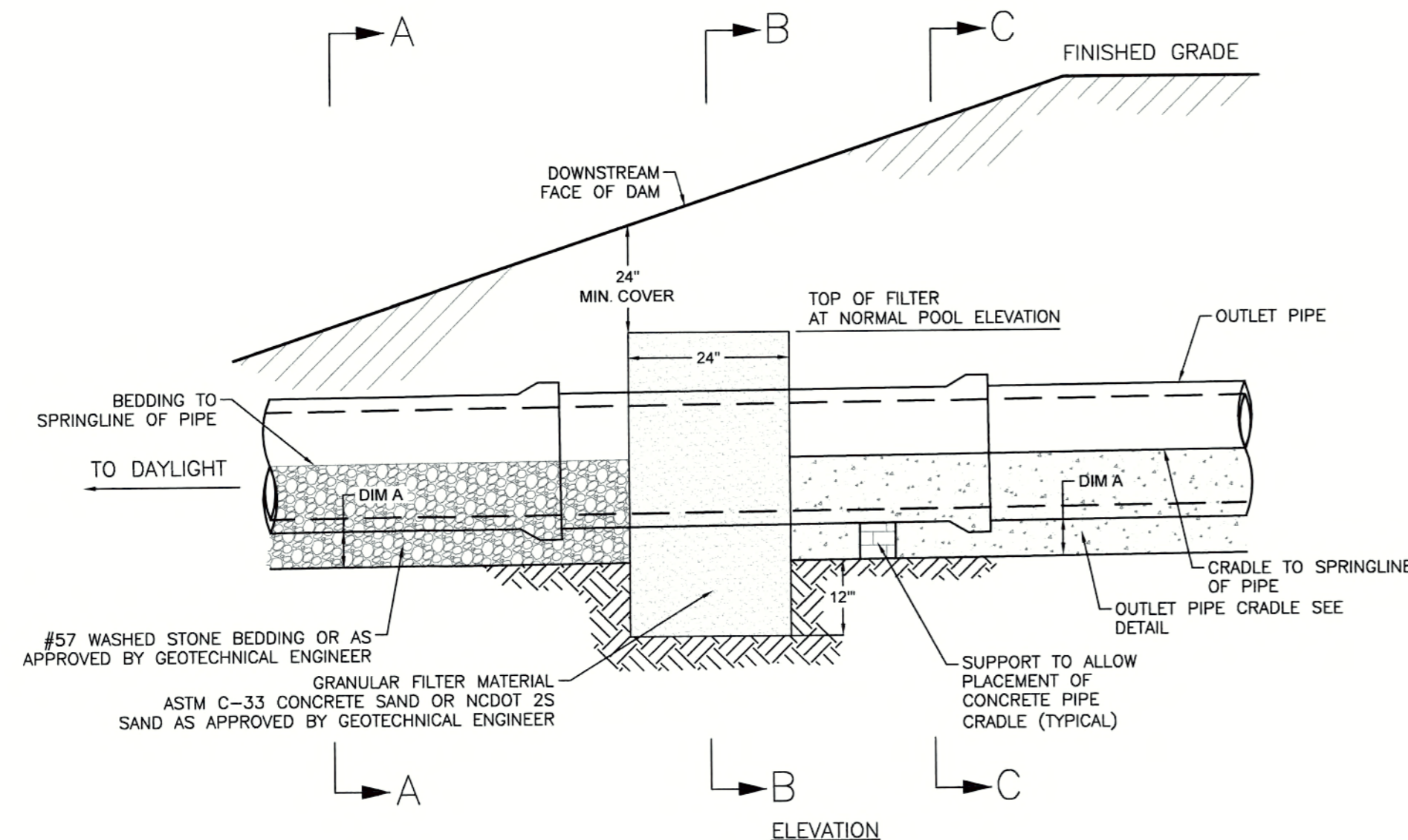
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TRASH RACK DETAIL

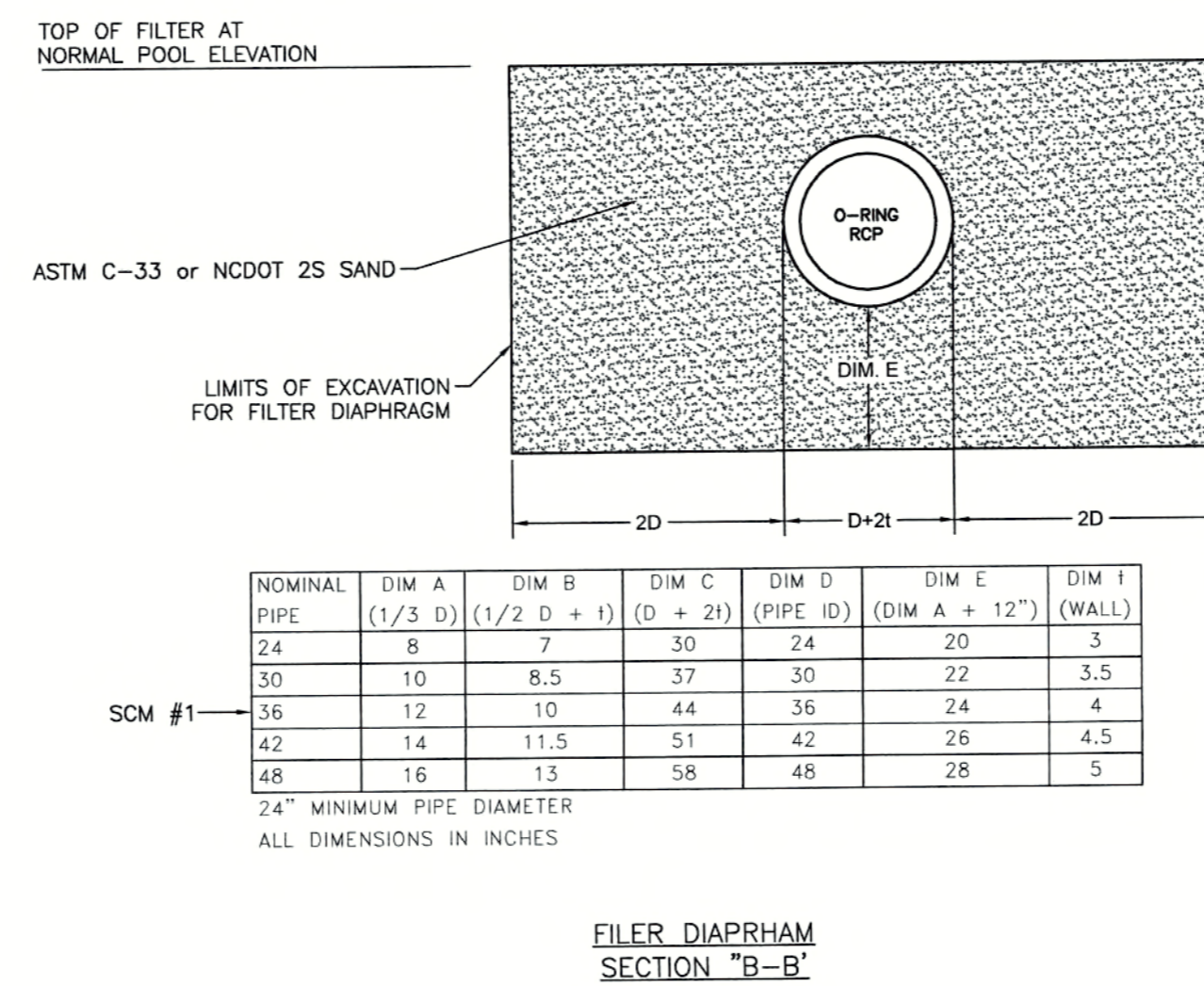
NTS

- TRASH RACK DETAIL BASED ON POMONA PIPE PRODUCTS "STANDARD ALUMINUM BAR & ANGLE PEAKED ROOF" TRASH RACK WITH ONE QUADRANT HINGED FOR MANWAY ACCESS TO FIT 48"x48" I.D. CONCRETE RISER WITH 6" OR 8" THICK WALLS".
- TRASH RACK TO BE POWDER-COATED BLACK.



**OUTLET PIPE FILTER DIAPHRAGM &
CONCRETE CRADLE DETAIL**

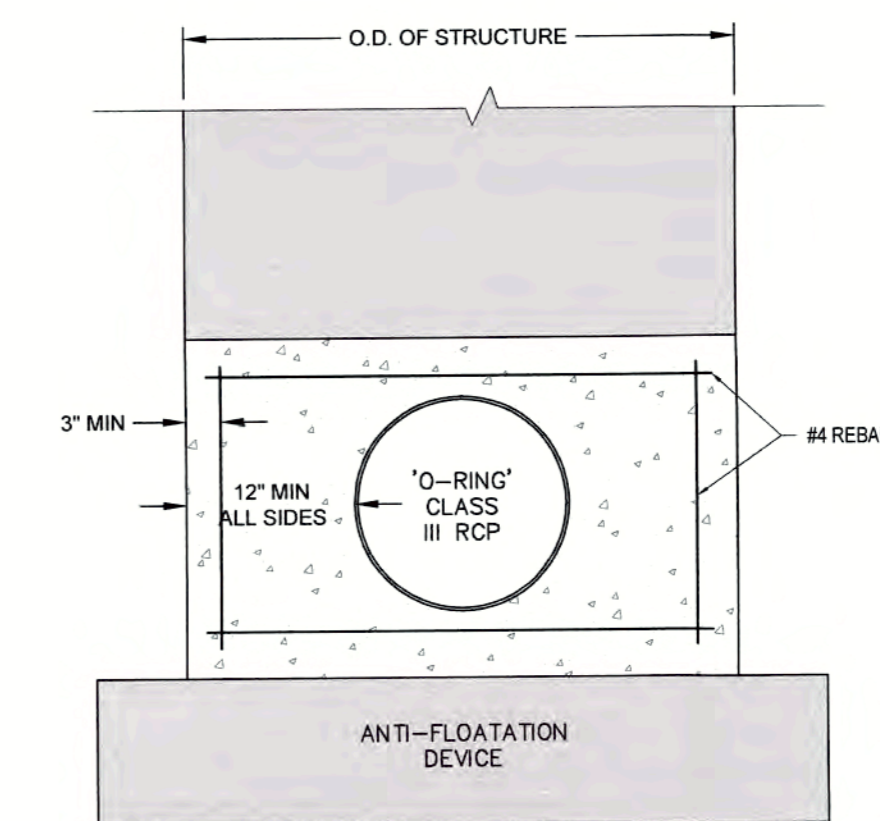
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**FILER DIAPHRAM
SECTION "B-B"**

NOMINAL PIPE	DIM A (1/3 D)	DIM B (1/2 D + 1)	DIM C (D + 2)	DIM D (PIPE ID)	DIM E (DIM A + 12") (WALL)	DIM F
24	8	7	30	24	20	3
30	10	8.5	37	30	22	3.5
36	12	10	44	36	24	4
42	14	11.5	51	42	26	4.5
48	16	13	58	48	28	5

SCM #1
24" MINIMUM PIPE DIAMETER
ALL DIMENSIONS IN INCHES

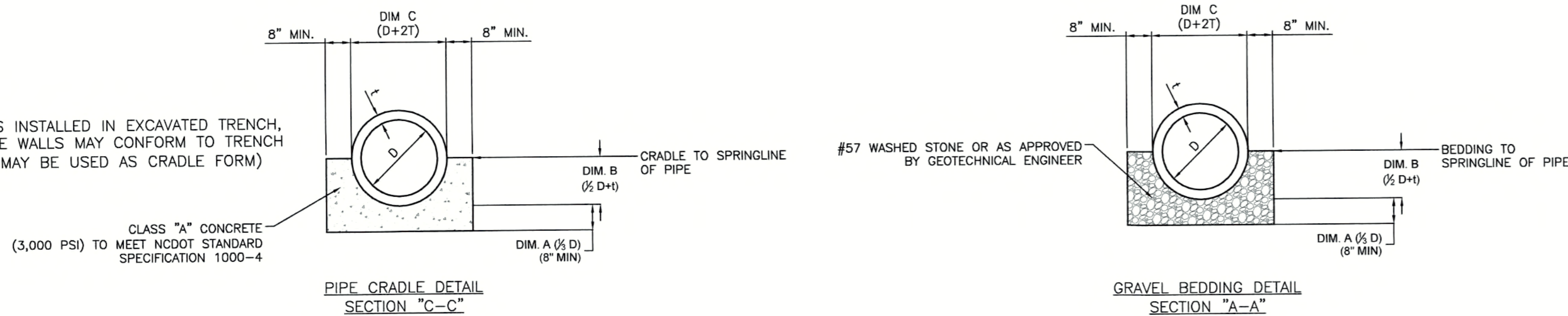


CONCRETE COLLAR DETAIL

NTS

NOTE:
INSTALL VERTICAL DOWELS IN FOUNDATION CONCRETE AS HOLDING BARS FOR CONCRETE COLLAR REBAR.

NOTE:
IF PIPE IS INSTALLED IN EXCAVATED TRENCH, THEN SIDE WALLS MAY CONFORM TO TRENCH (TRENCH MAY BE USED AS CRADLE FORM)



**PIPE CRADLE DETAIL
SECTION "C-C"**

**GRAVEL BEDDING DETAIL
SECTION "A-A"**

CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

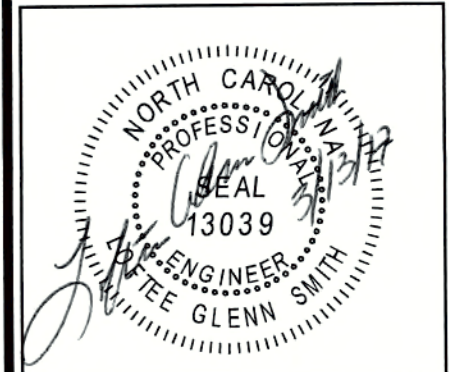
THIS DRAWING HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: SAMU DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

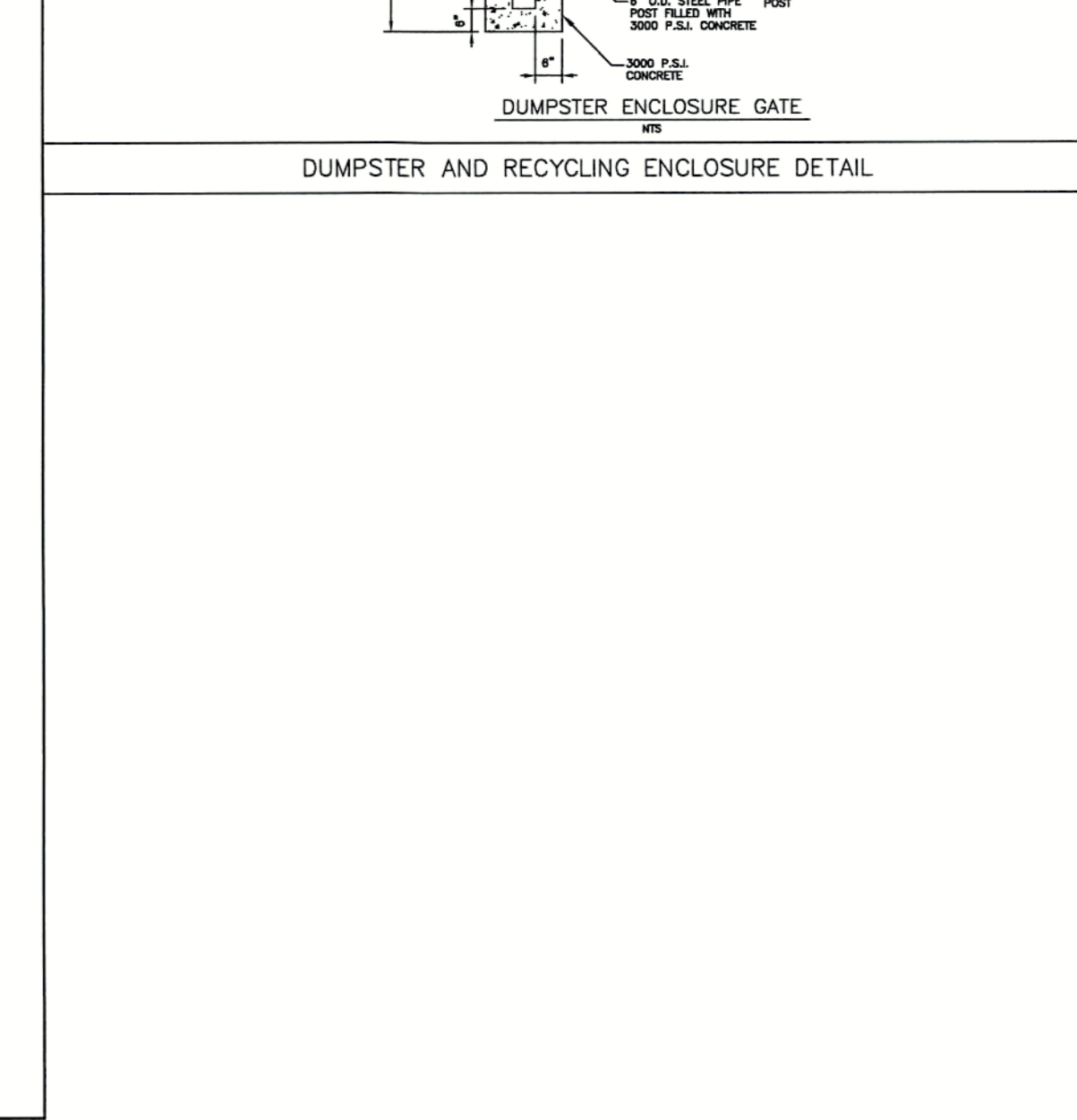
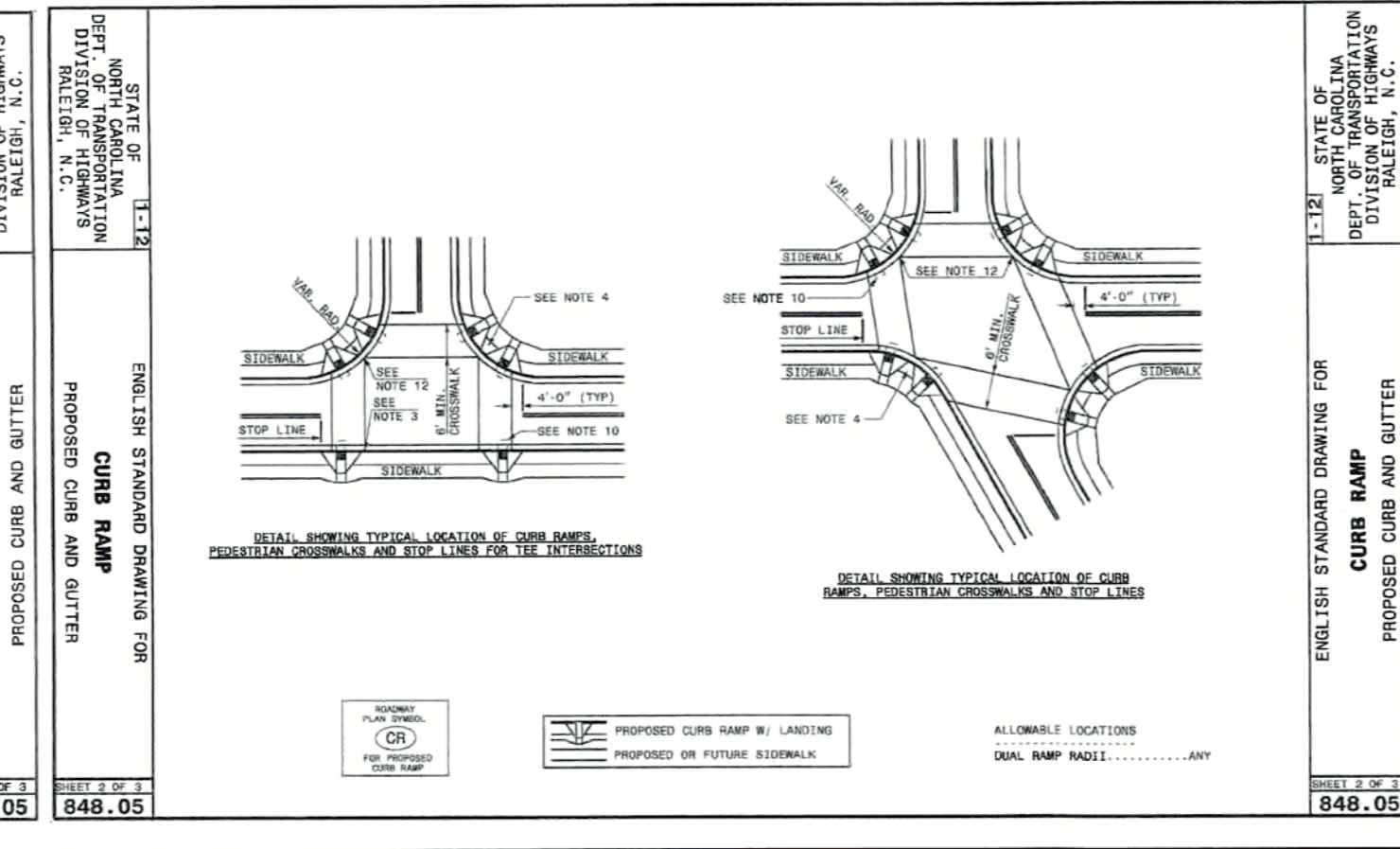
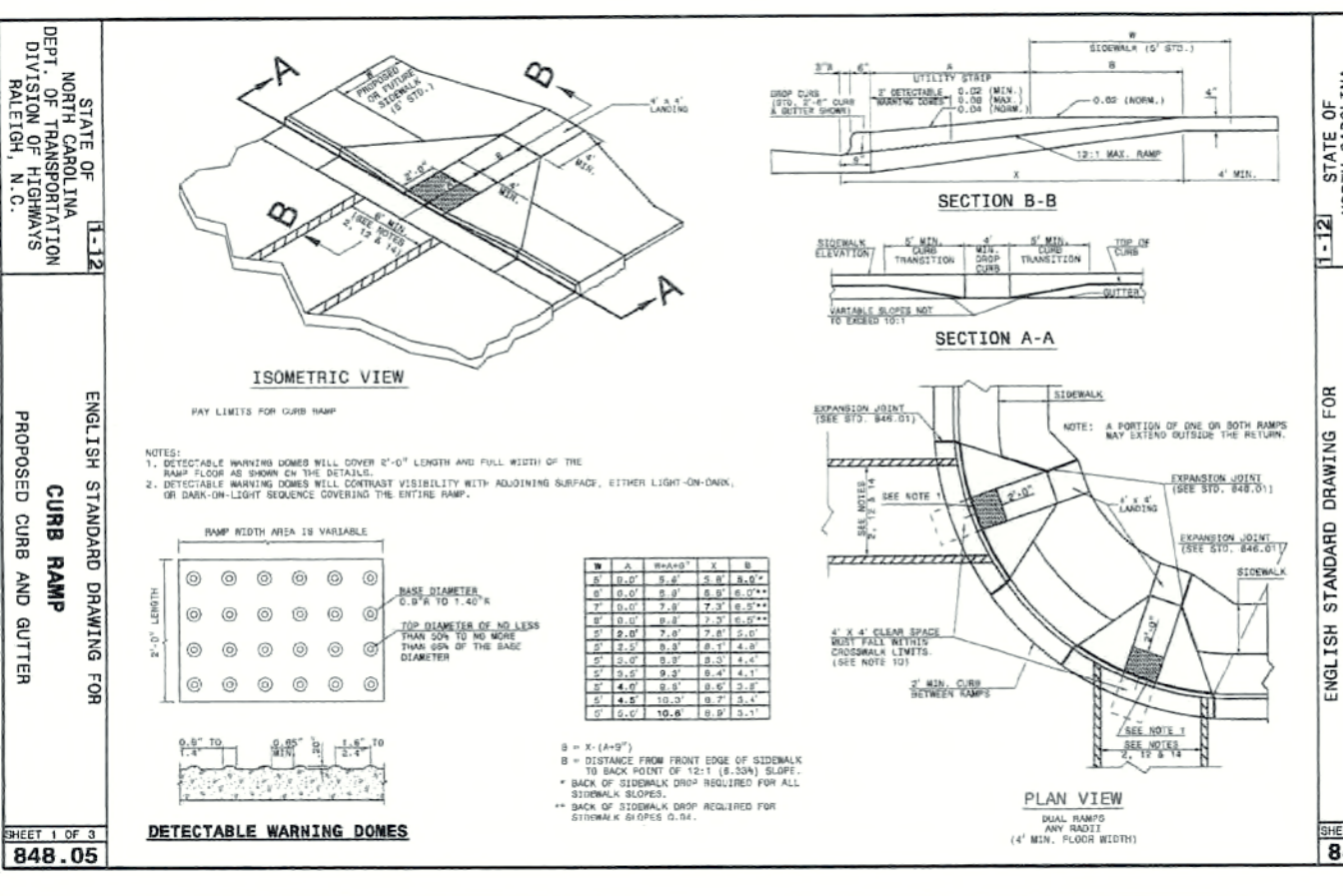
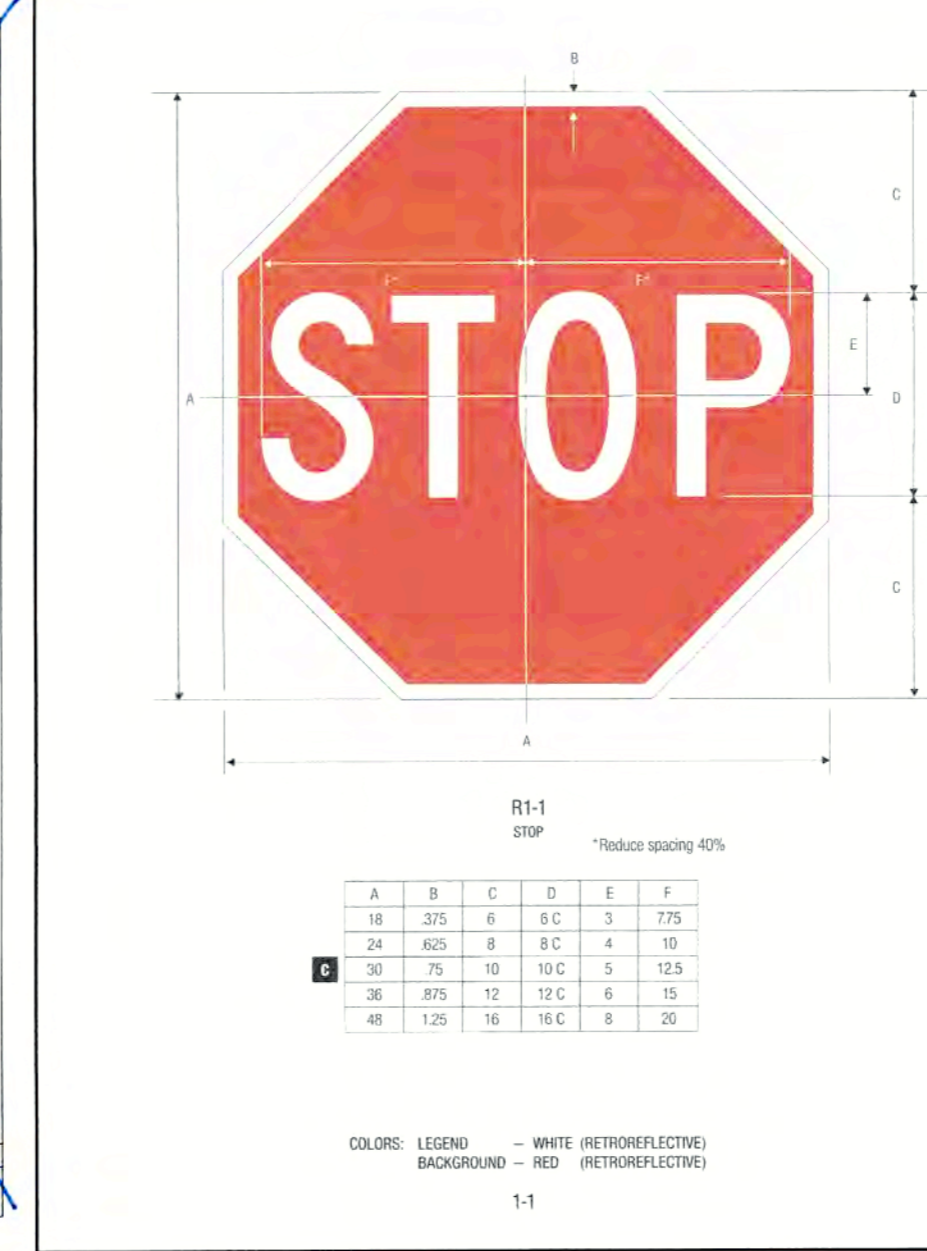
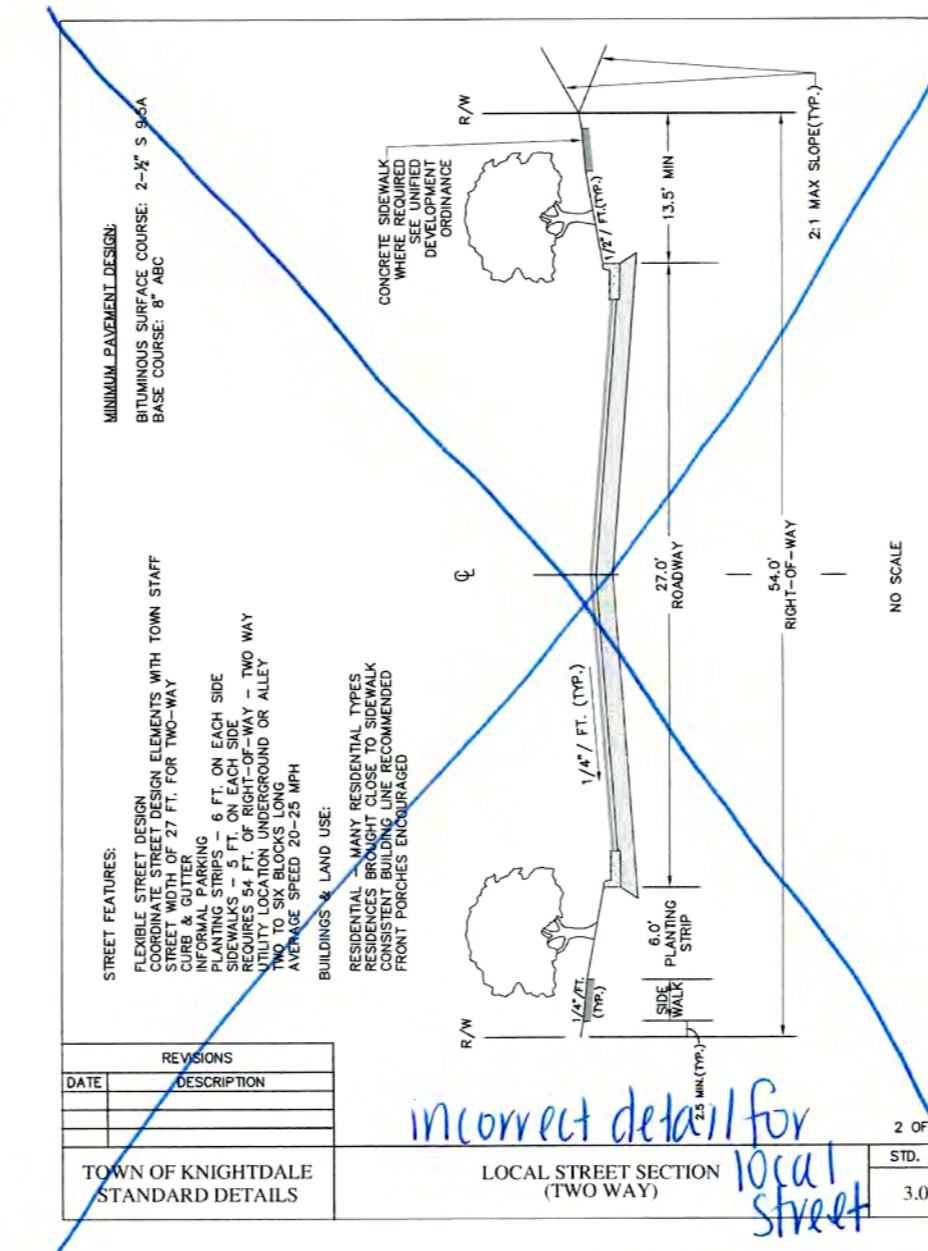
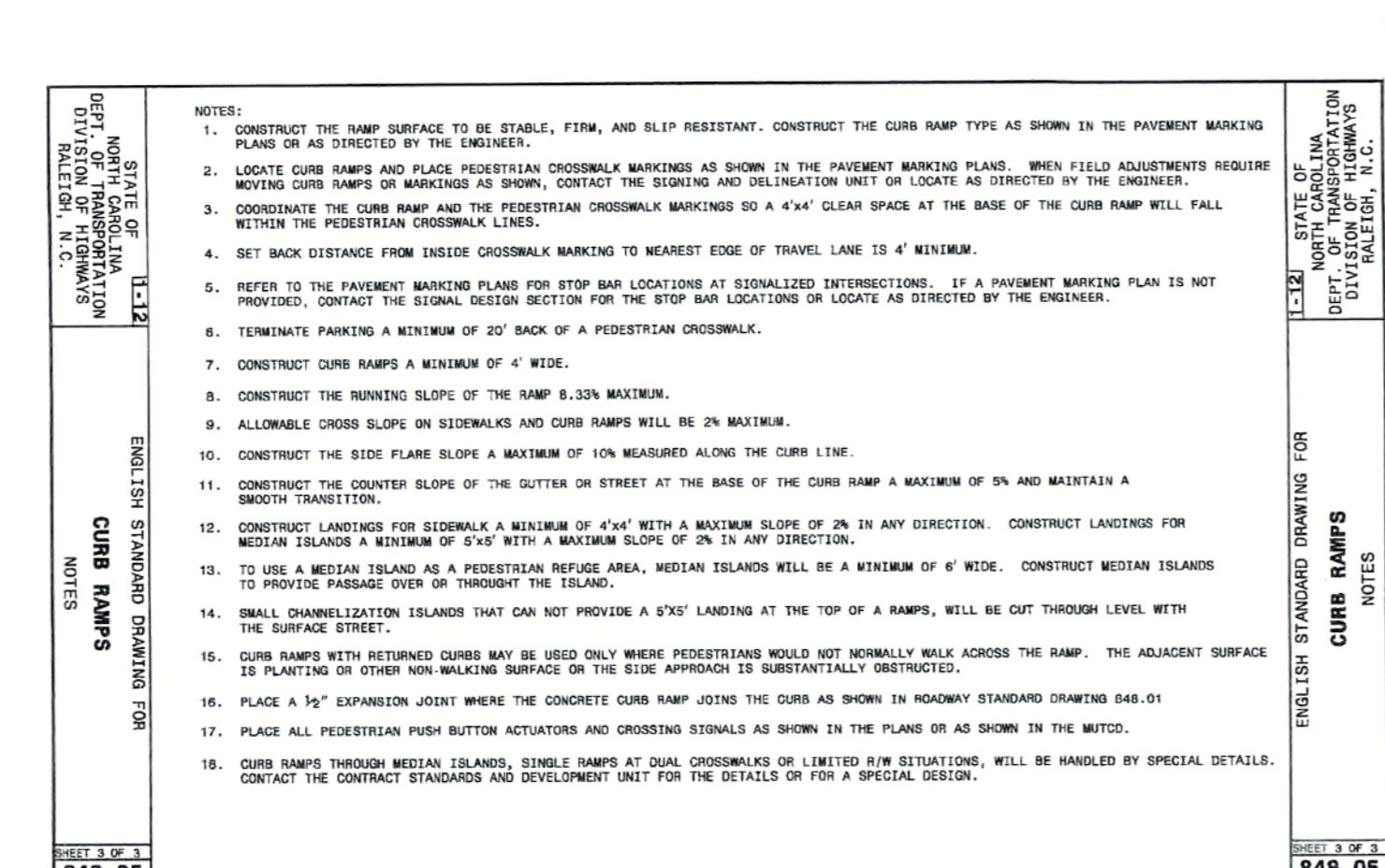
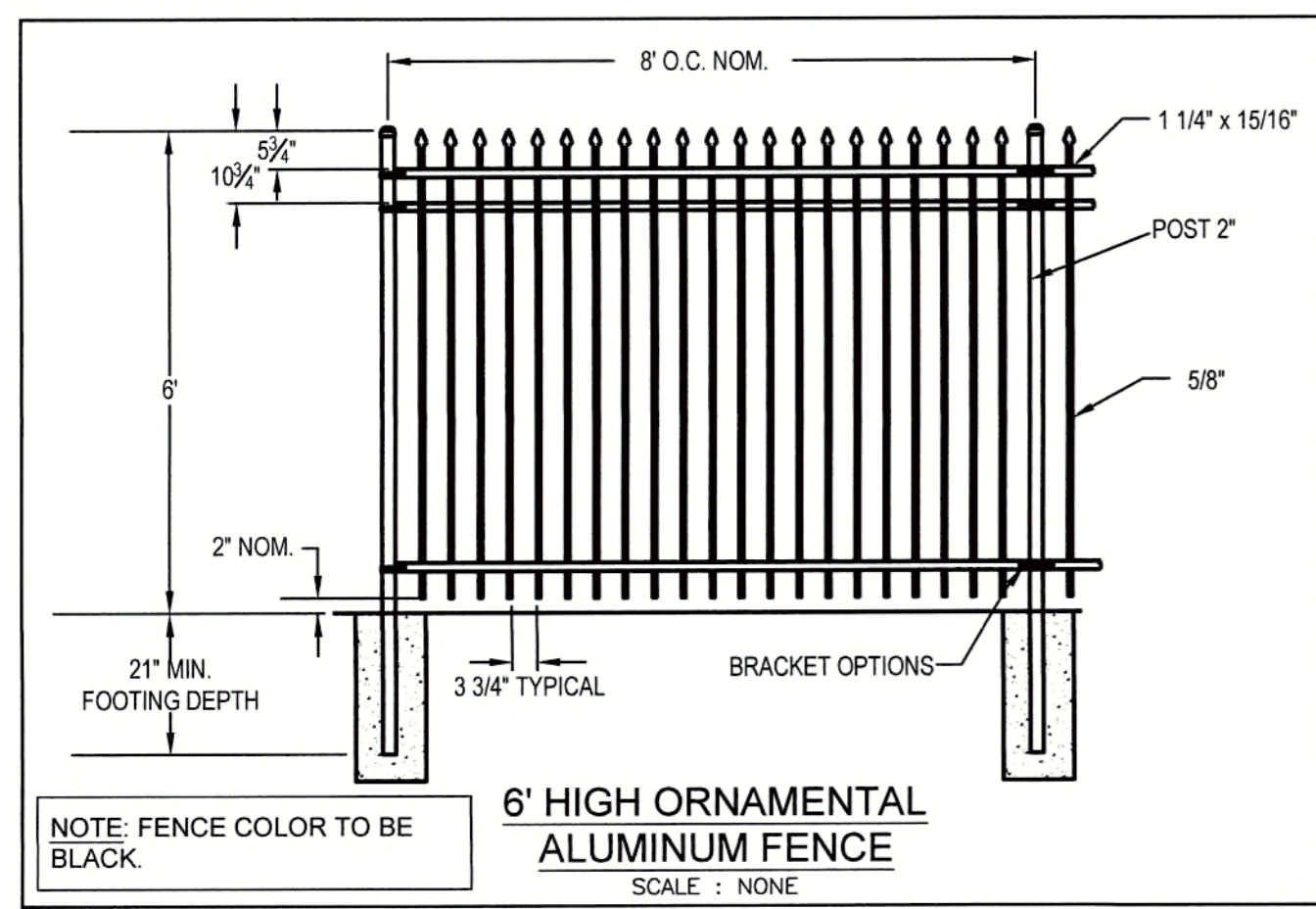
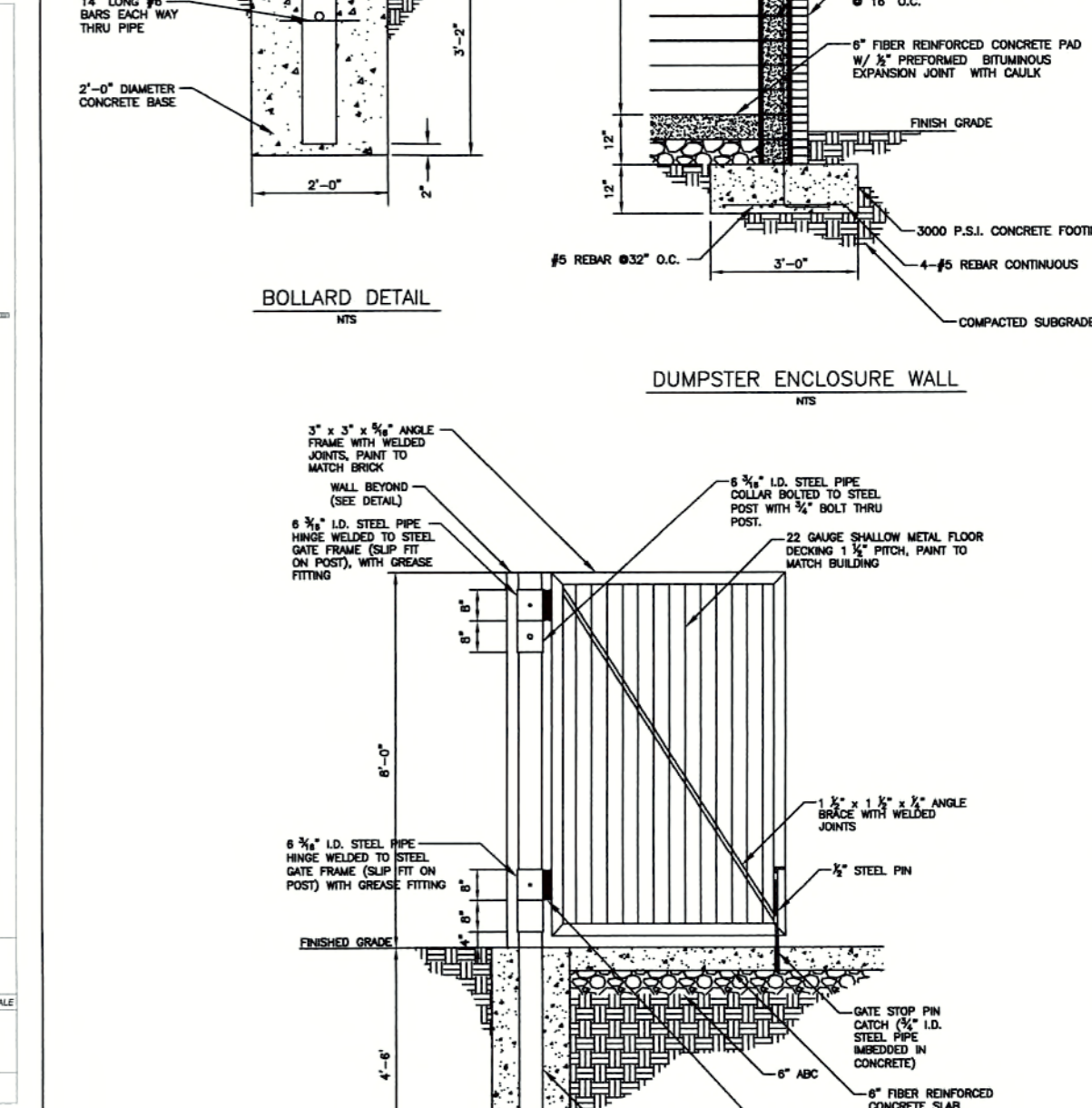
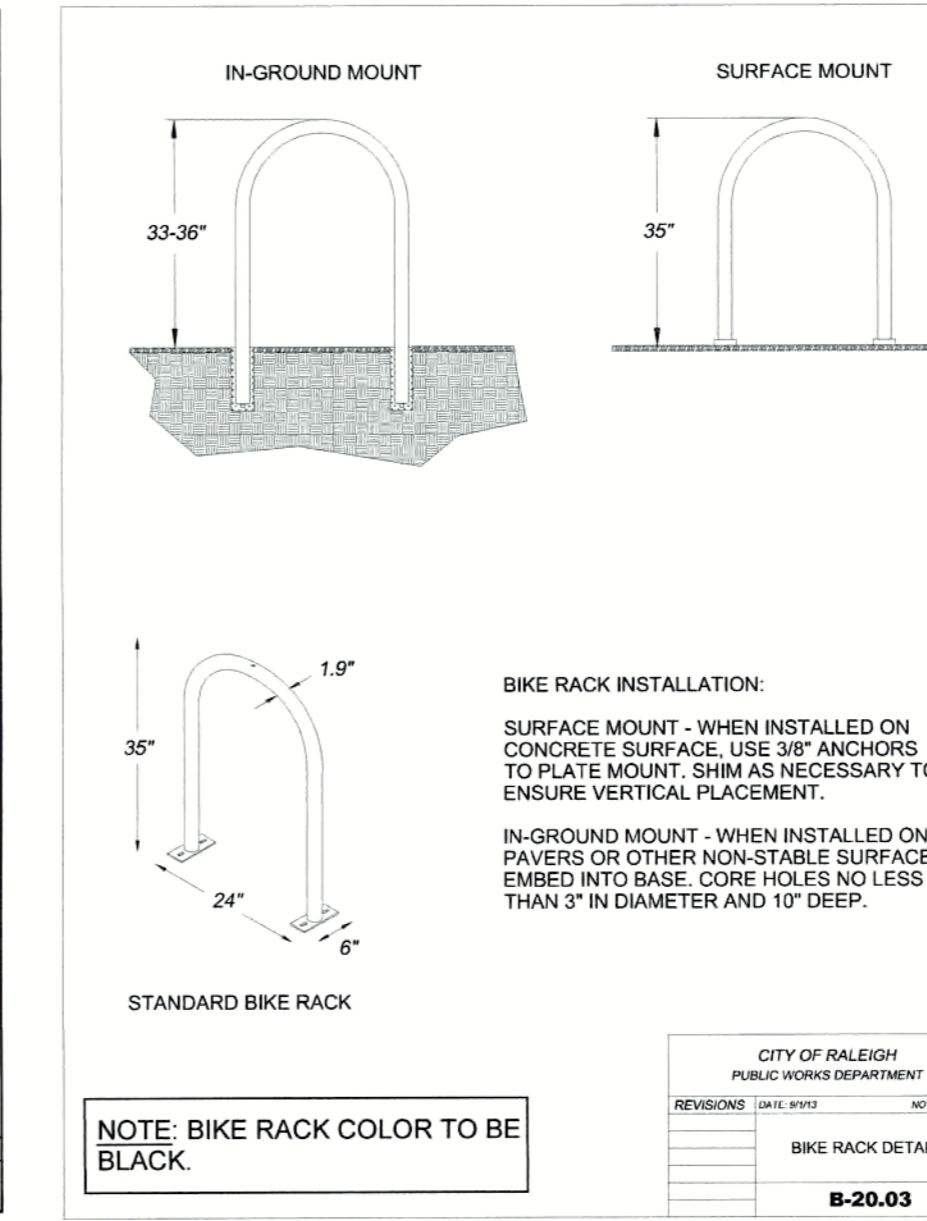
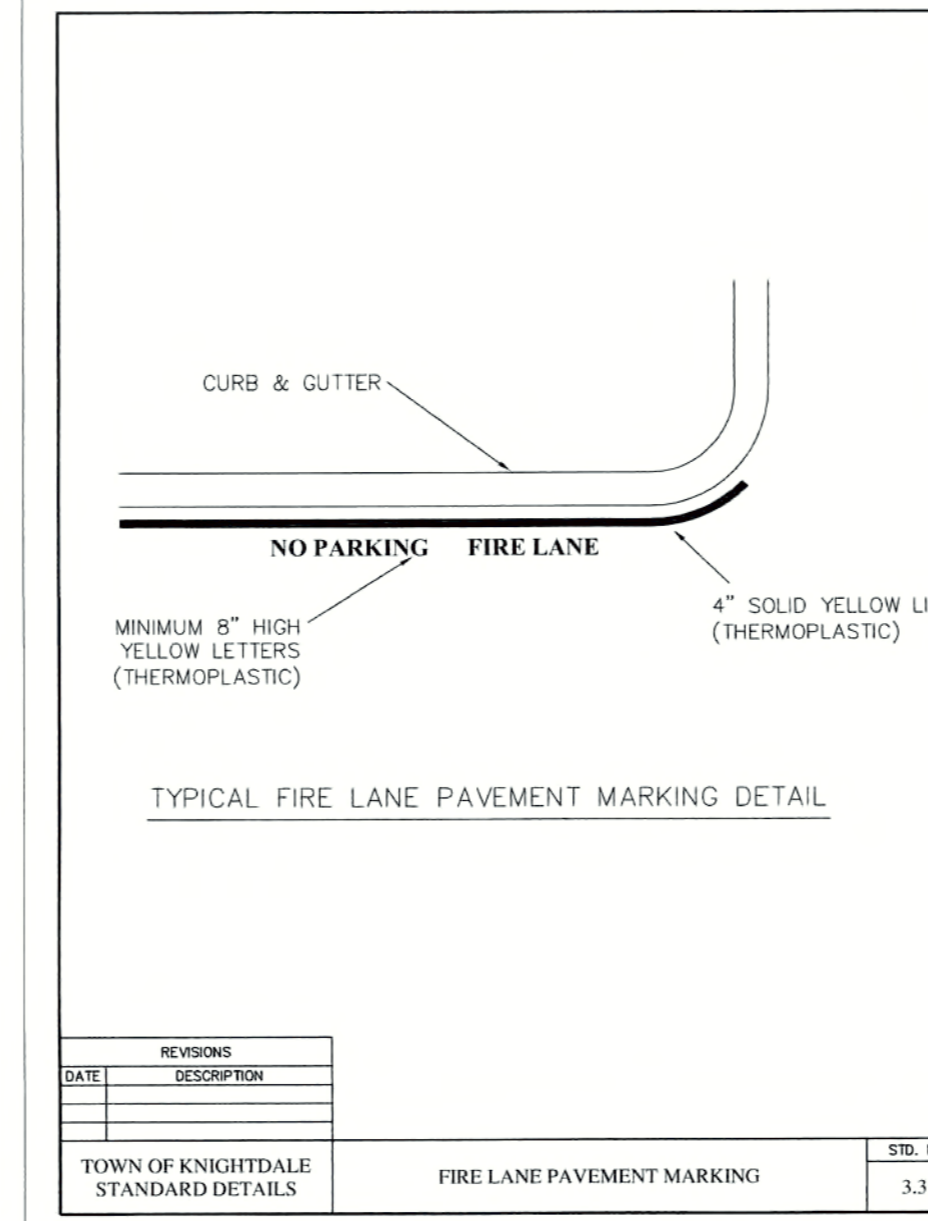
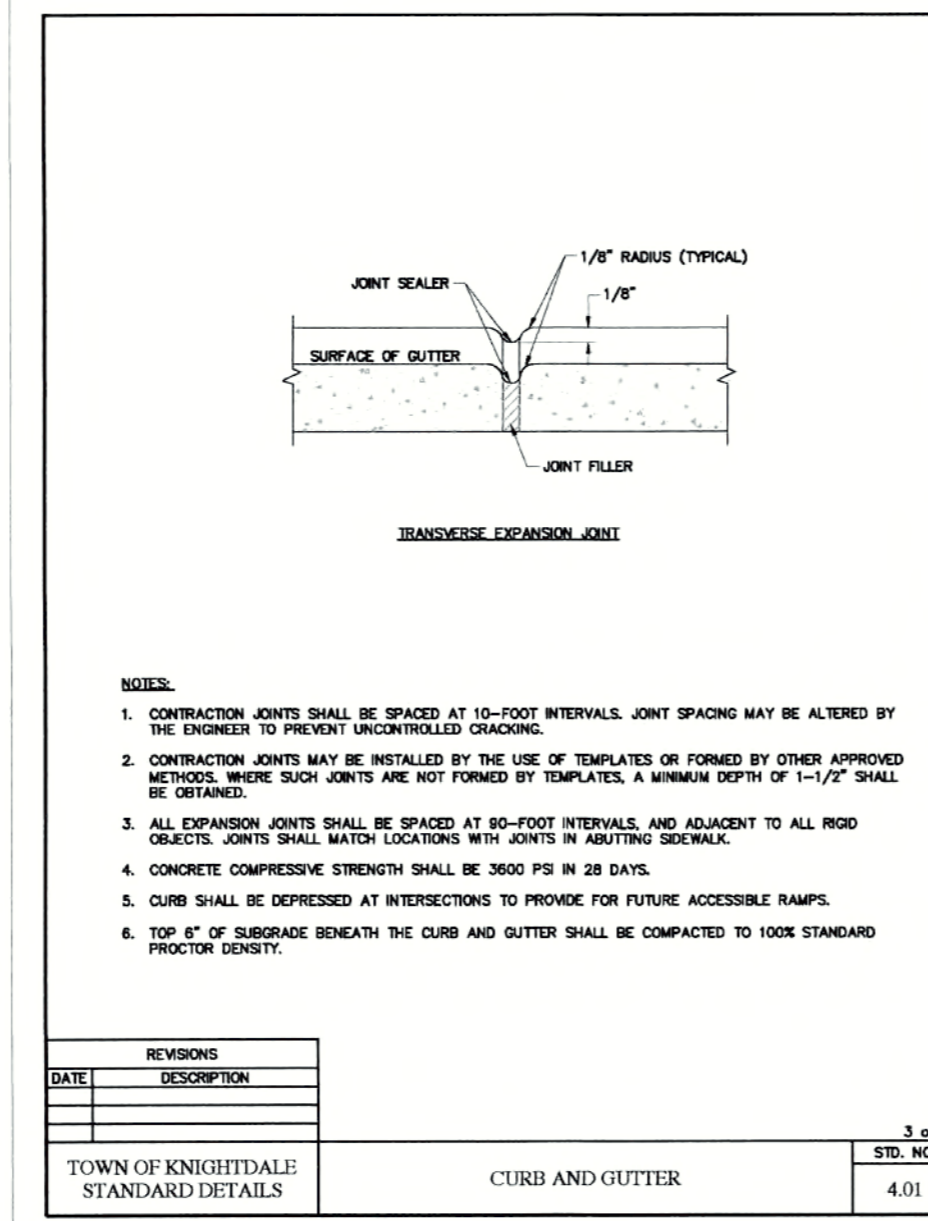
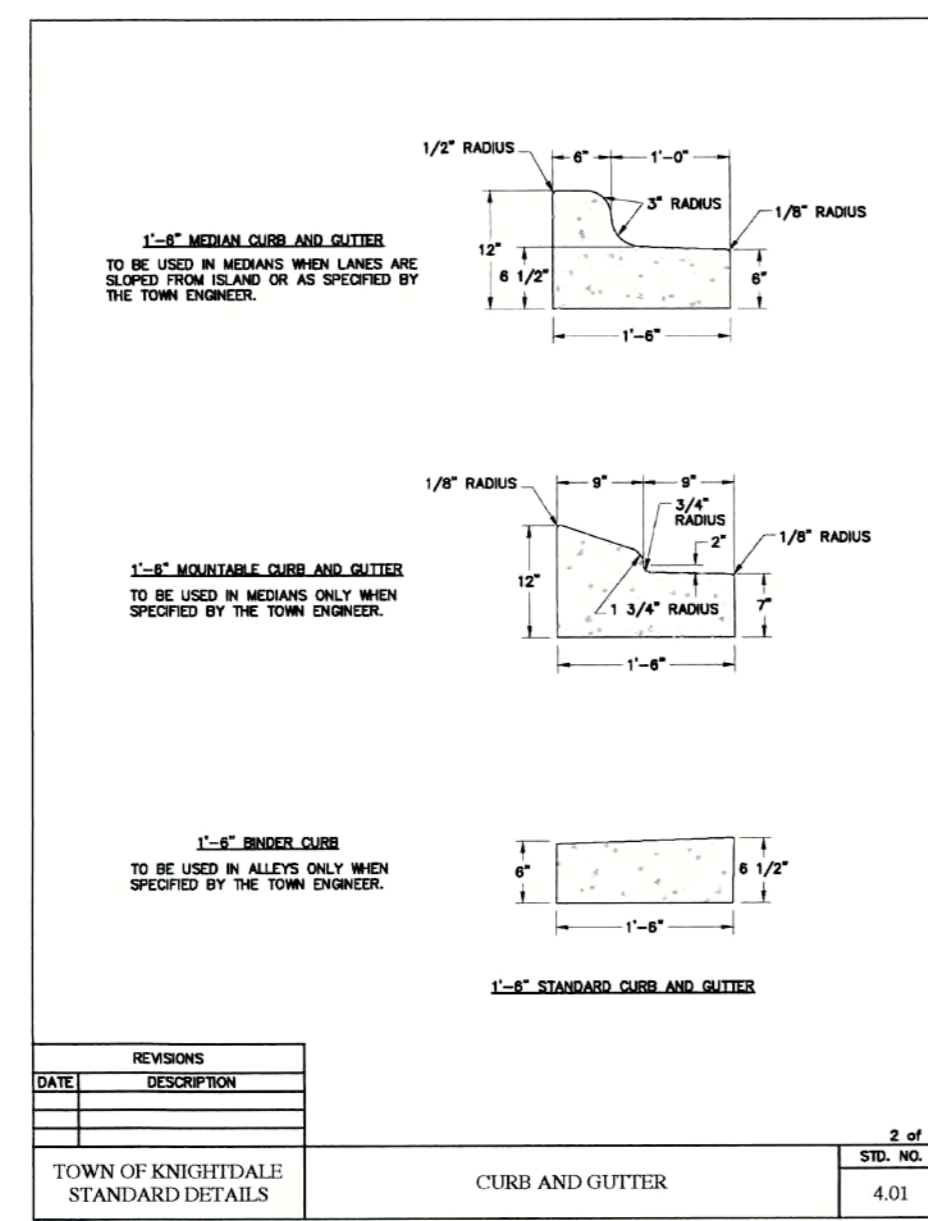
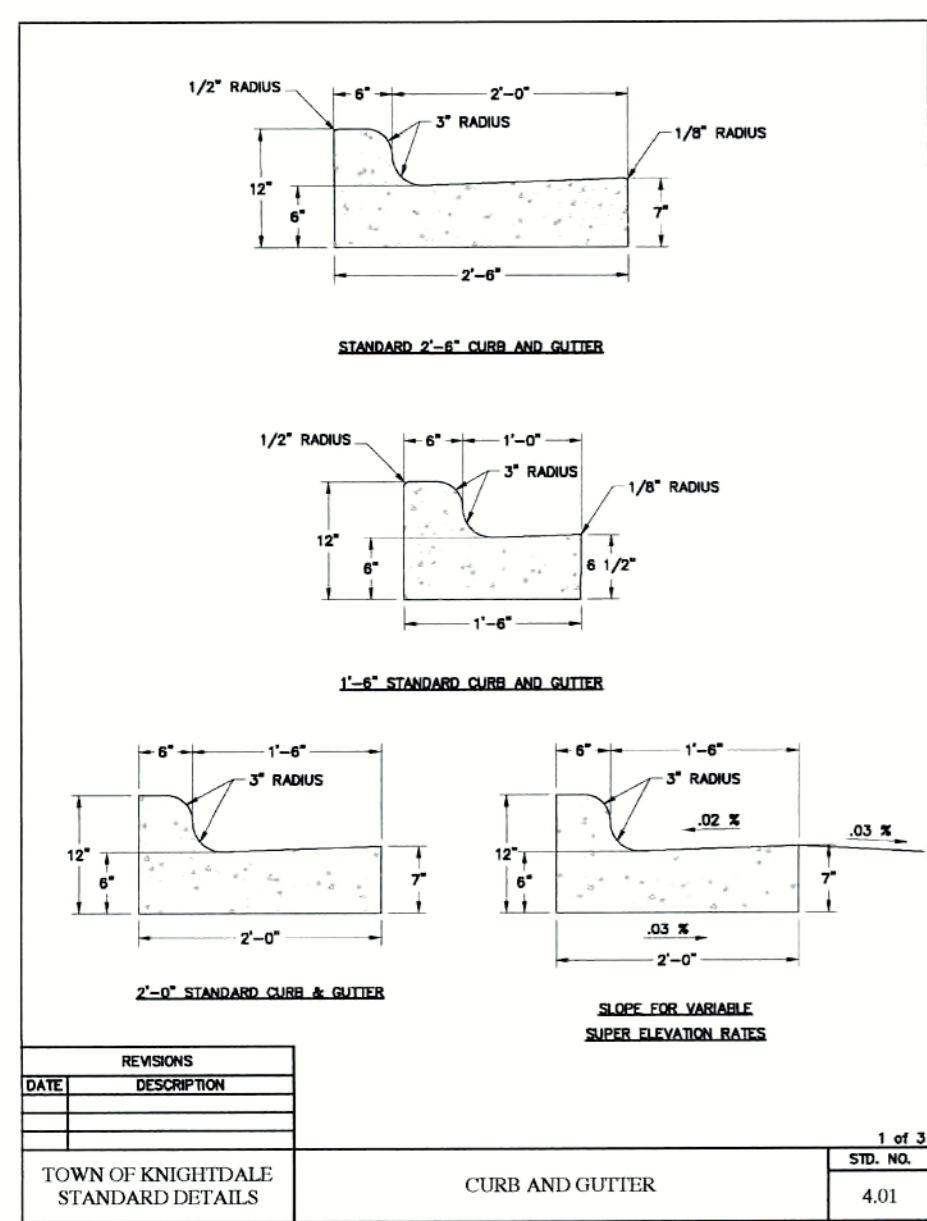
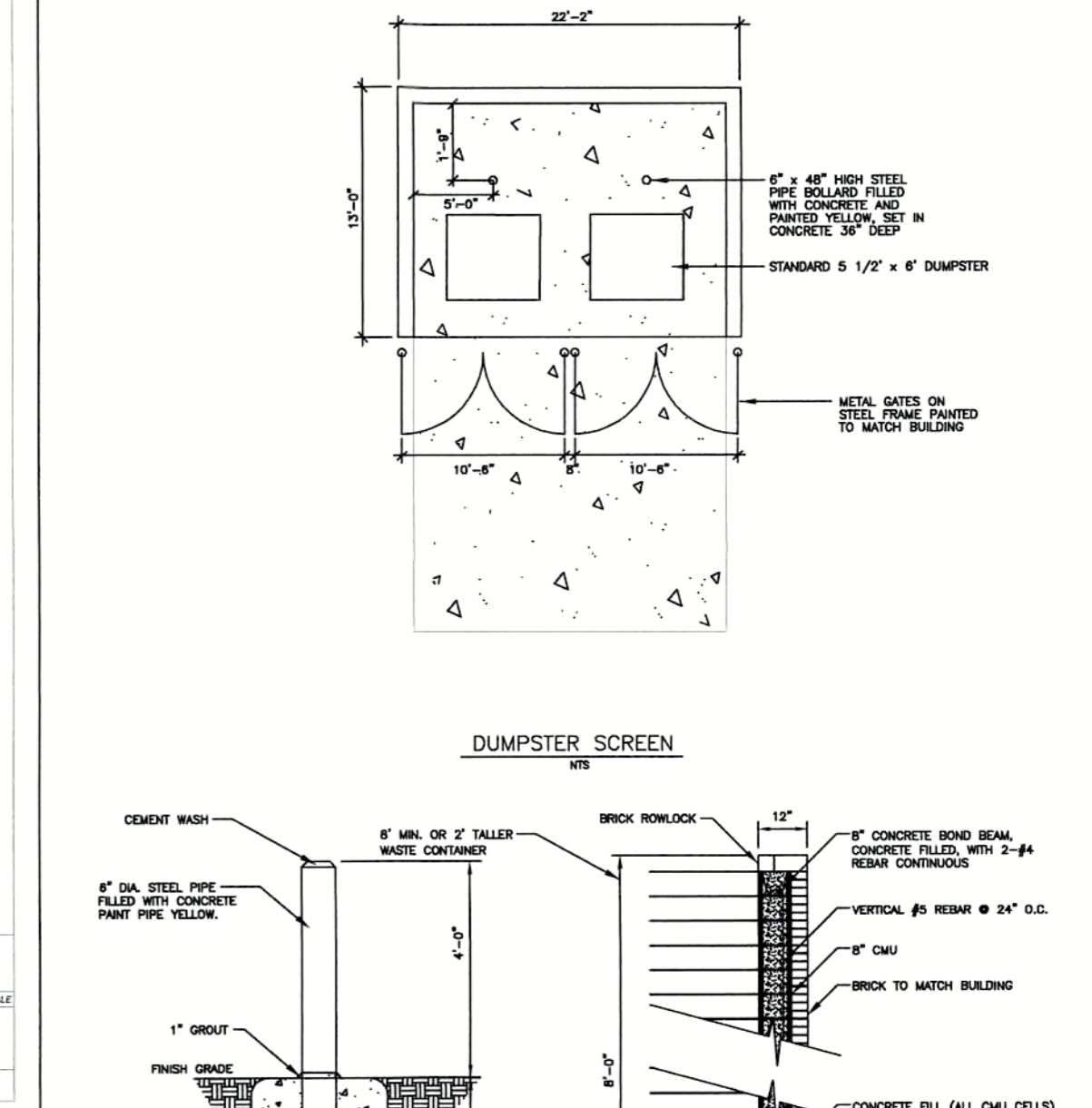
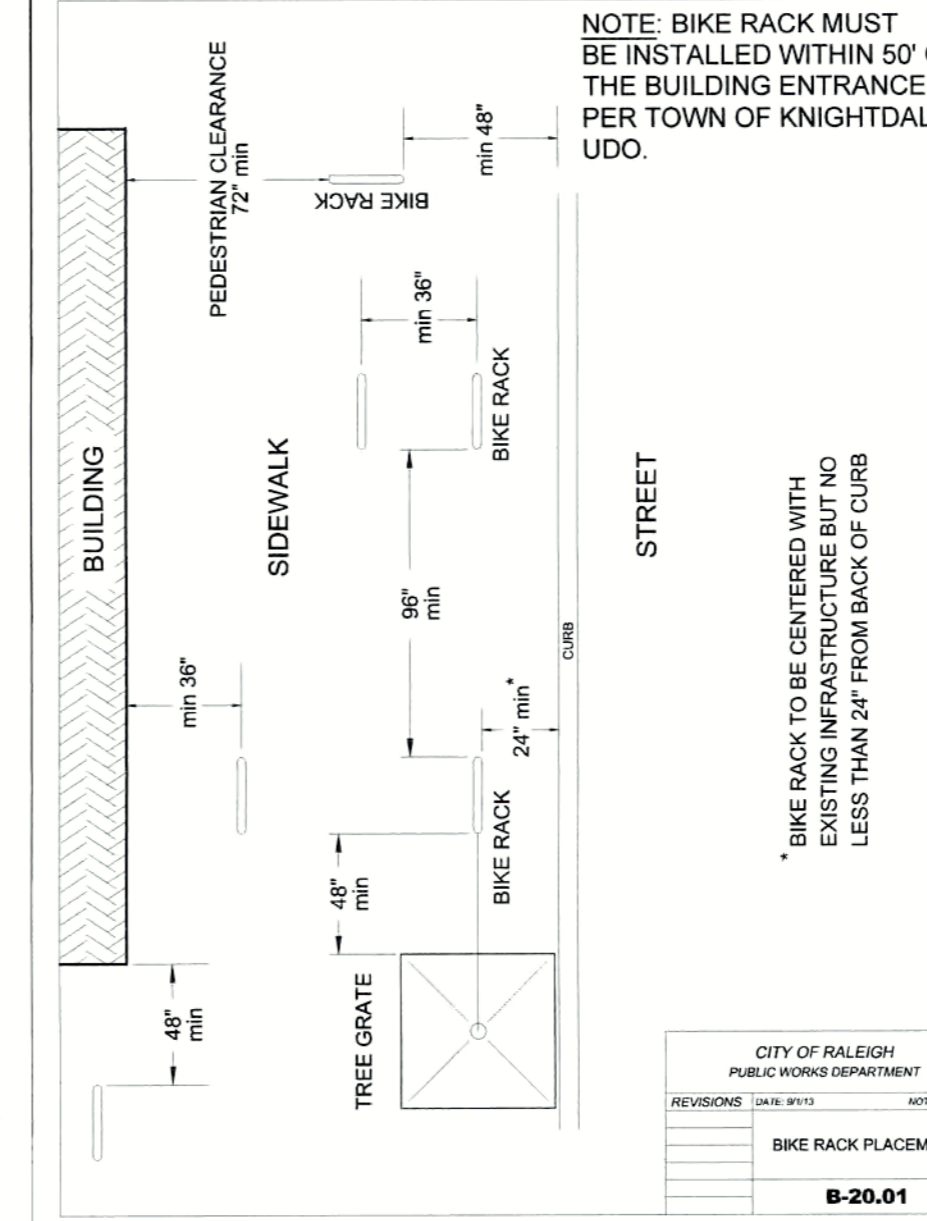
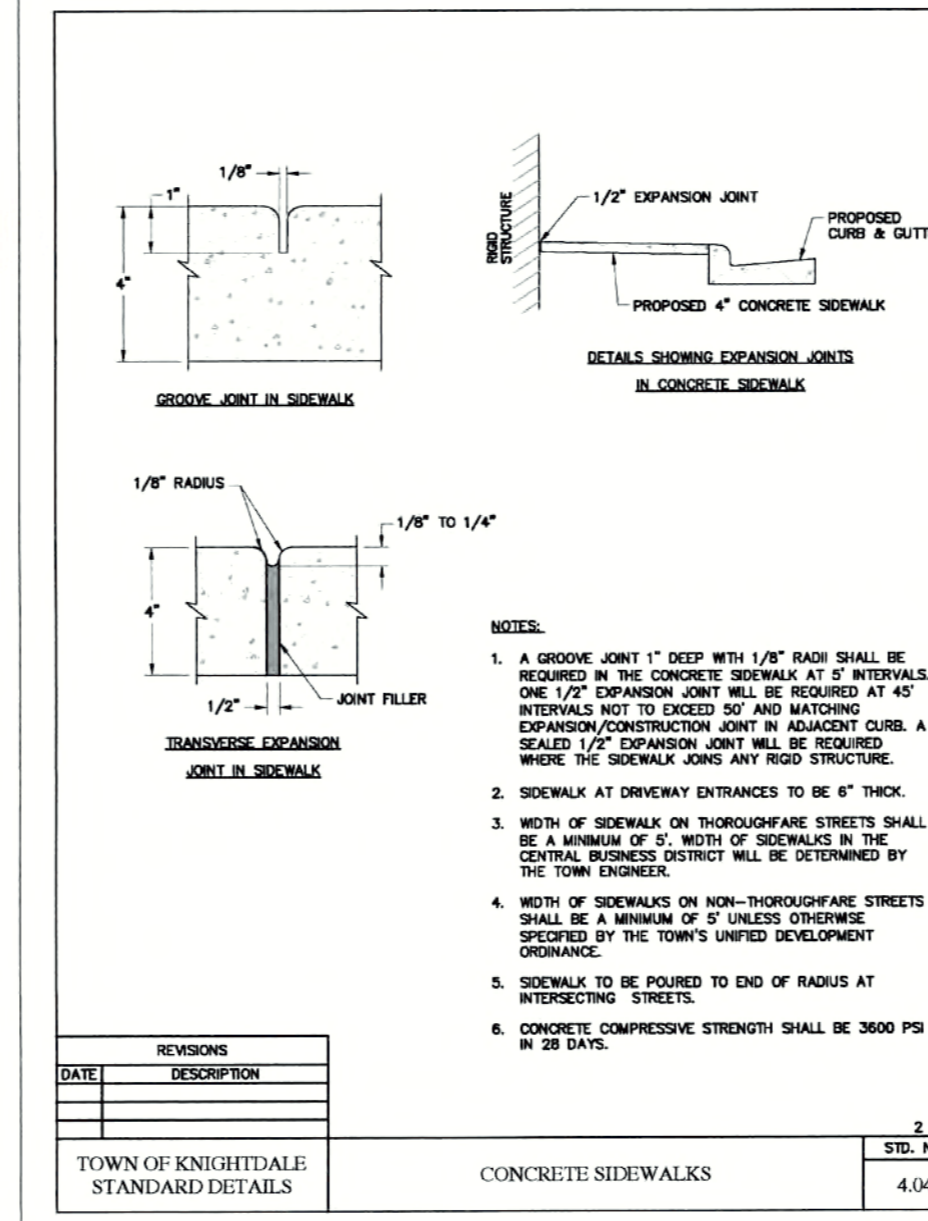
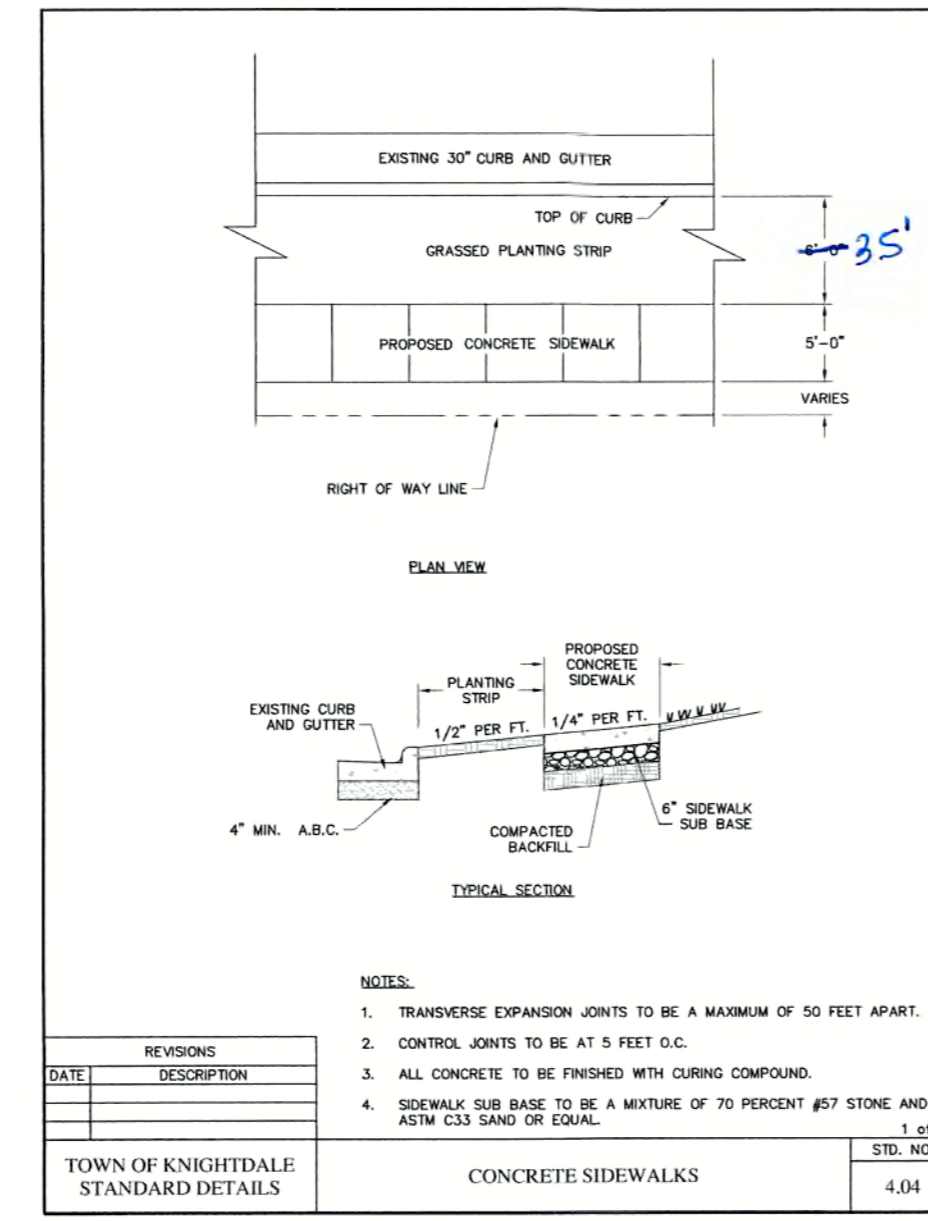
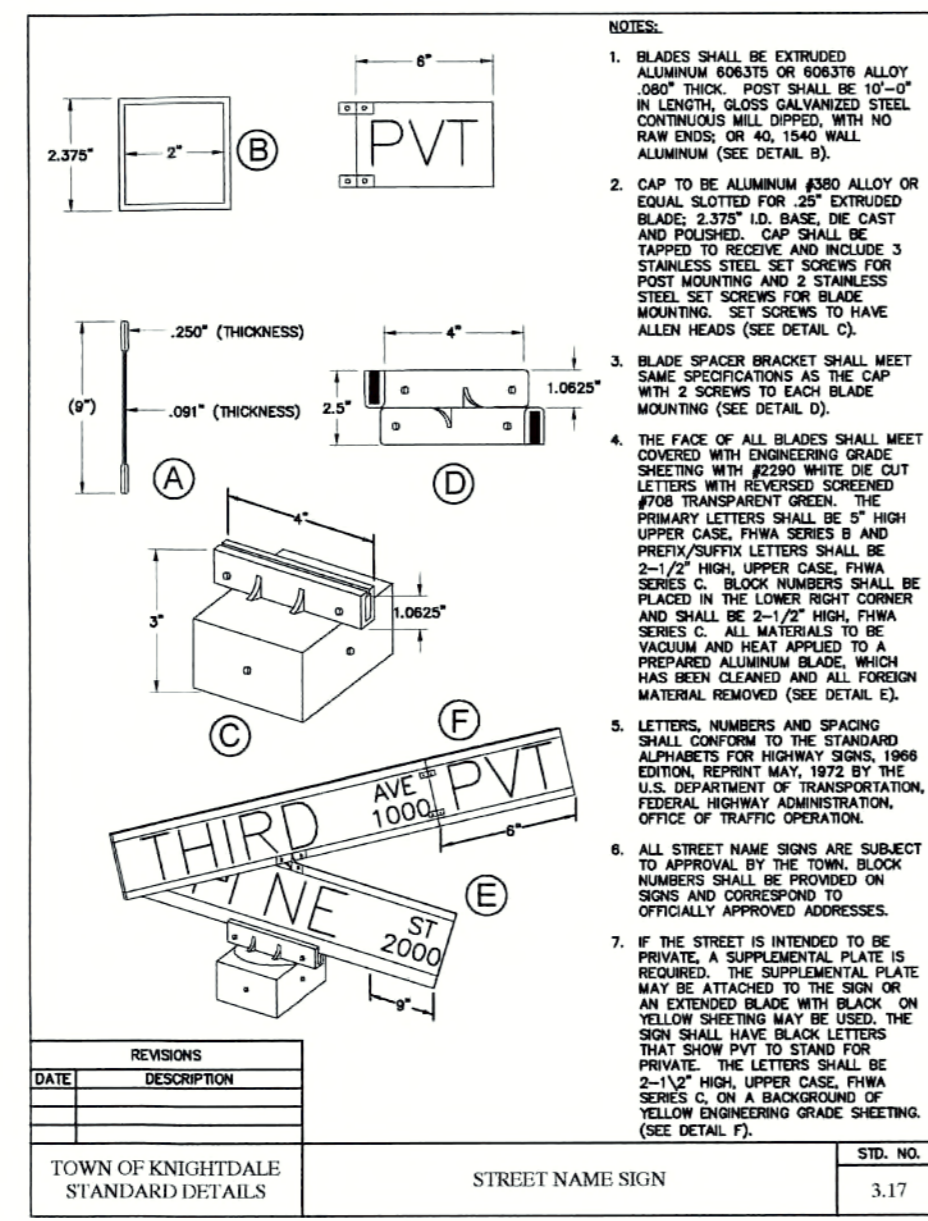
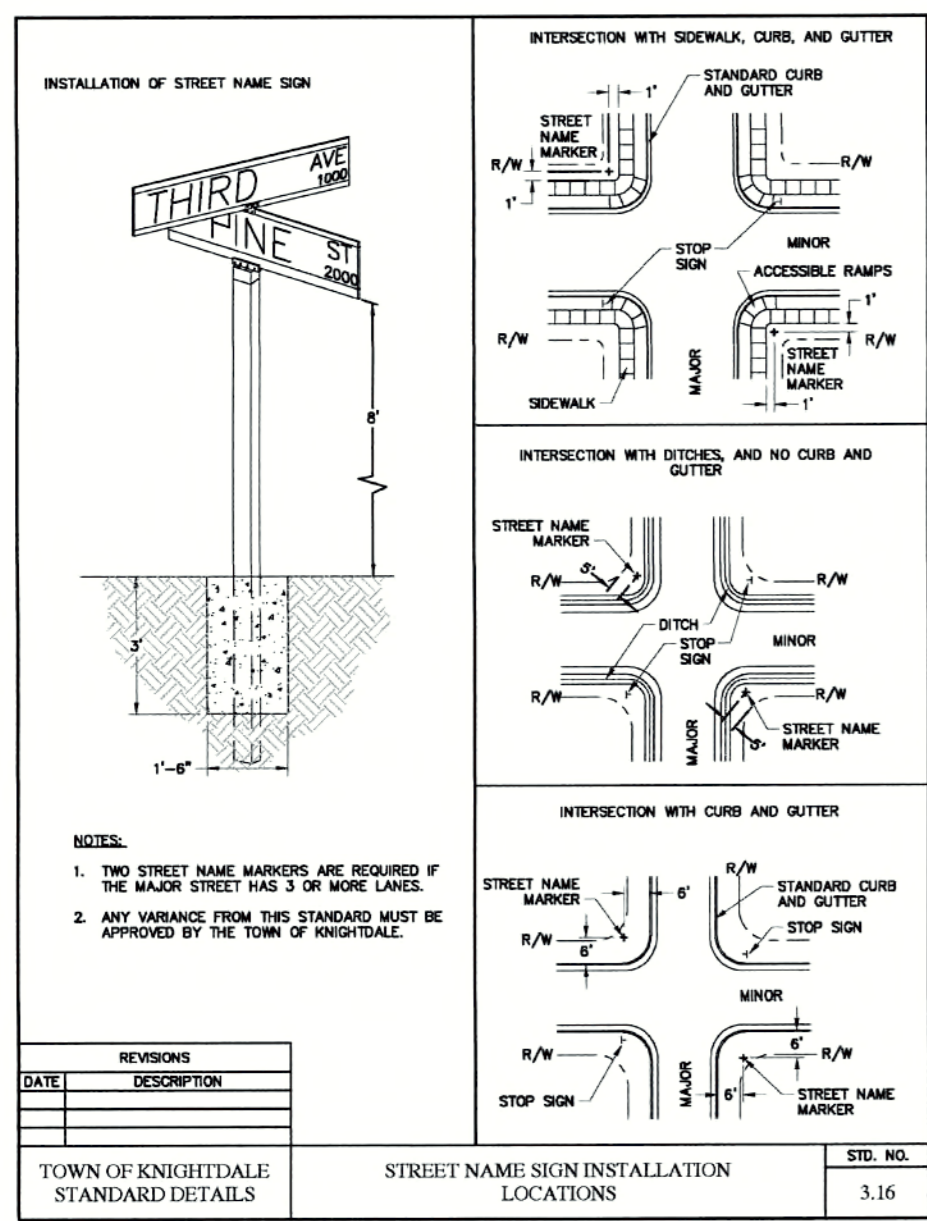
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

Job No. 02160032 Drawn by CDT
Date 06/03/2016 Designer WR



Revisions		
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: Sarah M. Williams DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

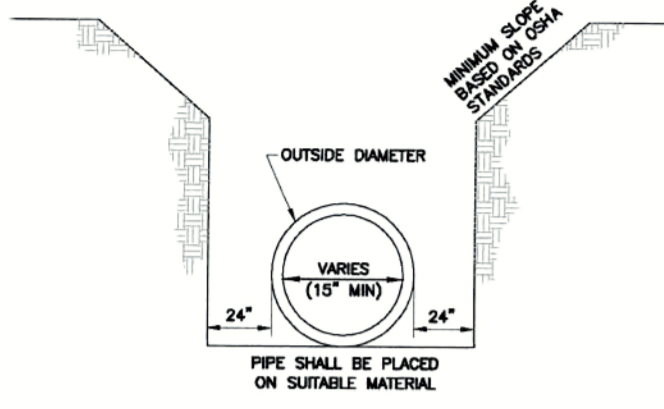
BY: Chris Curran DATE: 4-28-17
 ADMINISTRATOR



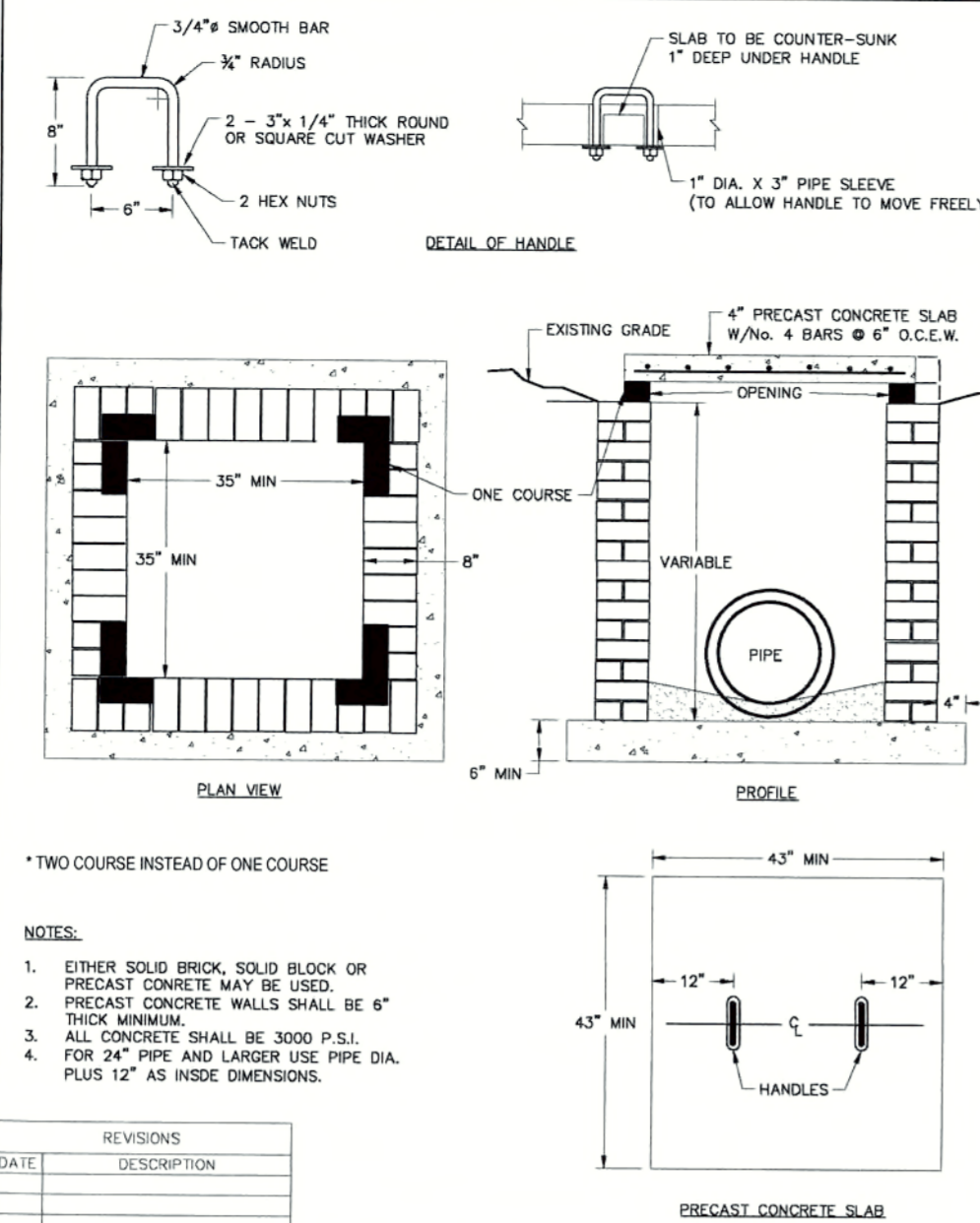
Revisions	1	2	3	4
PER TOK COMMENTS	09/09/16			
PER WAKE COMMENTS	11/15/16			
PER TOK COMMENTS	12/28/16			
PER TOK COMMENTS	03/01/17			

Sheet No. **8.0**

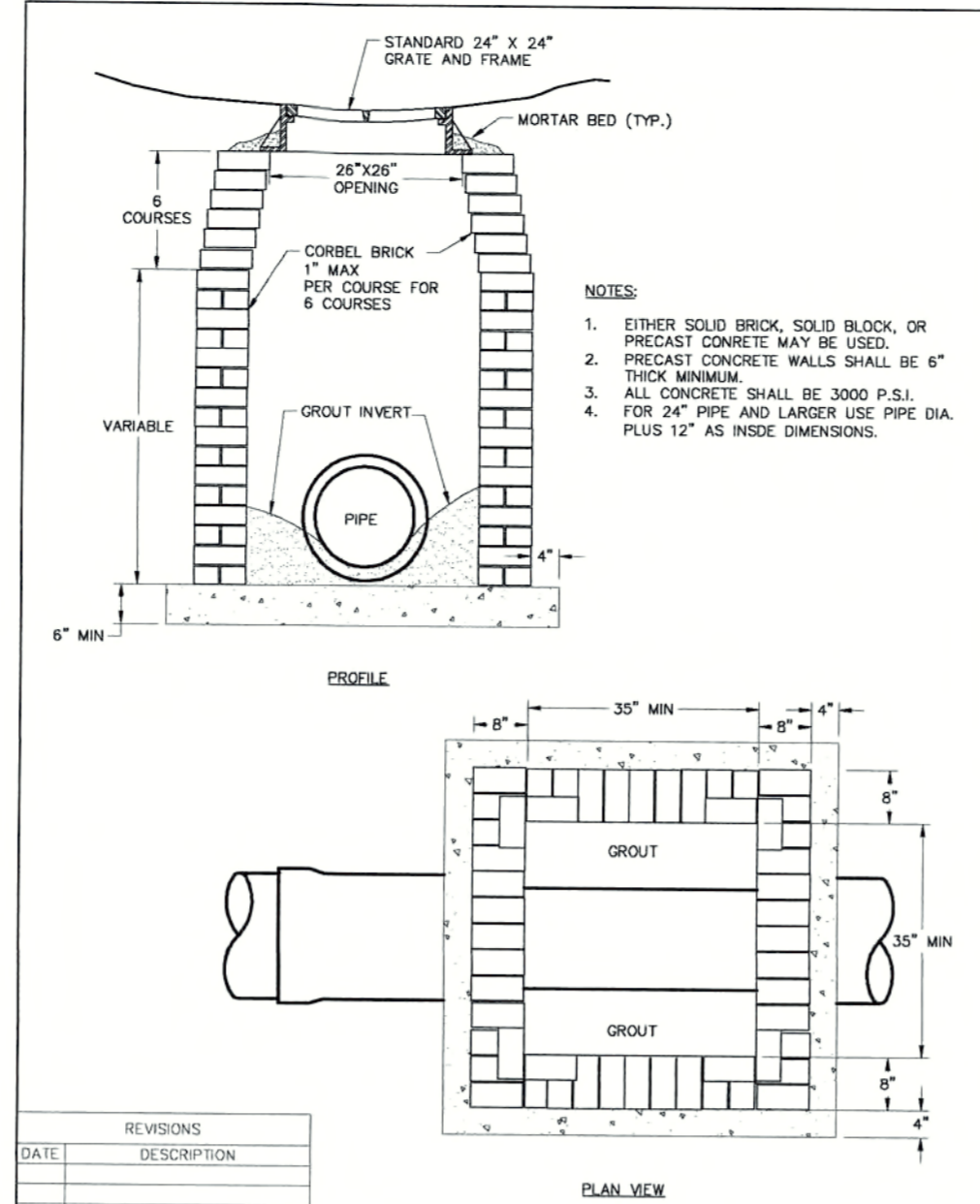
- NOTES:**
1. A MINIMUM OF 24" FROM OUTSIDE DIAMETER OF PIPE TO SIDE OF TRENCH MUST BE ALLOWED FOR COMPACTION OF FILL MATERIAL. SHOULDERING OF TRENCHES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER THE PIPE IS LAID. THE FILL AROUND THE PIPE SHALL BE PLACED IN LAYERS NOT TO EXCEED 6" UNDER NO CIRCUMSTANCES SHALL WATER BE PERMITTED TO RISE IN UNBACKFILLED TRENCHES AFTER THE PIPE HAS BEEN PLACED. COMPACTION REQUIREMENTS SHALL BE ATTAINED BY THE USE OF MECHANICAL TAMPS ONLY. EACH AND EVERY LAYER OF BACKFILL SHALL BE PLACED LOOSE AND THOROUGHLY COMPACTED INTO PLACE.
 2. ALL BACKFILL MATERIAL SHALL HAVE AN IN PLACE COMPACTION DENSITY OF AT LEAST 90% OF THE STANDARD PROCTOR MAXIMUM DENSITY.
 3. THE FINAL 24" OF BACKFILL MATERIAL SHALL BE COMPACTED TO 100% OF THE STANDARD PROCTOR MAXIMUM DENSITY.
 4. ALL TRENCHING OPERATIONS SHALL MEET OSHA STANDARDS.
 5. BACKFILL MATERIAL BENEATH ROADWAY SHALL BE SELECT BACKFILL MATERIAL.



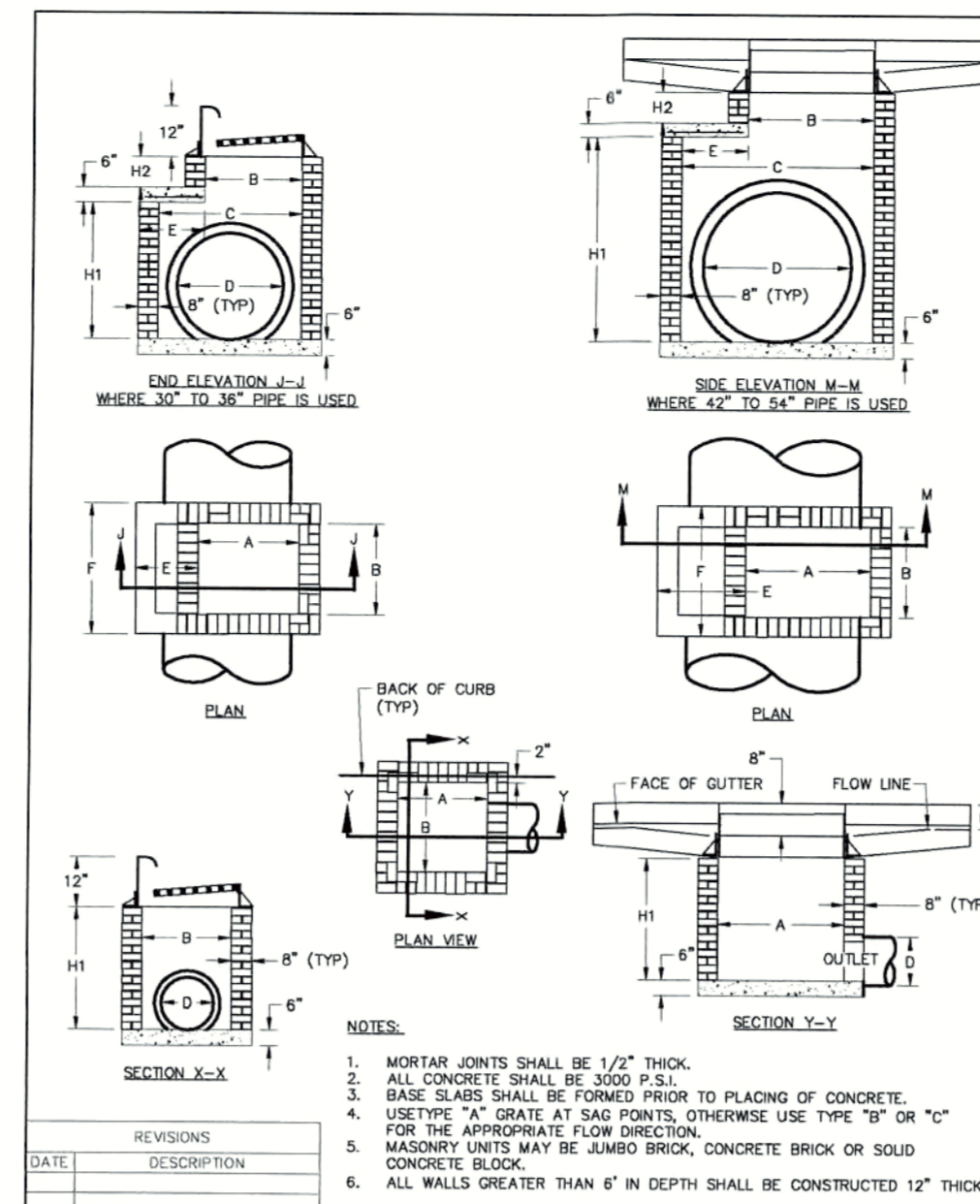
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		TRENCH FOR STORM DRAIN PIPES	5.02



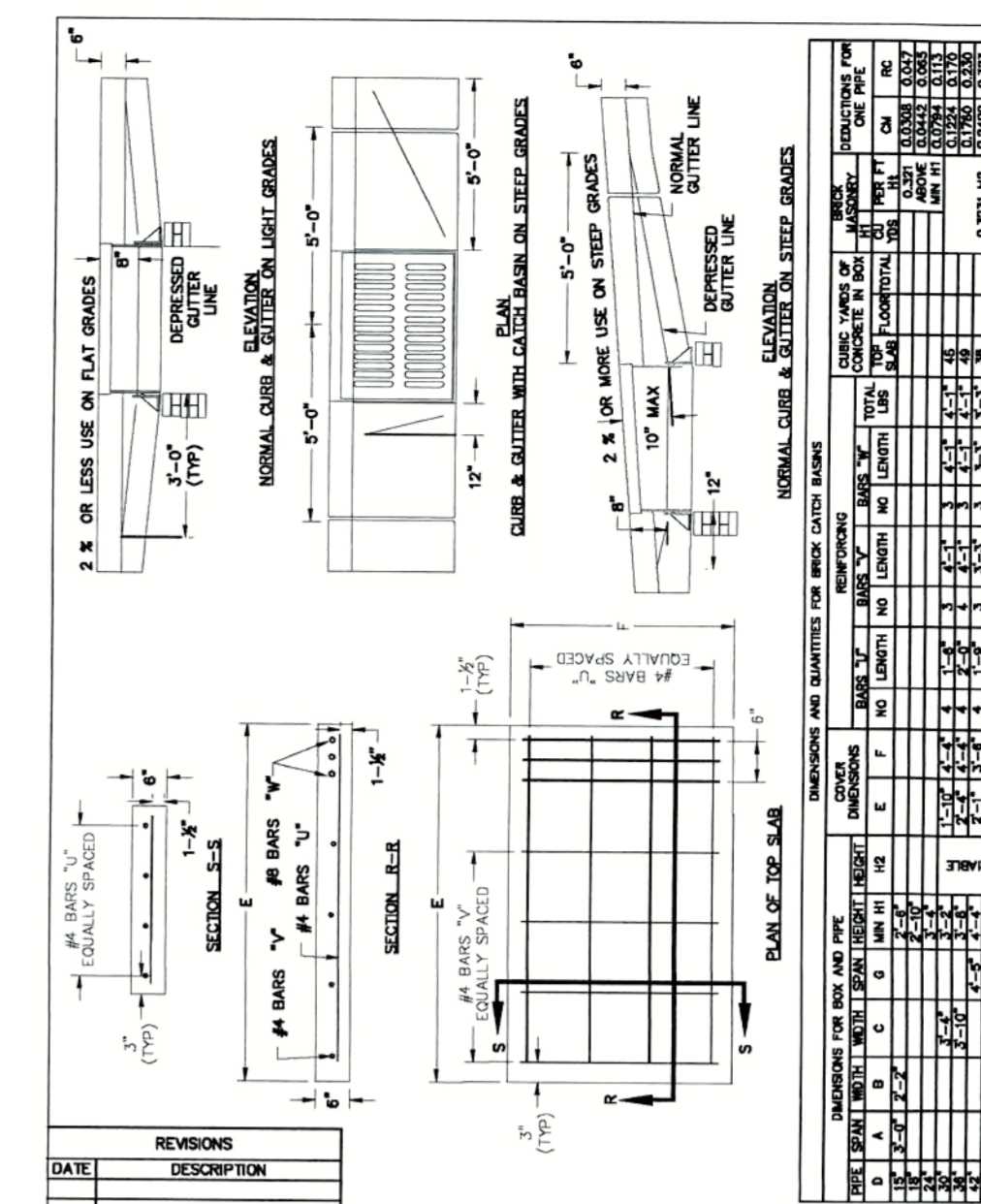
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD YARD INLET WITH CONCRETE SLAB	5.03



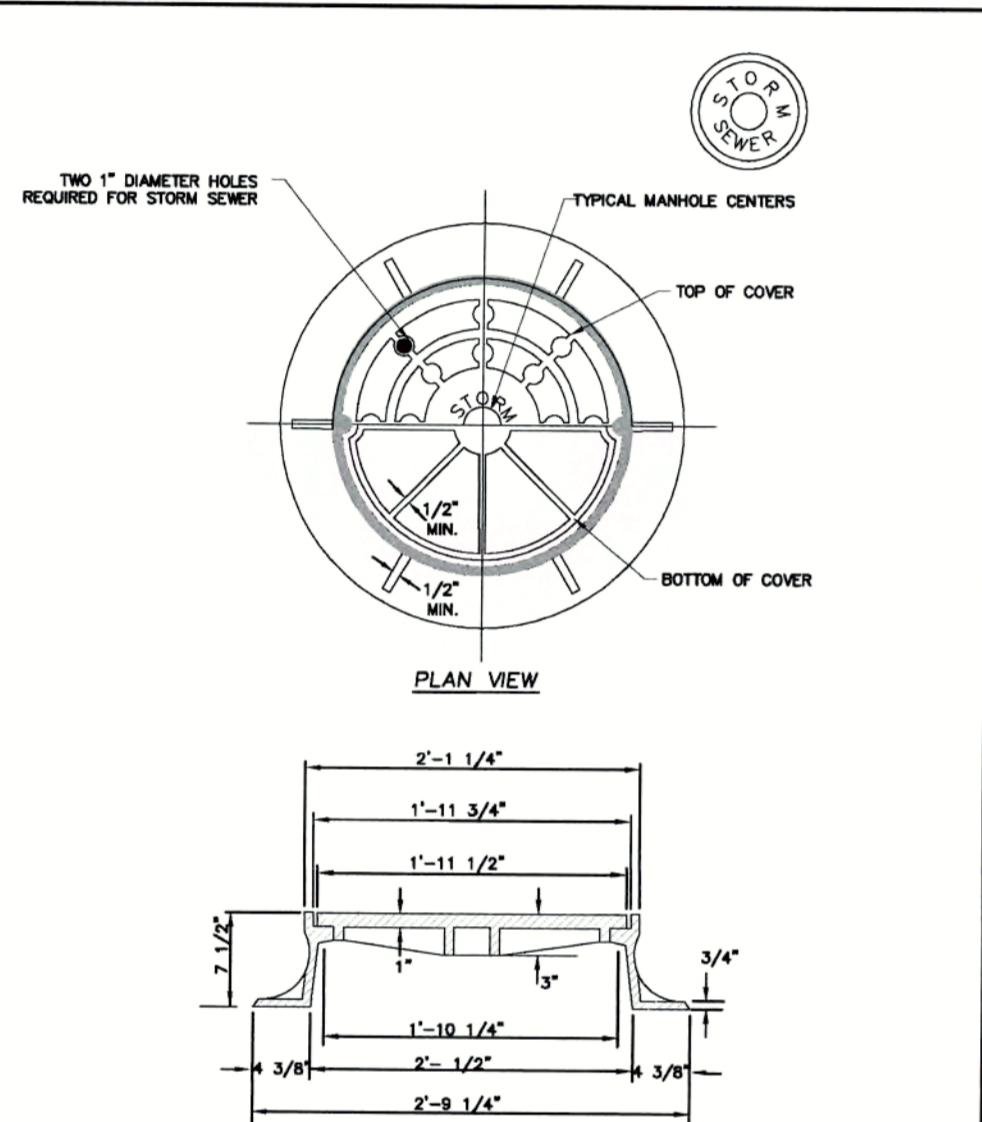
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD DROP INLET WITH GRATE AND FRAME	5.04



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

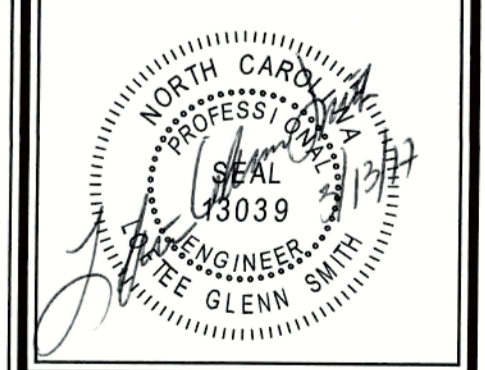


REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD CURB INLET	5.05



REVISIONS	DATE	DESCRIPTION	MINIMUM AVERAGE HEIGHT	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD MANHOLE RING & COVER	RING COVER TOTAL 310	5.10

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions	DATE	DESCRIPTION
1	09/09/16	PER TOK COMMENTS
2	11/15/16	PER WAKE COMMENTS
3	12/28/16	PER TOK COMMENTS
4	03/01/17	PER TOK COMMENTS

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

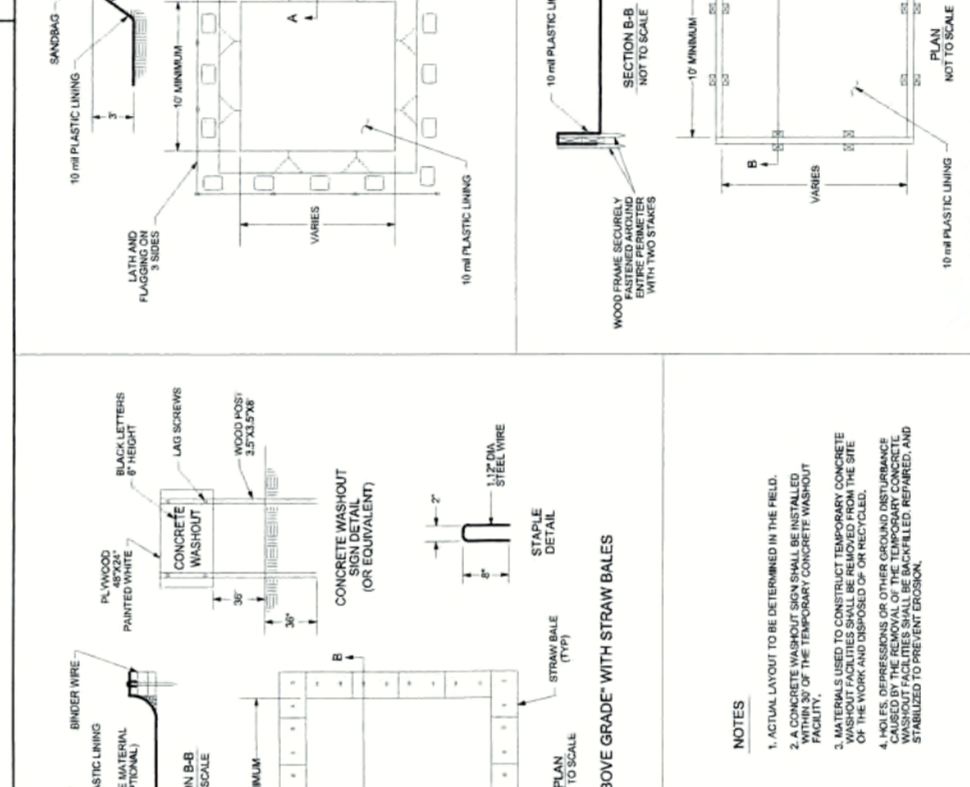
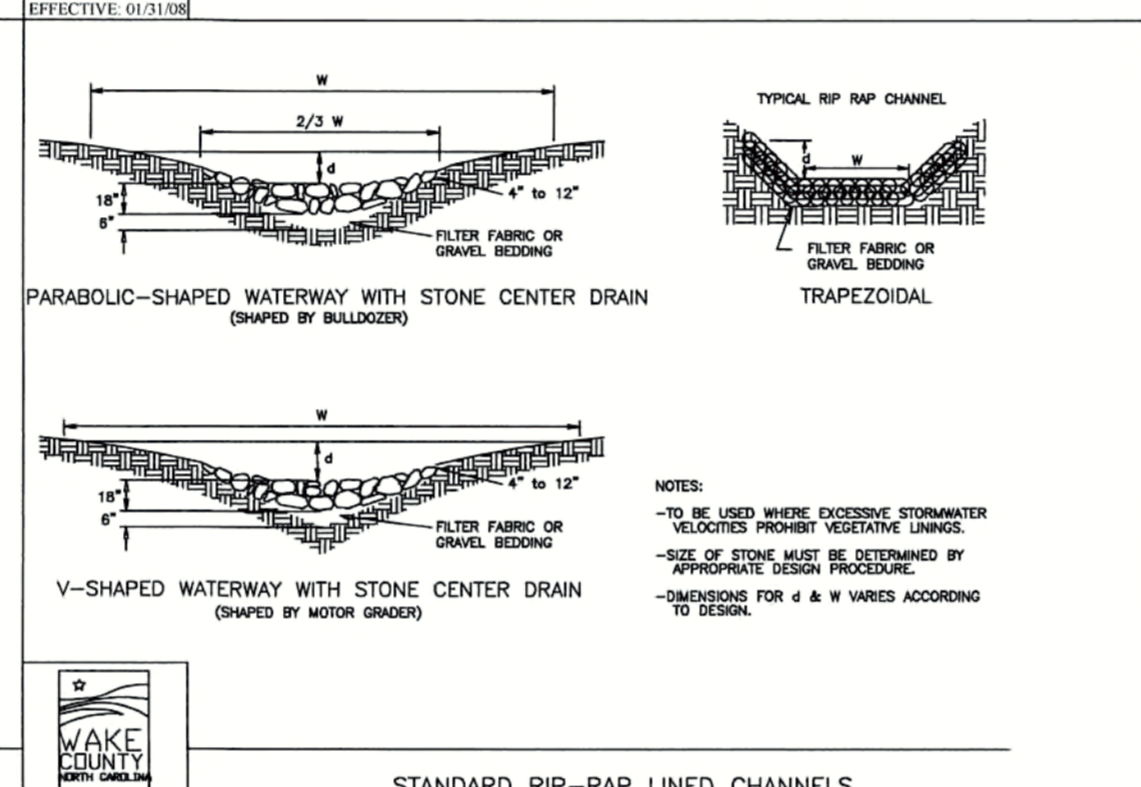
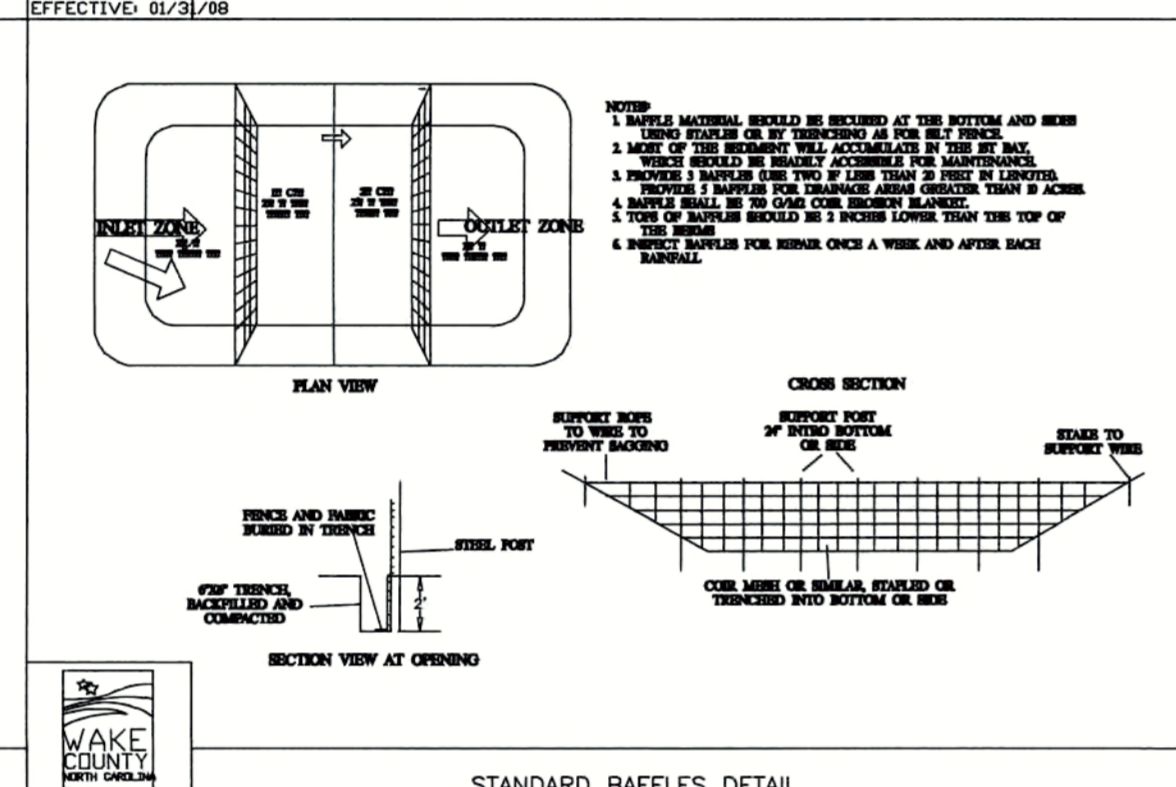
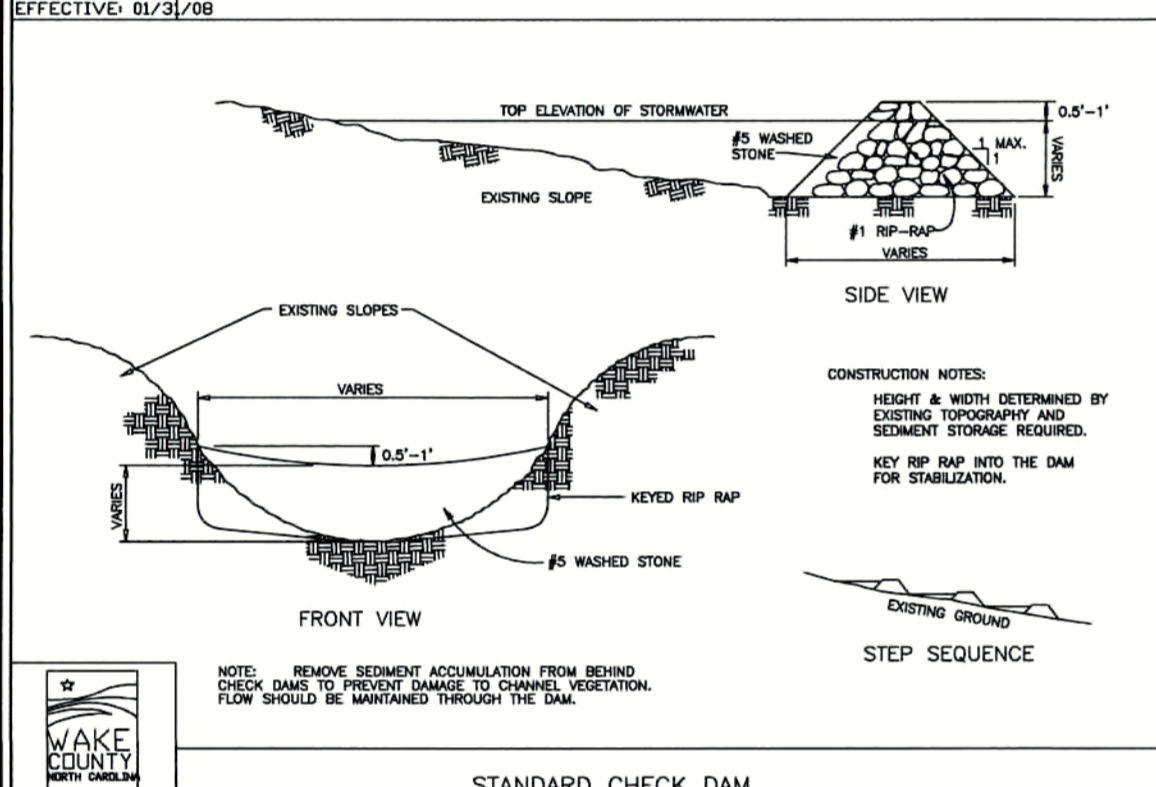
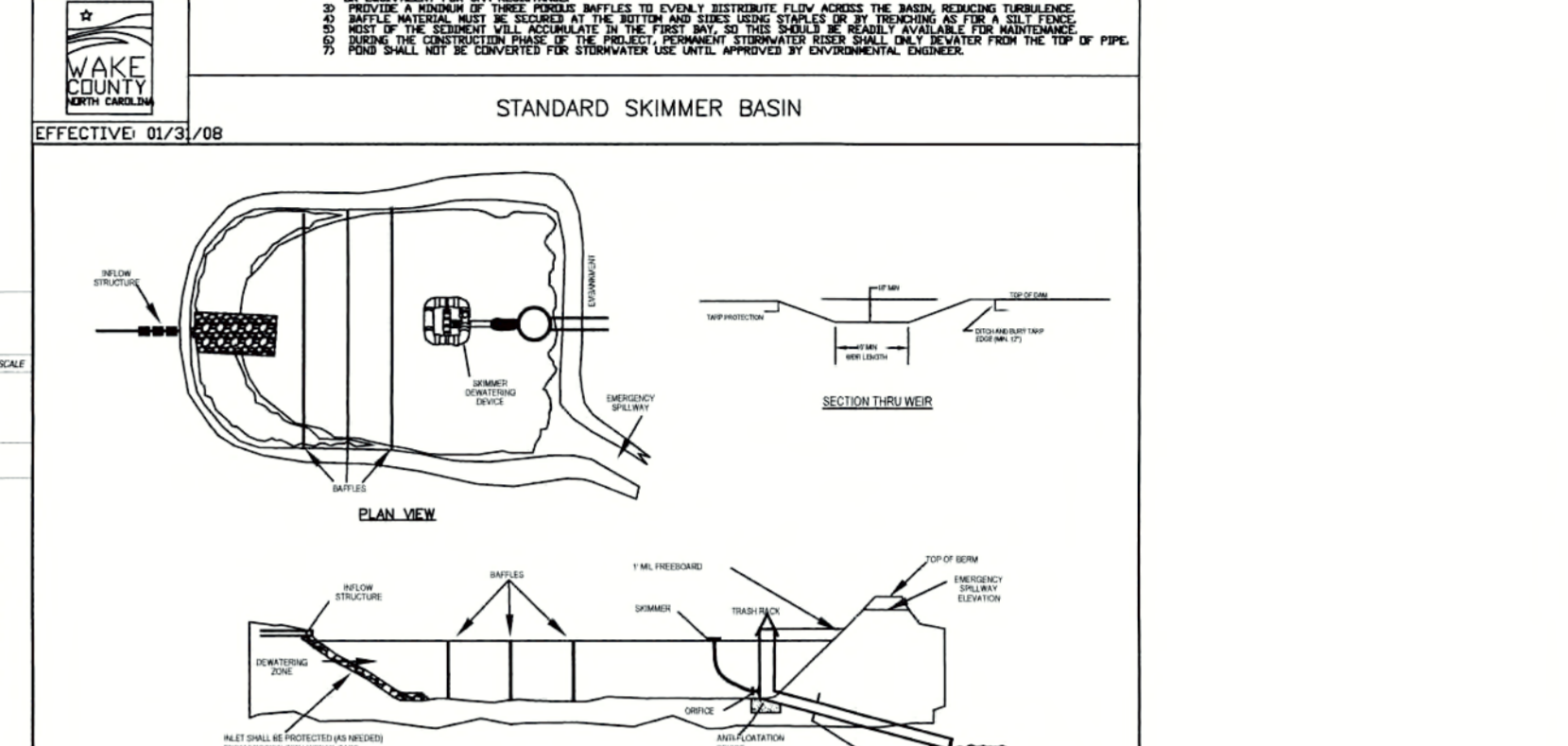
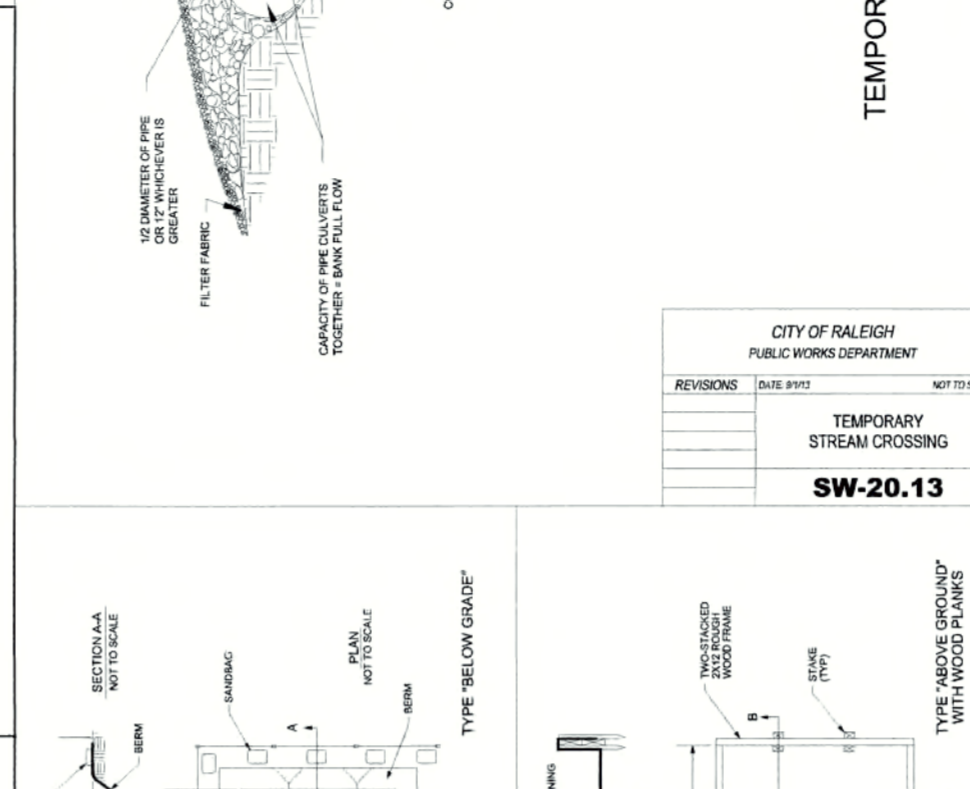
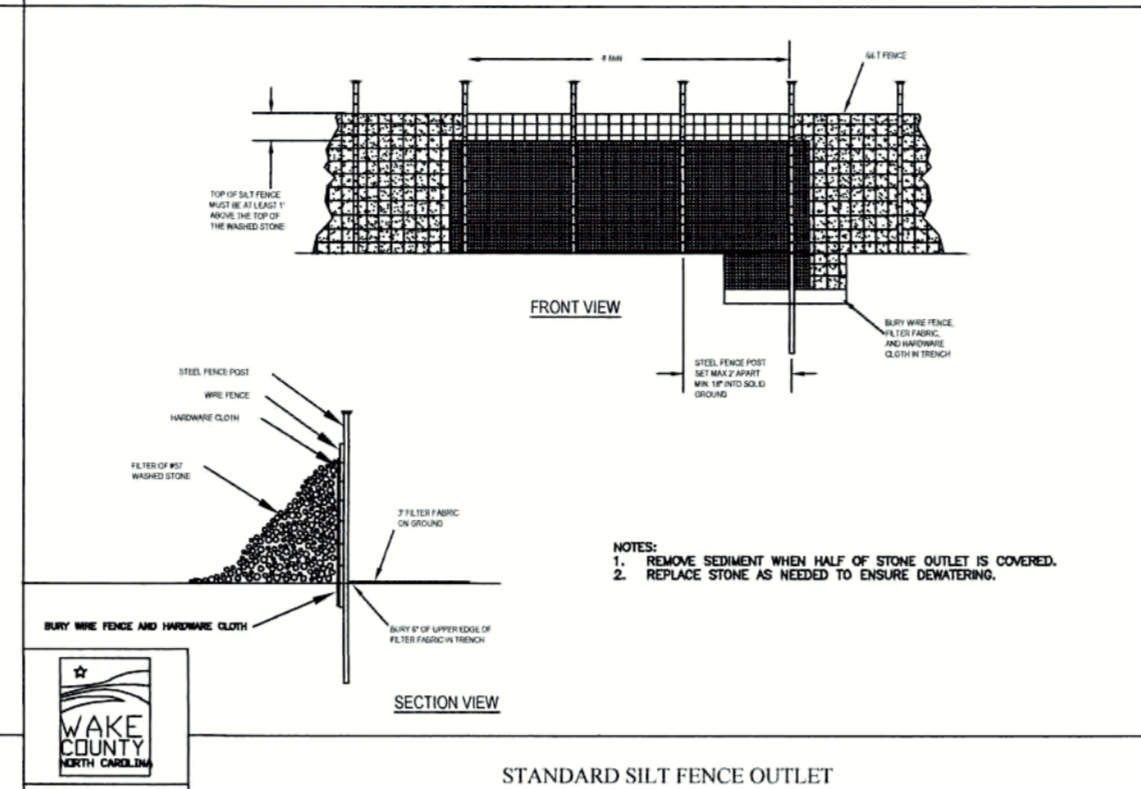
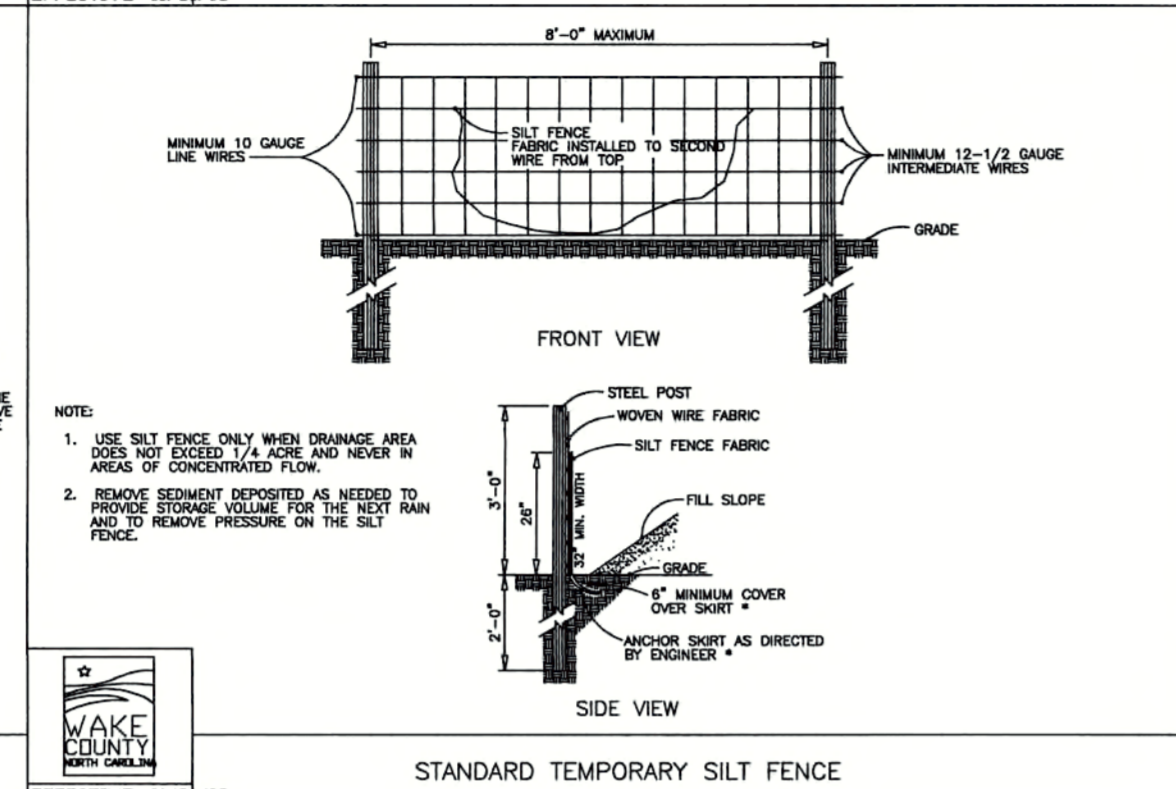
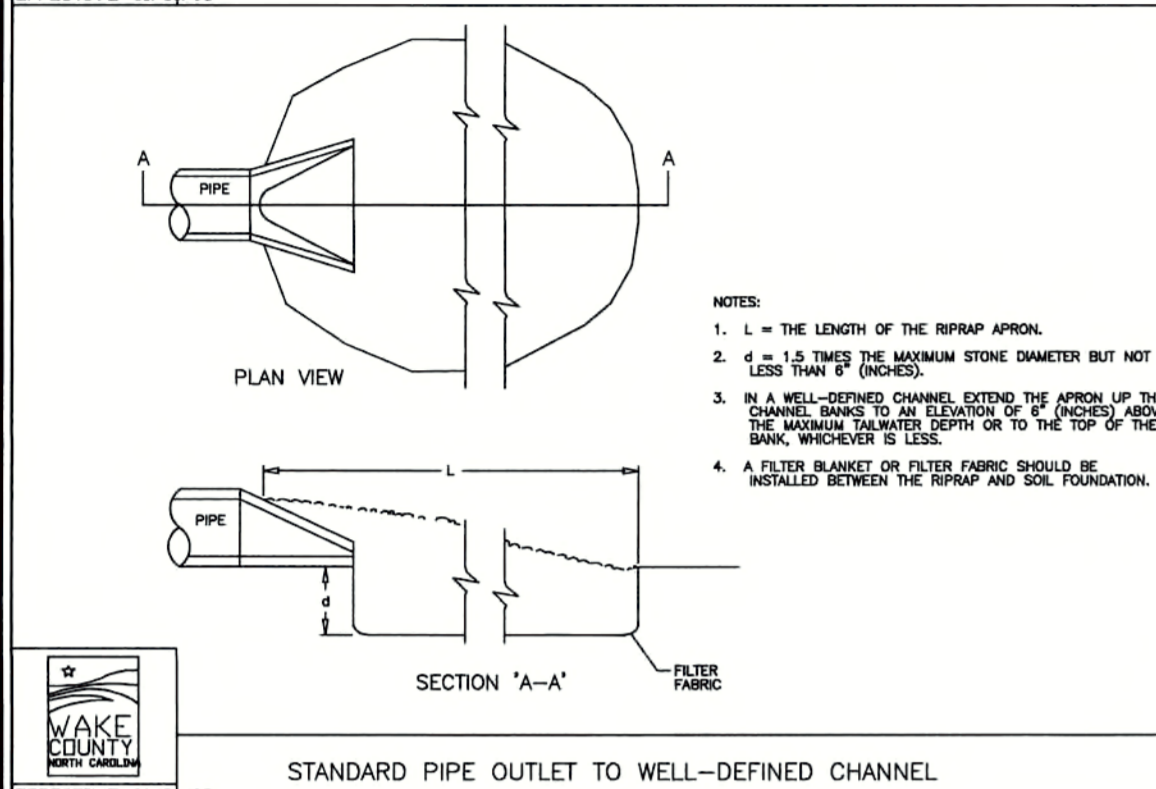
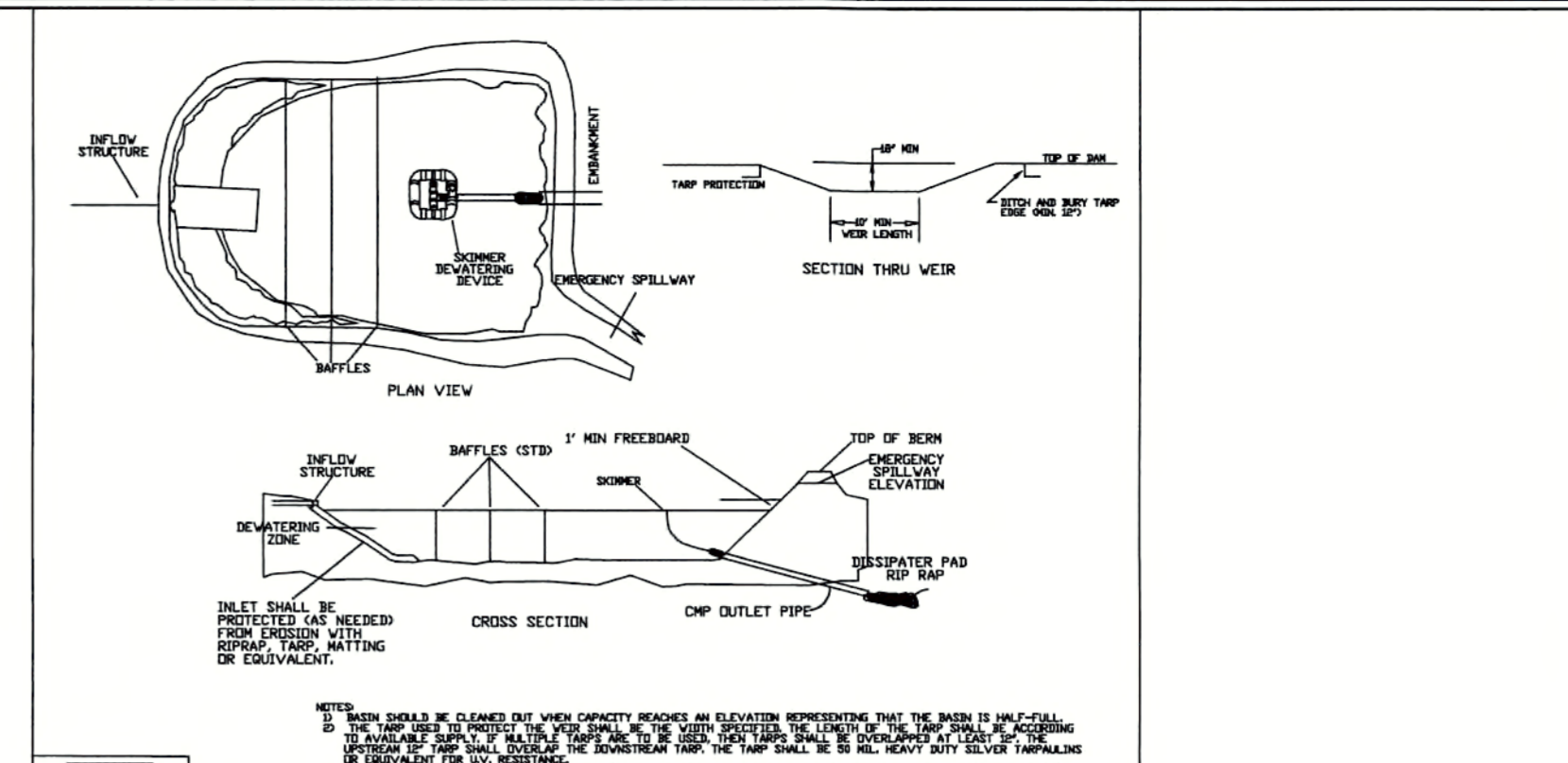
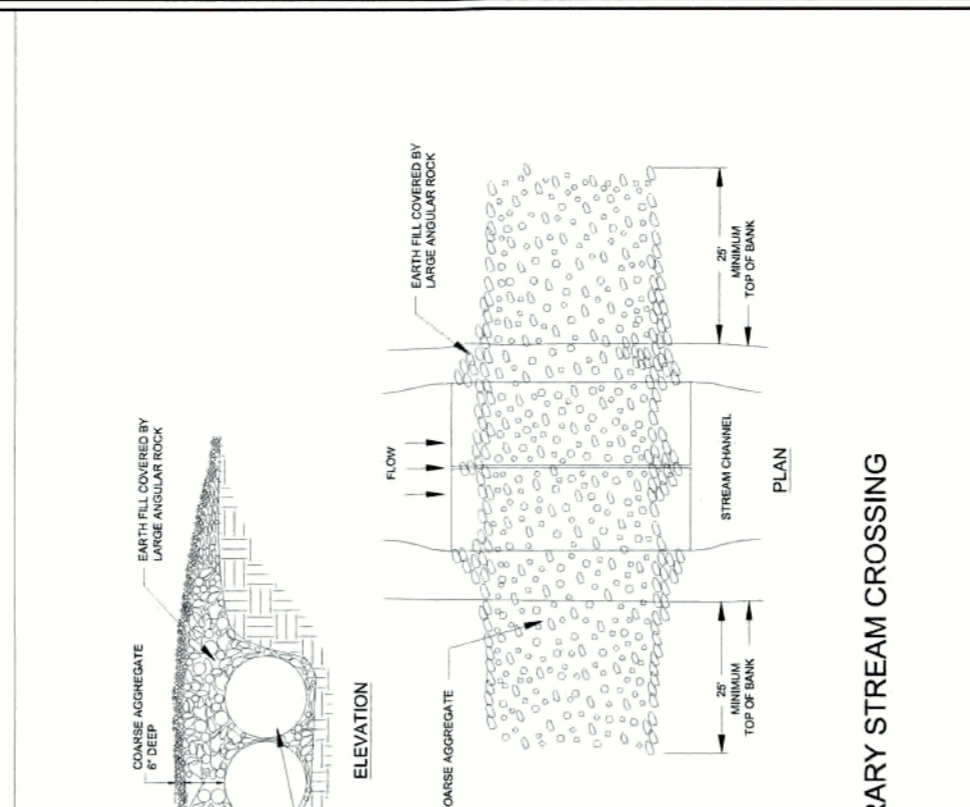
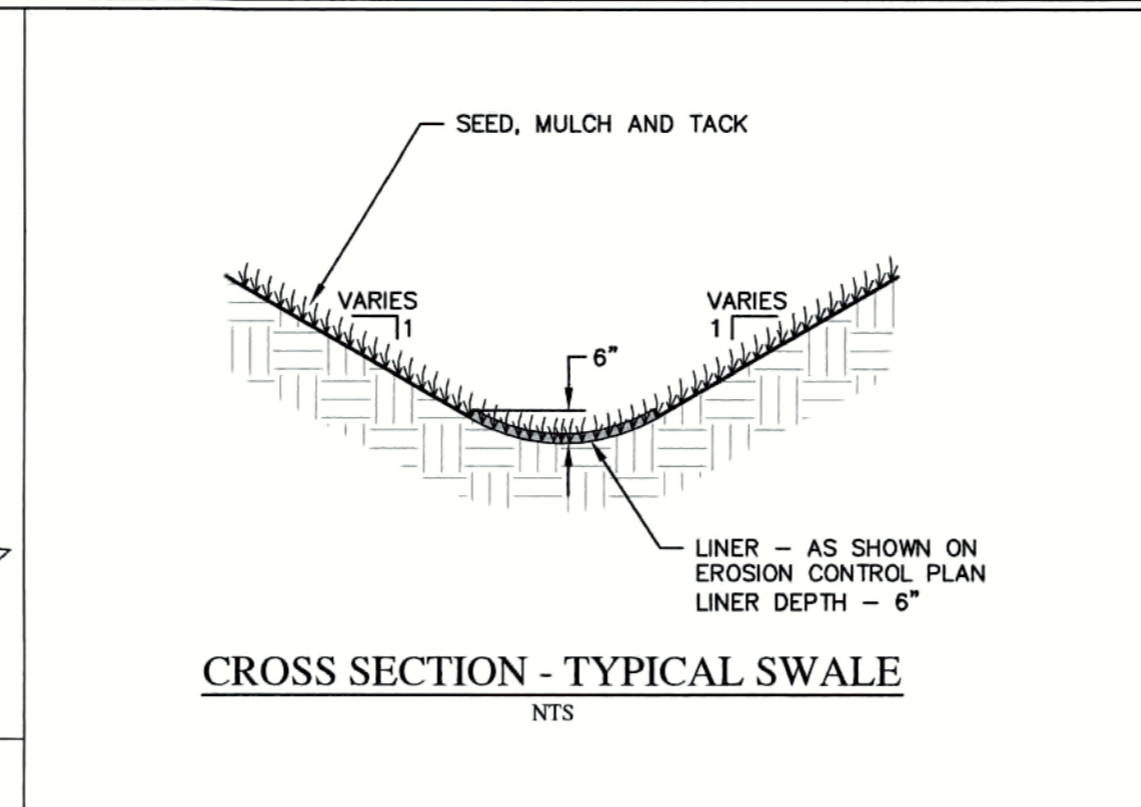
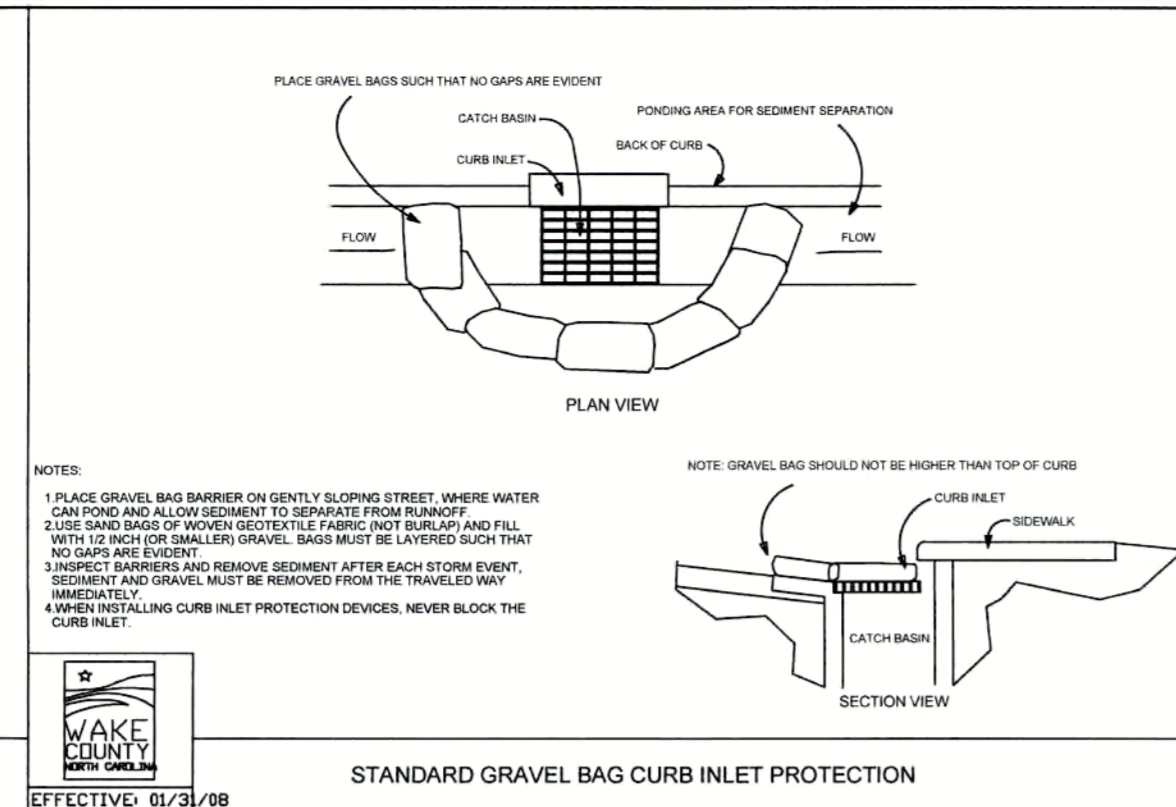
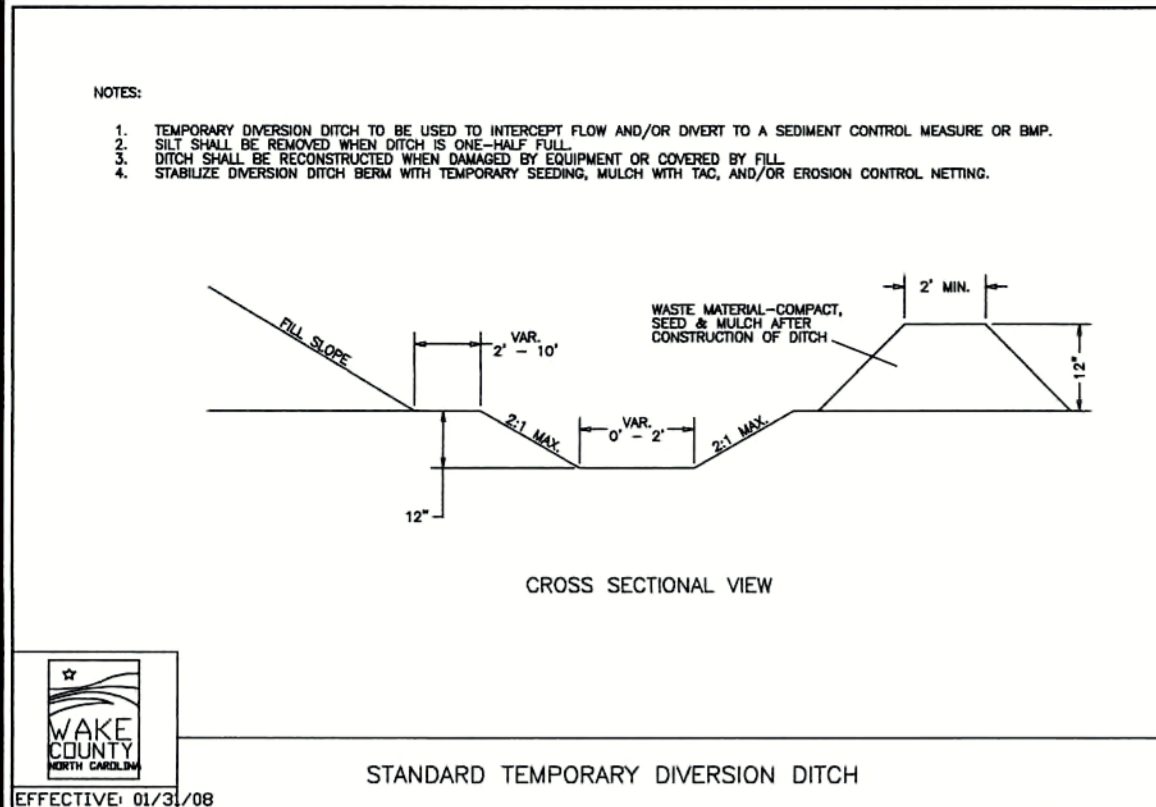
THIS DRAWING HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: Scott DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

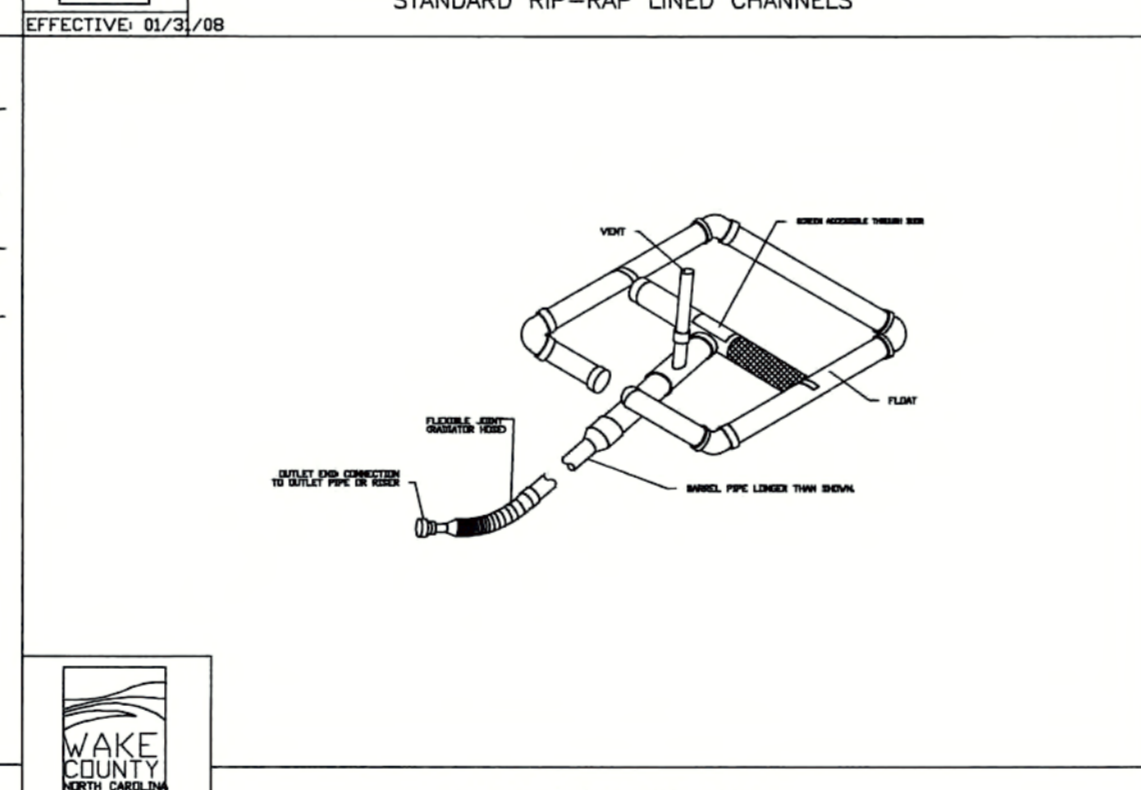
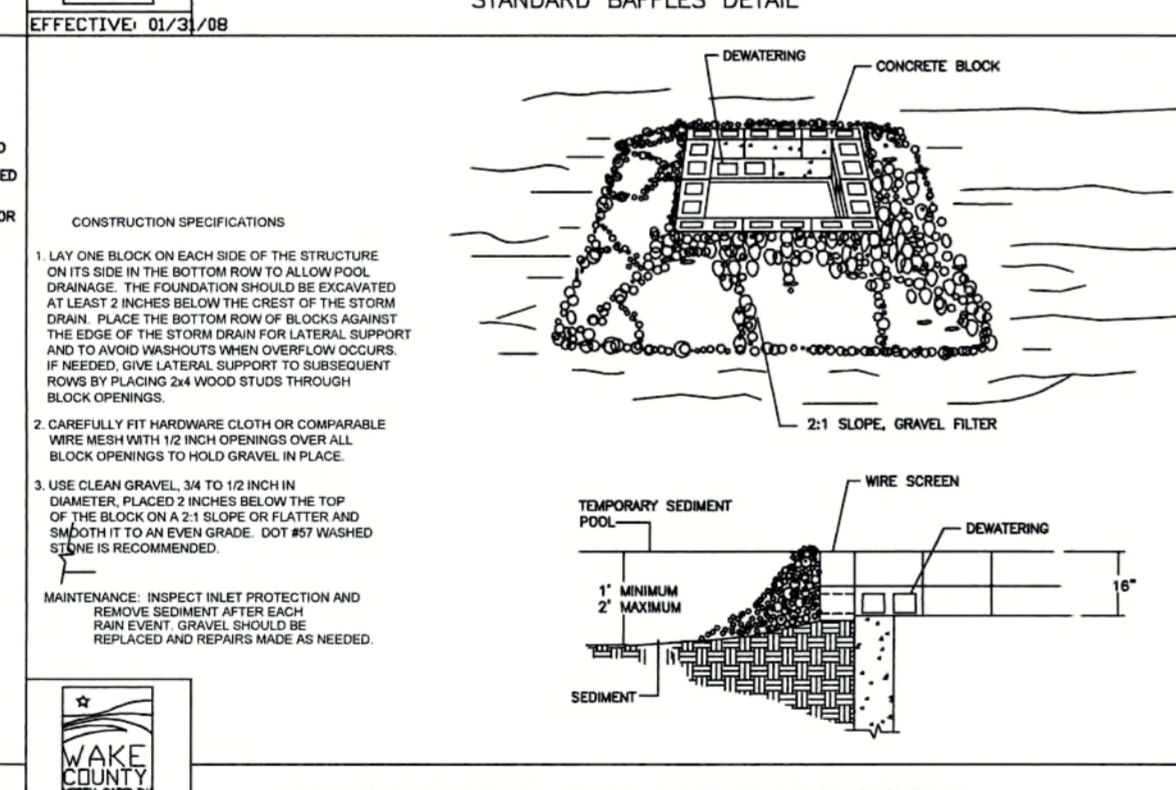
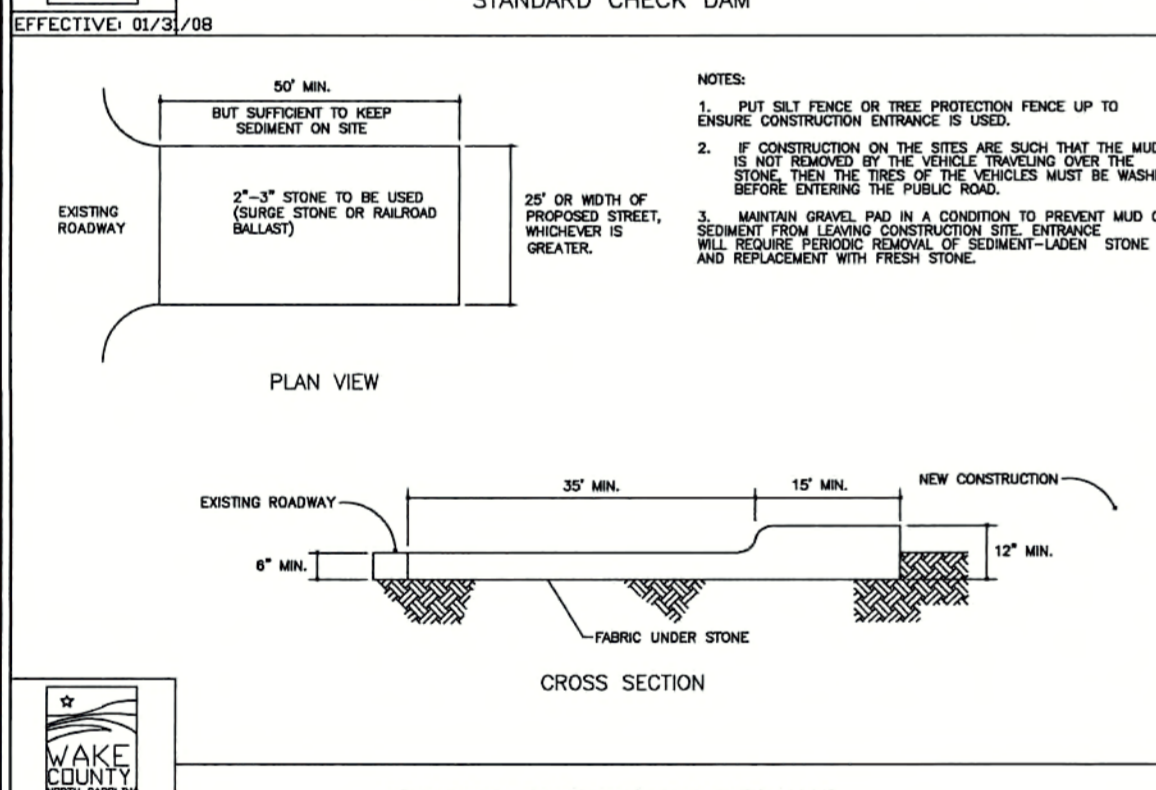
BY: Scott DATE: 4-28-17
ADMINISTRATOR

K:\016\020160032\Aggrigate Station Cottages\CADD\DWG - DETAIL.dwg, Sunday, March 12, 2017 3:32:18 PM - TOWNSEND CHARLIE

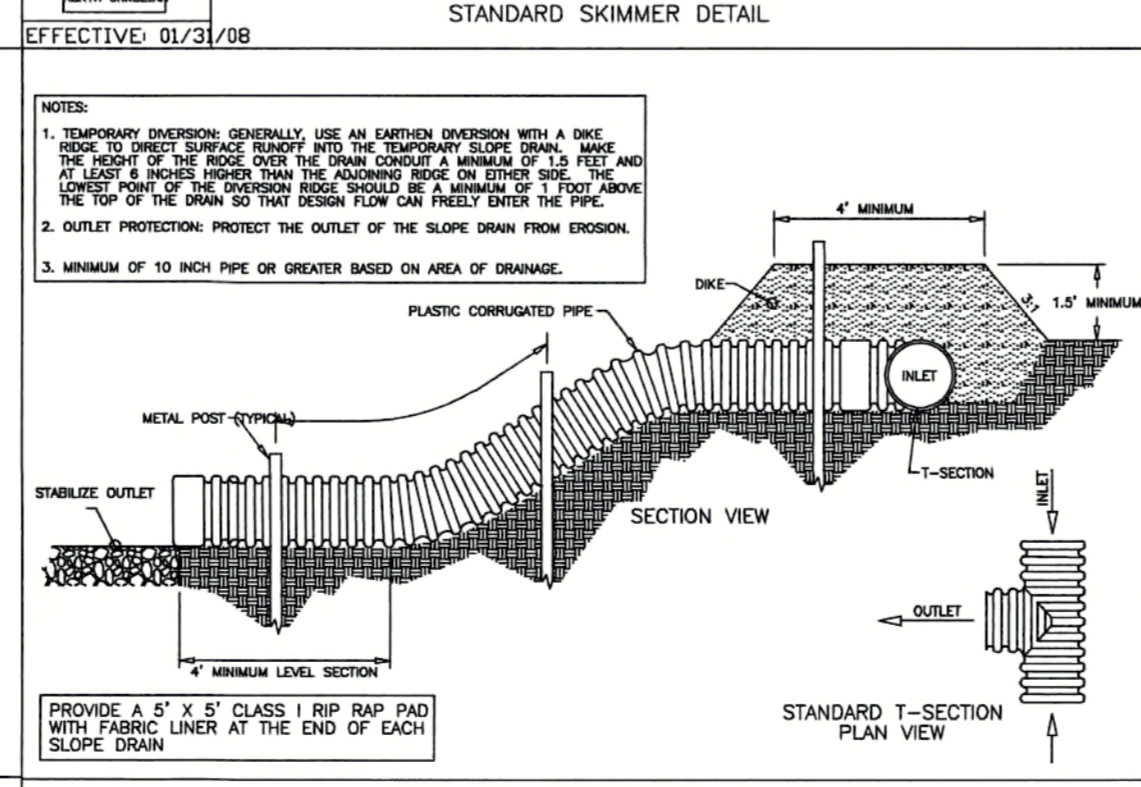
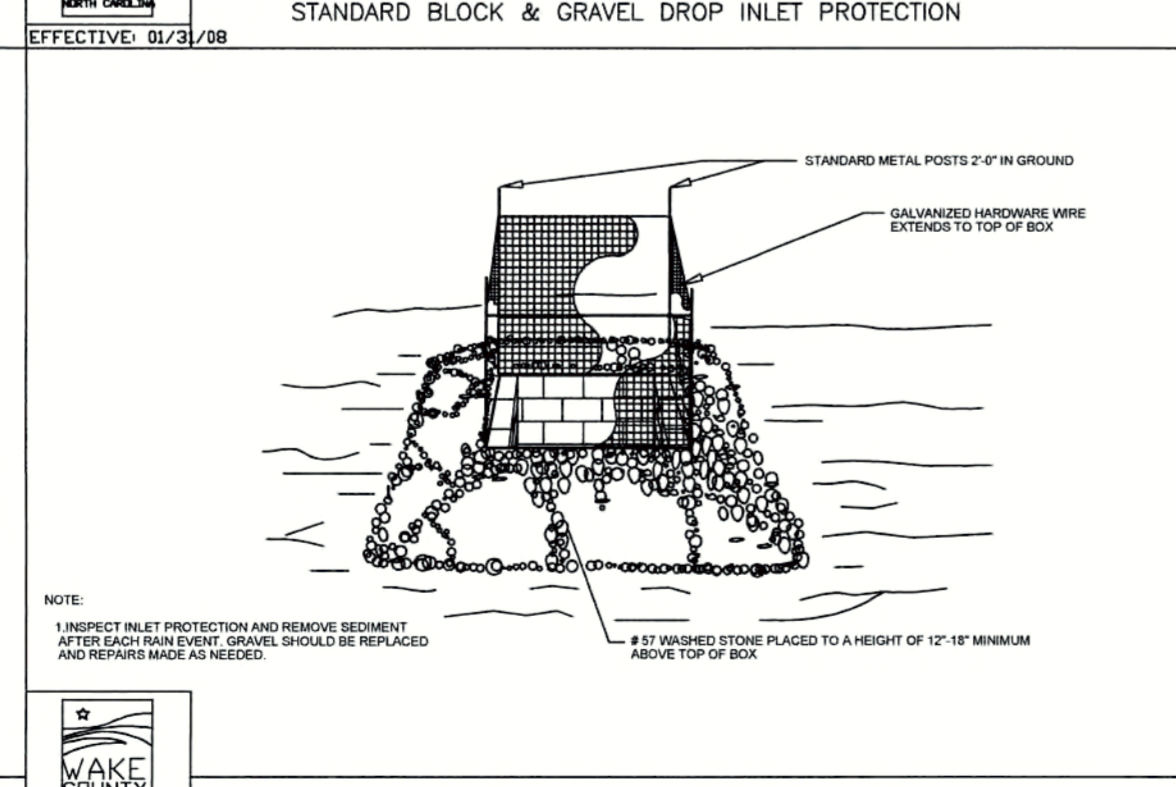
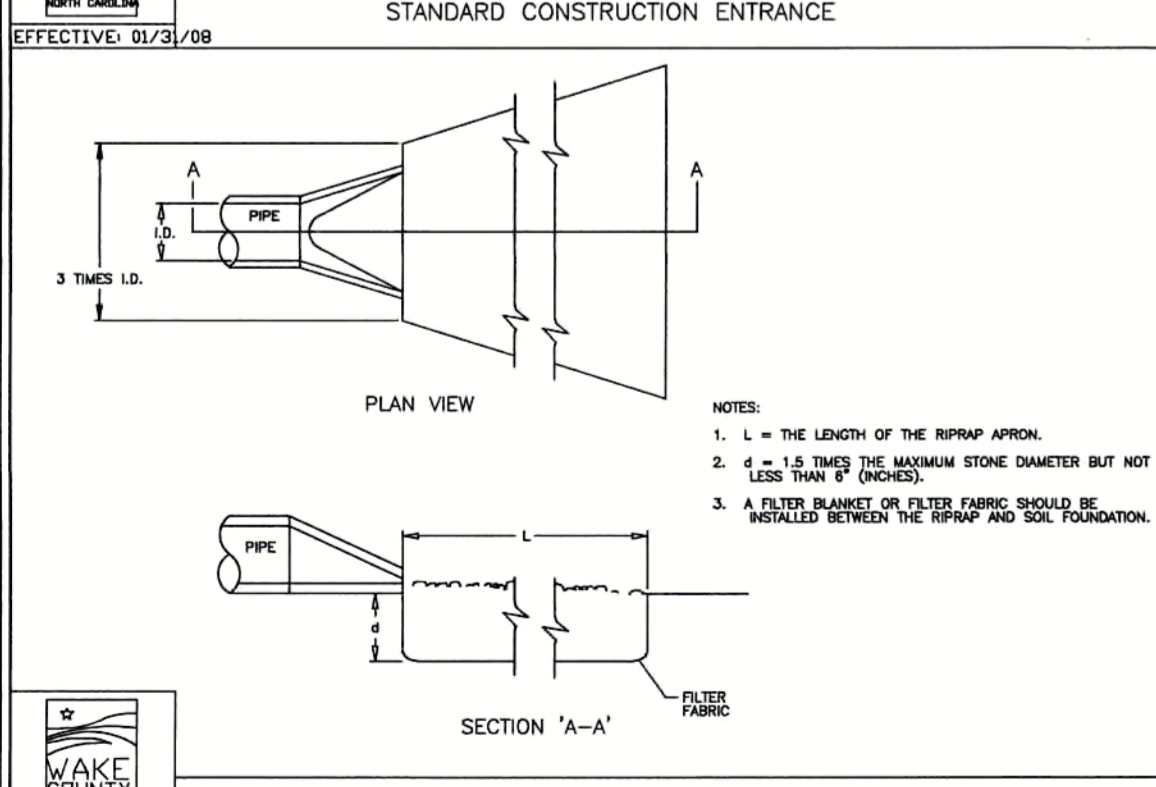
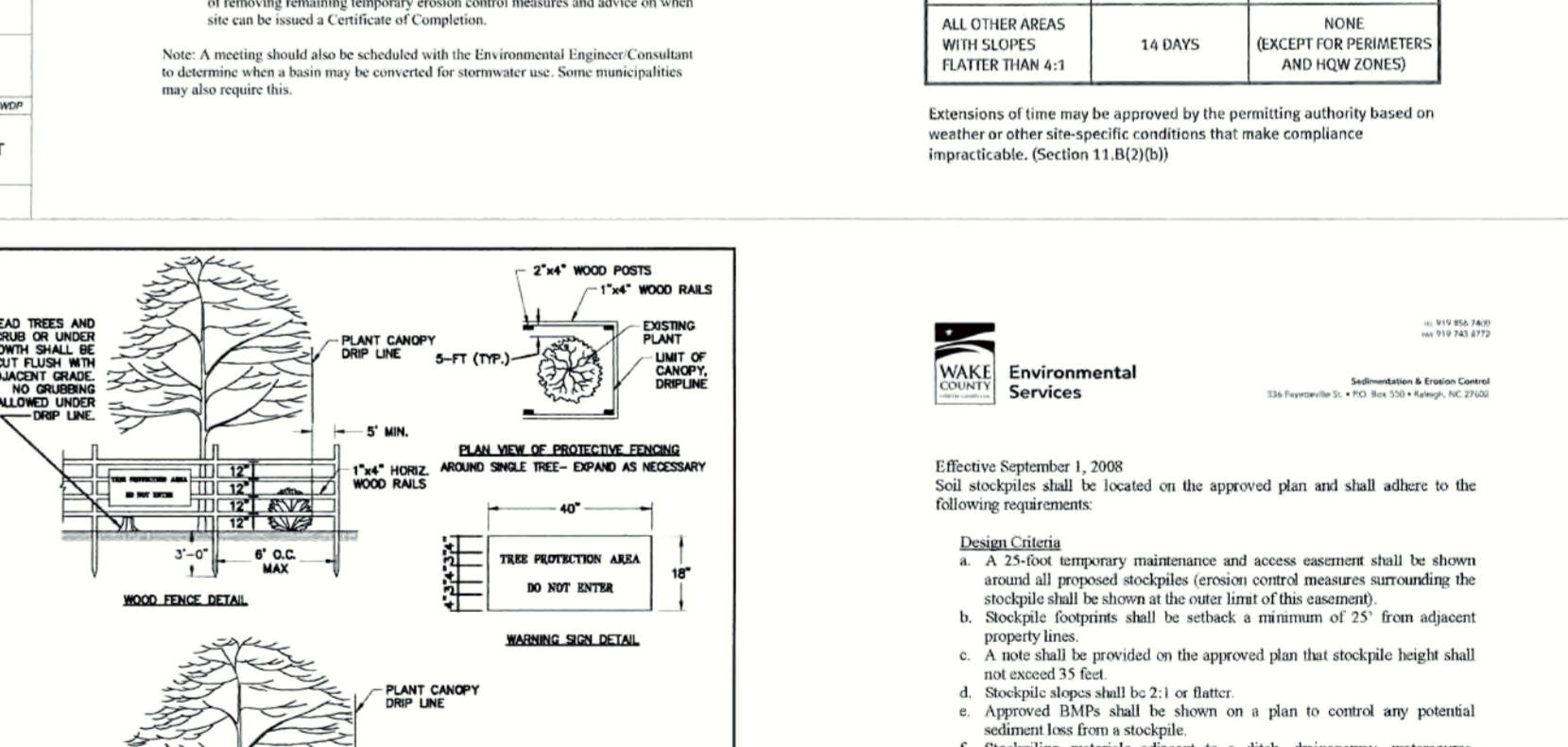


SITE AREA DESCRIPTION	GROUND STABILIZATION	
	STABILIZATION TIME FRAME	STABILIZATION TIME FRAME EXCEPTIONS
PERIMETER DITCHES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (ROW) SLOPES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 3:1, 15 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	(EXCEPT FOR PERIMETERS AND ROW ZONES)

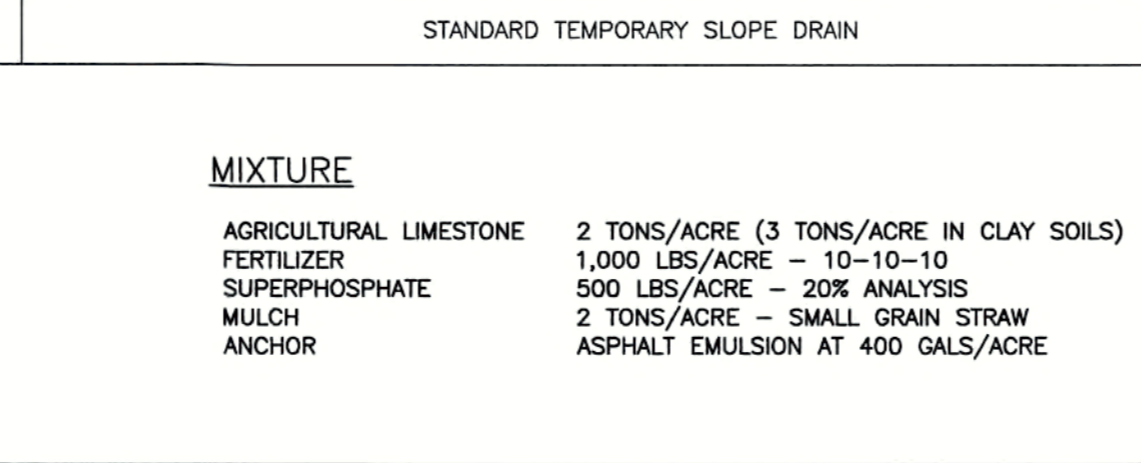
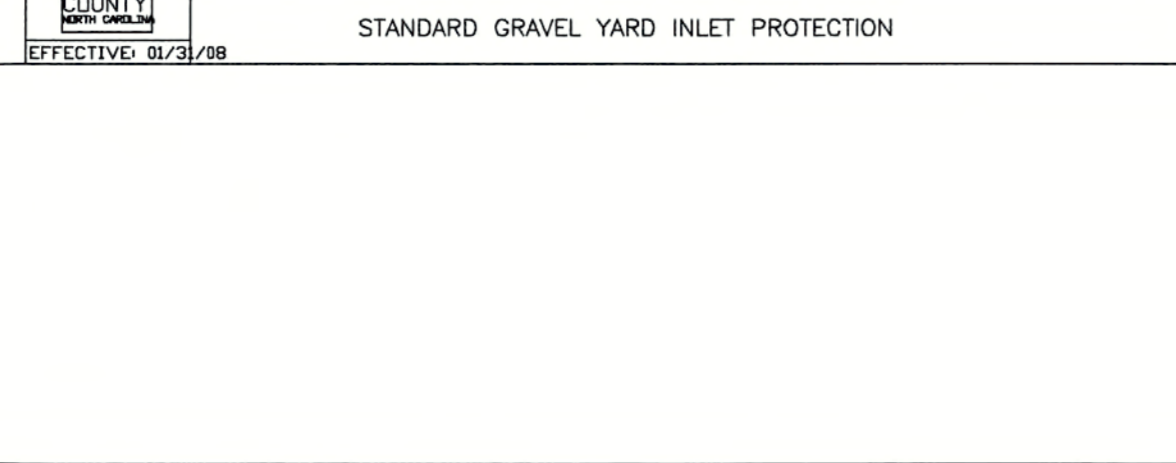
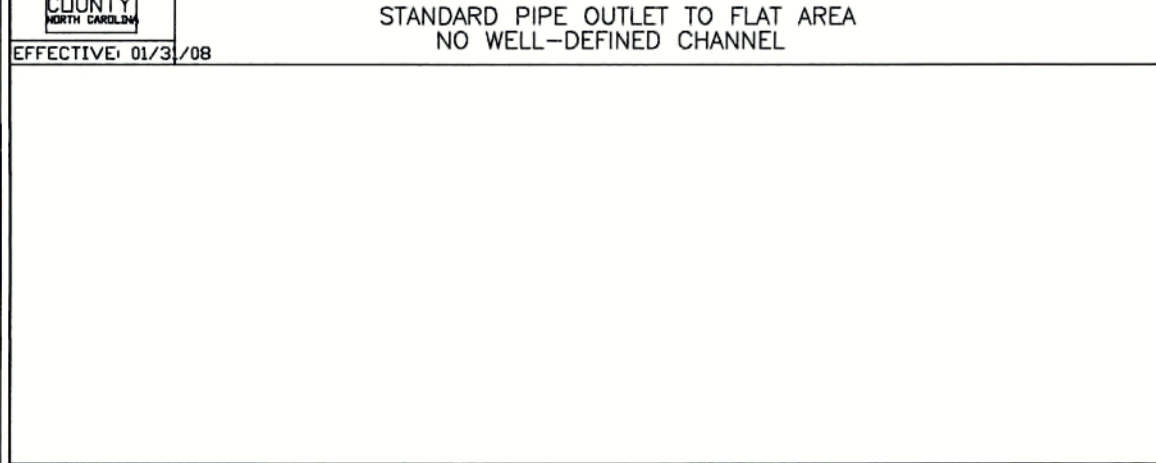
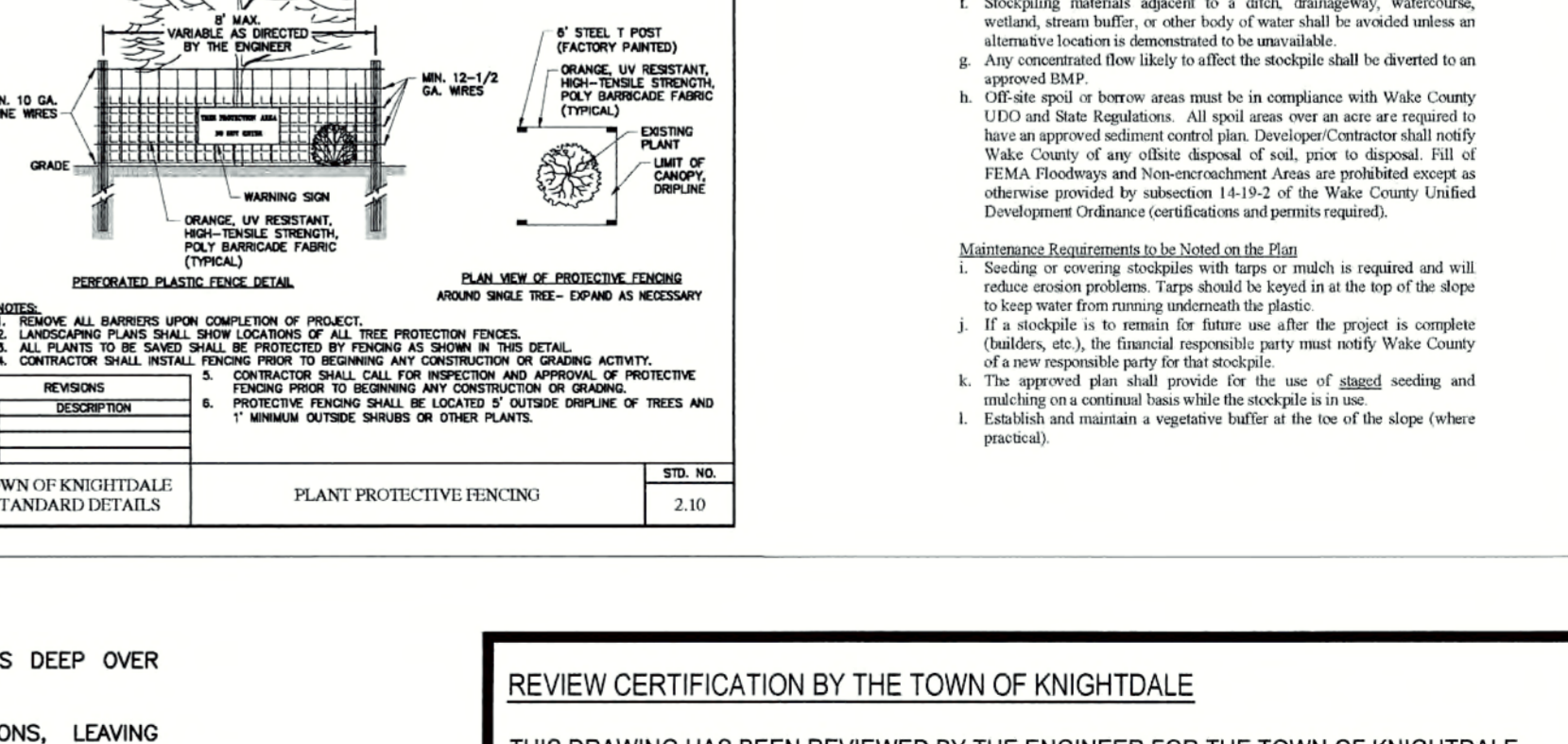
Extensions of time may be approved by the permitting authority based on weather or other site-specific conditions that make compliance impracticable. (Section 11.03(D))



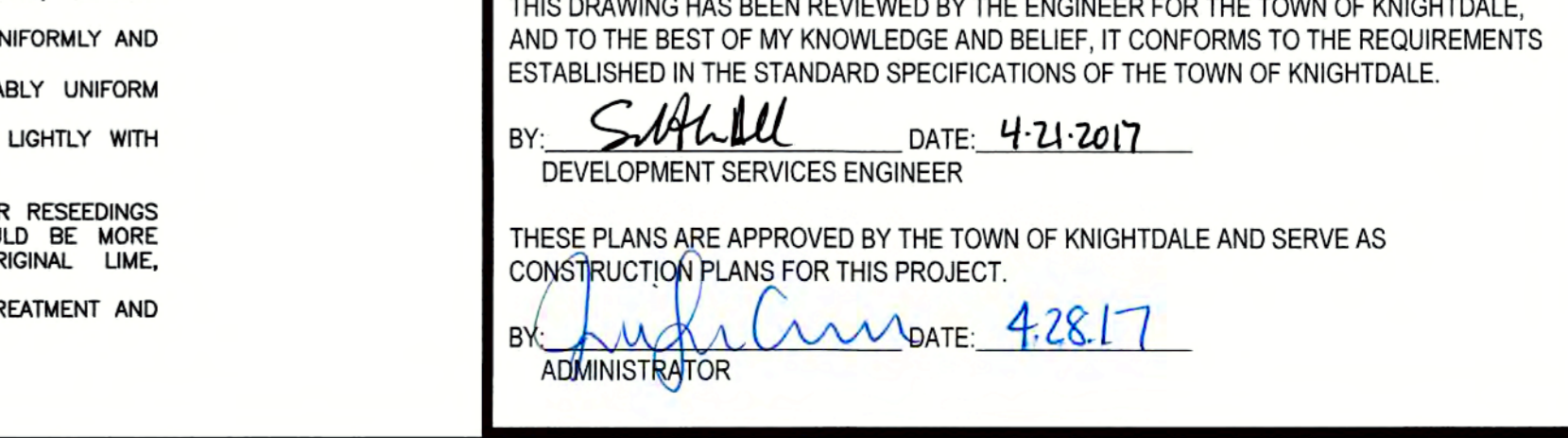
SEEDING PERIOD	SEEDING TYPE	APPLICATION RATE (LBS/ACRE)
AUGUST 15 - NOVEMBER 01	TALL FESCUE	300
NOVEMBER 01 - MARCH 01	TALL FESCUE AND AMARIZO GRASS	300
MARCH 01 - APRIL 15	TALL FESCUE	300
APRIL 15 - JUNE 30	HALLO COMMON BERMUDAGRASS	25
JULY 01 - AUGUST 15	PERENNIAL WHEAT OR HYDRANGEA-SUNSHINE HYDRANGEA	150
MARCH 01 - JUNE 01	AND (SCALPES (SCALPES) AND AMARIZO GRASS	80
MARCH 01 - APRIL 15	WETTING LONGGRASS OR TALL FESCUE AND	150
MARCH 01 - JUNE 30	HALLO COMMON BERMUDAGRASS	25
JUNE 01 - SEPTEMBER 01	PERENNIAL WHEAT OR HYDRANGEA-SUNSHINE HYDRANGEA	150
SEPTEMBER 01 - MARCH 01	PERENNIAL WHEAT OR HYDRANGEA-SUNSHINE HYDRANGEA	70
NOVEMBER 01 - MARCH 01	AMARIZO GRASS	150



REVISIONS	DESCRIPTION	DATE
1	ADDED SEEDING SCHEDULE	01/31/09



REVISIONS	DESCRIPTION	DATE
1	ADDED SEEDING SCHEDULE	01/31/09



WithersRavenel
Engineers | Planners

THE COTTAGES AT
KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

EROSION CONTROL
DETAILS

Job No. 02160032
Date 06/03/2016
Drawn By CDT
Designer WR

REVISIONS

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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.

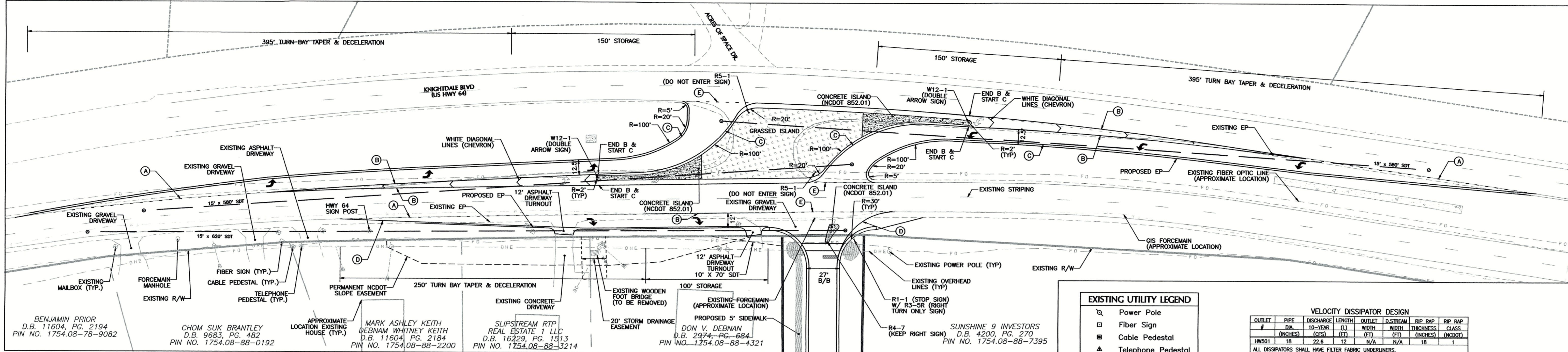
BY: *S. McMill* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

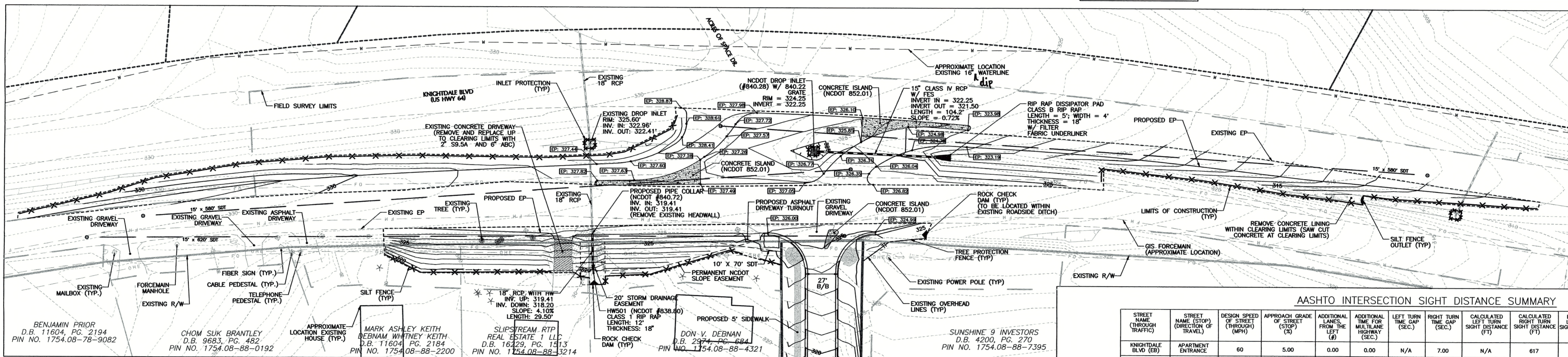
BY: *J. Glenn* DATE: 4-28-17
ADMINISTRATOR

Sheet No.
8.2

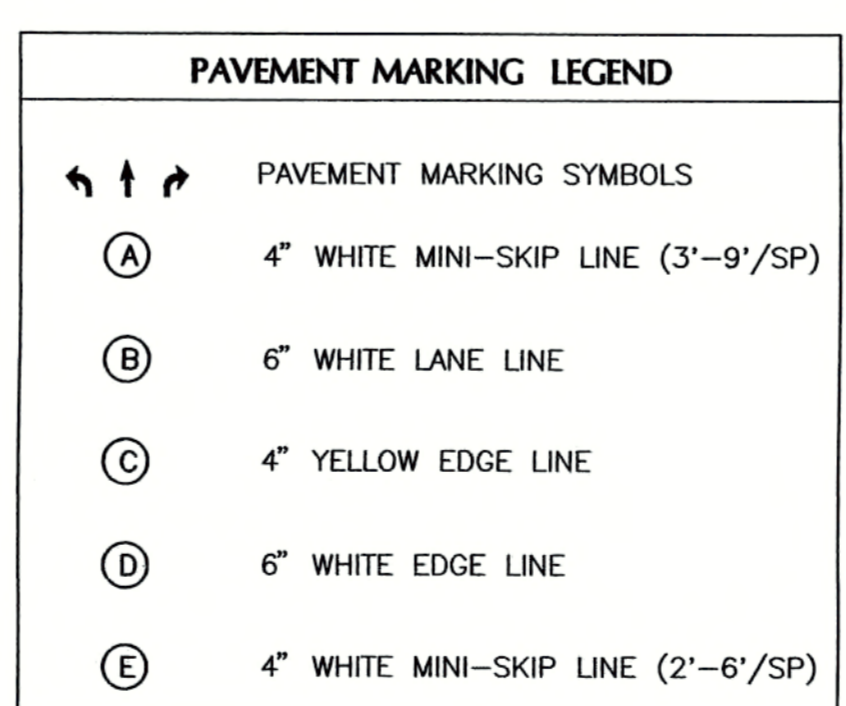
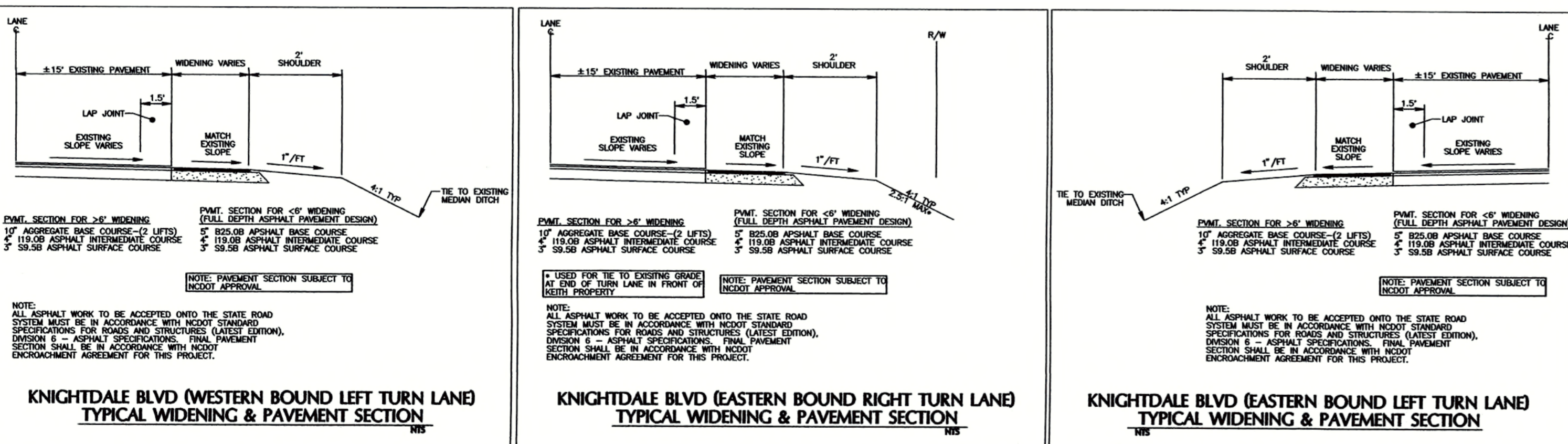
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KNIGHTDALE BLVD. PAVEMENT MARKING PLAN



KNIGHTDALE BLVD. GRADING PLAN & EROSION CONTROL PLAN



GENERAL NOTES

- ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE DESIGN STANDARDS AND SPECIFICATIONS AND NCDOT SPECIFICATIONS AND DETAILS.
- TOPOGRAPHIC SURVEY WITHIN FIELD SURVEY LIMITS PERFORMED BY WITHERSRAVENEL, INC. SURVEY OUTSIDE OF LIMITS BASED ON LIDAR.
- 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.
- PRIOR TO BEGINNING WORK, AFFECTED PROPERTY OWNERS SHALL BE CONTACTED. A TEMPORARY CONSTRUCTION EASEMENT WILL BE REQUIRED TO BE ACQUIRED FROM THE AFFECTED PROPERTY OWNERS TO ENCOMPASS THE LIMITS OF CONSTRUCTION. THIS EASEMENT WILL BE TERMINATED UPON COMPLETION OF CONSTRUCTION.
- ALL IMPACTED DRIVEWAYS SHALL BE RECONSTRUCTED BY CONTRACTOR TO PROVIDE ACCESS TO PROPERTIES. ACCESS TO ALL AFFECTED PROPERTIES SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
- ALL MAILBOXES IMPACTED BY CONSTRUCTION SHALL BE RELOCATED PER TOWN OF KNIGHTDALE & USPS STANDARDS.
- PERMANENT SLOPE AND DRAINAGE EASEMENTS ARE REQUIRED PER NCDOT TO ALLOW FOR MAINTENANCE. THESE EASEMENTS SHALL BE ACQUIRED PRIOR TO STARTING CONSTRUCTION.

CITY OF RALEIGH

ALL CONSTRUCTION MUST BE IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS.

TRANSPORTATION SERVICES: N/A

PUBLIC UTILITIES: *K.A. JUNE 3/24/17*

STORMWATER: N/A

PLANNING: N/A

FIRE: N/A

URBAN FORESTRY: N/A

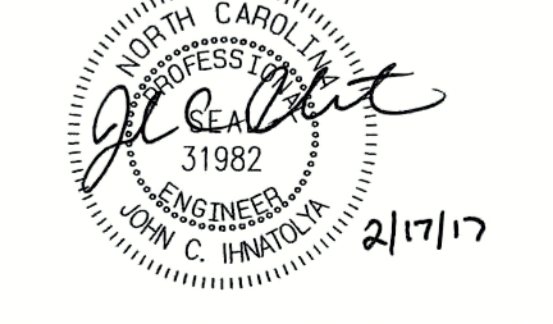


TOWN CERTIFICATION: THIS DESIGN HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: *[Signature]* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4-28-17
ADMINISTRATOR



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

No.	Revision	Date	By	Designer	W&R	Scale
1	NCDOT COMMENTS	06/05/16	JCI			1" = 40'
2	NCDOT COMMENTS	01/06/17	JCI			
3	FOK & COR COMMENTS	02/07/17	JCI			

COTTAGES AT KNIGHTDALE STATION

TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

KNIGHTDALE BLVD ROAD WIDENING

WithersRavenel
Engineers | Planners | Surveyors

115 MacKenan Drive Cary, NC 27511 | T: 919-498-3340 | License #C-0832 | www.withersravenel.com

Sheet No. **9A**

ARCHITECTURAL PLANS WALL LEGEND

	STANDARD STUD WALL, INTERIOR OR EXTERIOR IF EXT SEE ELEVATIONS FOR SIDING. STYLE THICKNESS OF WALL NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH 5" BRICK VENEER FOUNDATION WALL LEDGE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS.
	STANDARD STUD WALL WITH LOW APPLIED STONE WAINSCOTING. SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL. AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH STACKED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS (NOTE: BUILDER TO VERIFY STONE THICKNESS & NOTIFY PLAN DESIGNER IF THICKNESS IS MORE THAN 5" BEFORE FOOTINGS ARE POURED)
	STANDARD STUD WALL WITH 5" FOUNDATION LEDGE FOR LOW BRICK OR STACKED STONE WAINSCOTING. SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH APPLIED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS (NOTE: NO FOUNDATION SUPPORT IS REPRESENTED ON STRUCTURAL PLANS) IF STACKED STONE IS TO BE USED BUILDER MUST NOTIFY PLAN DESIGNER BEFORE FOOTINGS ARE POURED
	HALF WALL WITH 1x CAP (42" HEIGHT UNLESS NOTED OTHERWISE ON PLANS)		POURED CONCRETE WALL (THICKNESS PER PLANS)
	CMU BLOCK WALL		

NOTE: NOT ALL WALL TYPES SHOW IN LEGEND MAY BE USED IN PROJECT/ON BLDG. PLAN

APARTMENT FLOOR PLAN GENERAL NOTES

- DIMENSIONS ARE TO THE EXTERIOR FACE OF STUDS, UNO
- SLOPE CONCRETE AT BREEZEWAY ENTRY CORRIDOR PER THE BUILDING AND/OR THE FOUNDATION PLAN AND FOR LOCATIONS AND EXTENT OF SLOPE.
- F.E. DENOTES THE LOCATION OF A FIRE EXTINGUISHER IN A RECESSED WALL MOUNTED CABINET.
- BEARING WALLS ARE SHOWN ON BUILDING FRAMING PLANS.
- REFER TO ENLARGED UNIT PLANS FOR WINDOW & DOOR DIMENSIONS.
- REFER TO 'CS' SHEET SET FOR ALL APPLICABLE UL DETAILS AND ALL OTHER CODE REQUIREMENTS.
- ALL ROOMS/GROUND FLOOR UNIT DOORS TO HAVE IDENTIFICATION SIGNS MOUNTED ON LATCH SIDE OF DOOR WHICH INCLUDE RAISED CHARACTERS & BRAILLE MOUNTED AT CONSISTENT HGT. PER ANS 103
- REFER TO WINDOW AND DOOR SCHEDULE FOR MORE INFORMATION.

WALL LEGEND

SEE SHEET SET C3 FOR ALL ASSOCIATED WALL TYPES.

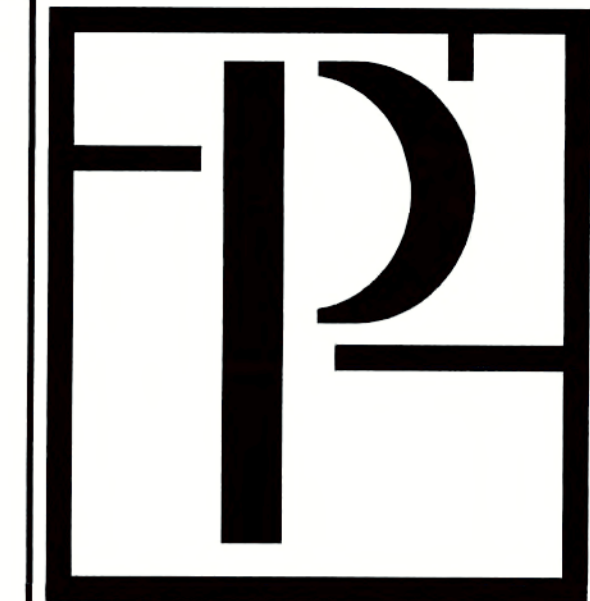
MARK	UL WALL TYPE	REMARKS
1	U396	1 HOUR RATED EXTERIOR WALL
2	U341	1 HOUR RATED INT. DBL. STUD WALL (UNIT SEPERATION)
3	GA-WP8105	1 HOUR RATED EXTERIOR WALL (BREEZEWAY)
4	U305	1 HOUR RATED INTERIOR BEARING WALL *SEE FRAMING PLANS FOR INTERIOR BEARING LOCATIONS

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.

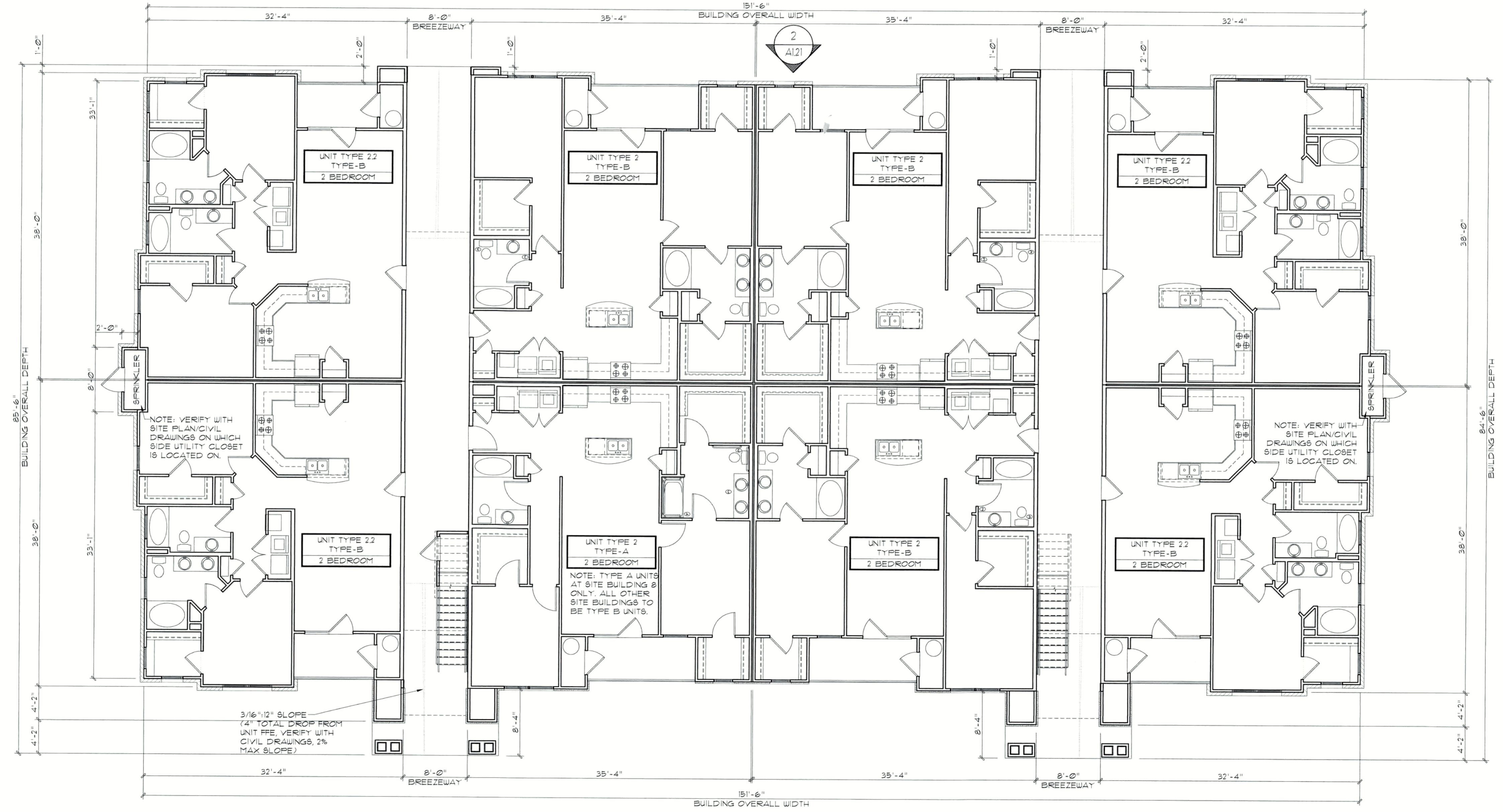
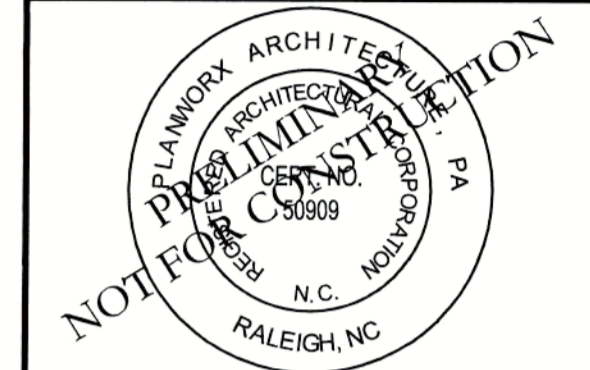
By: S. M. M. M. Date: 4-21-2017
Town Engineer

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

By: [Signature] Date: 4-28-17
Administrator



Planworx
ARCHITECTURE, P.A.
5711 Six Forks Road, Suite 100
Raleigh NC 27609
office (919) 846-8100
fax (919) 846-2661
website www.planworx.com



SITE BUILDING #5, 7

1 BUILDING FLOOR PLAN - FIRST
Scale: 1/8" = 1'-0"

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans.

Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DESCRIPTION
04.05.17			

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Building Type 1 First Floor Plan
SHEET NUMBER: A1.10



Planworx ARCHITECTURE, P.A.

571 Six Forks Road, Suite 100
Raleigh NC 27609

office (919) 846-8100

fax (919) 846-2661

website www.planworx.com



ARCHITECTURAL PLANS WALL LEGEND

	STANDARD STUD WALL INTERIOR OR EXTERIOR IF EXT SEE ELEVATIONS FOR SIDING STYLE THICKNESS OF WALL NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH 5" BRICK VENEER FOUNDATION WALL LEDGE, STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS
	STANDARD STUD WALL WITH LOW APPLIED STONE WAINSCOTING SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH STACKED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS (NOTE: BUILDER TO VERIFY STONE THICKNESS & NOTIFY PLAN DESIGNER IF THICKNESS IS MORE THAN 5" BEFORE FOOTINGS ARE POURED)
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	HALF WALL WITH 1x CAP (42" HEIGHT UNLESS NOTED OTHERWISE ON PLANS)		POURED CONCRETE WALL (THICKNESS PER PLANS)
	CMU BLOCK WALL		

NOTE: NOT ALL WALL TYPES SHOW IN LEGEND MAY BE USED IN PROJECT/ON BLDG. PLAN

APARTMENT FLOOR PLAN GENERAL NOTES

- DIMENSIONS ARE TO THE EXTERIOR FACE OF STUDS, UNO
- SLOPE CONCRETE AT BREEZEWAY ENTRY CORRIDOR PER THE BUILDING AND/OR THE FOUNDATION PLAN AND FOR LOCATIONS AND EXTENT OF SLOPE.
- F.E. DENOTES THE LOCATION OF A FIRE EXTINGUISHER IN A RECESSED WALL MOUNTED CABINET.
- BEARING WALLS ARE SHOWN ON BUILDING FRAMING PLANS.
- REFER TO ENLARGED UNIT PLANS FOR WINDOW & DOOR DIMENSIONS.
- REFER TO 'CS' SHEET SET FOR ALL APPLICABLE UL DETAILS AND ALL OTHER CODE REQUIREMENTS.
- ALL ROOMS/GROUND FLOOR UNIT DOORS TO HAVE IDENTIFICATION SIGNS MOUNTED ON LATCH SIDE OF DOOR WHICH INCLUDE RAISED CHARACTERS & BRAILLE MOUNTED AT CONSISTENT HGT. PER ANS1 103
- REFER TO WINDOW AND DOOR SCHEDULE FOR MORE INFORMATION.

WALL LEGEND

MARK	UL WALL TYPE	REMARKS
1	U356	1 HOUR RATED EXTERIOR WALL
2	U341	1 HOUR RATED INT. DBL. STUD WALL (UNIT SEPERATION)
3	GA-WP2105	1 HOUR RATED EXTERIOR WALL (BREEZEWAY)
4	U305	1 HOUR RATED INTERIOR BEARING WALL *SEE FRAMING PLANS FOR INTERIOR BEARING LOCATIONS

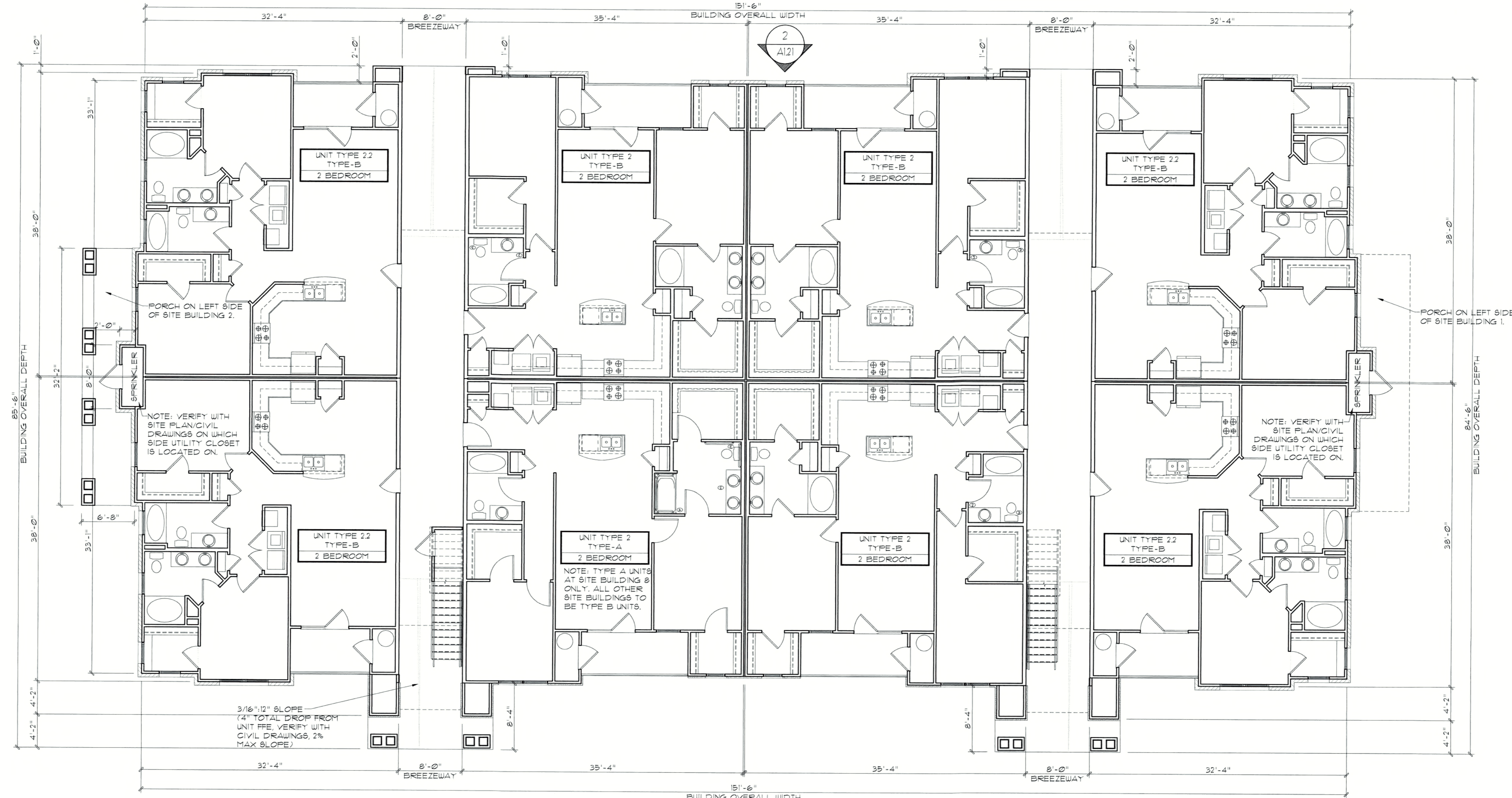
SEE SHEET SET C3 FOR ALL ASSOCIATED WALL TYPES.

a. **Town Certification.** This design has been reviewed by the Engineer for use in 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: *Michael McNeil* Date: **4-21-2017**
Town Engineer

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

By: *[Signature]* Date: **4-28-17**
Administrator



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	04-05-17
ISSUE DATE:	
REVISIONS NUMBER	DATE
	INITIALS

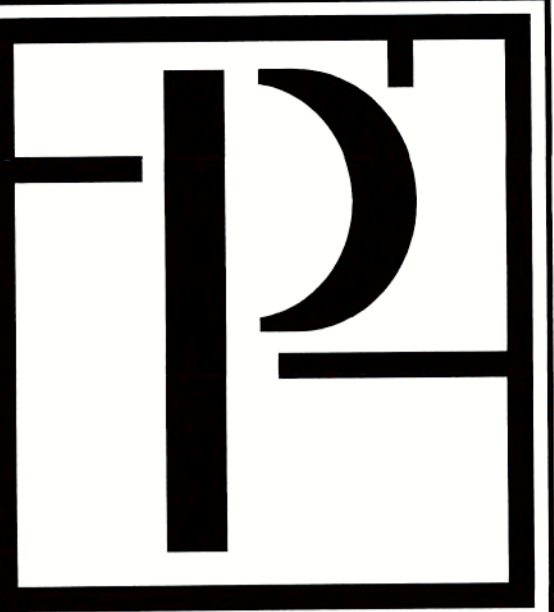
PROJECT NO: **027015**
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: **Building Type 1.1 First Floor Plan**

1 BUILDING FLOOR PLAN - FIRST
Scale: 1/8" = 1'-0"

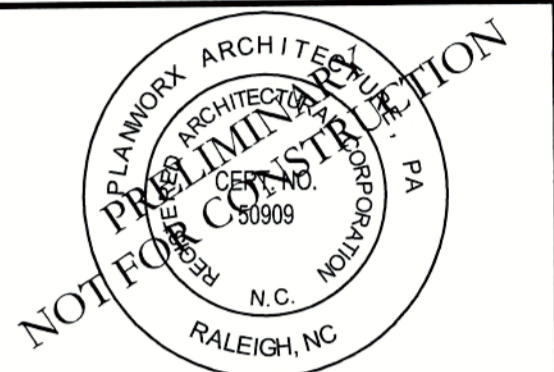
SITE BUILDING #1, 2

SHEET NUMBER: **A1.13**

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted.
2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design.
5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans.
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Planworx
ARCHITECTURE, P.A.
5711 Six Forks Road, Suite 100
Raleigh NC 27609
office (919) 846-8100
fax (919) 846-2661
website www.planworx.com



1 BT 1 FRONT ELEVATION
Scale: 1/8" = 1'-0"



2 BT 1 TYP. SIDE ELEVATION (LEFT SHOWN)
Scale: 1/8" = 1'-0"

ARCHITECTURAL PLANS EXTERIOR MATERIALS	
	* SHINGLE ROOF PER BUILDER
	* METAL ROOF PER BUILDER
	* SIDING PER BUILDER
	* BRICK PER BUILDER
	* B&B SIDING * ALIGN CENTER OF B&B PANEL WITH CENTER OF GABLE OR WINDOW TOP
	* CULTURED OR STACKED STONE (SEE FOUNDATION)
	* BRICK OR STONE ROULOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLACES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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: SMH Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: Andrew Date: 4-28-17
Administrator

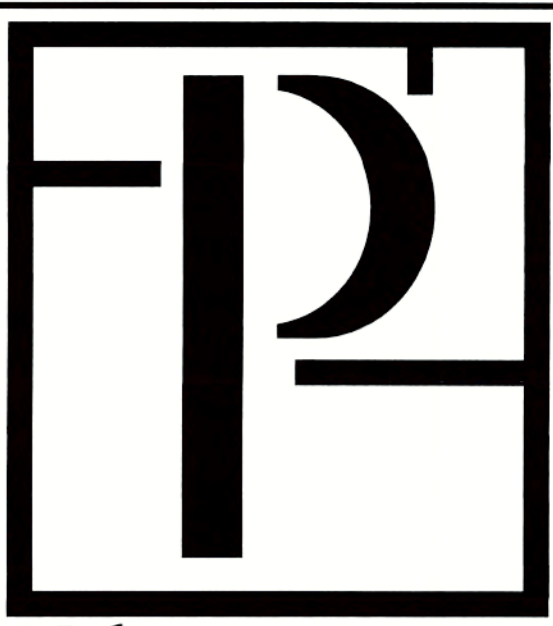
SITE BUILDING #5, 7

Caviness and Cates		Knightdale NC		Town Site Submittal Set	
PROJECT NO:	027015	PROGRESS DATE:	04/05/17	ISSUE DATE:	
DRAWN BY:	JK	REVISIONS NUMBER:		REVISIONS DATE:	
CHECKED BY:		INITIALS:		DESCRIPTION:	
SHEET TITLE:	Building Type 1 Elevations				
SHEET NUMBER:	A1.20				

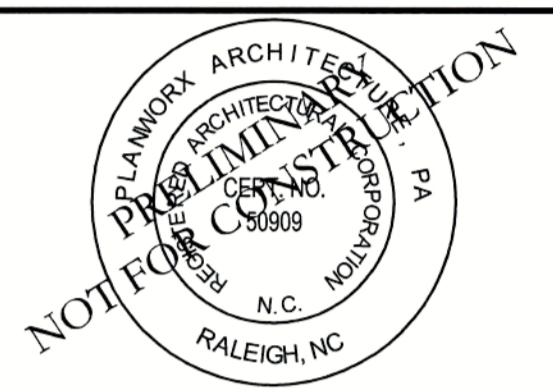
1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. © Copyright 2017 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



1 BT 1 REAR ELEVATION
Scale: 1/8" = 1'-0"



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website www.planworx.com



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

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: S. A. All Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: [Signature] Date: 4-28-17
Administrator

ARCHITECTURAL PLANS	
EXTERIOR MATERIALS	
	SHINGLE ROOF PER BUILDER
	METAL ROOF PER BUILDER
	SIDING PER BUILDER
	BRICK PER BUILDER
	B4B SIDING ALIGN CENTER OF B4B PANEL WITH CENTER OF GABLE OR WINDOW TYP.
	CULTURED OR STACKED STONE (SEE FOUNDATION)
	BRICK OR STONE ROULOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

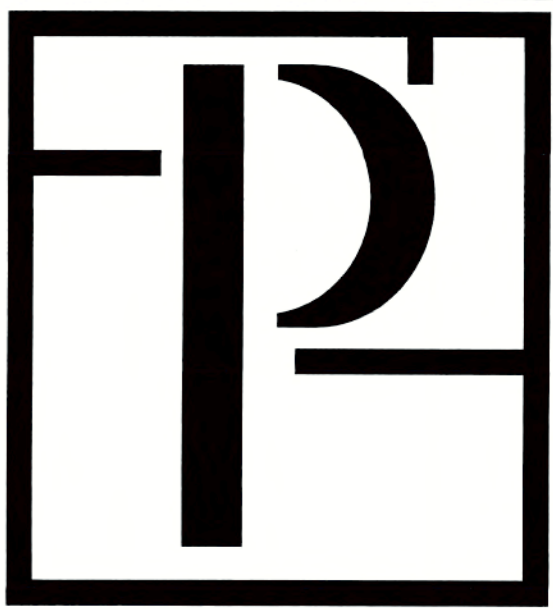
PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DATE	INITIALS	DESCRIPTION
04-05-17					

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Building Type 1 Elevations
SHEET NUMBER:

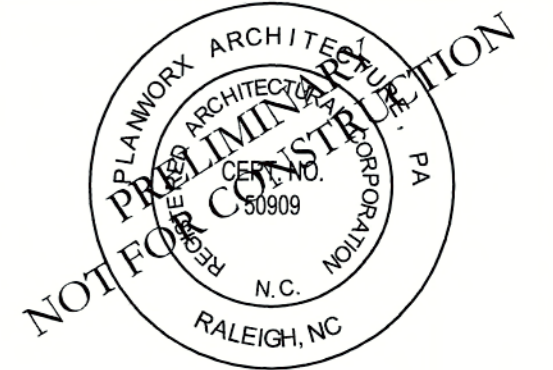
SITE BUILDING #5, 1

A1.21

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. Copyright 2017 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. Plans may be used once by client. Unauthorized use strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



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office (919) 846-8100
fax (919) 846-2661
website www.planworx.com



1 BT 1.1 FRONT ELEVATION
Scale: 1/8" = 1'-0"



ARCHITECTURAL PLANS EXTERIOR MATERIALS	
	* SHINGLE ROOF PER BUILDER
	* METAL ROOF PER BUILDER
	* SIDING PER BUILDER
	* BRICK PER BUILDER
	* B&B SIDING * ALIGN CENTER OF B&B PANEL WITH CENTER OF GABLE OR WINDOW TYP.
	* CULTURED OR STACKED STONE (SEE FOUNDATION)
	* BRICK OR STONE ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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: SAMU Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: [Signature] Date: 4-28-17
Administrator

SITE BUILDING #1, 2

2 BT 1.1 LEFT ELEVATION (SITE BUILDING #2 SHOWN. PORCH ON RIGHT ELEVATION OF SITE BUILDING #1)
Scale: 1/8" = 1'-0"

Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DESCRIPTION
04.05.17			

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Building Type 1.1 Elevations

SHEET NUMBER: A1.22

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. © Copyright 2017 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. Plans may be used once by client. Unauthorized use strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



1 BT 2 REAR ELEVATION
Scale: 1/8" = 1'-0"

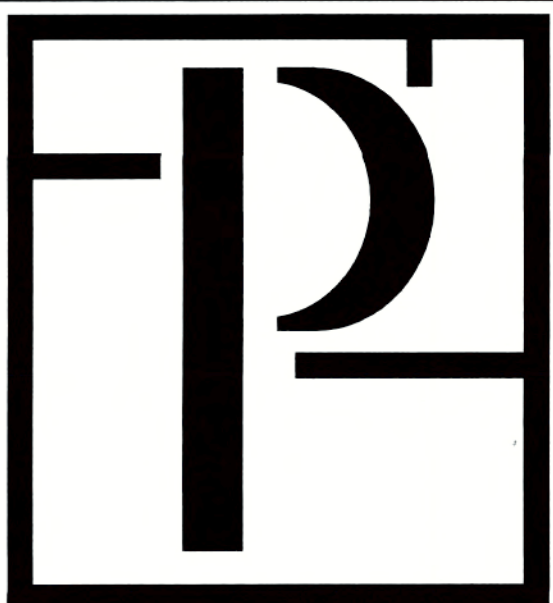
ARCHITECTURAL PLANS
EXTERIOR MATERIALS

	* SINGLE ROOF PER BUILDER
	* METAL ROOF PER BUILDER
	* SIDING PER BUILDER
	* BRICK PER BUILDER
	* B4B SIDING * ALIGN CENTER OF B4B PANEL WITH CENTER OF GABLE OR WINDOW TOP.
	* CULTURED OR STACKED STONE (SEE FOUNDATION)
	* BRICK OR STONE ROWLOCK/SOLDIER PER BUILDER

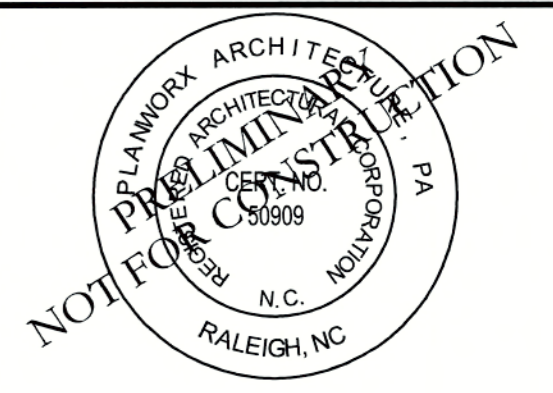
ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

a. **Town Certification.** This design has been reviewed by the Engineer for use in 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: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: *[Signature]* Date: 4-28-17
Administrator

SITE BUILDING #3, 4, 6, 8



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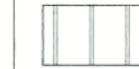

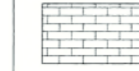
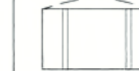


Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	04.05.17	DESCRIPTION	
ISSUE DATE:		INITIALS	
REVISIONS NUMBER		DATE	

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY: -
SHEET TITLE:
Building Type 2 Elevations

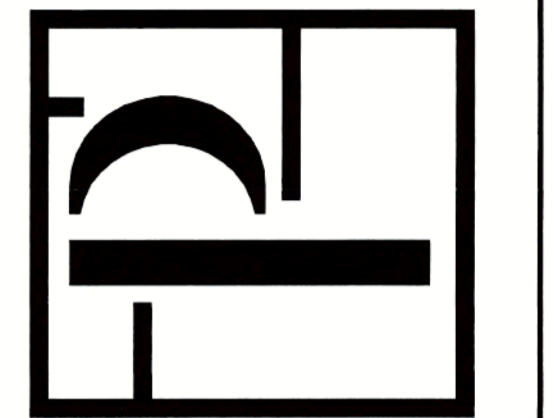
SHEET NUMBER:
A2.21

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- ARCHITECTURAL PLANS**
EXTERIOR MATERIALS
-  SHINGLE ROOF PER BUILDER
 -  METAL ROOF PER BUILDER
 -  SIDING PER BUILDER
 -  BRICK PER BUILDER
 -  B&B SIDING
ALIGN CENTER OF B&B PANEL WITH
CENTER OF GABLE OR WINDOW TYP.
 -  CULTURED OR STACKED STONE
(SEE FOUNDATION)
 -  BRICK OR STONE
ROLLLOCK-SOLDIER PER BUILDER

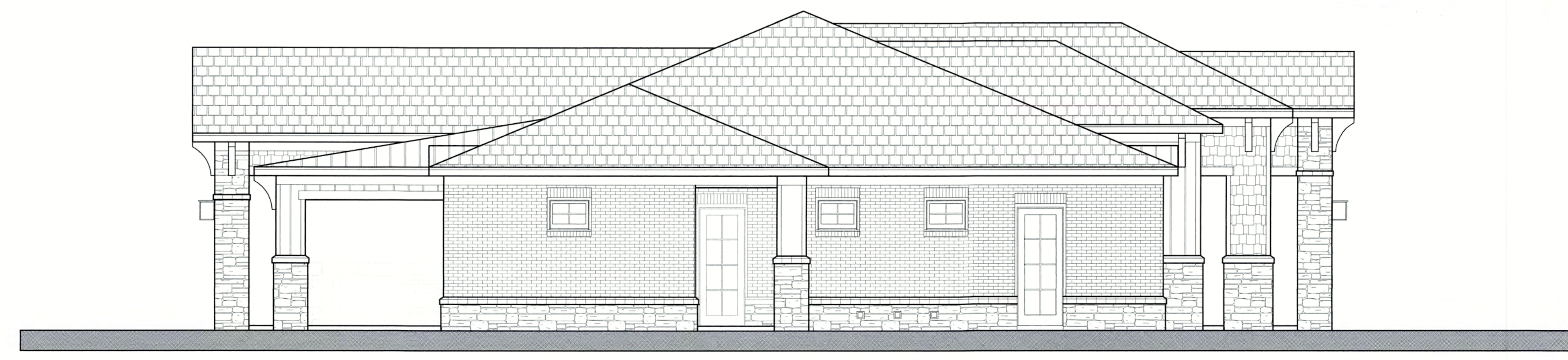
ELEVATION GENERAL NOTES
ROOFS
 USE ICE AND WATER SHIELD AT ALL ROOF PLACES SLOPED BELOW 4:12.
ROOF VENTILATION
 SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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 fax (919) 846-2661
 website www.planworx.com



1 FRONT ELEVATION
 Scale: 3/16" = 1'-0"

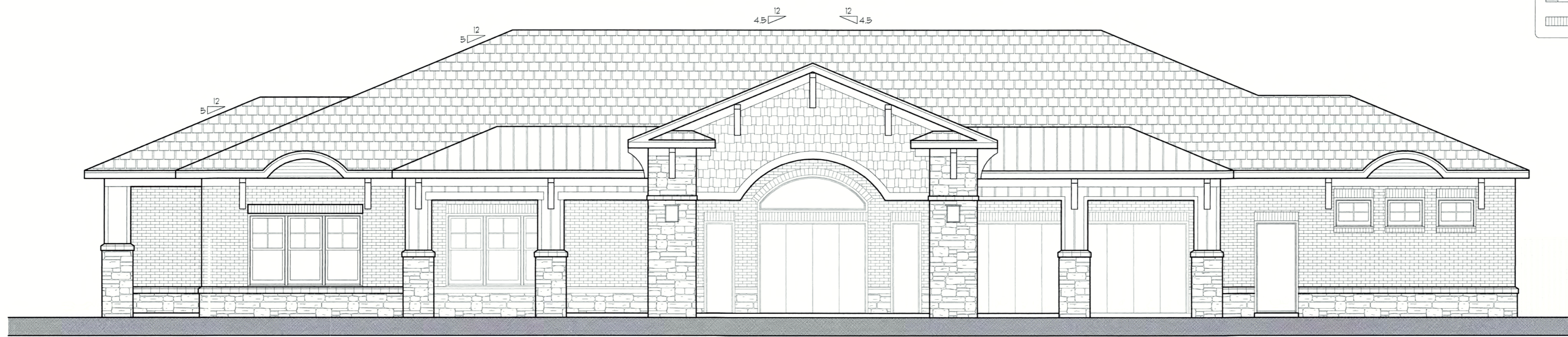
a. Town Certification. This design has been reviewed by the Engineer for use in Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
 By: S. McNeil Date: 4-21-2017
 Town Engineer
 These plans are approved by the Town of Knightdale and serve as construction plans for this project.
 By: [Signature] Date: 4-28-17
 Administrator










2 LEFT ELEVATION
 Scale: 3/16" = 1'-0"

Caviness and Cates		Cottages at Knightdale		Knightdale NC		Final TRC Approval Comments	
PROGRESS DATE:	04.15.16	DESCRIPTION					
ISSUE DATE:		REVISIONS NUMBER		DATE		INITIALS	
PROJECT NO:	027015						
DRAWN BY:	JK						
CHECKED BY:							
SHEET TITLE:	Clubhouse Elevations						
SHEET NUMBER:	A3.20						

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. Copyright 2015 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



- ARCHITECTURAL PLANS**
EXTERIOR MATERIALS
-  • SHINGLE ROOF PER BUILDER
 -  • METAL ROOF PER BUILDER
 -  • SIDING PER BUILDER
 -  • BRICK PER BUILDER
 -  • 8x8 SIDING
ALIGN CENTER OF 8x8 PANEL WITH
CENTER OF GABLE OR WINDOW TOP
 -  • CULTURED OR STACKED STONE
(SEE FOUNDATION)
 -  • BRICK OR STONE
ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
 F USE ICE AND WATER SHIELD AT ALL ROOF PLACES SLOPED BELOW 4:12.
ROOF VENTILATION
 SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

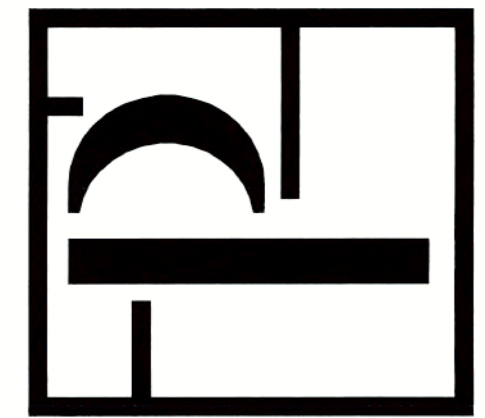
1 REAR ELEVATION
 Scale: 3/16"=1'-0"



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: S. M. Allen Date: 4-21-2017
 Town Engineer
 These plans are approved by the Town of Knightdale and serve as construction plans for this project.
 By: [Signature] Date: 4-28-17
 Administrator

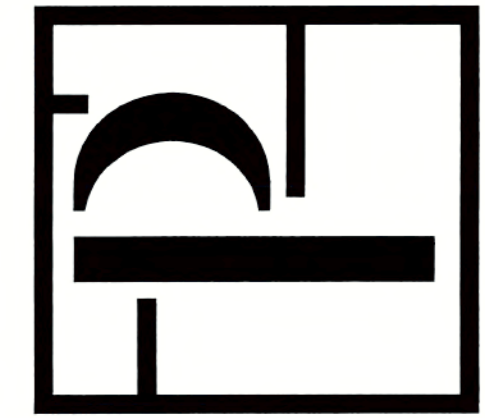
2 RIGHT ELEVATION
 Scale: 3/16"=1'-0"

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 office (919) 846-8100
 fax (919) 846-2661
 website www.planworx.com



Caviness and Cates	
Cottages at Knightdale	
Knightdale NC	
Final TRC Approval Comments	
PROGRESS DATE:	04.15.16
ISSUE DATE:	
REVISIONS NUMBER	DESCRIPTION
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
PROJECT NO:	027015
DRAWN BY:	JK
CHECKED BY:	
SHEET TITLE:	Clubhouse Elevations
SHEET NUMBER:	A3.21

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. Copyright 2015 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



1 HR RATED WALL (SEE FLOOR PLAN FOR TYPE)

CEILING/ ROOF ASSEMBLY OF UL* F522

SQUARE FOOTAGE	
BATHROOMS + D.F. =	385
BAR + PORCH =	787
CHEM. + POOL EQUIP. + SHOWER =	385
TOTAL =	1557

DESIGN CASE 1 BUILDING CODE FOR POOL AND DECK

Pool Deck Area plus Pool area:	9480
Gross Pool Deck (Deck Minus Pool Area):	7159
Deck occ. load:	35 sq ft/person
Other occ. load (eg clubhouse):	477.3 people on deck
Other occ. load (eg cabana):	0.0 people
Gross deck occ. load:	477.3
Pool Area:	2281 (x' x y') state size of rectangle if an assumption is made.
Pool occ load:	30 sq ft/person
Net deck occupant load:	431.6 Minimum value allowed is zero
Net deck plus pool occ loads:	477.3 Occupant load
	238.5/50% Male and 50% Females

DESIGN CASE 2 HEALTH DEPARTMENT RULES FOR POOLS AND BUILDING CODE FOR DECK

Health Dept occupant (at water surface level)	
5 ft or less	1.35
Greater than 5 feet	1.34
Deck area	1 PER 300
Spa	1.25
Interactive play attractions	1.25
Pool deck for area within the pool fence	1.35 minus 8' walking space around pool

Gross deck area:	7159
Area of perimeter around pool area:	3265
Net pool deck:	5254
Deck occ. load:	35 sq ft/person
Other occ. load (eg clubhouse):	0.0 people
Other occ. load (eg cabana):	0.0 people
Gross deck occ. load:	350.3
Pool Area:	2281 5 ft or less
	30 sq ft/person
	152.3 people in pool
Net Occupant load on deck:	198.2
Net Occupant load on deck:	198.2
Net Occupant load on deck:	198.2

GENERAL NOTES:

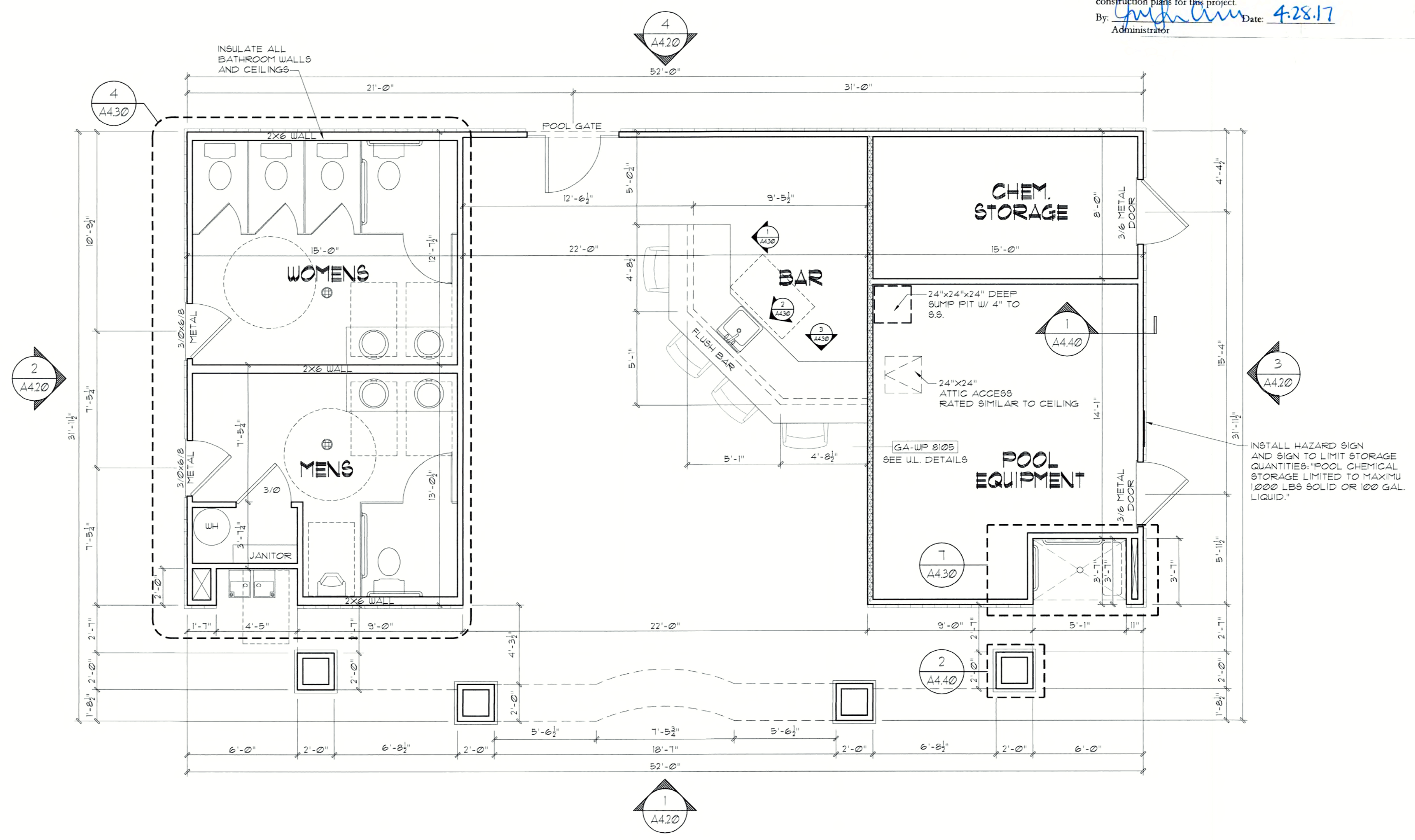
- ALL EXTERIOR WALLS ARE DIMENSIONED TO STUD, ALL INTERIOR WALLS DIMENSIONED TO STUD.
- ALL WALLS ARE DRAWN TO TRUE DIMENSIONS.
- ALL EGRESS COMPLIANCE CALCULATIONS ARE LISTED IN CODE SUMMARY.
- ATTIC ACCESS AS SHOWN ON FLOOR PLANS.
- WALL AND CEILING HEIGHT NOTES ARE BASED ON NOMINAL WALL SIZE (IE 10' 1-1/8" ACTUAL WALL HEIGHT IS LABELED 10'-0" ON PLANS)
- KNEEWALL HEIGHT LABELS FOR WALLS UNDER RAFTERS ASSUME AN EXTRA 3/8" OF FURRING (IN HEATED SPACES) FOR INSULATION. THE WALL HEIGHT REFERS TO THE HEIGHT FROM THE ROUGH FLOOR TO THE BOTTOM OF FURRING, NOT THE BOTTOM OF RAFTER.
- ALL EXTERIOR THRESHOLDS TO BE BARRIER FREE DESIGN.
- SUMP PIT, POOL EQUIPMENT ROOM SIZE / LAYOUT, FLOOR DRAINS & HOSE BIBS TO BE VERIFIED BEFORE CONSTRUCTION BEGINS TO COORDINATE WITH POOL MANUFACTURER'S SPECS & DRAWINGS BY OTHERS. IF NOT SUPPLIED PRIOR TO PERMITTING DRAWING RELEASE ARCHITECT HOLDS NO LIABILITY FOR FUTURE COORDINATION (TYP).
- ANY STRUCTURAL INFORMATION SHOWN IS FOR REFERENCE ONLY & TO BE CONFIRMED ON THE APPROPRIATE STRUCTURAL SHEETS. IF THERE ARE ANY DISCREPANCIES BETWEEN THE ARCHITECTURAL AND STRUCTURAL SHEETS, THE INFORMATION SHOWN ON THE STRUCTURAL SHEETS WILL OVERRIDE ANY ARCHITECTURAL INFORMATION SHOWN AND SHOULD BE REPORTED TO PLANWORX ARCHITECTURE, P.A. FOR CONFIRMATION BEFORE CONSTRUCTION.

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: S. McCall Date: 4-21-2017
Town Engineer

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

By: [Signature] Date: 4-28-17
Administrator



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Final TRC Approval Comments

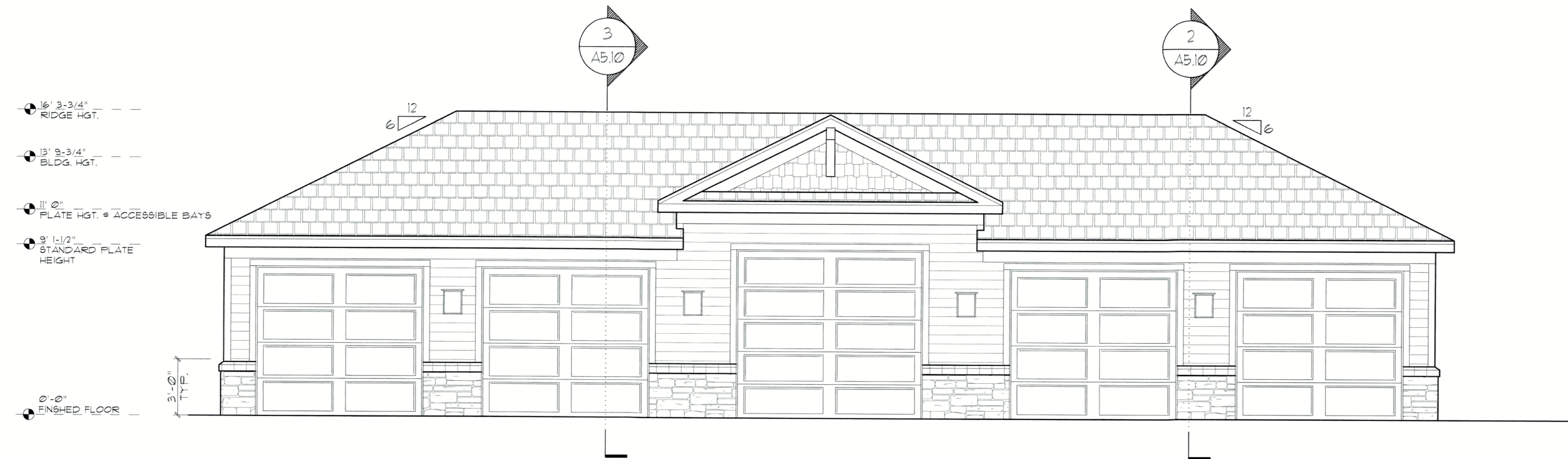
PROGRESS DATE:	DESCRIPTION
04.15.16	
ISSUE DATE:	
REVISIONS NUMBER	INITIALS
DATE	

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Poolhouse Floor Plan

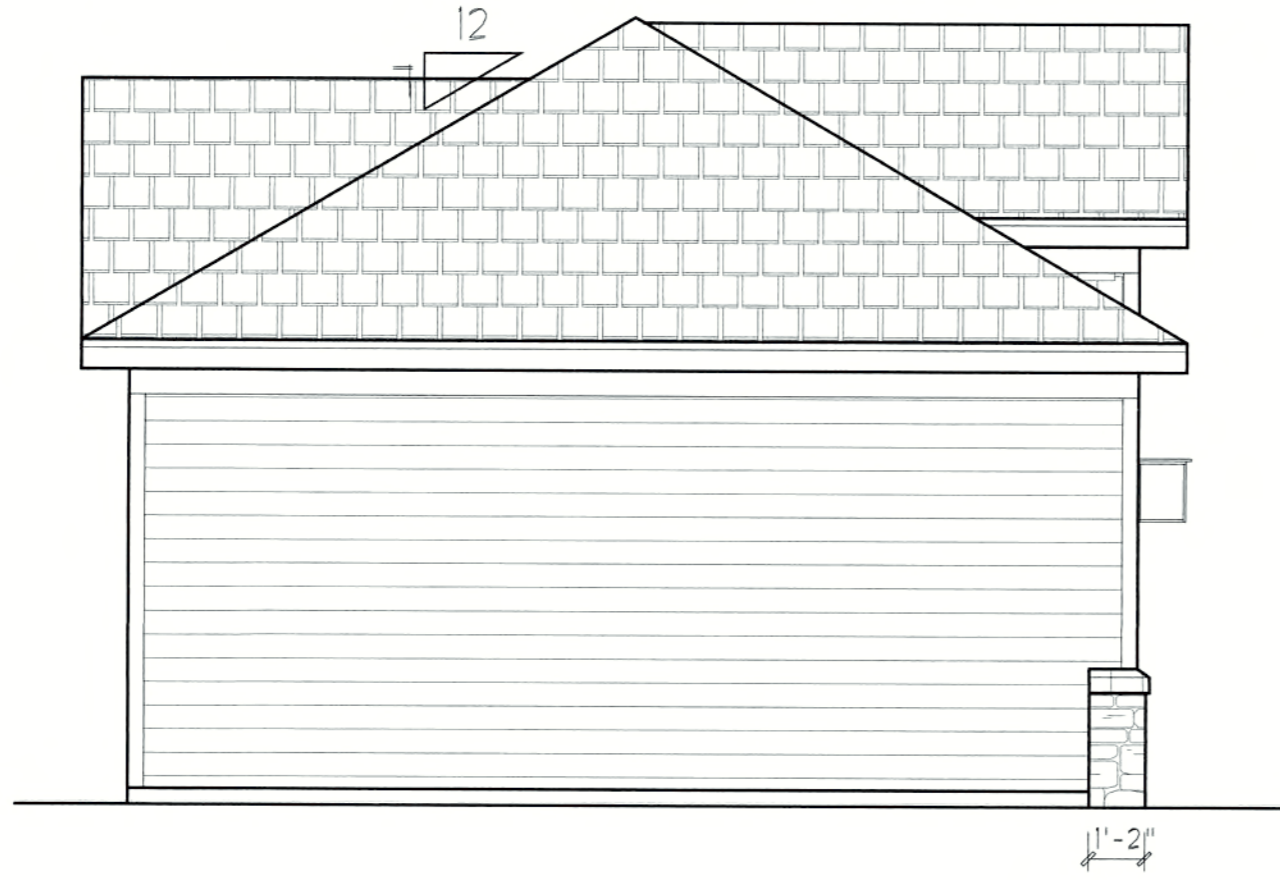
SHEET NUMBER: A4.10

1. **POOLHOUSE FLOOR PLAN**
Scale: 1/4" = 1'-0"

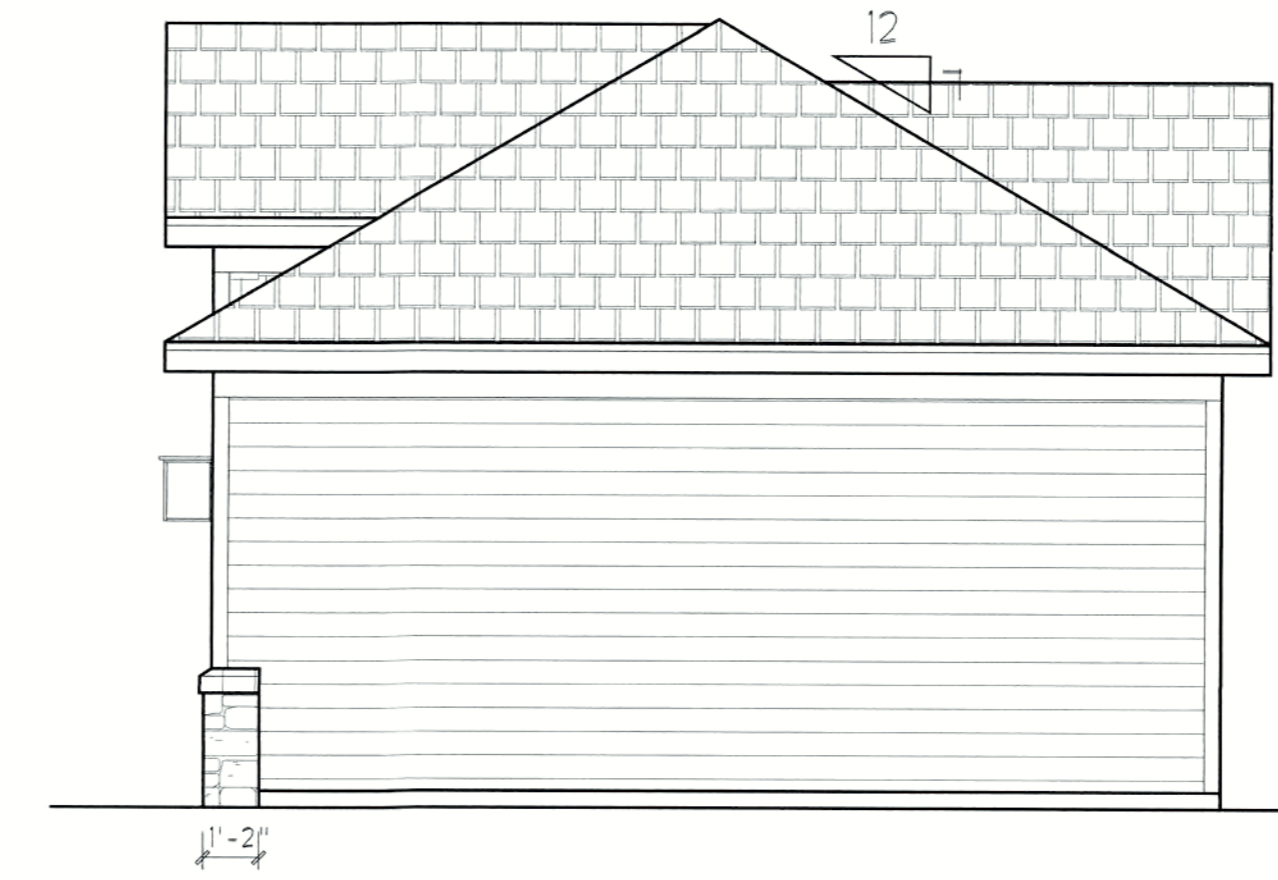
1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. Copyright 2015 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



1 FRONT ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"

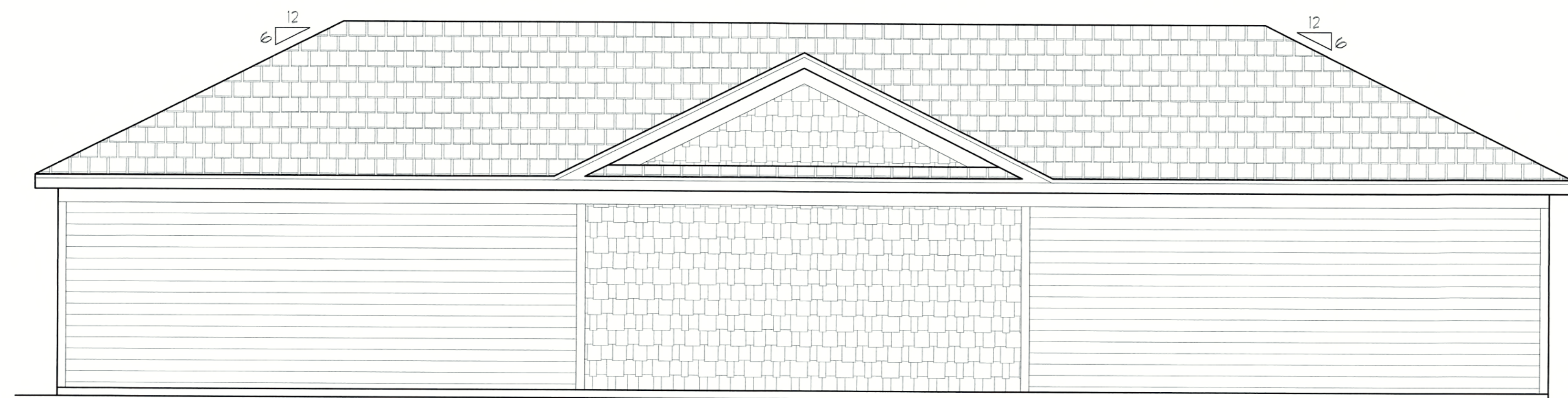


2 LEFT SIDE ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"



3 RIGHT SIDE ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"

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: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: *[Signature]* Date: 4-28-17
Administrator

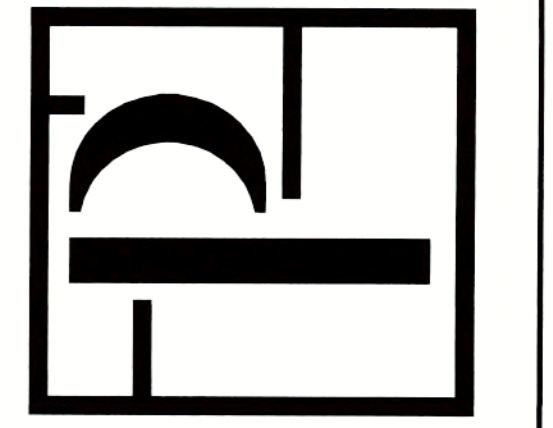


4 REAR ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"

ARCHITECTURAL PLANS EXTERIOR MATERIALS

- = SHINGLE ROOF PER BUILDER
- = METAL ROOF PER BUILDER
- = SIDING PER BUILDER
- = BRICK PER BUILDER
- = B4B SIDING
* ALIGN CENTER OF B4B PANEL WITH CENTER OF GABLE OR WINDOW TYP.
- = CULTURED OR STACKED STONE (SEE FOUNDATION)
- = BRICK OR STONE ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Final TRC Approval Comments

PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DATE	INITIALS	DESCRIPTION
04.15.16					

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Garage Elevations Elevations

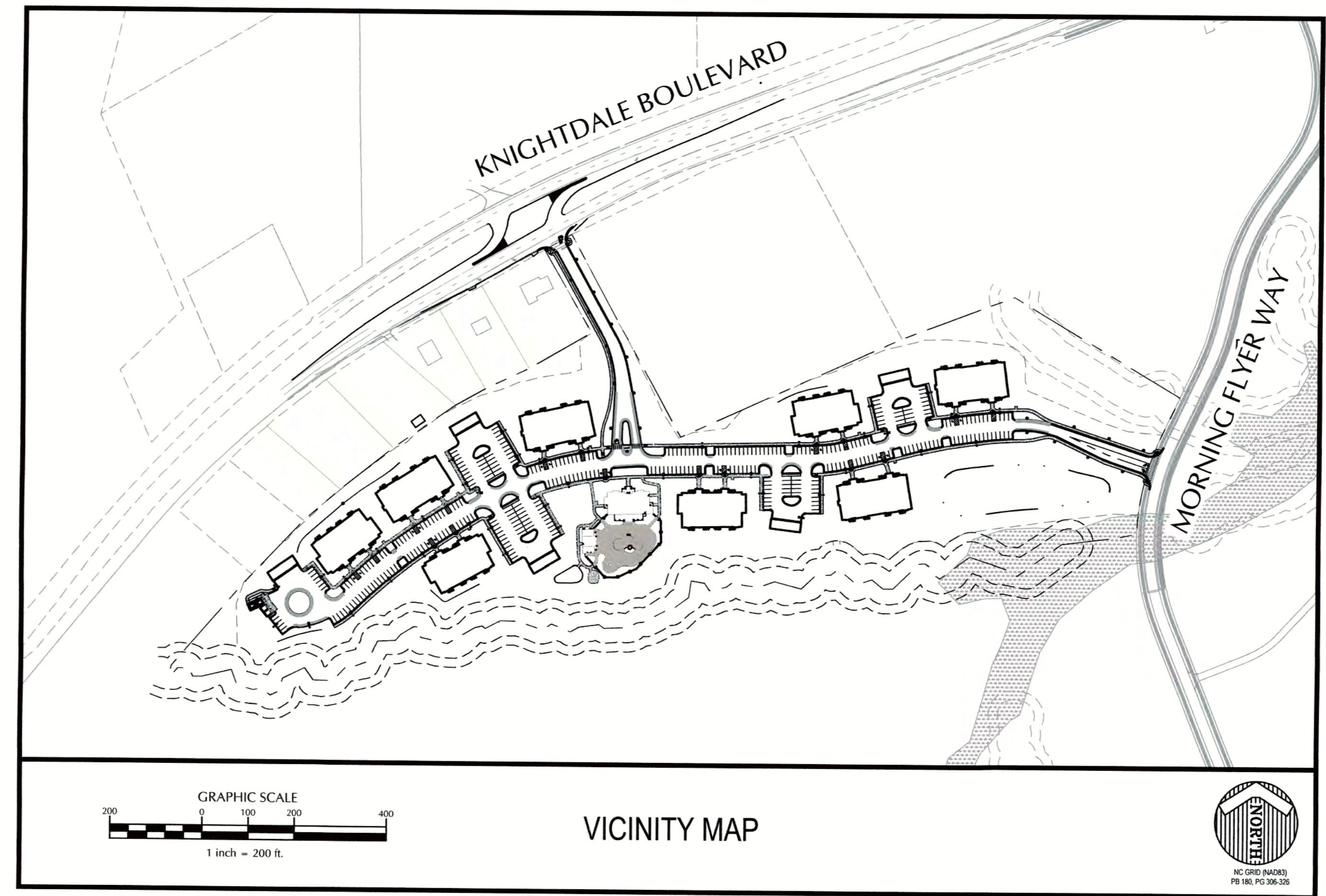
SHEET NUMBER: A5.20

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 3. Contractor is to notify architect immediately of conditions or items varying from depicted information. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. © Copyright 2015 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. Plans may be used once by client. Unauthorized use strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.

CONSTRUCTION DRAWINGS FOR THE COTTAGES AT KNIGHTDALE STATION

TOWN OF KNIGHTDALE, NC WAKE COUNTY, NC
 1st SUBMITTAL: JUNE 3, 2016 1st SUBMITTAL: AUGUST 9 2016
 2nd SUBMITTAL: SEPTEMBER 9, 2016 2nd SUBMITTAL: NOVEMBER 15, 2016
 3rd SUBMITTAL: DECEMBER 28, 2016 PERMIT SET: FEBRUARY 15, 2017
 4th SUBMITTAL: MARCH 14, 2017

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2.0	OVERALL SITE PLAN
2.1	SITE PLAN WEST
2.2	SITE PLAN CENTRAL
2.3	SITE PLAN EAST
3.0	OVERALL GRADING & DRAINAGE
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3.2	GRADING & DRAINAGE CENTRAL
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L2.2	LIGHTING PLAN CENTRAL
L2.3	LIGHTING PLAN EAST



Private Sewer Collection / Extension System
 The City of Raleigh consents to the connection to its public sewer system and extension of the private sewer collection system as shown on this plan. The material and construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
 City of Raleigh Public Utilities Department Permit # S-4281 (P)
 Authorization to Construct Keith A. Jew
 Date 3/24/17

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-4280
 Authorization to Construct Keith A. Jew
 Date 3/24/17

SITE DATA TABLE	
COTTAGES AT KNIGHTDALE STATION CONSTRUCTION DRAWING SUBMITTAL	
ADDRESS : 0 KNIGHTDALE BOULEVARD	
PIN : 1754-87-7981 FEMA ID: 3720175400J	
PROPERTY LOCATION: ST. MATHEWS TOWNSHIP	
ZONING DISTRICT: UR12	
OVERLAY DISTRICT: N/A	
EXISTING USE: VACANT	
PROPOSED USE: APARTMENTS	
OWNER: KNIGHTDALE INVESTORS LLC PO BOX 3557 CARY, NC 27519	
PROJECT ACREAGE: 21.81± ACRES	
DEED BOOK AND PAGE: 011717, 01216	
DENSITY: 12 DU/ACRE MAX - 262 DU MAX 24 DU/BUILDING 192 DU PROPOSED	
BUILDING INFORMATION: MAXIMUM HEIGHT: 3 STORY MINIMUM DWELLING UNIT SIZE: 800 SF	
PARKING: REQUIRED SPACES: 360 SPACES (1 SPACE PER BEDROOM, 360 BEDROOMS) PROVIDED: 362 SPACES (357 SPACES, 5 - 5 SPACE GARAGES)	
HANDICAP PARKING (INCLUDED IN PARKING ABOVE): 1 ACCESSIBLE SPACES REQUIRED 18 ACCESSIBLE SPACES PROVIDED ALL ARE VAN ACCESSIBLE	
BICYCLE PARKING: REQUIRED: 20 SPACES PROVIDED: 20 SPACES	

TOWN APPROVED STANDARDS SHALL CONTROL IN THE EVENT OF A CONFLICT OR INCONSISTENCY BETWEEN THESE CONSTRUCTION DRAWINGS AND THE TOWN OF KNIGHTDALE'S APPROVED STANDARDS FOR THIS PROJECT, THE APPROVED STANDARDS SHALL CONTROL. TOWN OF KNIGHTDALE APPROVED STANDARDS SHALL MEAN ALL DEVELOPMENT DOCUMENTS NECESSARY FOR APPROVAL FOR THE PROPERTY INCLUDING, BUT NOT LIMITED TO, ANY SPECIAL USE PERMIT, SUBDIVISION PLAN, SITE PLAN, SUBDIVISION PLAT(S), PHASING SCHEDULE, DEVELOPMENT AGREEMENT, UTILITY ALLOCATION AGREEMENT, ANNEXATION AGREEMENT, THE TOWN OF KNIGHTDALE STANDARD SPECIFICATION AND DETAIL MANUAL AND APPLICABLE PROVISIONS OF THE NORTH CAROLINA STATE BUILDING CODE.

CITY OF RALEIGH
 All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.
 TRANSPORTATION/PEDESTRIAN SERVICES: N/A
 PUBLIC UTILITIES: K.A. Jew 3/24/17
 STORMWATER: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

INFRASTRUCTURE QUANTITIES:

4" DIP PRIVATE WATERLINE =	1,800 LF
8" DIP PRIVATE FIRE LINE =	1,990 LF
8" DIP PUBLIC SEWER =	1,538 LF
8" DIP PRIVATE SEWER =	197 LF
8" PVC PUBLIC SEWER =	196 LF
6" DIP PRIVATE SEWER =	74 LF

ATTENTION CONTRACTORS
 THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.
 FAILURE TO NOTIFY BOTH CITY DEPARTMENTS IN ADVANCE OF BEGINNING CONSTRUCTION WILL RESULT IN THE ISSUANCE OF MONETARY FINES AND REQUIRE REINSTALLATION OF ANY WATER OR SEWER FACILITIES NOT INSPECTED AS A RESULT OF THIS NOTIFICATION FAILURE.
 FAILURE TO CALL FOR INSPECTION, INSTALL A DOWNSTREAM PLUG, HAVE PERMITTED PLANS ON 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.

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
 THIS DRAWING 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: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER
 THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
 BY: [Signature] DATE: 4-28-17
 ADMINISTRATOR

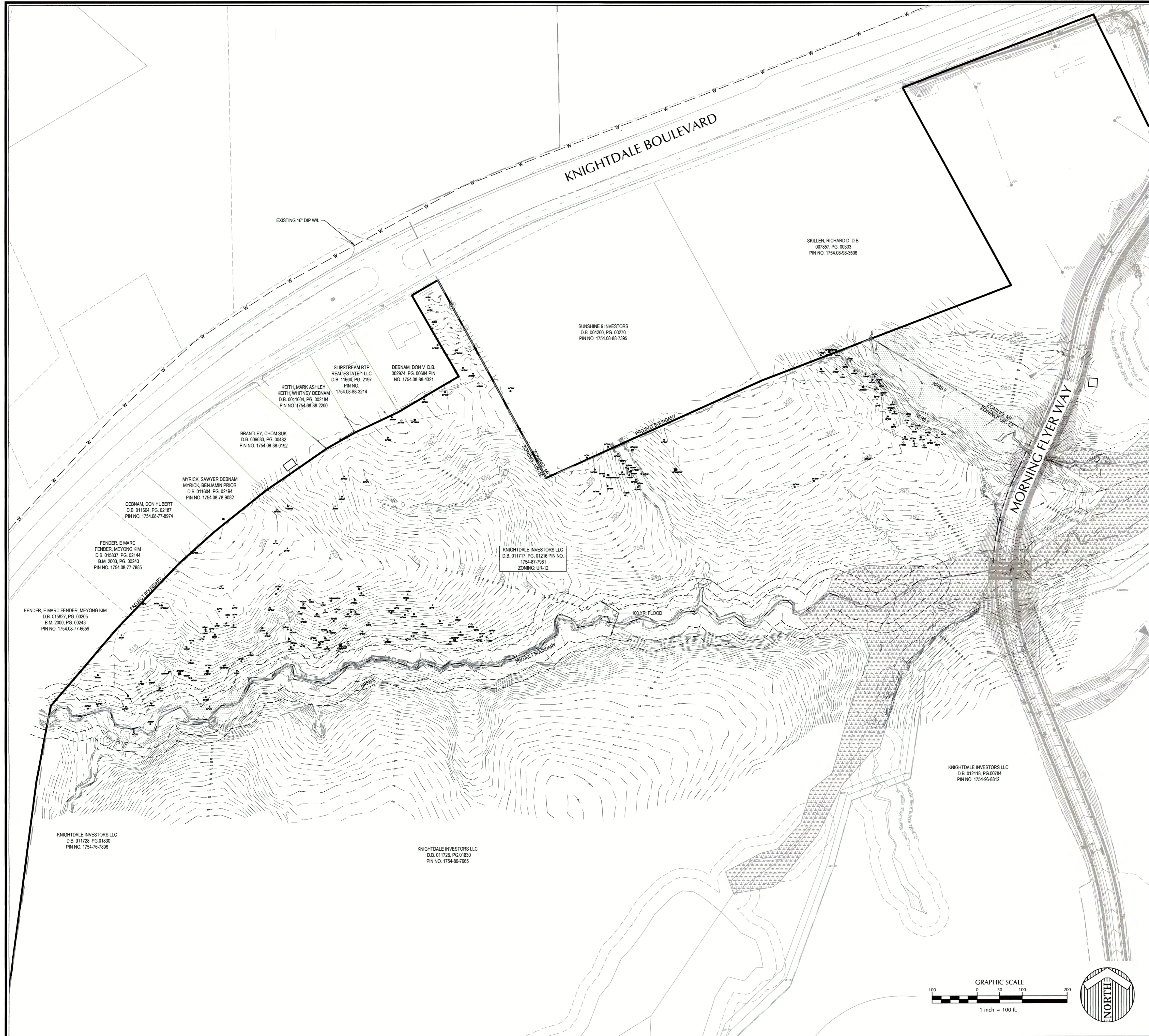
THESE IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING DRAWINGS AND WITH THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.
 I, LOFTEE SMITH, PE, CERTIFY THAT THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE HAVE BEEN THOROUGHLY CHECKED AND FOUND TO BE APPLICABLE TO THIS PROJECT.
 BY: [Signature] PE
 DATE: 5/3/17

PREPARED BY:

WithersRavenel
 Engineers | Planners
 131 1/2 S. Wilmington Street | Raleigh, NC 2601 | t: 919.469.3340 | license #: C-0832
 www.withersravenel.com

DEVELOPER/OWNER
Caviness & Cates, LLC
 639 Executive Place, Suite 400
 Fayetteville, NC 28305
 ATTN: WATSON CAVINESS

DESCRIPTION	EXISTING	PROPOSED
1' CONTOUR INTERVAL	---	---
5' CONTOUR INTERVAL	---	---
PROPERTY LINE	---	---
ROADWAY CENTERLINE	---	---
RIGHT OF WAY LIMITS	---	---
EASEMENT LINE	---	---
CURB & GUTTER	---	---
SANITARY SEWER FACILITIES	---	SS
STORM SEWER FACILITIES	---	---
WATERLINE	---	W
FIRE HYDRANT ASSEMBLY	---	---
FENCING STRUCTURE	---	---
WOODSLINE	---	N/A
WATERWAYS	---	---
TREE PROTECTION FENCE	N/A	TP
# PARKING SPACES	N/A	#
FIBER OPTIC LINE	FO	---
POOL DRAIN	---	---



- EXISTING CONDITION NOTES:**
1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL CONFORM TO TOWN OF KNIGHTDALE STANDARDS AND SPECIFICATIONS.
 2. BOUNDARY AND EXISTING SITE INFORMATION BY WITHERSRAVENEL.
 3. TOPOGRAPHIC INFORMATION WITHERSRAVENEL.
 4. WETLAND AND NEUSE RIVER BUFFER DELINEATIONS WERE DETERMINED BY WITHERSRAVENEL.
 5. THE ZONING BOUNDARIES INTERPOLATED FROM WAKE COUNTY IMAPS AND SHOULD BE CONSIDERED APPROXIMATE.
 6. PROPERTY IS NOT LOCATED IN 100 YEAR FLOODPLAIN AS SHOWN ON FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAPS #3720175300J (EFFECTIVE DATE MAY 2, 2006). PROPERTY IS LOCATED WITHIN FLOOD ZONE X.

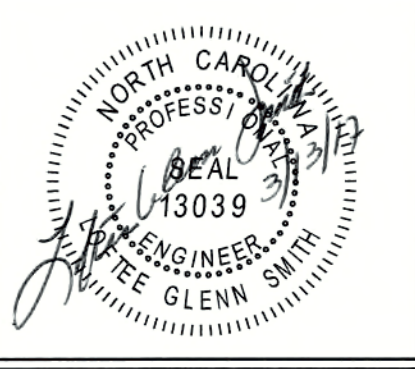


**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

**EXISTING CONDITIONS
PLAN**

Job No.	02160032	Drawn By	CDT
Date	04/03/2016	Designer	WR



Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

Sheet No.
1.0

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION HELD HARMLESS: N/A
PUBLIC UTILITIES: K.A. Jew 3/24/16
FORMWASER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: 4-21-2017
DEVELOPMENT SERVICES ENGINEER







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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

K:\16\16-0001\160012-Knightdale Station Cottages\CADD\011 - EXISTING CONDITIONS.dwg, Sunday, March 12, 2017 3:15:27 PM - TOWNSEND, CHARLIE

TREE LEGEND

TREE DESCRIPTION

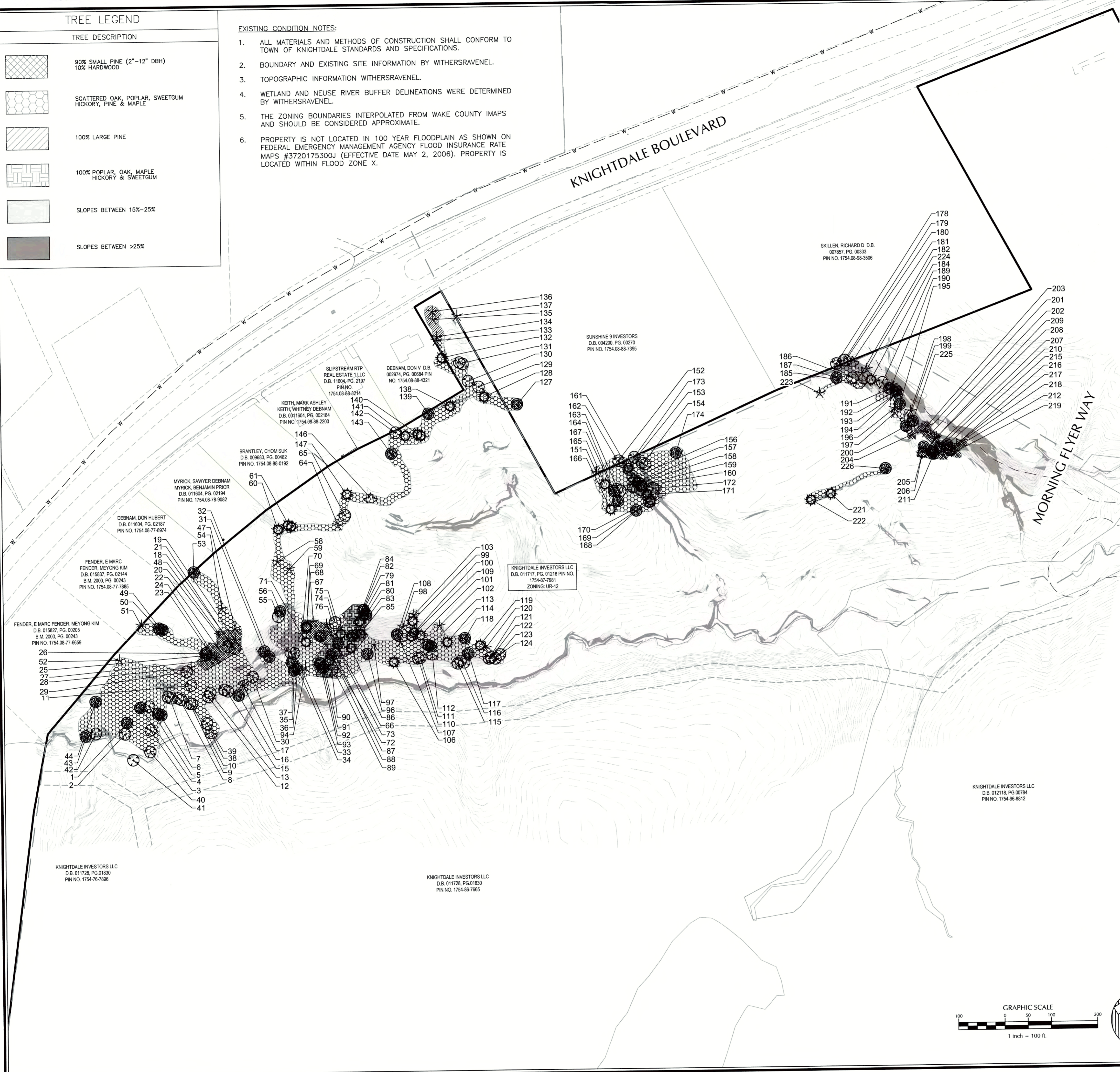
-  90% SMALL PINE (2"-12" DBH)
10% HARDWOOD
-  SCATTERED OAK, POPLAR, SWEETGUM
HICKORY, PINE & MAPLE
-  100% LARGE PINE
-  100% POPLAR, OAK, MAPLE
HICKORY & SWEETGUM
-  SLOPES BETWEEN 15%-25%
-  SLOPES BETWEEN >25%

EXISTING CONDITION NOTES:

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL CONFORM TO TOWN OF KNIGHTDALE STANDARDS AND SPECIFICATIONS.
2. BOUNDARY AND EXISTING SITE INFORMATION BY WITHERSRAVENEL.
3. TOPOGRAPHIC INFORMATION WITHERSRAVENEL.
4. WETLAND AND NEUSE RIVER BUFFER DELINEATIONS WERE DETERMINED BY WITHERSRAVENEL.
5. THE ZONING BOUNDARIES INTERPOLATED FROM WAKE COUNTY IMAPS AND SHOULD BE CONSIDERED APPROXIMATE.
6. PROPERTY IS NOT LOCATED IN 100 YEAR FLOODPLAIN AS SHOWN ON FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAPS #3720175300J (EFFECTIVE DATE MAY 2, 2006). PROPERTY IS LOCATED WITHIN FLOOD ZONE X.

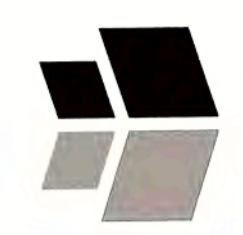
KNIGHTDALE BOULEVARD

MORNING FLYER WAY



Existing Tree Inventory		Existing Tree Inventory		Existing Tree Inventory		Existing Tree Inventory	
Point	Description	Point	Description	Point	Description	Point	Description
1	12" OAK	60	26" GUM	122	12" POP	190	12" PN
2	14" POP	61	14" TWGUM	123	12" POP	191	12" OAK
3	20" POP	64	24" PN	124	12" POP	192	12" OAK
4	14" OAK	65	24" POP	127	34" OAK	193	12" HK
5	12" POP	66	12" PN	128	26" GUM	194	24" PN
6	10" TPOAK	67	12" PN	129	24" POP	195	18" OAK
7	8" TWPO	68	12" GUM	130	22" POP	196	12" PN
8	8" TWPO	69	12" GUM	131	12" TWPO	197	12" PN
9	12" POP	70	14" PN	132	24" GUM	198	18" PN
10	14" POP	71	12" GUM	133	28" PN	199	8" TWMP
11	12" POP	72	14" OAK	134	24" PN	200	12" OAK
12	8" TWPO	73	12" PN	135	24" PN	201	12" PN
13	12" POP	74	12" SOURWOOD	136	24" PN	202	14" PN
14	12" POP	75	14" GUM	137	24" PN	203	18" PN
15	12" TWPO	76	12" OAK	138	24" GUM	204	12" PN
16	16" OAK	77	12" OAK	139	28" OAK	205	12" OAK
17	12" HK	78	12" OAK	140	12" TWGUM	206	14" GUM
18	12" POP	79	12" OAK	141	24" GUM	207	12" OAK
19	16" PN	80	12" OAK	142	30" POP	208	14" PN
20	12" POP	81	12" GUM	143	24" OAK	209	14" PN
21	14" PN	82	12" GUM	144	24" OAK	210	14" OAK
22	12" PN	83	12" GUM	145	24" MPL	211	12" OAK
23	16" PN	84	12" OAK	146	24" MPL	212	14" PN
24	12" HK	85	12" GUM	147	24" GUM	213	14" PN
25	12" POP	86	12" GUM	148	16" PN	214	18" OAK
26	16" OAK	87	14" POP	149	20" POP	215	18" OAK
27	12" PN	88	14" OAK	150	12" GUM	216	18" OAK
28	14" PN	89	12" GUM	151	10" TWPO	217	12" PN
29	12" POP	90	12" POP	152	12" MPL	218	12" PN
30	12" POP	91	14" POP	153	14" GUM	219	12" PN
31	12" OAK	92	12" OAK	154	12" POP	220	24" GUM
32	12" OAK	93	12" OAK	155	14" GUM	221	24" GUM
33	18" POP	94	12" PN	156	12" POP	222	24" PN
34	14" POP	95	12" OAK	157	14" POP	223	24" PN
35	14" OAK	96	12" PN	158	10" TWGUM	224	24" PN
36	12" OAK	97	14" PN	159	14" OAK	225	24" OAK
37	12" OAK	98	12" PN	160	12" POP	226	24" OAK
38	24" MPL	99	12" GUM	161	14" POP		
39	24" POP	100	12" GUM	162	14" POP		
40	36" POP	101	12" GUM	163	10" TWGUM		
41	24" POP	102	12" GUM	164	14" OAK		
42	24" POP	103	14" PN	165	12" GUM		
43	30" OAK	104	14" PN	166	14" GUM		
44	24" OAK	105	12" GUM	167	16" OAK		
45	24" PN	106	20" GUM	168	14" OAK		
46	24" PN	107	14" PN	169	18" POP		
47	24" PN	108	16" OAK	170	12" GUM		
48	24" PN	109	12" GUM	171	12" GUM		
49	12" TWGUM	110	12" POP	172	12" POP		
50	24" PN	111	14" POP	173	12" POP		
51	18" TRPN	112	12" POP	174	24" OAK		
52	28" PN	113	12" POP	175	14" POP		
53	24" OAK	114	12" TWGUM	176	12" SOURWOOD		
54	24" PN	115	12" GUM	177	14" MPL		
55	12" SOURWOOD	116	12" POP	178	18" MPL		
56	12" OAK	117	10" TWPO	179	18" PN		
57	24" PN	118	12" OAK	180	14" GUM		
58	24" PN	119	12" GUM	181	12" MPL		
59	24" PN	120	12" PN	182	18" POP		
		121	12" POP	183	16" GUM		
				184	12" OAK		
				185	12" MPL		
				186	18" POP		
				187	12" OAK		
				188	12" POP		

WithersRavenel
Engineers | Planners



131 1/2 Wilmington Street | Raleigh, NC 27601 | 919-469-3340 | License # C-0632 | www.withersravenel.com

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

ENVIRONMENTAL SURVEY

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No.
1.1

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

- TRANSPORTATION FIELD SERVICES: N/A
- PUBLIC UTILITIES: N/A
- GEOTECHNICAL: N/A
- PLANNING/ZONING: N/A
- HR: N/A
- URBAN FORESTRY: N/A

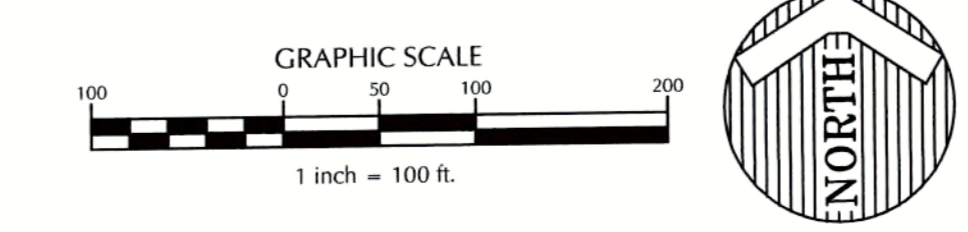
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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.

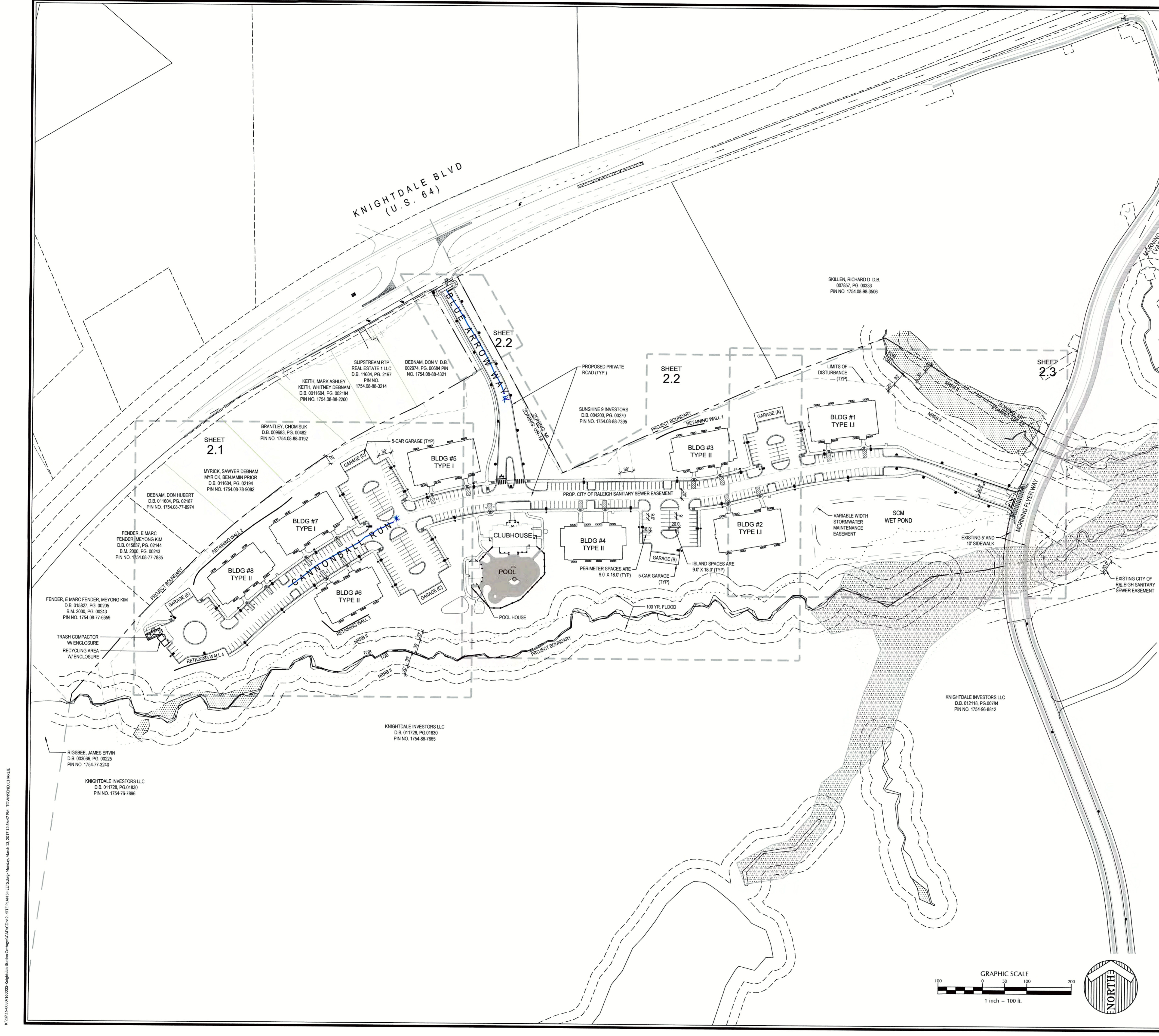
BY: *S.M. All* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *Chad C...* DATE: 4-28-17
ADMINISTRATOR



K:\1614-00001\00023-Knightdale Station Cottages\CD\CD\1-1 - ENVIRONMENTAL SURVEY.dwg - Sunday, March 12, 2017 3:17:05 PM - TOWNING, CHABLE



- DEVELOPMENT NOTES:**
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE CONSTRUCTION DETAILS.
 - THE CLUBHOUSE SHALL BE AT LEAST 1,200 SF AND INCLUDE MEN'S AND WOMEN'S CHANGING ROOM/RESTROOMS WITH SHOWERS, MECHANICAL ROOM, SEPARATE CHEMICAL STORAGE ROOM AND A COMMUNITY MEETING SPACE.
 - ALL BICYCLE PARKING SHALL BE LOCATED WITHIN BUILDING BREEZEWAYS UNLESS OTHERWISE NOTED.

SITE DATA TABLE

COTTAGES AT KNIGHTDALE STATION
SITE PLANS

ADDRESS: 0 KNIGHTDALE BOULEVARD
PIN: 1754-87-7881

PROPERTY LOCATION: ST. MATHEWS TOWNSHIP
ZONING DISTRICT: UR12
EXISTING USE: VACANT
PROPOSED USE: APARTMENTS

OWNER: KNIGHTDALE INVESTORS LLC
PO BOX 3557
CARY, NC 27519

DEEDED ACREAGE: 32.43± ACRES
PROJECT ACREAGE: 21.80± ACRES
DEED BOOK AND PAGE: 011717, 01216

DENSITY: 12 DU/ACRE MAX - 262 DU MAX
24 DUBUILDING
192 DU PROPOSED

BUILDING INFORMATION:
MAXIMUM HEIGHT: 45'
MINIMUM DWELLING UNIT SIZE: 800 SF

PARKING:
REQUIRED SPACES: 360 SPACES (1 SPACE PER BEDROOM, 360 BEDROOMS)
PROVIDED: 382 SPACES (357 SPACES, 5 - 5 SPACE GARAGES)

HANDICAP PARKING (INCLUDED IN PARKING ABOVE):
1 ACCESSIBLE SPACES REQUIRED
18 ACCESSIBLE SPACES PROVIDED
ALL ARE VAN ACCESSIBLE

BICYCLE PARKING:
REQUIRED: 20 SPACES
PROVIDED: 20 SPACES

IMPERVIOUS AREA:
PRE: 0 SF, 0% OF SITE AREA
POST: 326,055.25 SF, 34.3% OF SITE AREA

SETBACKS:
LOT WIDTH: N/A
FRONT SETBACK: 0 FT MIN; 25 FT MAX
SITE SETBACK: 10 FT BETWEEN BUILDINGS
REAR SETBACK: N/A
ACCESSORY STRUCTURE SETBACK: 5 FT
MAXIMUM HEIGHT: 3 STORIES

PAVEMENT MARKING NOTES:

- ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC, EXCEPT PARKING STALLS MAY BE LATEX PAINT.
- ALL PAVEMENT MARKINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARDS & SPECIFICATIONS.
- PREMARKINGS SHALL BE APPROVED BY TOWN OF KNIGHTDALE PRIOR TO COMPLETION.

4. Cross walks shall be provided internal on-site connecting ADA ramps showing safe pedestrian walkways.

CITY OF RALEIGH

All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: K.A. Joo 3/24/17
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

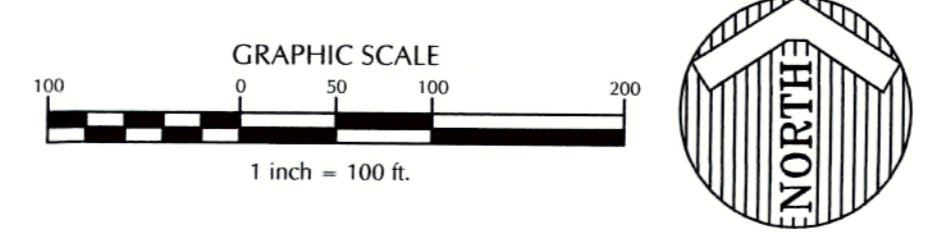
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S.M. DL* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4-28-17
ADMINISTRATOR



Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR

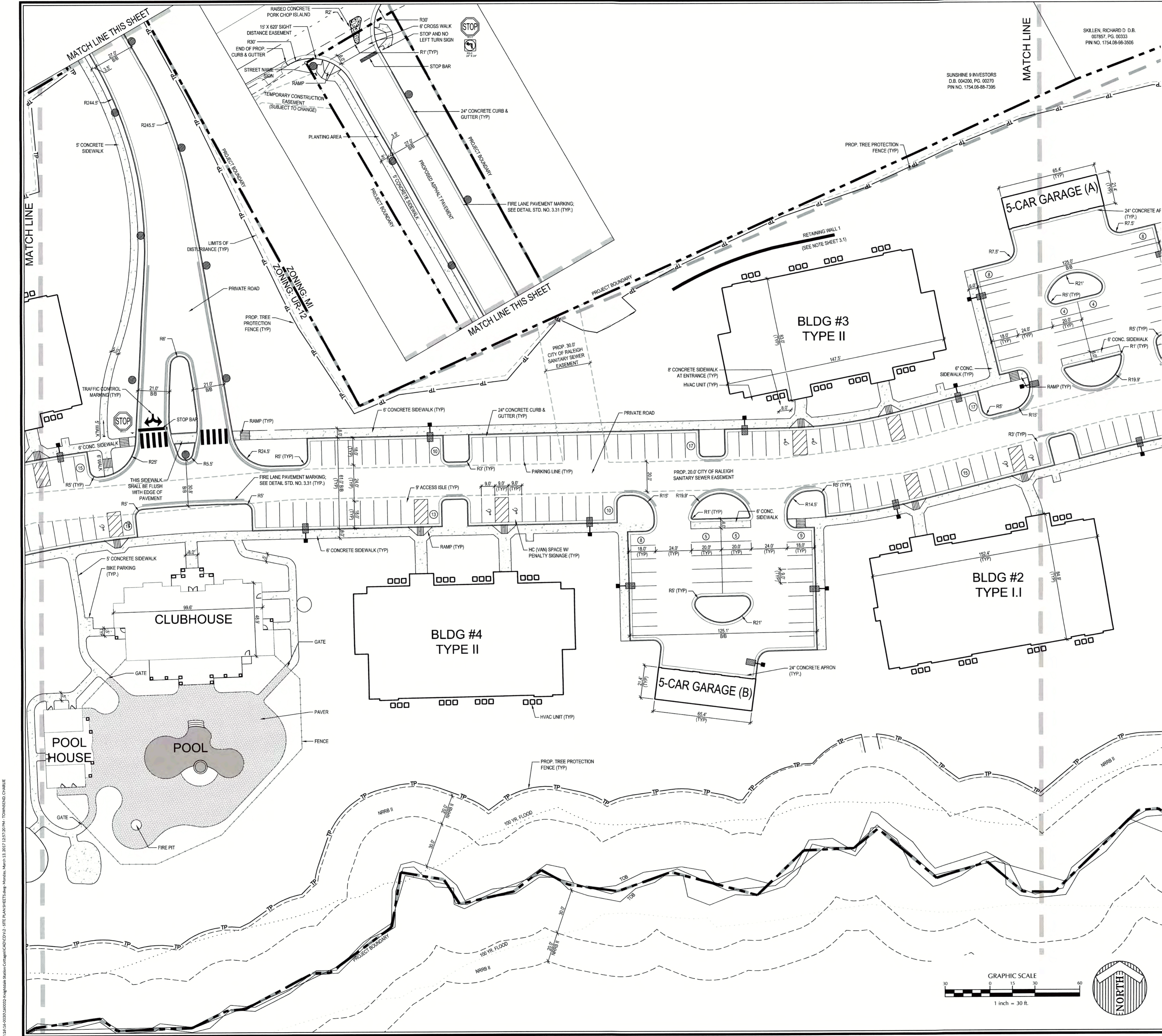
Professional Engineer Seal: REAL 13039, W. GLENN SMITH

Revisions

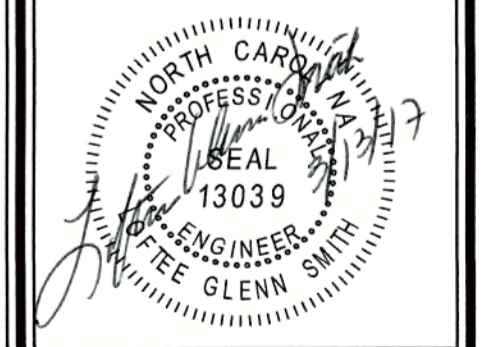
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. 2.0

K:\1614-00003\00003_Appliances Station Cottages\CAD\CIV\2 - SITE PLAN SHEETS.dwg - Monday, March 13, 2017 12:56:47 PM - TOWNSEND CHANUE



Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

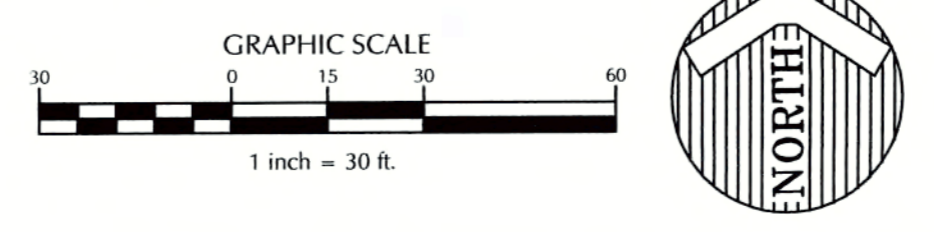
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: S. Hall DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: Glenn Smith DATE: 4-28-17
ADMINISTRATOR



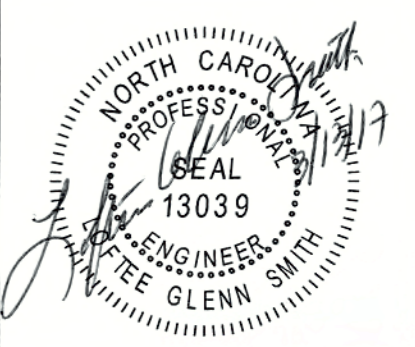
K:\1616\0002160032\Knightdale Station Cottages\CAD\CIVIL - SITE PLAN\SET\16160032.dwg - Monday, March 13, 2017 12:57:20 PM - TOWNSEND, CHARLIE

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

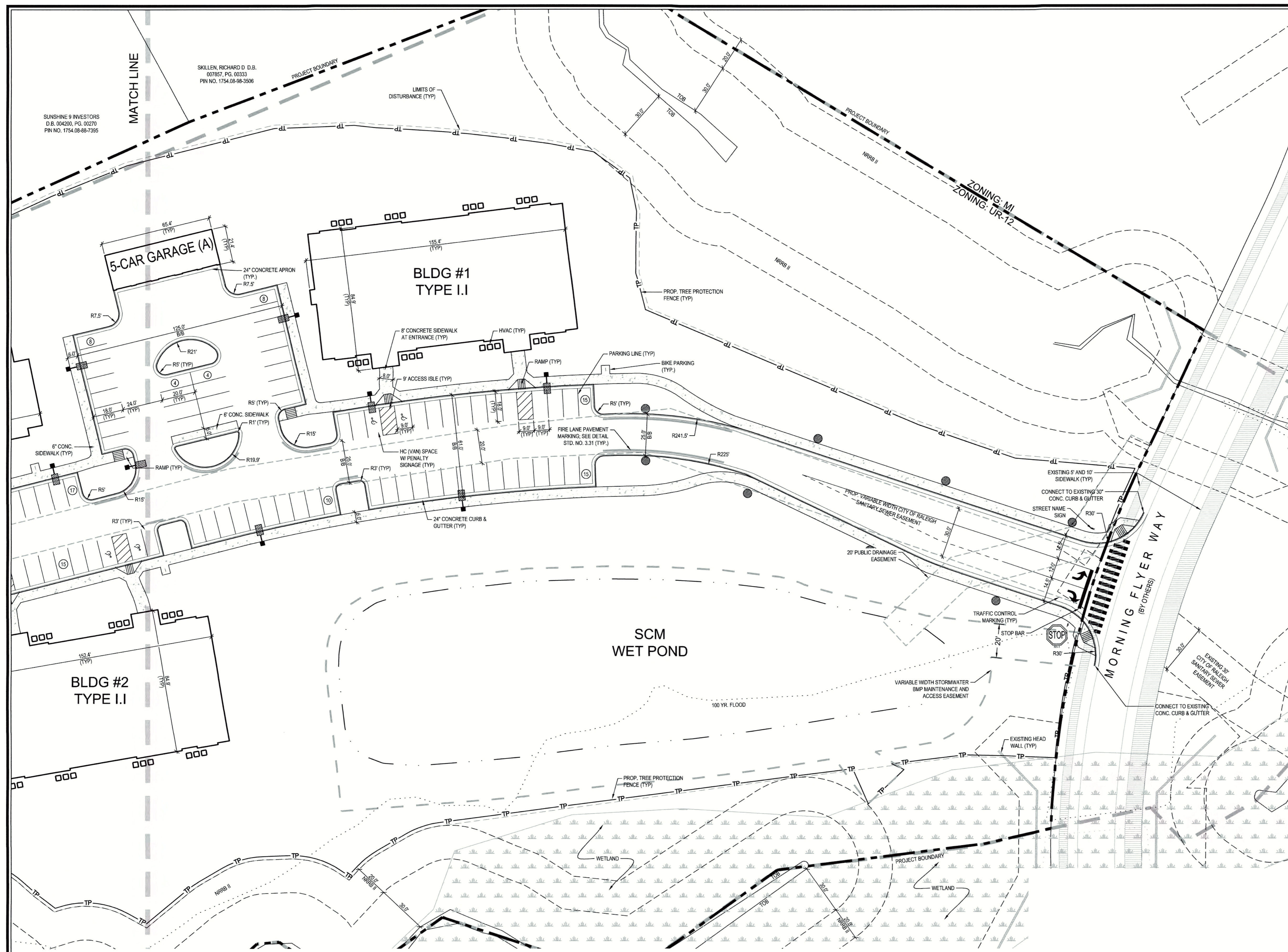
SITE PLAN EAST

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



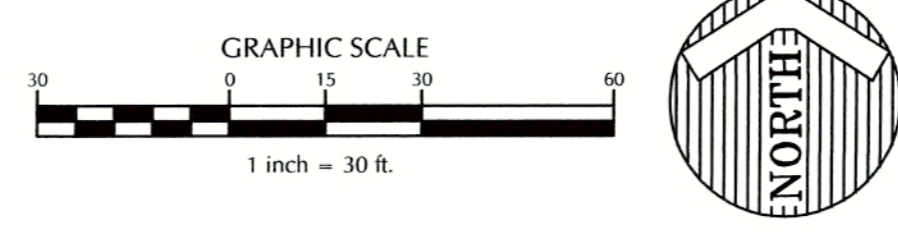
Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

Sheet No.	2.3
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CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION SERVICES: N/A
PUBLIC UTILITIES: K.A. Glenn 3/22/19
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

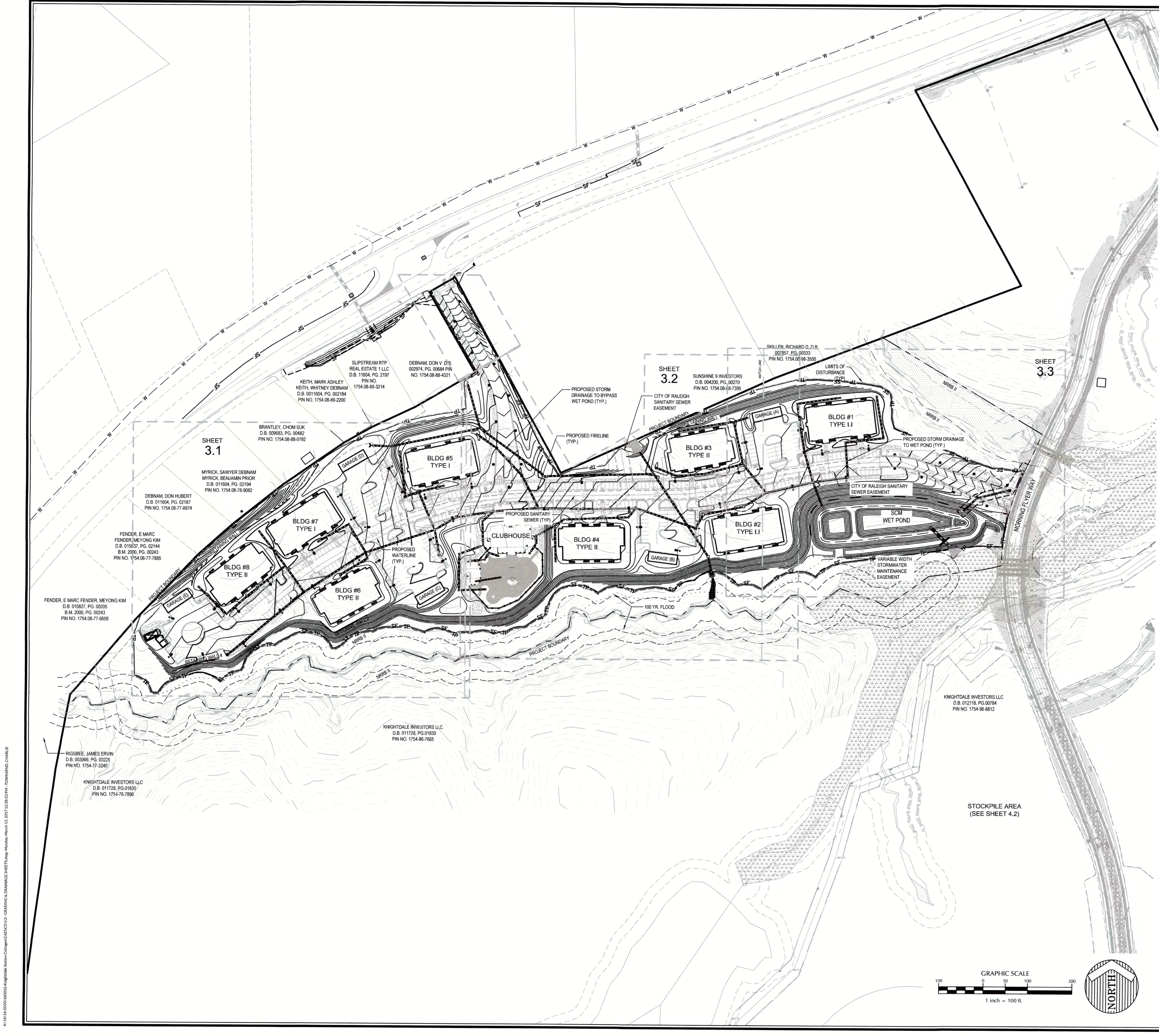
THIS DRAWING HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: Sarah Bell DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

K:\16-0000160032-Knightdale Station-CottageCAD\CDT13-SITE PLAN SHEETS.dwg - Monday, March 13, 2017 12:56:05 PM - TOWNSHND.CHAMBLE



- ### EROSION CONTROL NOTES
1. ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
 2. BOUNDARY SURVEY PERFORMED BY WITHERS & RAVENEL, INC.
 3. THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720174400J WITH AN EFFECTIVE DATE OF MAY 2, 2008.
 4. RECEIVING WATERCOURSE: UNNAMED TRIBUTARY OF THE NEUSE RIVER.
 5. 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.
 6. 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.
 7. ALL STORM DRAINAGE PIPE SHALL HAVE A MINIMUM COVER OF 1 FOOT TO THE PIPE CROWN IN NON-TRAFFIC AREAS.
 8. STORM SEWER PIPE ENDS SHALL BE FURNISHED WITH REINFORCED CONCRETE PIPE FLARED END SECTION UNLESS OTHERWISE SPECIFIED ON PLANS.
 9. 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 - 48 INCH PIPE, AND ONE-FOURTH THE DIAMETER FOR PIPE GREATER THAN 48 INCHES.
 10. 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.
 11. STORM PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
 12. A PRECONSTRUCTION MEETING MAY BE REQUIRED FOR THIS CONSTRUCTION.
 13. GRAVEL CONSTRUCTION ENTRANCE PADS SHALL BE CONSTRUCTED AT EACH POINT OF CONSTRUCTION ACCESS TO THE 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 UDO OR NC 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.
 14. 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, SO AS TO CUT, RATHER THAN TEAR, ROOTS.
 15. 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.
 16. 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 6.3).
 17. CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING LOT CLEARING WILL BE MINIMIZED.
 18. CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL STRUCTURES DURING THE LIFE OF THE PROJECT.
 19. CONTRACTOR SHALL CONSTRUCT DIVERSION DITCHES AS NECESSARY TO ENSURE ALL SEDIMENT IS DIRECTED INTO EROSION CONTROL MEASURES.
 20. TOPSOIL SHALL BE WASTED OFF-SITE OR AT APPROVED STOCKPILE AREA ON SITE.
 21. ALL STORM DRAINAGE PIPE SHALL BE PROTECTED DURING CONSTRUCTION IN ACCORDANCE WITH TOWN OF KNIGHTDALE DETAILS AND SPECIFICATIONS.
 22. CONTRACTOR SHALL PROVIDE RIP RAP DISSIPATOR PADS AT STORM DRAINAGE PIPE DISCHARGE POINTS AS REQUIRED TO ENSURE POSITIVE DRAINAGE.
 23. 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.
 24. ALL EROSION CONTROL MEASURES SHALL BE COMPLETED IN ACCORDANCE WITH THE TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND CONSTRUCTION DETAILS MANUAL (SECTION 2.09) 28. STABILIZATION SHALL BE IN ACCORDANCE WITH NPDES STORMWATER DISCHARGE PERMIT (SEE TABLE ON EC DETAILS SHEET).

- ### CONSTRUCTION SEQUENCE
1. SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE WATERSHED MANAGER, DEBRA TANNER (919-842-7142), OBTAIN A LAND-DISTURBING PERMIT.
 2. INSTALL GRAVEL CONSTRUCTION PAD, TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS, OR OTHER MEASURES AS SHOWN ON THE APPROVED PLAN. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. SEED TEMPORARY DIVERSIONS, BERMS, AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
 3. CALL 919-842-7142 FOR AN ONSITE INSPECTION BY THE WATERSHED MANAGER TO OBTAIN A CERTIFICATE OF COMPLIANCE.
 4. 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.
 5. STABILIZE SITE AS AREAS ARE BROUGHT UP TO FINISH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC.
 6. AT THE POINT WHEN THE MAJOR PORTION OF THE SITE WORK IS COMPLETE AND STABILIZED, AND WITH THE PERMISSION OF THE WATERSHED MANAGER, THE SKIMMER BASIN SHALL BE REMOVED. THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN A LEGAL MANNER. THE AREA SHALL BE BACK FILLED IN LIFTS NO GREATER THAN 8" THICK AND COMPACTED TO 100% PROCTOR DENSITY. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THE REMAINING EROSION CONTROL MEASURES ON A DAILY BASIS.
 7. WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE STABILIZED COMPLETELY, CALL 919-842-7142 FOR AN INSPECTION BY THE WATERSHED MANAGER.
 8. 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 TANNER (919-842-7142), OBTAIN A CERTIFICATE OF COMPLETION.

NOTE: THE TOWN OF KNIGHTDALE DOES NOT ALLOW THE USE OF WAFFLE BOXES WITHIN PUBLIC RIGHT OF WAY.

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: K.L. Jew 3/24/17
STORMWATER: N/A
PLANNING/ENGINEERING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S. Hall* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

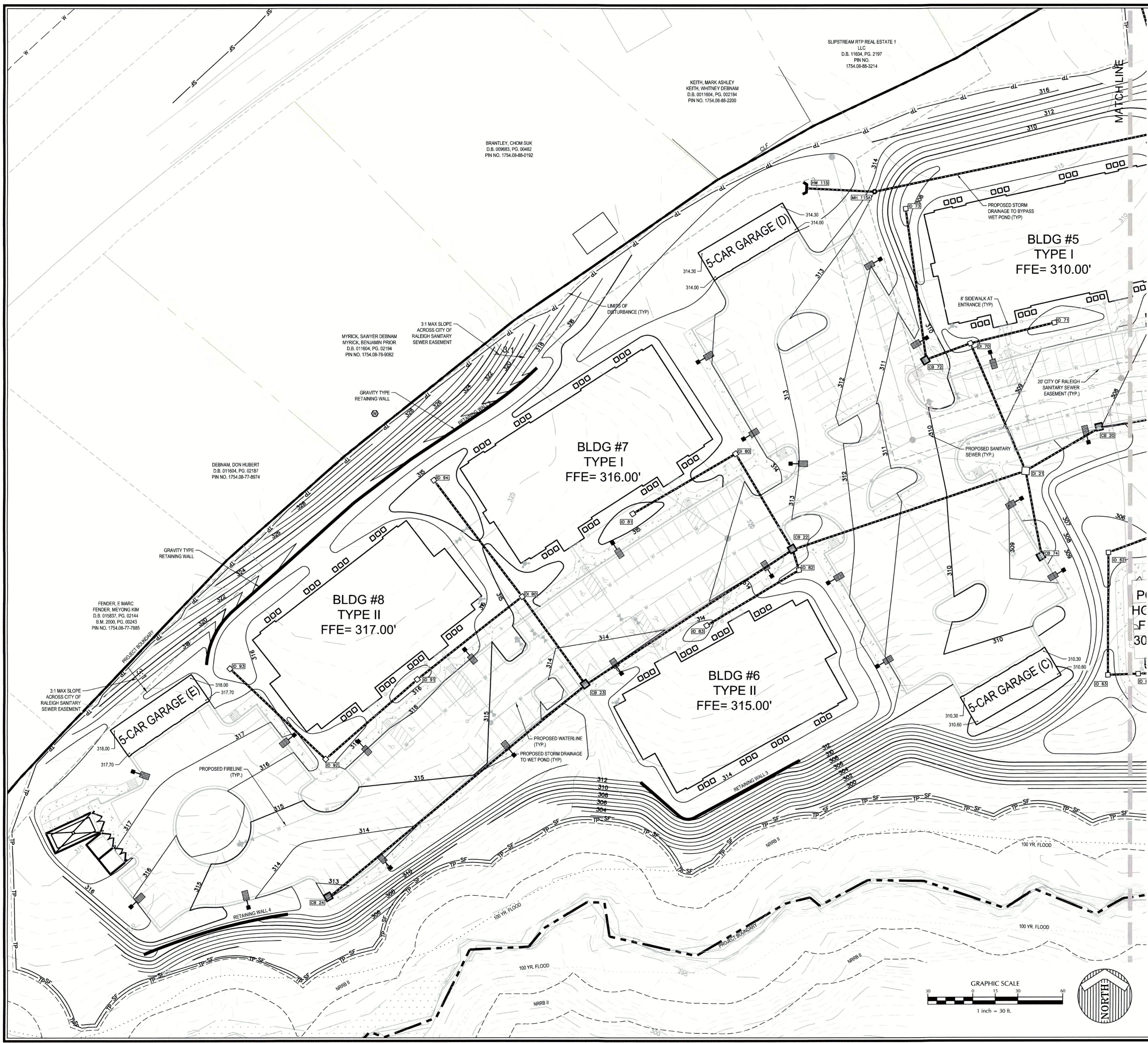
BY: *John C. ...* DATE: 4-28-17
ADMINISTRATOR

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

K:\174\00074\00023\Agg\Main\Station Cottages\CD\02160032.dwg - GRADING & DRAINAGE SHEETS - Amp - Monday, March 13, 2017 12:28:53 PM - TOWNSEND, CHARLE



RETAINING WALL NOTES:

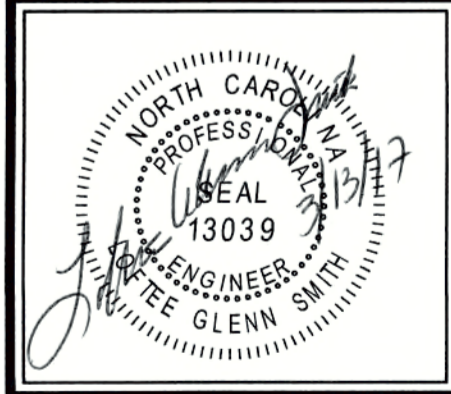
1. THE RETAINING WALL INFORMATION SHOWN ON THESE PLANS IS FOR GENERAL LOCATION AND GENERAL DIMENSIONS ONLY. WITHERSRAVENEL IS NOT RESPONSIBLE FOR THE DESIGN, PERMITTING, INSPECTION OR CONSTRUCTION CERTIFICATION OF ANY RETAINING WALLS SHOWN ON THESE PLANS. RETAINING WALLS SHALL BE CONSTRUCTED BY PLANS PREPARED SEPARATELY FOR THE OWNER BY OTHER CONSULTANTS. WITHERSRAVENEL ACCEPTS NO LIABILITY FOR SUCH PLANS.
2. GEOGRIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

**GRADING & DRAINAGE
WEST**

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



Revisions		
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No.
3.1

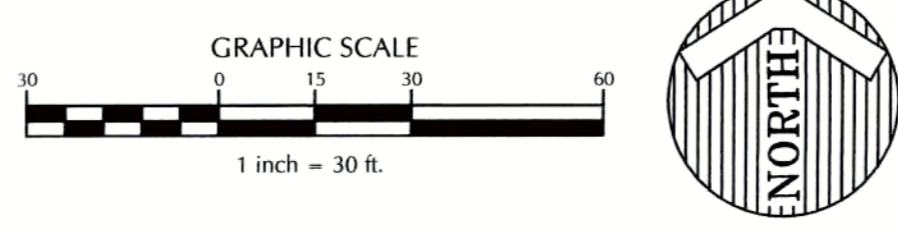
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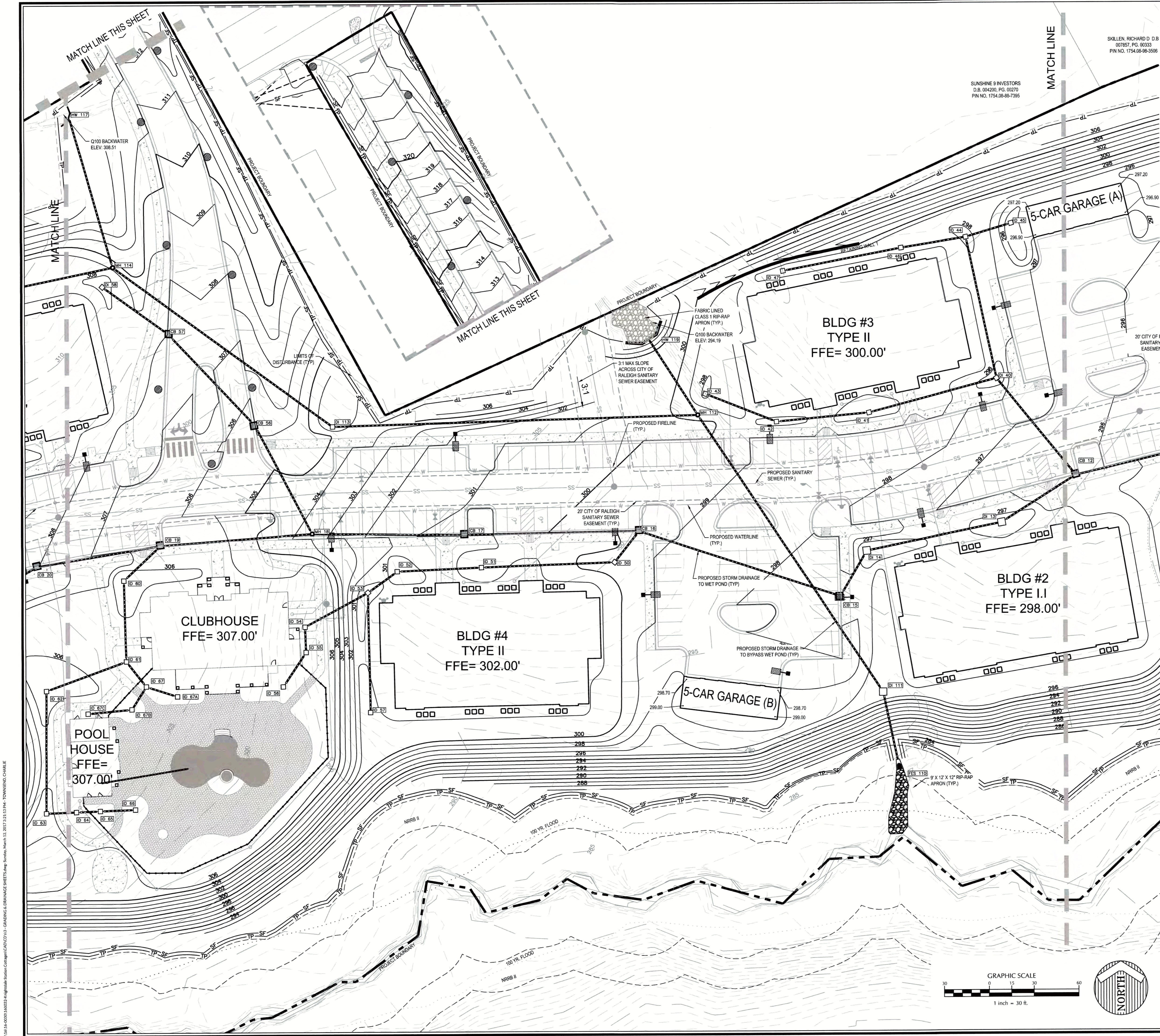
BY: *[Signature]* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4-28-17
ADMINISTRATOR



K:\15-00001\0002\Knightdale Station\Grading\DRAINAGE\DRAINAGE SHEETS\Map_Match\15-00001-0002-DRAINAGE WEST.dwg, Modified: March 11, 2017 12:59:09 PM, TOWNSEND, CHARLIE



Outlet Protection Calculations	
OUTLET: FES 110	
Inputs:	
Pipe Diameter =	36 in
Slope =	5.67%
Q(10) =	21.10 cfs
V(10) =	2.99 fps
Zone =	1
Apron Materials:	
Minimum -	Stone Filling (Fine) - Cl. 'A'
Proposed -	Stone Filling (Fine) - Cl. 'A'
Apron Dimensions:	
Multiplier	3
To Protect Culvert (L1) =	9 ft
Multiplier	4
To Protect Scour (L2) =	12 ft
Width	W = 9 ft
Thickness	Th = 12 in

RETAINING WALL NOTES:

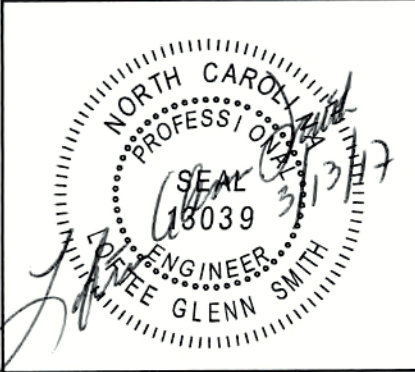
1. THE RETAINING WALL INFORMATION SHOWN ON THESE PLANS IS FOR GENERAL LOCATION AND GENERAL DIMENSIONS ONLY. WITHERSRAVENEL IS NOT RESPONSIBLE FOR THE DESIGN, PERMITTING, INSPECTION OR CONSTRUCTION CERTIFICATION OF ANY RETAINING WALLS SHOWN ON THESE PLANS. RETAINING WALLS SHALL BE CONSTRUCTED BY PLANS PREPARED SEPARATELY FOR THE OWNER BY OTHER CONSULTANTS. WITHERSRAVENEL ACCEPTS NO LIABILITY FOR SUCH PLANS.

2. GEORIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.

SKILLEN, RICHARD D. D.B.
007857, PG. 00333
PIN NO. 1754.08-98-3506

SUNSHINE 9 INVESTORS
D.B. 004200, PG. 00270
PIN NO. 1754.08-98-7395

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
All Construction must be in accordance with all Local, State and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: E.A. Jow 3/29/14
GEOTECHNICAL: N/A
PLANNING/ENGINEERING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

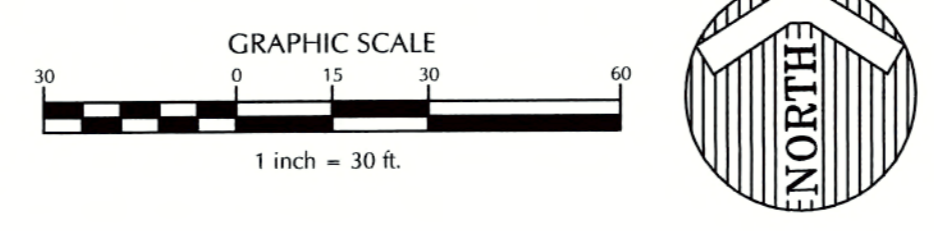
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: S. Skillen DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

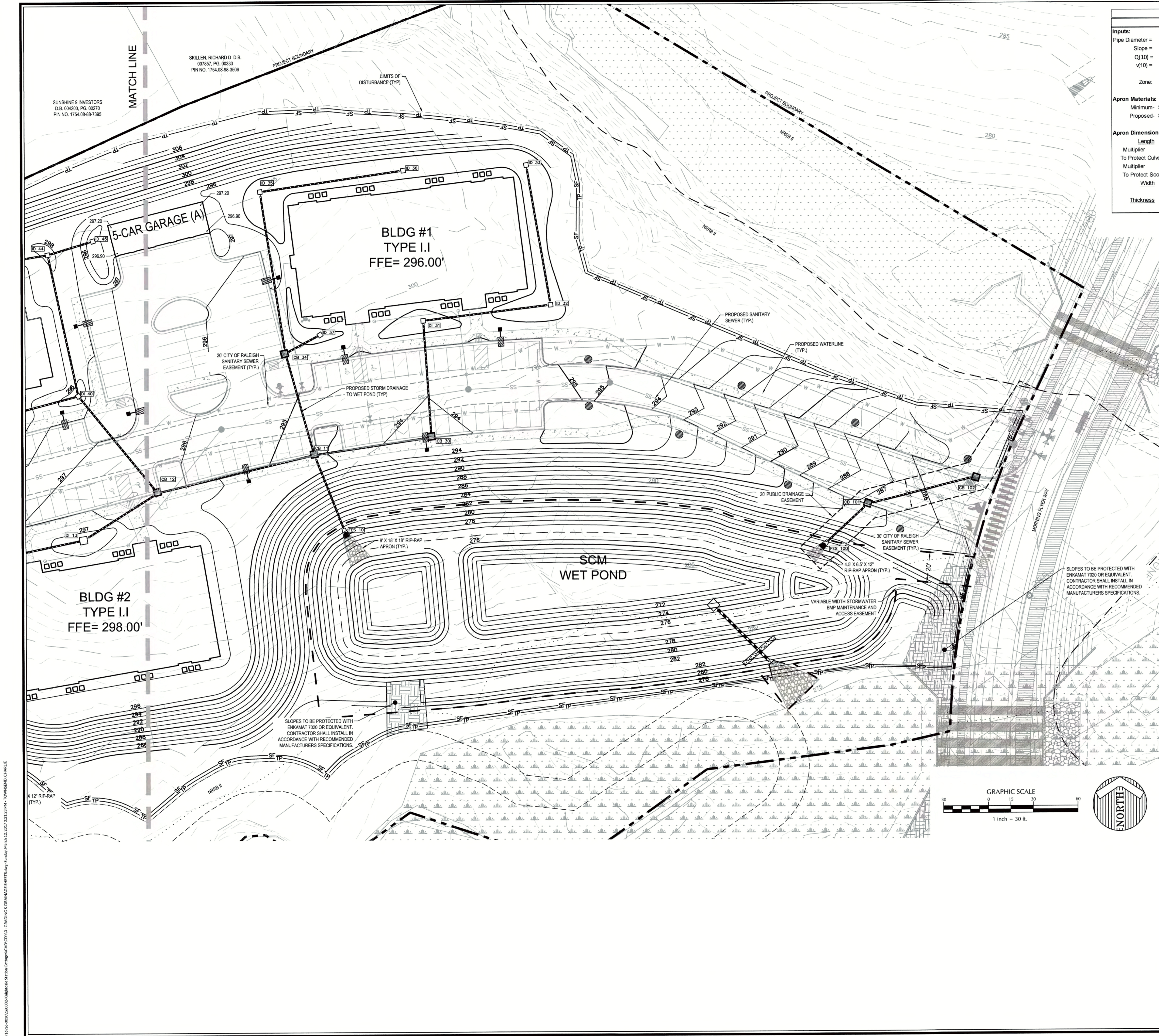
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: Glenn Smith DATE: 4-28-17
ADMINISTRATOR



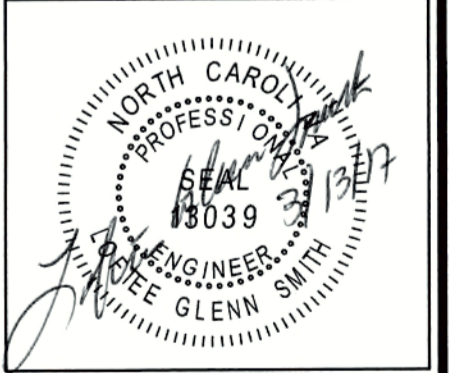
K:\174\00003\00003\Aggravated Station\Central\CD\174\00003\GRADING & DRAINAGE SHEETS\Ang_Survey_Maps\17_2017\21131.PLA, TOWNSHIP, CHARLE

Revisions		
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

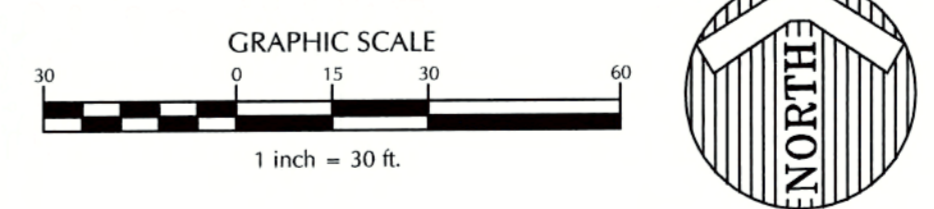


Outlet Protection Calculations	
OUTLET: FES 10	OUTLET: FES 100
Inputs:	
Pipe Diameter = 36 in	Pipe Diameter = 18 in
Slope = 1.28%	Slope = 1.28%
Q(10) = 42.85 cfs	Q(10) = 6.55 cfs
v(10) = 6.06 fps	v(10) = 3.71 fps
Zone: 2	Zone: 1
Apron Materials:	
Minimum- Stone Filling (Light) - Cl. 'B'	Minimum- Stone Filling (Fine) - Cl. 'A'
Proposed- Stone Filling (Light) - Cl. 'B'	Proposed- Stone Filling (Fine) - Cl. 'A'
Apron Dimensions:	
Length	
Multiplier 3	Multiplier 3
To Protect Culvert (L1) = 9 ft	To Protect Culvert (L1) = 4.5 ft
Multiplier 6	Multiplier 4
To Protect Scour (L2) = 18 ft	To Protect Scour (L2) = 6 ft
Width	
W = 9 ft	W = 4.5 ft
Thickness	
Th = 18 in	Th = 12 in

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.
TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: *E.O. 3/24/17*
GEOTECHNICAL: N/A
PLANNING/FORMING: N/A
HRE: N/A
URBAN FORESTRY: N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
THIS DRAWING 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: *S.M. DU* DATE: *4-21-2017*
DEVELOPMENT SERVICES ENGINEER
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
BY: *Glenn Smith* DATE: *4-28-17*
ADMINISTRATOR

Revisions		
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

K:\18\160003\Agg\Agg\Station Cottages\CD\CD151 - GRADING & DRAINAGE SHEETS.dwg, Sunday, March 12, 2017 3:23:23 PM - TOWNWKS.CHARLE

**THE COTTAGES AT
KNIGHTDALE STATION**
KNIGHTDALE, NORTH CAROLINA

**STORM DRAINAGE PIPE
AND STRUCTURE TABLE**

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
CB 11	295.00	CB 12 CB 30 CB 34	285.80 282.00 285.00	279.75
CB 12	296.35	DI 13 DI 40	288.90 287.10	287.00
CB 15	297.86	CB 16	291.00	290.90
CB 16	299.65	CB 17 ID 50	292.55 296.10	292.45
CB 17	301.00	MH 18	293.85	293.75
CB 19	306.59	CB 20 ID 60	297.90 301.45	297.80
CB 20	308.04	DI 21	298.85	298.75
CB 22	313.09	CB 23 DI 80 ID 82	304.30 303.40 309.60	303.30
CB 23	313.97	CB 24 DI 90	306.10 306.10	306.00
CB 24	313.00			308.38
CB 30	294.00	DI 31	284.00	283.00
CB 34	295.19	ID 35 ID 37	290.25 291.45	287.35
CB 56	306.10	CB 57	301.35	295.85
CB 57	308.00	DI 58	302.60	302.50
CB 72	310.46	ID 73	303.65	303.40
CB 74	308.75			304.12
CB 101	287.00	CB 102	279.85	279.55
CB 102	285.60			281.35
DI 13	297.00	DI 14	289.50	289.40
DI 14	296.75	CB 15	290.35	290.25

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
DI 21	309.02	CB 22 DI 70 CB 74	301.65 299.55 303.50	299.45
DI 31	295.00	ID 32	290.35	286.86
DI 40	297.00	ID 41 ID 44	293.45 291.90	288.00
DI 58	307.75			303.12
DI 70	309.00	ID 71 CB 72	304.60 303.20	300.50
DI 80	314.60	ID 81	311.15	304.20
DI 90	314.50	ID 91 ID 94	310.65 311.00	306.90
DI 111	296.36	MH 112	286.10	286.00
DI 113	303.75	MH 114	299.50	299.40
FES 10	-0.92	CB 11	279.00	
FES 100	280.79	CB 101	279.00	
FES 110	3.92	DI 111	283.00	
HW 115	314.21			312.00
HW 117	312.19			307.00
HW 119	297.33			293.00
ID 32	295.00	ID 33	290.80	290.80
ID 33	294.75			291.75
ID 35	294.50	ID 36	290.80	290.80
ID 36	294.75			291.75
ID 37	294.75			291.75

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
ID 41	298.50	ID 42	293.90	293.90
ID 42	298.75	ID 43	294.30	294.30
ID 43	297.75			294.75
ID 44	297.75	ID 46 ID 45	294.45 292.40	292.40
ID 45	295.75			292.75
ID 46	298.75	ID 47	294.90	294.90
ID 47	298.75			295.75
ID 50	299.50	ID 51	296.25	296.25
ID 51	299.99	ID 52	296.85	296.85
ID 52	300.50	ID 53	297.15	297.15
ID 53	300.50	ID 54 ID 57	297.30 297.30	297.30
ID 54	302.36	ID 55	301.00	301.00
ID 55	305.50	ID 56	302.00	302.00
ID 56	305.50			303.00
ID 57	300.50			298.10
ID 60	305.50	ID 61	301.65	301.65
ID 61	305.50	ID 62 ID 67	302.00 302.00	302.00
ID 62	305.50	ID 63	302.30	302.30
ID 63	305.50	ID 64	303.00	303.00
ID 64	305.50	ID 65	303.10	303.10

STORM STRUCTURE TABLE				
STRUCTURE	RIM EL	STRUCTURE IN	INVERT IN	INVERT OUT
ID 65	305.50	ID 66	303.20	303.20
ID 66	305.50			303.45
ID 67	305.50	ID 67B ID 67A	302.15 302.15	302.15
ID 67A	305.50			302.40
ID 67B	306.50	ID 67C	302.25	302.25
ID 67C	306.50			302.60
ID 71	308.25			305.25
ID 73	307.75			304.75
ID 81	315.00			312.00
ID 83	312.99	ID 83	309.70	309.70
ID 83	311.63			310.50
ID 91	312.28	ID 92	311.15	311.15
ID 92	312.68	ID 93	311.55	311.55
ID 93	315.50			312.50
ID 94	314.50			312.00
MH 18	303.97	CB 19 CB 56	296.75 295.00	294.90
MH 112	299.65	HW 119 DI 113	292.00 294.30	288.33
MH 114	310.28	MH 115A HW 117	301.85 303.00	301.75
MH 115A	313.00	HW 115	309.00	304.00

NOTE: ANY STORM DRAINAGE PIPES INSTALLED IN NON-VIRGIN GROUND REQUIRE ASTM CLASS 1 STRUCTURAL FILL MATERIAL TO THE BOTTOM OF THE PIPE.

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
CB 34	CB 11	287.35	285.00	15	71	3.33%	15" RCP
CB 30	CB 11	283.00	282.00	15	79	1.26%	15" RCP
CB 12	CB 11	287.00	285.80	30	108	1.11%	30" RCP
DI 40	CB 12	288.00	287.10	15	84	1.07%	15" RCP
DI 13	CB 12	289.40	288.90	30	59	0.85%	30" RCP
CB 16	CB 15	292.45	291.00	30	142	1.02%	30" RCP
ID 50	CB 16	296.25	296.10	15	26	0.57%	15" PVC
CB 17	CB 16	293.75	292.55	30	117	1.03%	30" RCP
MH 18	CB 17	294.90	293.85	30	102	1.03%	30" RCP
ID 60	CB 19	301.65	301.45	12	34	0.59%	12" PVC
CB 20	CB 19	298.75	297.90	24	84	1.02%	24" RCP
DI 21	CB 20	299.45	298.85	24	57	1.05%	24" RCP
ID 82	CB 22	309.70	309.60	12	14	0.70%	12" PVC
DI 80	CB 22	304.20	303.40	15	74	1.08%	15" RCP
CB 23	CB 22	306.00	304.30	18	165	1.03%	18" RCP
DI 90	CB 23	306.90	306.10	15	72	1.11%	15" RCP
CB 24	CB 23	308.38	306.10	15	222	1.02%	15" RCP
DI 31	CB 30	286.86	284.00	15	78	3.67%	15" RCP
ID 37	CB 34	291.75	291.45	12	26	1.14%	12" PVC
ID 35	CB 34	290.80	290.25	12	109	0.50%	12" PVC

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
CB 57	CB 56	302.50	301.35	15	85	1.36%	15" RCP
DI 58	CB 57	303.12	302.60	15	54	0.98%	15" RCP
ID 73	CB 72	304.75	303.65	12	102	1.08%	12" PVC
CB 102	CB 101	281.35	279.85	18	75	2.00%	18" RCP
DI 14	DI 13	290.25	289.50	30	92	0.81%	30" RCP
CB 15	DI 14	290.90	290.35	30	35	1.57%	30" RCP
CB 74	DI 21	304.12	303.50	15	57	1.09%	15" RCP
DI 70	DI 21	300.50	299.55	15	93	1.02%	15" RCP
CB 22	DI 21	303.30	301.65	24	164	1.01%	24" RCP
ID 32	DI 31	290.80	290.35	12	86	0.52%	12" PVC
ID 44	DI 40	292.40	291.90	12	96	0.52%	12" PVC
ID 41	DI 40	293.90	293.45	12	88	0.51%	12" PVC
CB 72	DI 70	303.40	303.20	15	31	0.64%	15" PVC
ID 71	DI 70	305.25	304.60	12	58	1.12%	12" PVC
ID 81	DI 80	312.00	311.15	12	79	1.07%	12" PVC
ID 94	DI 90	312.00	311.00	12	97	1.03%	12" PVC
ID 91	DI 90	311.15	310.65	12	89	0.56%	12" PVC
MH 112	DI 111	288.33	286.10	36	223	1.00%	36" RCP
MH 114	DI 113	301.75	299.50	36	182	1.24%	36" RCP
CB 11	FES 10	279.75	279.00	36	59	1.26%	36" RCP

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
CB 101	FES 100	279.55	279.00	18	43	1.28%	18" RCP
DI 111	FES 110	286.00	283.00	36	53	5.67%	36" RCP
MH 114	HW 117	303.00	307.00	30	105	3.82%	30" RCP
MH 112	HW 119	292.00	293.00	36	60	1.66%	36" RCP
ID 33	ID 32	291.75	290.80	12	95	1.00%	12" PVC
ID 36	ID 35	291.75	290.80	12	97	0.98%	12" PVC
ID 42	ID 41	294.30	293.90	12	62	0.64%	12" PVC
ID 43	ID 42	294.75	294.30	12	51	0.88%	12" PVC
ID 45	ID 44	292.75	292.40	12	32	1.11%	12" PVC
ID 46	ID 44	294.90	294.45	12	44	1.03%	12" PVC
ID 47	ID 46	295.75	294.90	12	81	1.06%	12" PVC
ID 51	ID 50	296.85	296.25	15	89	0.67%	15" PVC
ID 52	ID 51	297.15	296.85	15	56	0.53%	15" PVC
ID 53	ID 52	297.30	297.15	15	24	0.62%	15" PVC
ID 54	ID 53	301.00	297.30	15	48	7.74%	15" PVC
ID 54	ID 55	301.00	302.00	12	17	5.95%	12" RCP
ID 56	ID 55	303.00	302.00	12	28	3.62%	12" PVC
ID 53	ID 57	297.30	298.10	12	80	1.00%	12" RCP
ID 61	ID 60	302.00	301.65	12	54	0.65%	12" PVC
ID 67	ID 61	302.15	302.00	12	21	0.70%	12" PVC

PIPE SCHEDULE							
UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM INVERT	SIZE (IN)	LENGTH (FT)	SLOPE	MATERIAL
ID 61	ID 62	302.00	302.30	12	57	0.53%	12" PVC
ID 62	ID 63	302.30	303.00	12	82	0.86%	12" PVC
ID 63	ID 64	303.00	303.10	12	20	0.50%	12" RCP
ID 64	ID 65	303.10	303.20	12	16	0.63%	12" RCP
ID 65	ID 66	303.20	303.45	12	24	1.06%	12" RCP
ID 67	ID 67A	302.15	302.40	12	22	1.14%	12" RCP
ID 67	ID 67B	302.15	302.25	12	18	0.55%	12" RCP
ID 67B	ID 67C	302.25	302.60	12	30	1.19%	12" RCP
ID 83	ID 82	310.50	309.70	12	72	1.12%	12" PVC
ID 92	ID 91	311.55	311.15	12	81	0.49%	12" PVC
ID 93	ID 92	312.50	311.55	12	88	1.08%	12" PVC
CB 56	MH 18	295.85	295.00	15	82	1.04%	15" RCP
CB 19	MH 18	297.80	296.75	24	102	1.03%	24" RCP
DI 113	MH 112	299.40	294.30	36	245	2.09%	36" RCP
MH 115A	MH 114	304.00	301.85	18	206	1.04%	18" RCP
HW 115	MH 115A	312.00	309.00	18	45	6.61%	18" RCP

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: K.A. JAW 3/24/17
STORMWATER: N/A
PLANNING/ENGINEERING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

EROSION CONTROL AND STORM DRAINAGE NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
- BOUNDARY SURVEY PERFORMED BY WITHERSRAVENEL.
- WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERSRAVENEL.
- THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 3720175A001, 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 THE PLANS 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 10 TO 24 INCH PIPE, ONE-THIRD THE PIPE DIAMETER FOR 30 - 48 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 BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
- A PRECONSTRUCTION MEETING SHALL 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 UDD OR NC 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, SO 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 6.3).
- CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING 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 (SHEET 9.3) 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.
- 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 THIS SHEET).

Flowrate to Basin #1:

Basin Drainage Area "A": 8.13 AC

Runoff Coefficient "C":
 Disturbed earth = 0.15 AC @ C = 0.50
 Undisturbed, wooded areas = 0.00 AC @ C = 0.25
 Undisturbed, grassy areas = 0.00 AC @ C = 0.30
 Other areas = 0.00 AC @ C = 0.95

Composite C value = 0.50

Rainfall Intensity "I": $I = g/(h+T)$

Time of Concentration (Tc) Kirpich equation: $T_c = (L^2/1480) * 0.385$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

$T_c = 1.60$ min minimum = 5 min

$I = 7.22$ in/hr

Flow "Q = CIA" = **29.35 cfs**

Sediment Basin Summary

Bottom Width = 75 ft
 Bottom Length = 210 ft
 Top Width = 95 ft
 Top Length = 231 ft
 Storage Depth = 2 ft
 Dam Height = 3.5 ft
 Sideslopes = 3 :1

Sediment Basin Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 14,634 cf
 Surface Area Required = 12,787 sf

Shape is assumed to be Trapezoidal - excavation may be required

Depth of Basin = 2 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 75 ft
 Bottom Length = 210 ft

Surface Width = 87 ft
 Surface Length = 222 ft
 Bottom Area = 15750 sf

Volume Provided = 35,064 cf OK
 Surface Area Provided = 19,314 sf OK

Spillway Design - Skimmer Outlet

Volume Required = 14,634 cf
 Discharge per day (Qd) = 4878 cfs/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gh)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s^2
 Desired orifice Dia. (D) = 2.96 in
 Skimmer Size = 3 in
 Head on Skimmer = 0.25 ft
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
 Required Capacity = 29.35 cfs

Discharge capacity of stone outlet:
 $C = 3$
 Bottom Width (L) = 28 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

Basin Weir Eq'n: $Q = C * L * h^{1.5}$
 Provided Capacity = 29.70 cfs OK

Flowrate to Basin:

Basin Drainage Area "A": 4.10 AC

Runoff Coefficient "C":
 Disturbed earth = 4.10 AC @ C = 0.50
 Undisturbed, wooded areas = 0.00 AC @ C = 0.25
 Undisturbed, grassy areas = 0.00 AC @ C = 0.30
 Other areas = 0.00 AC @ C = 0.95

Composite C value = 0.50

Rainfall Intensity "I": $I = g/(h+T)$

Time of Concentration (Tc) Kirpich equation: $T_c = (L^2/1480) * 0.385$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

$T_c = 1.60$ min minimum = 5 min

$I = 7.22$ in/hr

Flow "Q = CIA" = **14.80 cfs**

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf
 Discharge per day (Qd) = 2460 cfs/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gh)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s^2
 Desired orifice Dia. (D) = 1.28 in
 Skimmer Size = 6 in
 Head on Skimmer = 0.417 ft
 Orifice Size = 1.25 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Sediment Basin #2 Summary

Bottom Width = 53 ft
 Bottom Length = 315 ft
 Top Width = 80 ft
 Top Length = 342 ft
 Storage Depth = 3 ft
 Dam Height = 4.5 ft
 Sideslopes = 3 :1

Sediment Basin #2 Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 7,380 cf
 Surface Area Required = 6,438 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 3 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 53 ft (try to be 2X width)
 Bottom Length = 315 ft

Surface Width = 71 ft
 Surface Length = 333 ft
 Bottom Area = 16695 sf

Volume Provided = 68,007 cf OK
 Surface Area Provided = 23,643 sf OK

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf
 Discharge per day (Qd) = 2460 cfs/day (assume 3 days)

Orifice Eq'n: $Q = Cd * (pi/4) * D^2 * SQRT(2gh)$

Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s^2
 Desired orifice Dia. (D) = 1.28 in
 Skimmer Size = 6 in
 Head on Skimmer = 0.417 ft
 Orifice Size = 1.25 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
 Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:
 $C = 3$
 Bottom Width (L) = 14 ft min = 10ft
 Depth of flow (h) = 0.5 ft (1" added for larger storms)

Basin Weir Eq'n: $Q = C * L * h^{1.5}$
 Provided Capacity = 14.85 cfs OK

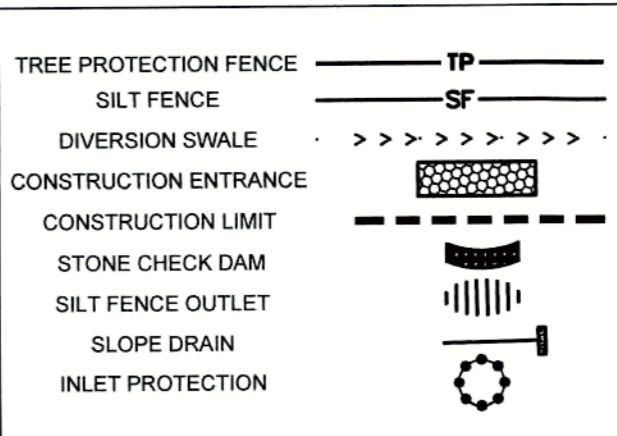
Temporary Diversion Ditch Sizing and Lining Calculations

Rainfall Intensity $I_{10yr} = 7.08$ in/hr

Location	Rational C	Drainage Area (ac)	Q _{10yr} (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lb/ft ²)	Calculated Velocity (ft/s)	Type of Lining
Basin #1 East	0.50	0.54	1.91	0.1	0.02	0.06	0.64	NAG S75
Basin #1 West	0.50	0.14	21.74	1.4	0.02	0.79	6.17	NAG C125
Basin #2 East	0.50	0.97	2.92	0.2	0.12	0.27	0.81	NAG S75
Basin #2 West	0.50	1.32	4.67	1.6	0.06	0.66	2.13	NAG S75
Stockpile Area Basin	0.50	2.90	10.44	2.2	0.07	1.18	3.19	NAG S75

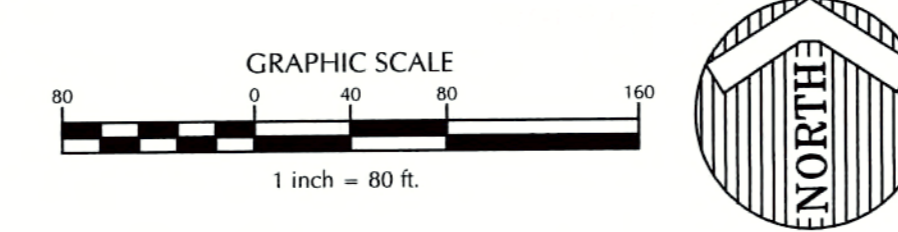
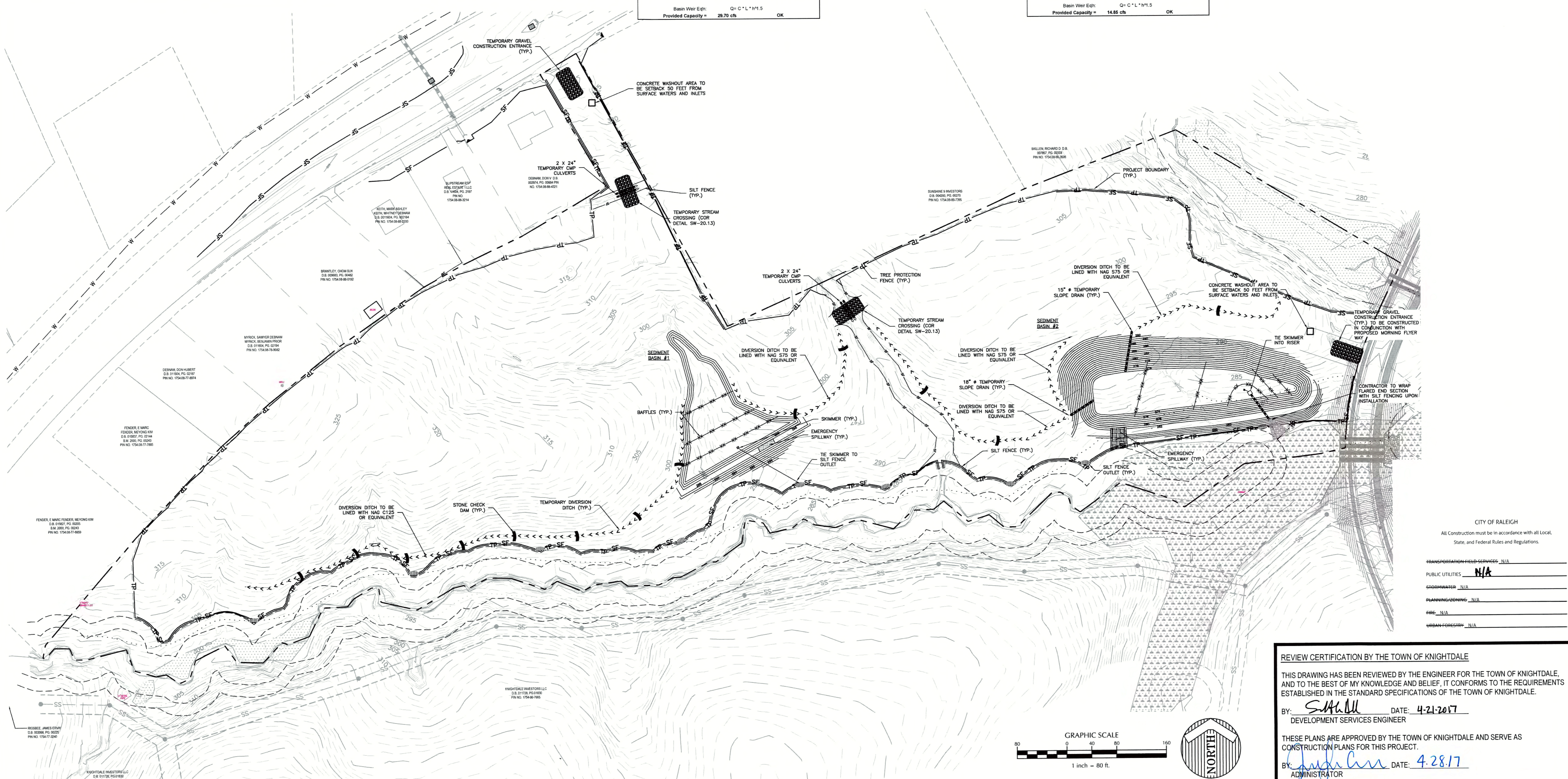
NOTES:
 All ditches are to be trapezoidal in shape: 2:1 sideslopes, bottom width of 2.0', and height of 1.0'
 Calculated Depth and Calculated Velocity Based on Erosion Output
 NAG S75: North American Green S75 or approved equal
 NAG C125: North American Green C125 or approved equal

EROSION CONTROL LEGEND



PHASE 1 CONSTRUCTION SEQUENCE:

- SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE WATERSHED MANAGER, DEBRA TANNER, 919-842-7142. OBTAIN A LAND DISTURBING PERMIT.
- INSTALL GRAVEL CONSTRUCTION PAD, TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS OR OTHER MEASURES AS SHOWN ON THE APPROVED PLAN. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. SEED TEMPORARY DIVERSIONS, BERMS AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
- CALL DEBRA TANNER, 919-842-7142 FOR AN ON-SITE INSPECTION BY THE WATERSHED MANAGER TO OBTAIN A CERTIFICATE OF COMPLIANCE.
- BEGIN CLEARING AND GRUBBING. MAINTAIN DEVICES AS NEEDED. WHEN COMPLETE, BEGIN PHASE 2 EROSION CONTROL SEQUENCE.



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S. Hall* DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: *John Cox* DATE: 4-28-17
 ADMINISTRATOR

WithersRavenel
 Engineers | Planners

131 S.W. Wilmington Street | Raleigh, NC 27601 | 1-919-469-3340 | license # C-0852 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

EROSION CONTROL PH. 1

Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR

CITY OF RALEIGH
 All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: N/A
 GEOTECHNICAL: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

Revisions:
 1 PER TOK COMMENTS 09/09/16
 2 PER WAKE COMMENTS 11/15/16
 3 PER TOK COMMENTS 12/28/16
 4 PER TOK COMMENTS 03/01/17

Sheet No. **4.0**

K:\16-00016\02160032-Knightdale Cottages\CD\14 - EROSION CONTROL PH.1.dwg, Saturday, March 11, 2017 3:23:14 PM - TOWNSEND, CHARLIE

EROSION CONTROL AND STORM DRAINAGE NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS & DETAILS.
- BOUNDARY SURVEY PERFORMED BY WITHERSRAVENEL.
- WETLANDS AND STREAM BUFFERS DELINEATED AND SURVEYED BY WITHERSRAVENEL.
- THIS PROPERTY DOES NOT LIE WITHIN THE FEMA FLOODPLAIN PER MAP NUMBER 320217500J, WITH AN EFFECTIVE DATE OF MAY 2, 2009.
- 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 THE PLANS 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 NON TRAFFIC AREAS.
- 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, 48 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 DISCHARGE PAD AND THE NATURAL GROUND.
- STORM PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS.
- A PRECONSTRUCTION MEETING SHALL 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 UDO OR NC 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 STREETS CAPES, THE CONTRACTOR SHALL CUT MINIMUM 2 TRENCHES ALONG LIMITS OF DISTURBANCE, SO 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 6.3.
- CONTRACTOR SHALL INSTALL PROPER EROSION CONTROL MEASURES TO ENSURE THAT SEDIMENTATION DURING 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 (SHEET 3.3) 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.
- 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 THIS SHEET).

Flowrate to Basin #1:

Flowrate Q = CIA

Basin Drainage Area "A": 8.13 AC

Runoff Coefficient "C":
 Disturbed earth = 0.13 AC @ c= 0.50
 Undisturbed, wooded areas = 0.00 AC @ c= 0.25
 Undisturbed, grassy areas = 0.00 AC @ c= 0.30
 Other areas = 0.00 AC @ c= 0.95

Composite C value = 0.50

Rainfall Intensity "I": (g/(h*T))

Time of Concentration (Tc) Kirpich equation: $T_c = (L^3/H)^{0.385} / 128$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

Tc = 1.60 min minimum = 5 min

$I = 7.22$ in/hr

Flow "Q" = CIA = 29.35 cfs

Sediment Basin Summary

Bottom Width = 75 ft
 Bottom Length = 210 ft
 Top Width = 96 ft
 Top Length = 231 ft
 Storage Depth = 2 ft
 Dam Height = 3.5 ft
 Sideslopes = 3 :1

Sediment Basin Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 14,634 cf
 Surface Area Required = 12,767 sf

Shape is assumed to be Trapezoidal - excavation may be required

Depth of Basin = 2 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 75 ft
 Bottom Length = 210 ft

Surface Width = 87 ft
 Surface Length = 222 ft
 Bottom Area = 15750 sf

Volume Provided = 35,064 cf OK
 Surface Area Provided = 19,314 sf OK

Spillway Design - Skimmer Outlet

Volume Required = 14,634 cf
 Discharge per day (Qd) = 4878 cf/day (assume 3 days)

Orifice Eqn: $Q = Cd \cdot (pi/4) \cdot D^2 \cdot \sqrt{2g \cdot H}$
 Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 2.06 in
 Skimmer Size = 3 in
 Head on Skimmer = 0.25 ft
 Orifice Size = 2 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
 Required Capacity = 29.35 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 26 ft min = 10ft
 Depth of flow (h) = 0.5 ft (*1 added for larger storms)

Basin Weir Eqn: $Q = C \cdot L \cdot H^{1.5}$
 Provided Capacity = 29.70 cfs OK

Flowrate to Basin #2:

Flowrate Q = CIA

Basin Drainage Area "A": 4.10 AC

Runoff Coefficient "C":
 Disturbed earth = 4.10 AC @ c= 0.50
 Undisturbed, wooded areas = 0.00 AC @ c= 0.25
 Undisturbed, grassy areas = 0.00 AC @ c= 0.30
 Other areas = 0.00 AC @ c= 0.95

Composite C value = 0.50

Rainfall Intensity "I": (g/(h*T))

Time of Concentration (Tc) Kirpich equation: $T_c = (L^3/H)^{0.385} / 128$

Flow Length (L) = 324 ft
 High Point = 305 ft
 Low Point = 271 ft
 Change in elevation of drainage area (H) = 34 ft

Tc = 1.60 min minimum = 5 min

$I = 7.22$ in/hr

Flow "Q" = CIA = 14.80 cfs

Sediment Basin #2 Summary

Bottom Width = 53 ft
 Bottom Length = 315 ft
 Top Width = 80 ft
 Top Length = 342 ft
 Storage Depth = 3 ft
 Dam Height = 4.5 ft
 Sideslopes = 3 :1

Sediment Basin #2 Volume

Minimum Required Volume = 1800 cfs/acre drainage area per year
 Minimum Required Surface Area = 435 sqft/cfs of Q10 peak inflow

Volume Required = 7,380 cf
 Surface Area Required = 6,438 sf

Shape is assumed to be trapezoidal - excavation may be required

Depth of Basin = 3 ft
 Sideslopes = 3 :1 (2:1 minimum)
 Bottom Width = 53 ft
 Bottom Length = 315 ft (try to be 2X width)

Surface Width = 71 ft
 Surface Length = 333 ft
 Bottom Area = 16950 sf

Volume Provided = 60,507 cf OK
 Surface Area Provided = 23,643 sf OK

Spillway Design #2 - Skimmer Outlet

Volume Required = 7,380 cf
 Discharge per day (Qd) = 2460 cf/day (assume 3 days)

Orifice Eqn: $Q = Cd \cdot (pi/4) \cdot D^2 \cdot \sqrt{2g \cdot H}$
 Orifice Coefficient (Cd) = 0.6
 Gravitational constant (g) = 32.2 ft/s²
 Desired orifice Dia. (D) = 3.26 in
 Skimmer Size = 6 in
 Head on Skimmer = 0.417 ft
 Orifice Size = 1.25 in (1/4 inch increments)
 Dewatering Time (days) = 3.2 (Suggest about 3 days)

Emergency Spillway Design

Required Capacity = Peak Flow from a 10 yr storm event
 Required Capacity = 14.80 cfs

Discharge capacity of stone outlet:
 C = 3
 Bottom Width (L) = 14 ft min = 10ft
 Depth of flow (h) = 0.5 ft (*1 added for larger storms)

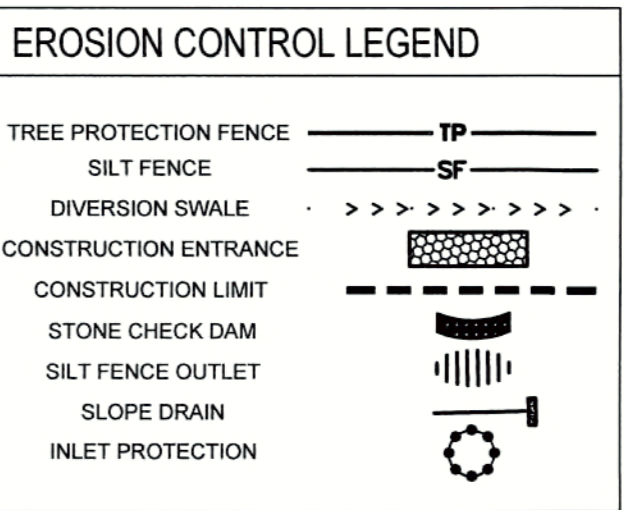
Basin Weir Eqn: $Q = C \cdot L \cdot H^{1.5}$
 Provided Capacity = 14.85 cfs OK

Temporary Diversion Ditch Sizing and Lining Calculations

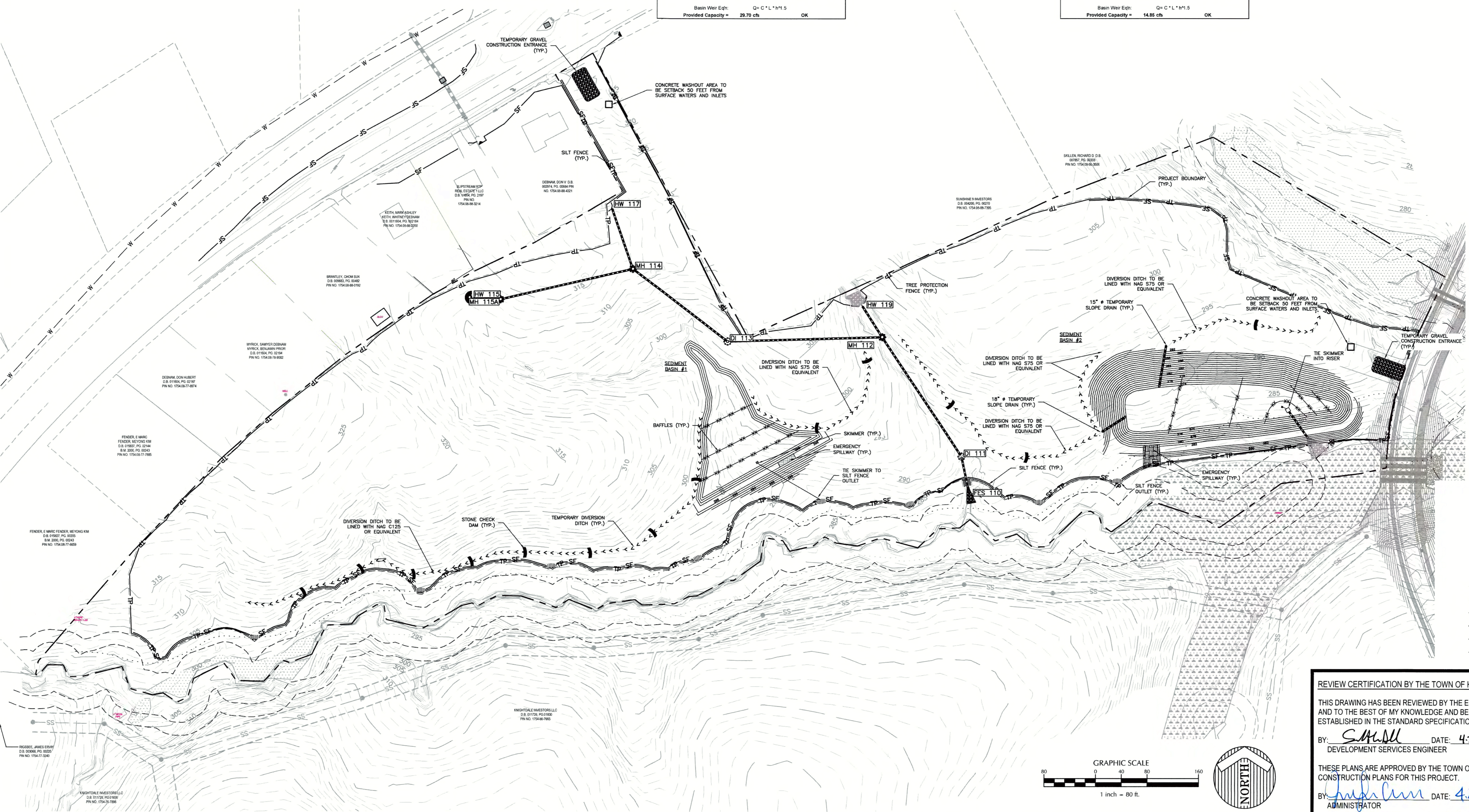
Rainfall Intensity (I_{10yr}) = 7.08 in/hr

Location	Rational C	Drainage Area (ac)	Q _{10yr} (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lb/ft ²)	Calculated Velocity (ft/s)	Type of Lining
Basin #1 East	0.50	0.54	1.81	0.1	0.83	0.18	0.64	NAG S75
Basin #1 West	0.50	6.14	21.74	1.4	0.92	0.79	6.17	NAG C125
Basin #2 East	0.50	0.67	2.02	0.2	0.72	0.07	0.81	NAG S75
Basin #2 West	0.50	1.32	4.67	1.6	0.89	0.86	2.13	NAG S75
Stockpile Area Basin	0.50	2.89	10.44	2.2	0.97	1.18	3.19	NAG S75

NOTE: All ditches are to be trapezoidal in shape, 2:1 sideslopes, bottom width of 2'0", and height of 1'0".
 Calculated Depth and Calculated Velocity Based on Erosion Output
 NAG S75: North American Green S75 or approved equal
 NAG C125: North American Green C125 or approved equal



- PHASE 2 CONSTRUCTION SEQUENCE:**
- INSTALL CLEAN WATER BYPASS PIPE SYSTEMS: FES 110 - HW 118, MH 112 TO HW117/HW115
 - PROCEED WITH GRADING OPERATIONS.
 - MAINTAIN DEVICES.



CITY OF RALEIGH
 All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: N/A
 STORMWATER: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

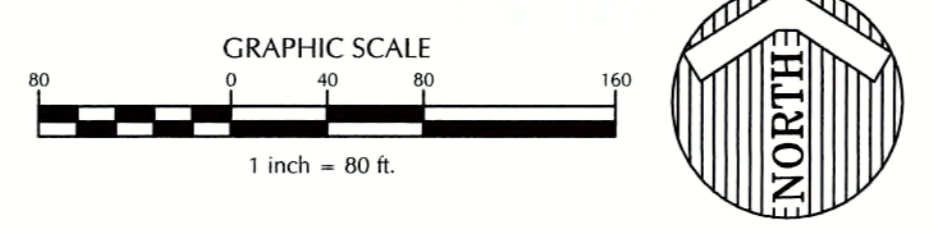
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S.M.H.* DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4-28-17
 ADMINISTRATOR



Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR

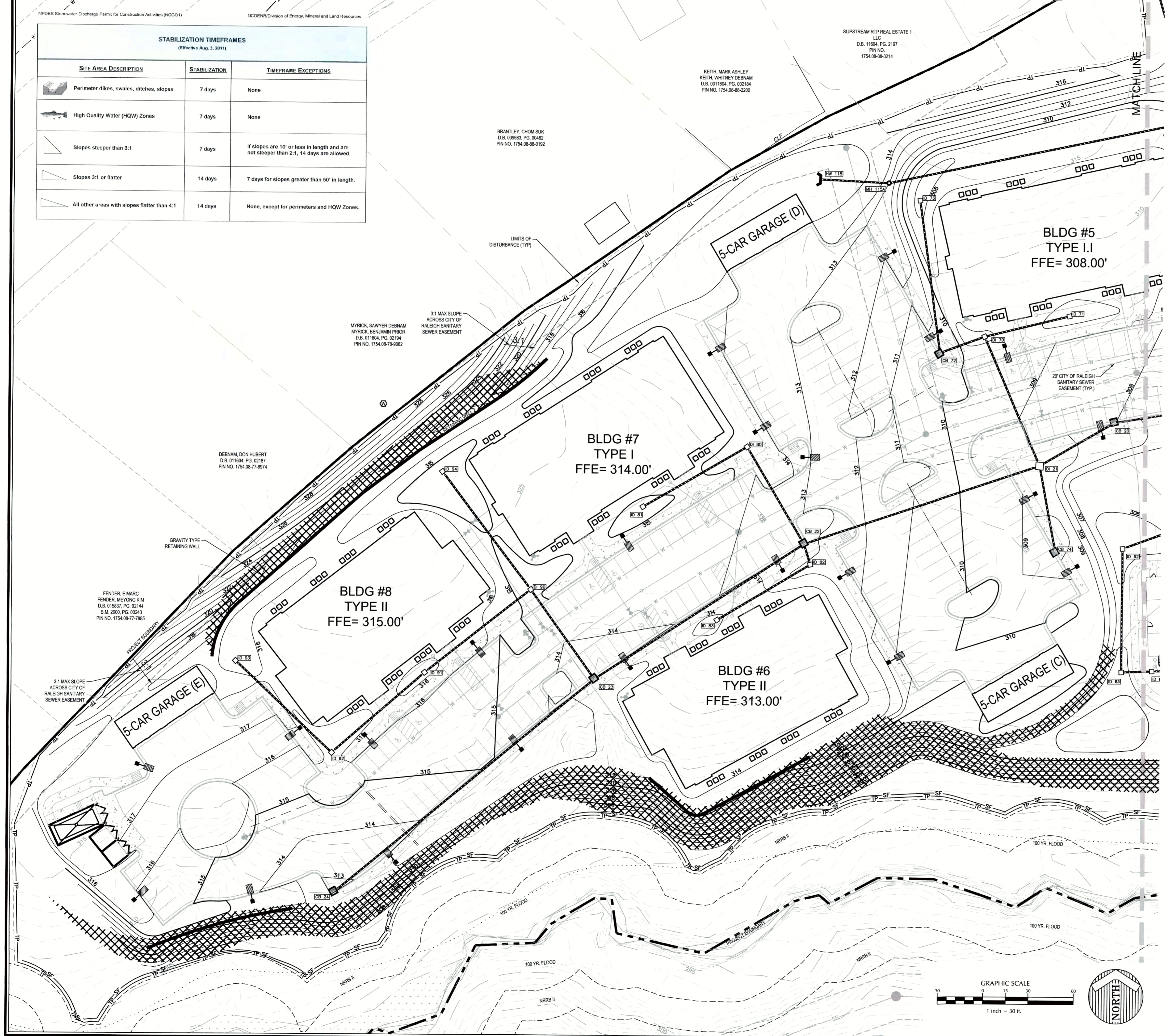
PROFESSIONAL SEAL
 NORTH CAROLINA
 13039
 ENGINEER
 GLENN SMITH

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No.
4.1

STABILIZATION TIMEFRAMES (Effective Aug. 3, 2011)		
SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, 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 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.



RETAINING WALL NOTES:
 1. THE RETAINING WALL INFORMATION SHOWN ON THESE PLANS IS FOR GENERAL LOCATION AND GENERAL DIMENSIONS ONLY. WITHERSRAVENEL IS NOT RESPONSIBLE FOR THE DESIGN, PERMITTING, INSPECTION OR CONSTRUCTION CERTIFICATION OF ANY RETAINING WALLS SHOWN ON THESE PLANS. RETAINING WALLS SHALL BE CONSTRUCTED BY PLANS PREPARED SEPARATELY FOR THE OWNER BY OTHER CONSULTANTS. WITHERSRAVENEL ACCEPTS NO LIABILITY FOR SUCH PLANS.
 2. GEOGRIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.



DEBNAM, DON HUBERT
 D.B. 011694, PG. 02187
 PIN NO. 1754.08-77-8974

MYRICK, SAWYER DEBNAM
 MYRICK, BENJAMIN PRICK
 D.B. 011694, PG. 02184
 PIN NO. 1754.08-78-9082

BRANTLEY, CHOM SUK
 D.B. 009683, PG. 00482
 PIN NO. 1754.08-88-0192

KEITH, MARK ASHLEY
 KEITH, WHITNEY DEBNAM
 D.B. 0011694, PG. 002184
 PIN NO. 1754.08-88-2200

SLIPSTREAM RTP REAL ESTATE 1
 LLC
 D.B. 11694, PG. 2197
 PIN NO.
 1754.08-88-3214

FENDER, E MARC
 FENDER, MEYONG KIM
 D.B. 015837, PG. 02144
 B.M. 2000, PG. 00263
 PIN NO. 1754.08-77-7885

CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: N/A
 STORMWATER: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

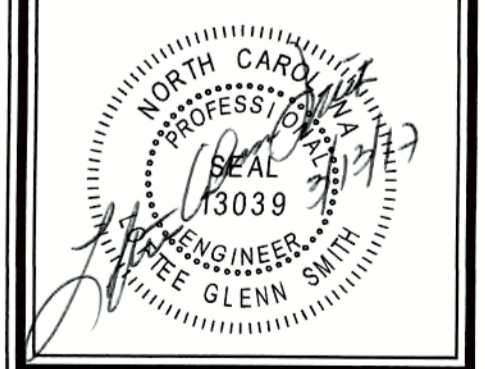
WithersRavenel
 Engineers | Planners

131 1/2 Wilmington Street | Raleigh, NC 27601 | P: 919-469-3340 | License #: C-08203 | www.withersravenel.com

**THE COTTAGES AT
 KNIGHTDALE STATION**
 KNIGHTDALE, NORTH CAROLINA

**NPDES STABILIZATION
 PLAN - WEST**

Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR



Revisions

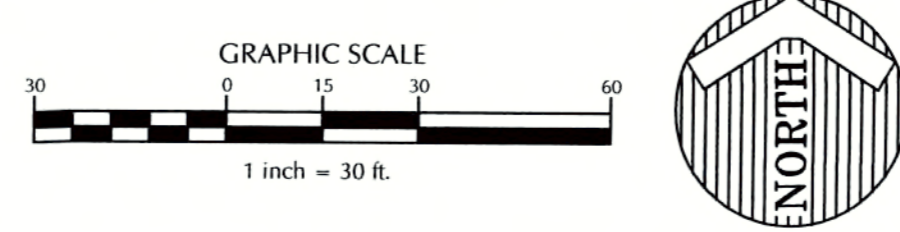
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
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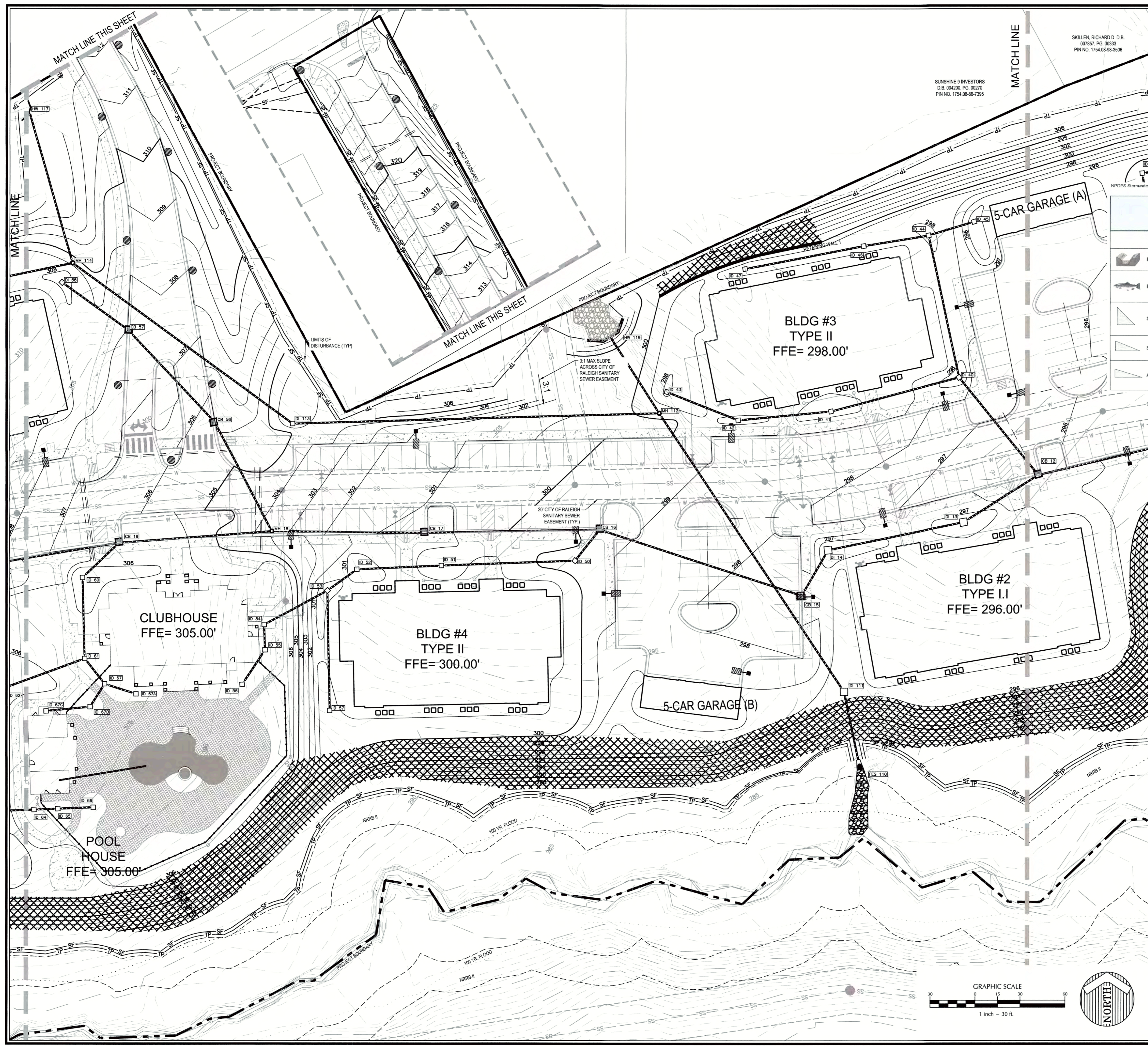
BY: S.M. DU DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
 ADMINISTRATOR



K:\1616-0000\160003\160003.dwg:npdes-stabilization-plan-west.dwg, Monday, March 13, 2017 5:53:58 PM - TOWNSEND, CHAMBLE

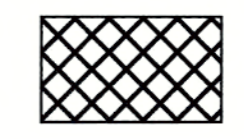


SKILLEN, RICHARD D. D.B.
007857, PG. 00233
PIN NO. 1754.08-88-3506

SUNSHINE 9 INVESTORS
D.B. 084200, PG. 00270
PIN NO. 1754.08-88-7955

RETAINING WALL NOTES:

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2. GEOGRIDS ARE NOT ALLOWED WITHIN CITY OF RALEIGH SANITARY SEWER EASEMENT, USE GRAVITY TYPE RETAINING WALL.



AREA TO BE STABILIZED WITHIN 7 DAYS

STABILIZATION TIMEFRAMES (Effective Aug. 3, 2011)		
SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, 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 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

NPDES Stormwater Discharge Permit for Construction Activities (NC001)

NC DENR/Division of Energy, Mineral and Land Resources

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



Revisions	DATE
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
GEOTECHNICAL: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

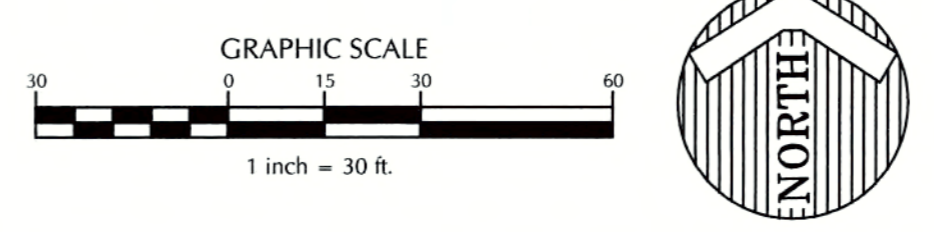
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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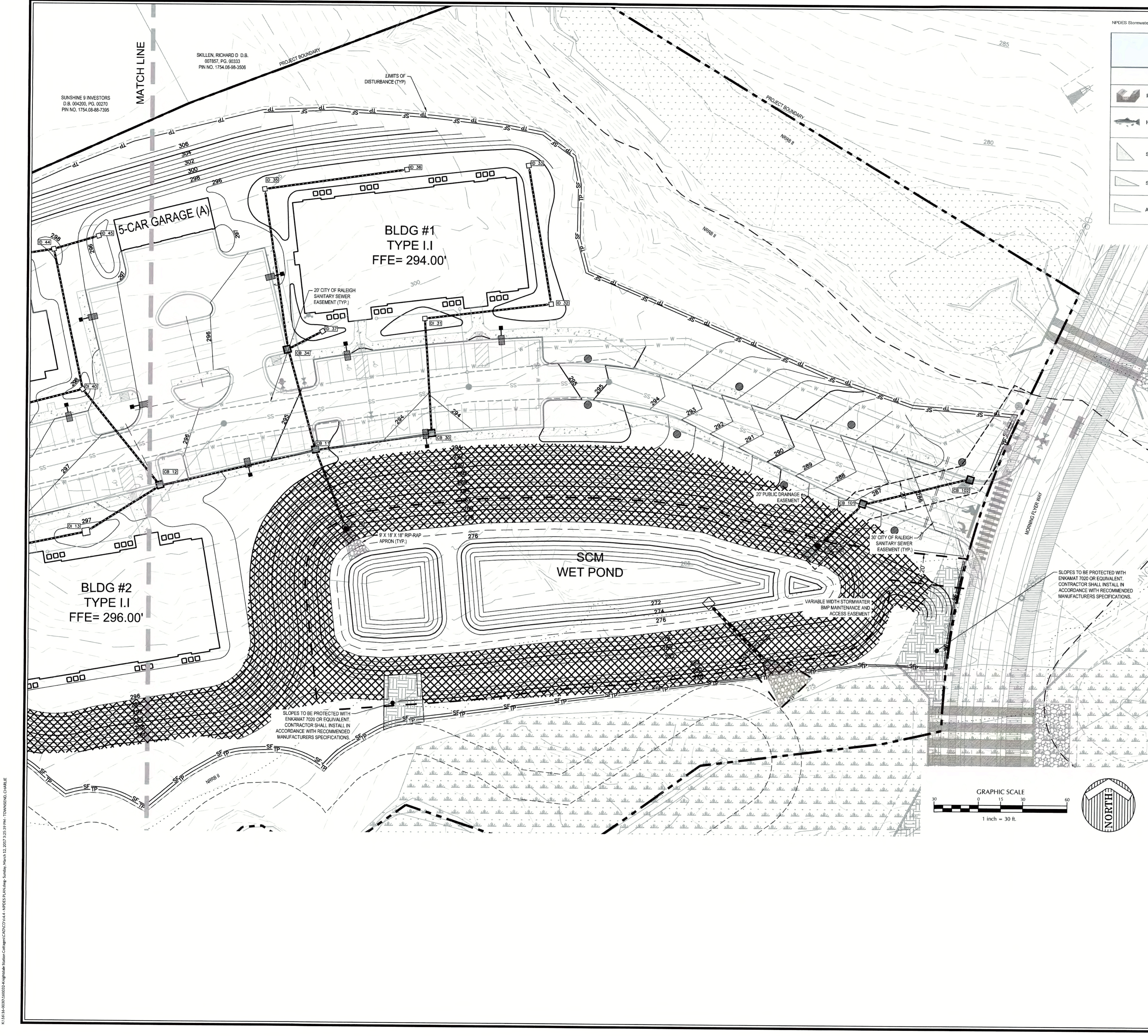
BY: SAW DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR



K:\1616\0001\0002\2-Knightdale Station Cottages\CACT\164-1-NPDES PLAN.dwg Sunday, March 12, 2017 3:25:38 PM TOWN OF KNIGHTDALE



NPDES Stormwater Discharge Permit for Construction Activities (NCGO1)

NCDENR/Division of Energy, Mineral and Land Resources

STABILIZATION TIMEFRAMES (Effective Aug. 3, 2011)		
SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, 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 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

AREA TO BE STABILIZED WITHIN 7 DAYS

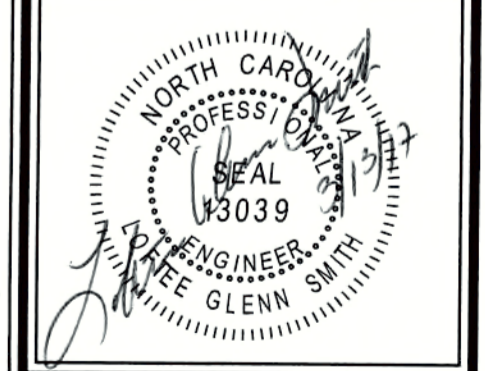
NOTE: REFER TO SHEET L1.3 FOR BMP PLANTING & STABILIZATION SCHEDULE

**THE COTTAGES AT
KNIGHTDALE STATION**

KNIGHTDALE, NORTH CAROLINA

**NPDES STABILIZATION
PLAN - EAST**

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

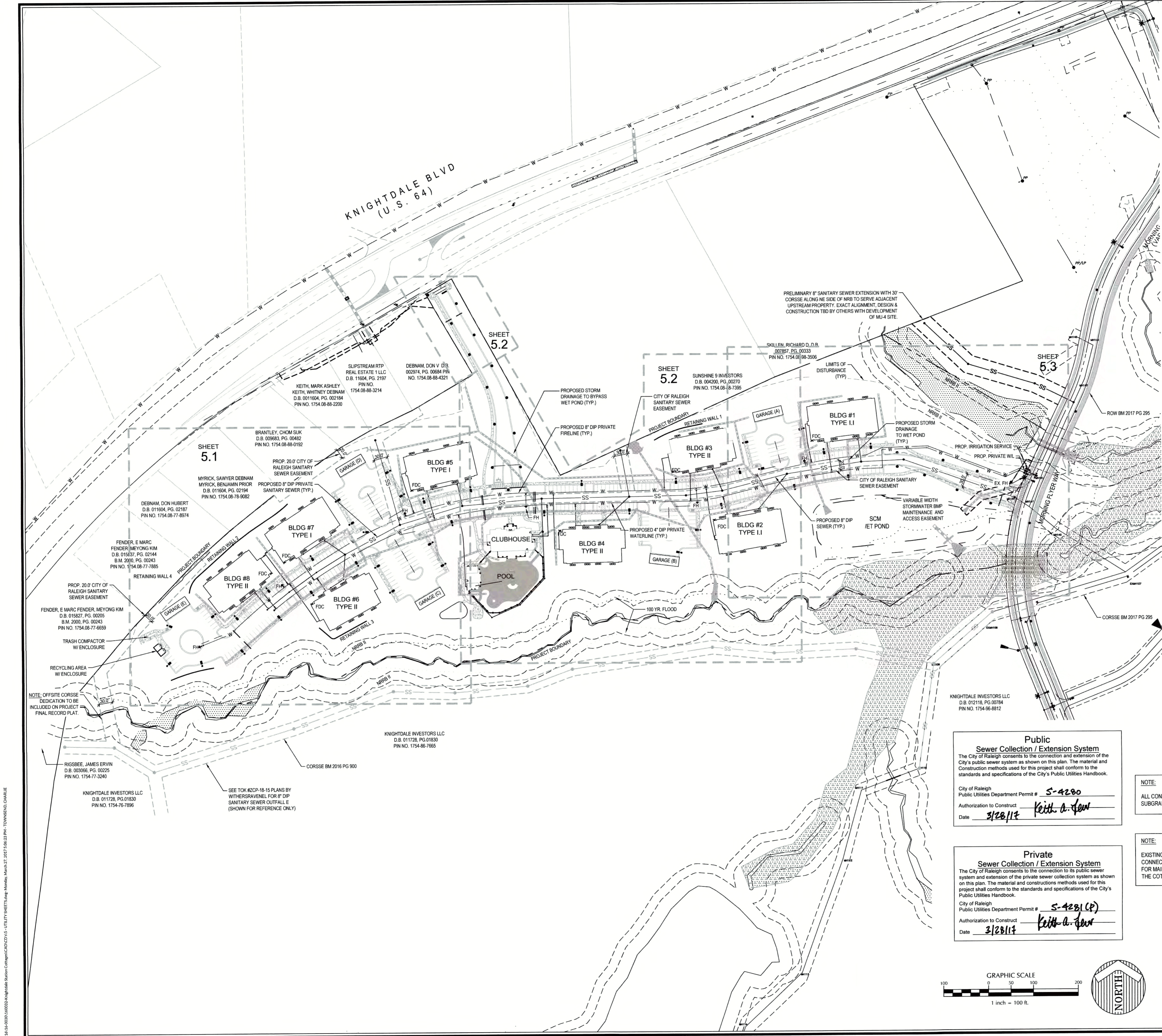
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By: S. A. Hill DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

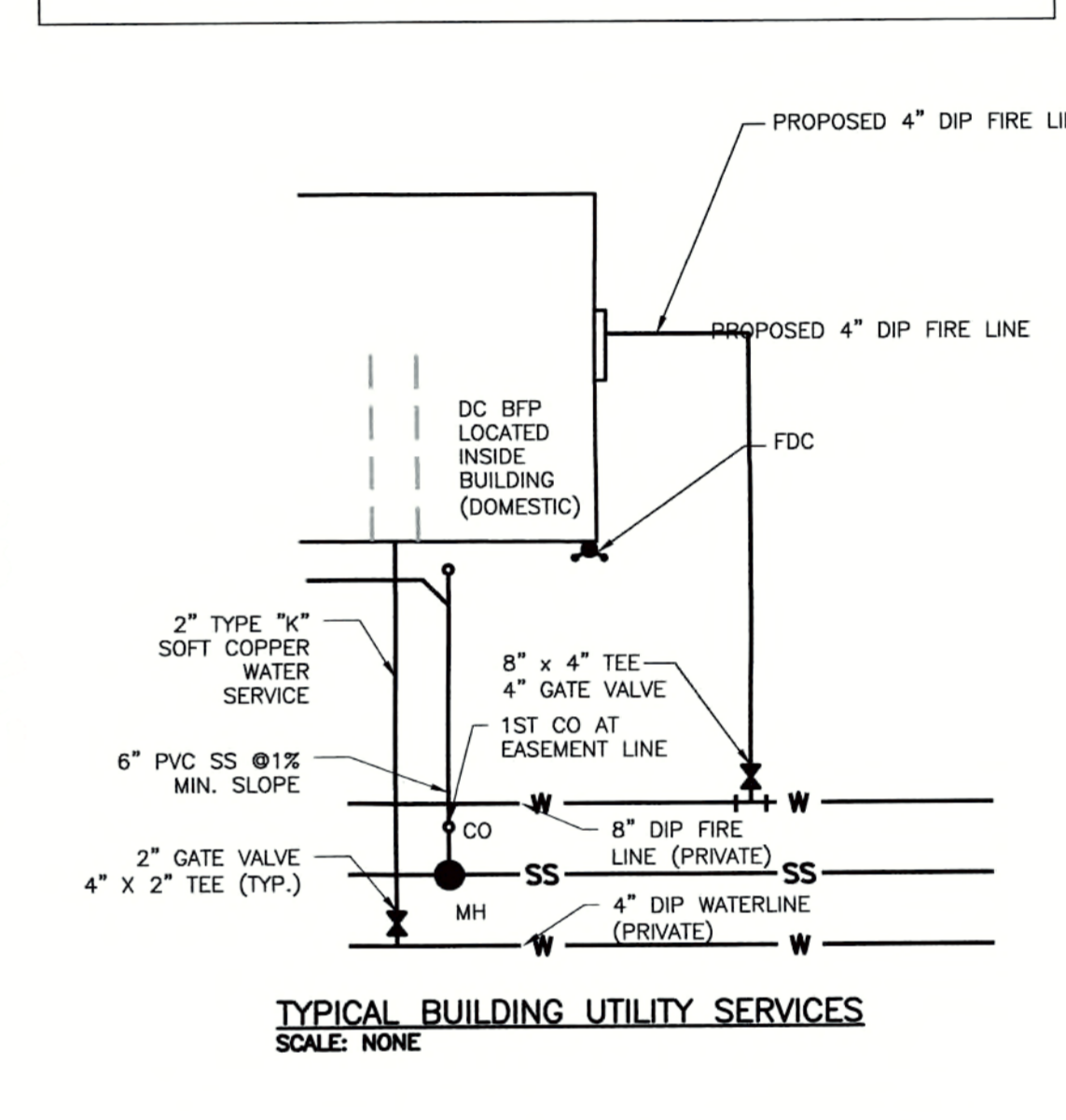
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

By: [Signature] DATE: 4-28-17
ADMINISTRATOR

K:\1614-00001\00001\Knpdes\Station Cottages\CD\1614 - NPDES PLAN - East.dwg, Sunday, March 12, 2017 2:53:39 PM, TOWNSEND, CHARLE



- STANDARD UTILITY NOTES (AS APPLICABLE):**
1. ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS REFERENCE: CORPUS HANDBOOK, CURRENT EDITION.
 2. UTILITY SEPARATION REQUIREMENTS:
 - a) 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, PERIODIC SANITARY SEWER PIPES 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.
 - b) WHEN INSTALLING WATER & RCP SEWER MAINS, THE HORIZONTAL SEPARATION BETWEEN UTILITIES SHALL BE 10'. IF THIS SEPARATION CANNOT BE MAINTAINED DUE TO EXISTING CONDITIONS, THE VARIATION ALLOWED IS THE WATER MAIN IN A SEPARATE TRENCH WITH THE ELEVATION OF THE WATER MAIN AT LEAST 18" ABOVE THE TOP OF THE SEWER & MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR.
 - c) WHERE IT IS IMPOSSIBLE TO OBTAIN PROPER SEPARATION, OR ANYTIME A SANITARY SEWER PASSES OVER A WATERMAIN, DIP MATERIALS OR STEEL ENCASUREMENT EXTENDED 12" ON EACH SIDE OF CROSSING MUST BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS.
 - d) 50' MINIMUM HORIZONTAL SEPARATION IS REQUIRED BETWEEN ALL SANITARY SEWER & STORM SEWER FACILITIES, UNLESS DIP MATERIAL IS SPECIFIED FOR SANITARY SEWER.
 - e) MAINTAIN 6" MIN. VERTICAL SEPARATION AT ALL WATERMAIN & RCP STORM DRAIN CROSSINGS; MAINTAIN 24" MIN. VERTICAL SEPARATION AT ALL SANITARY SEWER & RCP STORM DRAIN CROSSINGS. WHERE ADEQUATE SEPARATIONS CANNOT BE ACHIEVED, SPECIFY DIP MATERIALS & A CONCRETE CRADLE HAVING 6" MIN. CLEARANCE (PER CORPUS DETAILS W-41 & S-49).
 - f) ALL OTHER UNDERGROUND UTILITIES SHALL CROSS WATER & SEWER FACILITIES WITH 18" MIN. VERTICAL SEPARATION REQUIRED.
 3. ANY NECESSARY FIELD REVISIONS ARE SUBJECT TO REVIEW & APPROVAL OF AN AMENDED PLAN &/OR PROFILE BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT PRIOR TO CONSTRUCTION.
 4. CONTRACTOR SHALL MAINTAIN CONTINUOUS WATER & SEWER SERVICE TO EXISTING RESIDENCES & BUSINESSES THROUGHOUT CONSTRUCTION OF PROJECT. ANY NECESSARY SERVICE INTERRUPTIONS SHALL BE PRECEDED BY A 24 HOUR ADVANCE NOTICE TO THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT.
 5. 3.0' MINIMUM COVER IS REQUIRED ON ALL WATER MAINS & SEWER FORCE MAINS; 4.0' MINIMUM COVER IS REQUIRED ON ALL REUSE MAINS.
 6. IT IS THE DEVELOPER'S RESPONSIBILITY TO ABANDON OR REMOVE EXISTING WATER & SEWER SERVICES NOT BEING USED IN REDEVELOPMENT OF A SITE UNLESS OTHERWISE DIRECTED BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT. THIS INCLUDES ABANDONING TAP AT MAIN & REMOVAL OF SERVICE FROM ROW OR EASEMENT PER CORPUS HANDBOOK PROCEDURES.
 7. INSTALL 4" DIP WATER SERVICE WITH WETTER LOCATED AT ROW OR WITHIN A 2' Z' WATERLINE EASEMENT IMMEDIATELY ADJACENT. NOTE: IT IS THE APPLICANT'S RESPONSIBILITY TO PROPERLY SIZE THE WATER SERVICE FOR EACH CONNECTION TO PROVIDE ADEQUATE FLOW & PRESSURE.
 8. INSTALL 4" PVC SEWER SERVICES @ 1% MINIMUM GRADE WITH CLEANOUTS LOCATED AT ROW OR EASEMENT LINE & SPACED EVERY 75' LINEAR FEET MAXIMUM.
 9. PRESSURE REDUCING VALVES ARE REQUIRED ON ALL WATER SERVICES EXCEEDING 80 PSI. BACKFLOW VALVES ARE REQUIRED ON ALL SANITARY SEWER SERVICES HAVING BUILDING DRAINS LOWER THAN 12" ABOVE THE NEXT UPSTREAM MANHOLE.
 10. ALL ENVIRONMENTAL PERMITS APPLICABLE TO THE PROJECT MUST BE OBTAINED FROM NCDOUG, USACE, & OR FEMA FOR ANY RIPARIAN BUFFER, WETLAND & OR FLOODPLAIN IMPACTS (RESPECTIVELY) PRIOR TO CONSTRUCTION.
 11. NCDOT (RALEIGH) ENCROACHMENT AGREEMENTS ARE REQUIRED FOR ANY UTILITY WORK (INCLUDING MAIN EXTENSIONS & SERVICE TAPS) WITHIN STATE OR RALEIGH ROW PRIOR TO CONSTRUCTION.
 12. GREASE INTERCEPTOR / OIL WATER SEPARATOR SIZING CALCULATIONS & INSTALLATION SPECIFICATIONS SHALL BE APPROVED BY THE CORPUS PROGRAM COORDINATOR PRIOR TO ISSUANCE OF A BUILDING PERMIT. CONTACT TM.BEASLEY AT (919) 996-2334 OR TIMOTHY.BEASLEY@RALEIGH.GOV FOR MORE INFORMATION.
 13. CROSS CONNECTION CONTROL PROTECTION DEVICES ARE REQUIRED BASED ON DEGREE OF HEALTH HAZARD INVOLVED AS LISTED IN APPENDIX B OF THE RULES GOVERNING PUBLIC WATER SYSTEMS IN NORTH CAROLINA. THESE GUIDELINES ARE THE MINIMUM REQUIREMENTS. THE DEVICES SHALL MEET AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) STANDARDS OR BE ON THE UNIVERSITY OF SOUTHERN CALIFORNIA APPROVAL LIST. THE DEVICES SHALL BE INSTALLED AND TESTED (BOTH INITIAL AND PERIODIC TESTING THEREAFTER) IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS OR THE LOCAL CROSS CONNECTION CONTROL PROGRAM, WHICHEVER IS MORE STRINGENT. CONTACT JOANNE HARTLEY AT (919) 996-5232 OR JOANNE.HARTLEY@RALEIGH.GOV FOR MORE INFORMATION.



ATTENTION CONTRACTORS

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER MAIN SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.

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FAILURE TO CALL FOR INSPECTION, INSTALL A DOWNSTREAM PLUG, HAVE PERMITTED PLANS ON 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.

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-4280**

Authorization to Construct **Keith A. Jew**

Date **3/28/17**

Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # **S-4281 (P)**

Authorization to Construct **Keith A. Jew**

Date **3/28/17**

NOTE:

ALL CONDUIT SHALL BE 4" SCH. 40 PVC, 12" MIN. COVER TO SUBGRADE, 6" MIN. HORIZONTAL SEPARATION.

NOTE:

EXISTING DOWNSTREAM UTILITIES TO WHICH THIS PROJECT CONNECTS SHALL BE ACCEPTED BY THE CITY OF RALEIGH FOR MAINTENANCE PRIOR TO THE RELEASE OF 1ST CO FOR THE COTTAGES AT KNIGHTDALE STATION

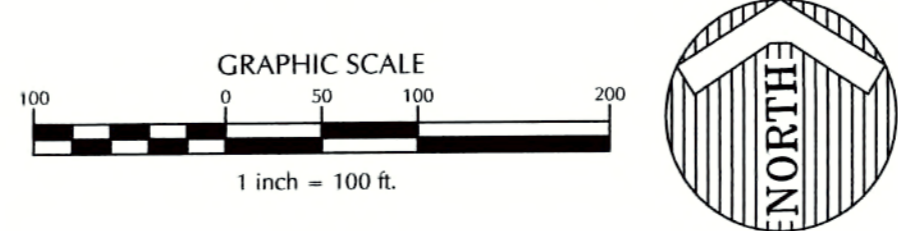
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: **Sarah All** DATE: **4-21-2017**
DEVELOPMENT SERVICES ENGINEER

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

BY: **John Smith** DATE: **4-28-17**
ADMINISTRATOR



WithersRavenel
Engineers | Planners

131 1/2 S Wilmington Street | Raleigh, NC 27601 | P: 919-669-3540 | License # C-6832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

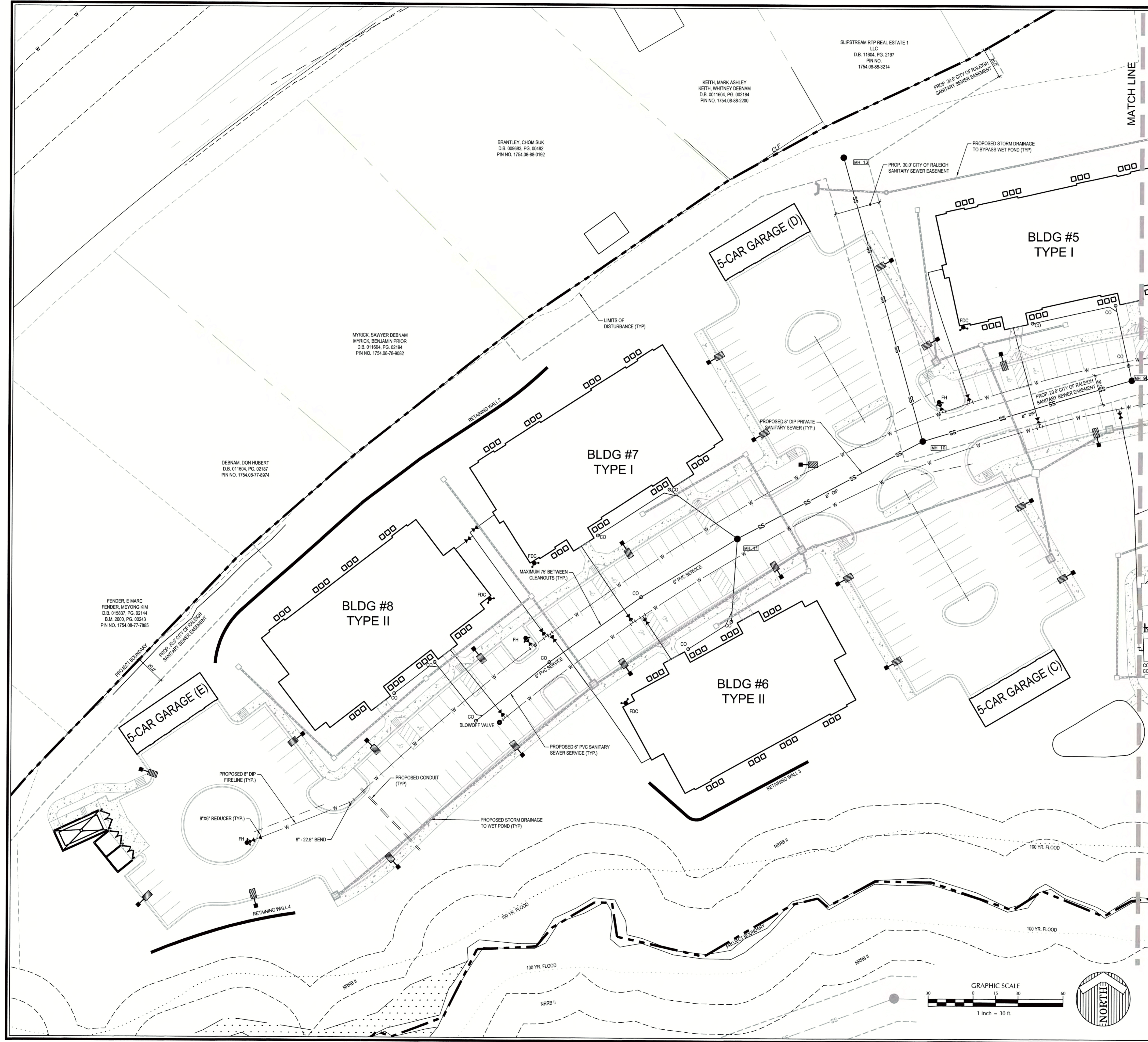
OVERALL UTILITY PLAN

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR

REVISIONS

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. **5.0**



ATTENTION CONTRACTORS

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Public Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4280
Authorization to Construct Keith A. Dew
Date 3/24/17

Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4281(P)
Authorization to Construct Keith A. Dew
Date 3/24/17

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/ROAD SERVICES: N/A
PUBLIC UTILITIES: K.A. Dew 3/24/17
STORMWATER: N/A
PLANNING/POURING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: SMH DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4-28-17
ADMINISTRATOR

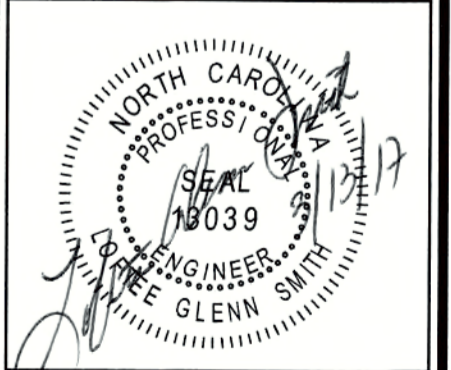
WithersRavenel
Engineers | Planners

13175 S.Wilmington Street | Raleigh, NC 27601 | 1-919-469-2340 | License #: C-0832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION
KNIGHTDALE, NORTH CAROLINA

UTILITY PLAN WEST

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR

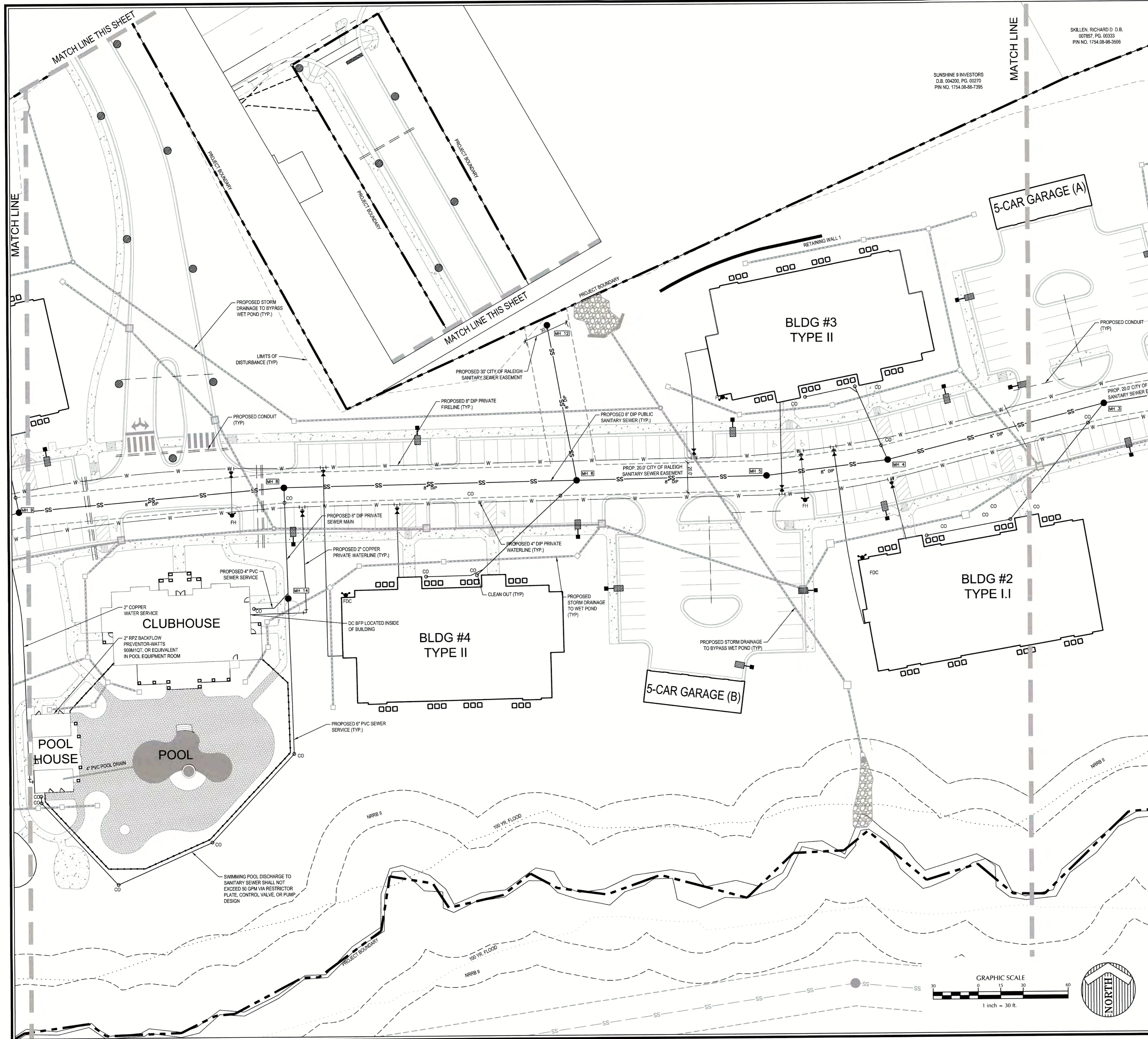


Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No. **5.1**

K:\16-00001\00025-Knightdale Station\Drawings\CADD\CD\15- UTILITY SHEETS\Rev. Monday, March 13, 2017 5:01:18 PM - TOWNSEND.CHAMBERLAIN



SKILLEN, RICHARD D. D.B.
007857, PG. 00333
PIN NO. 1754-08-88-3506

SUNSHINE 9 INVESTORS
D.B. 004280, PG. 00270
PIN NO. 1754-08-88-7565

ATTENTION CONTRACTORS

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Public Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4280
Authorization to Construct Keith A. Dew
Date 3/24/17

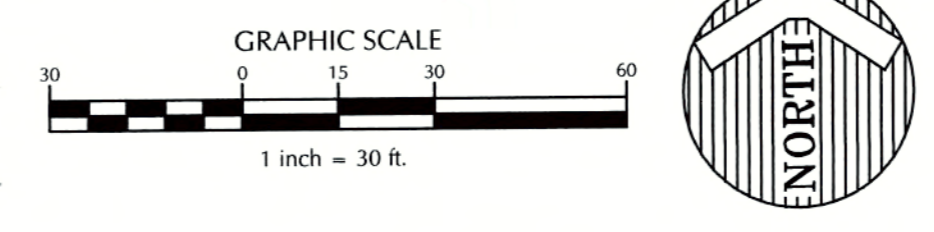
Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4281(P)
Authorization to Construct Keith A. Dew
Date 3/24/17

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSFORMATION FIELD SERVICES N/A
PUBLIC UTILITIES K.A. Dew 3/24/17
STORMWATER N/A
PLANNING/GRADING N/A
FHPC N/A
URBAN FORESTRY N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: SMH DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

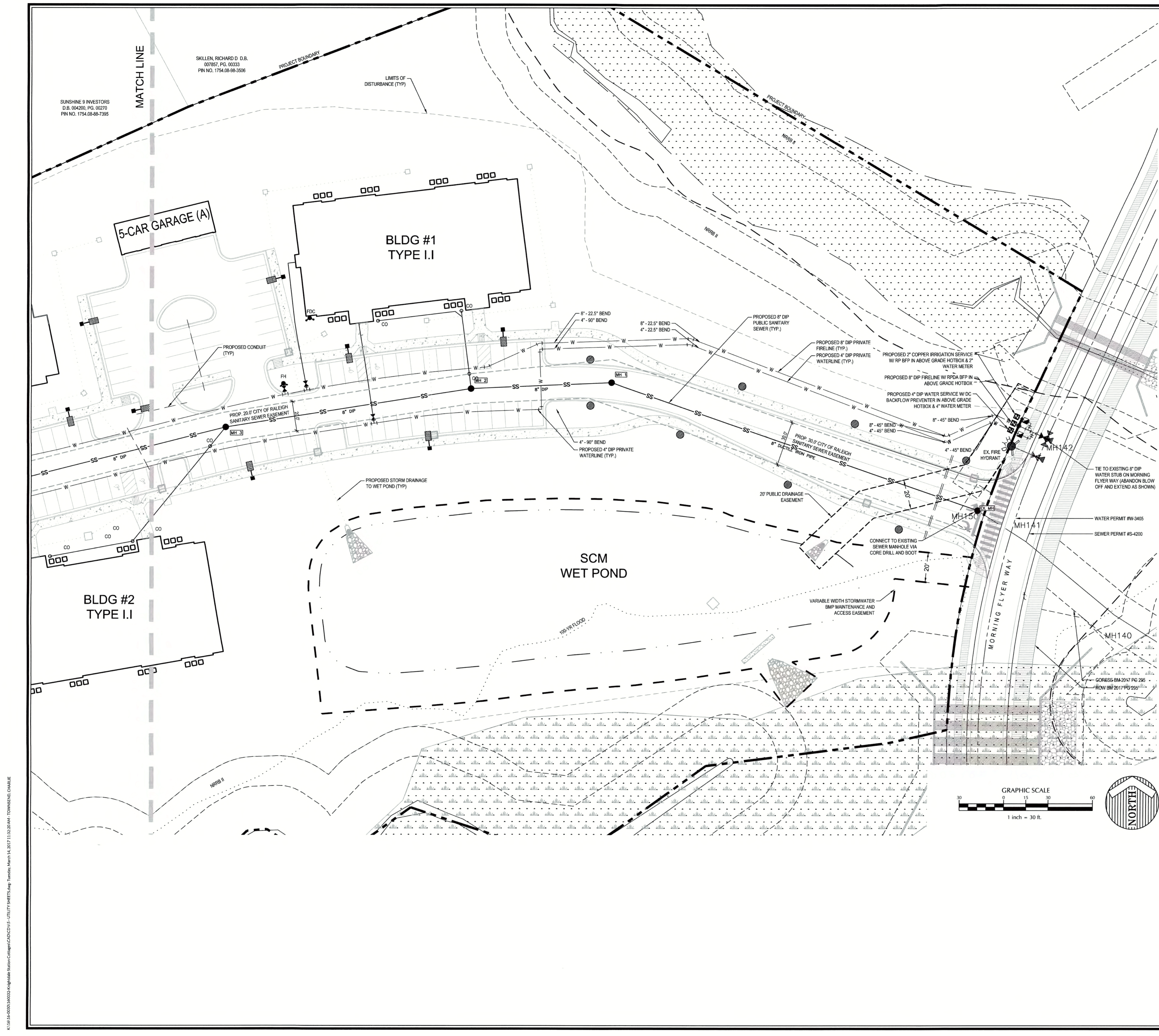
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: [Signature] DATE: 4.28.17
ADMINISTRATOR

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR

Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

K:\1616-00001\00001\Knightdale Station Cottages\CD\05 - UTILITY SHEETS.dwg - Sunday, March 12, 2017 3:29:48 PM - TOWNSEND, CHARLIE



ATTENTION CONTRACTORS

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Public Sewer Collection / Extension System

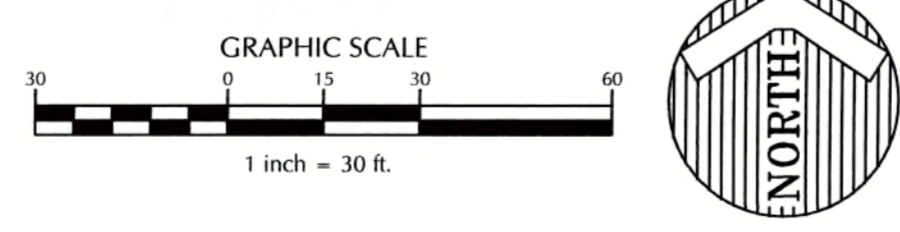
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City of Raleigh
Public Utilities Department Permit # **S-4280**
Authorization to Construct
Date **3/22/17** *Keith A. Dew*

Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # **S-4281(P)**
Authorization to Construct
Date **3/22/17** *Keith A. Dew*



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/FREEDOMWAYS: N/A
PUBLIC UTILITIES: **K.A. Dew 3/22/17**
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN/FORESTRY: N/A


REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S.A. Hill* DATE: **4-21-2017**
DEVELOPMENT SERVICES ENGINEER

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

BY: *Chris Carr* DATE: **4-28-17**
ADMINISTRATOR



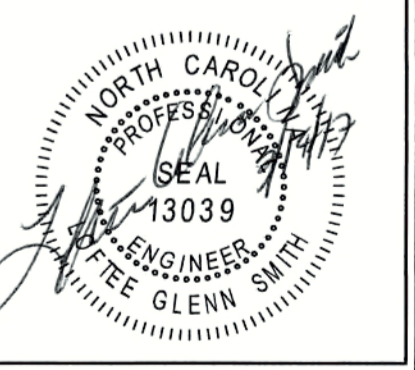
WithersRavenel
Engineers | Planners

THE COTTAGES AT KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

UTILITY PLAN EAST

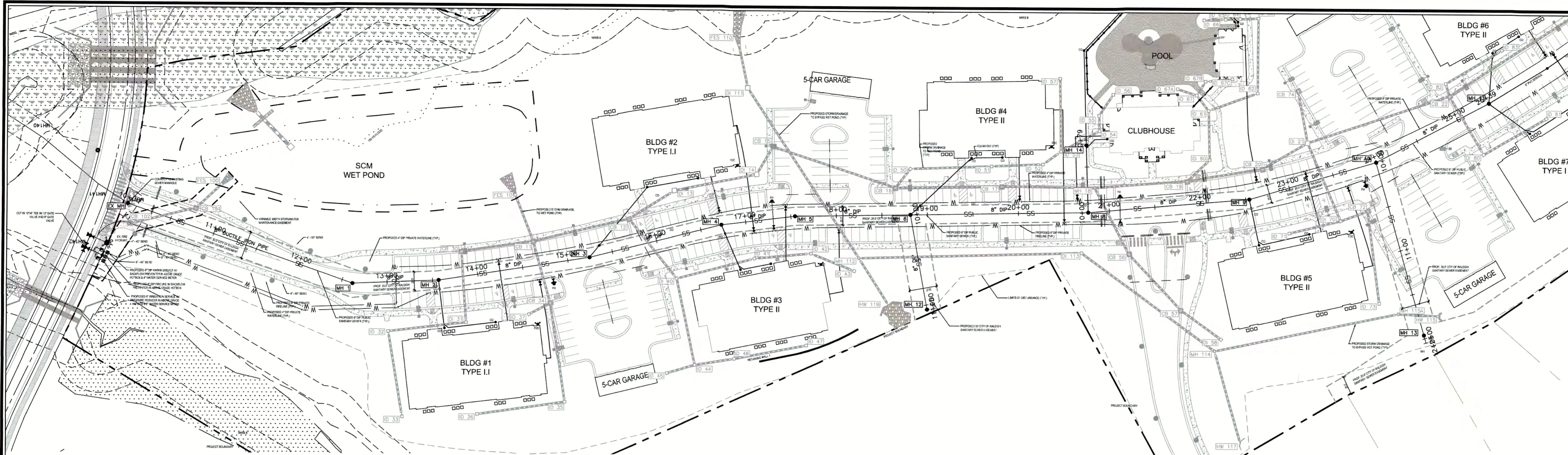
Job No. 02160032	Drawn By CDT
Date 06/03/2016	Designer WR



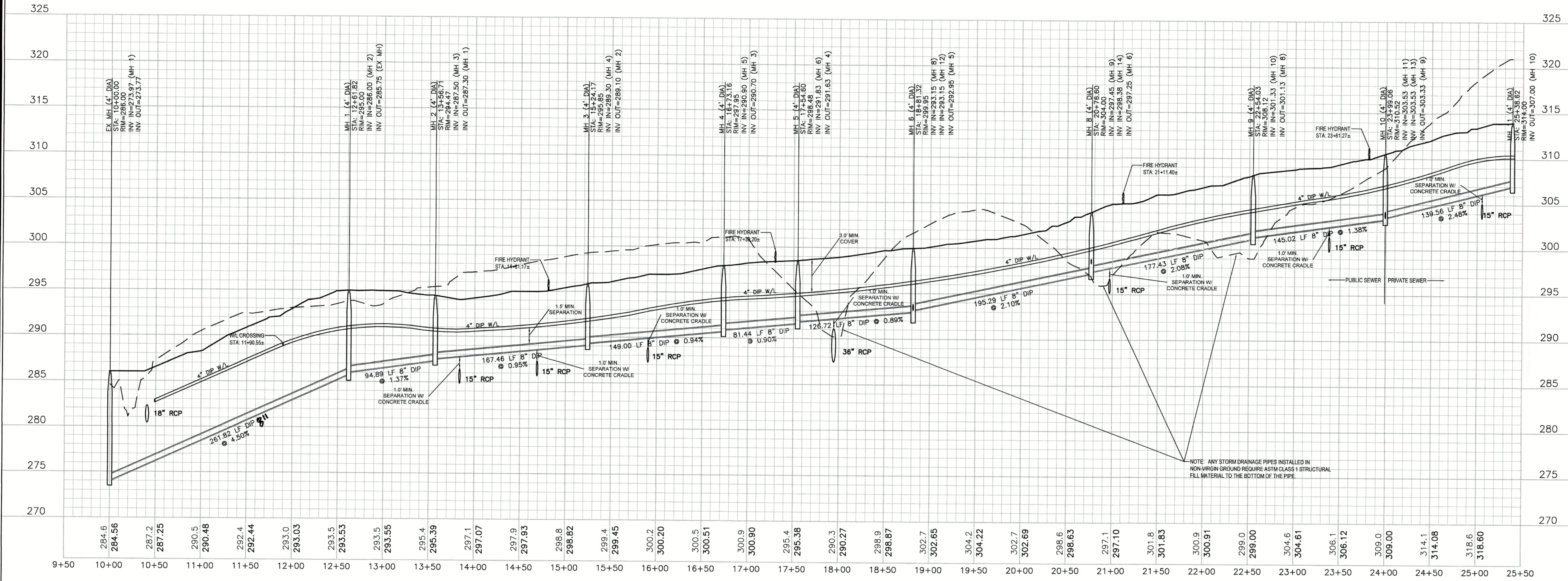
Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

Sheet No.
5.3

K:\16-0000\02160032-Knightdale Station-Cottages-CDD\3-5-UTILITY SHEETS.dwg Tuesday, March 14, 2017 11:32:26AM TOWNSEND, CHARLIE



SANITARY SEWER PROFILE



ATTENTION CONTRACTORS

THE CONSTRUCTION CONTRACTOR RESPONSIBLE FOR THE EXTENSION OF THE WATER AND SEWER, AS APPROVED IN THESE PLANS, IS RESPONSIBLE FOR CONTACTING THE PUBLIC UTILITIES DEPARTMENT AT 919-996-4540, AT LEAST TWENTY FOUR HOURS PRIOR TO BEGINNING ANY OF THEIR CONSTRUCTION.

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Private Sewer Collection / Extension System

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City of Raleigh
Public Utilities Department Permit # S-4281(P)
Authorization to Construct
Date 3/24/17 *Keith A. Jew*

Public Sewer Collection / Extension System

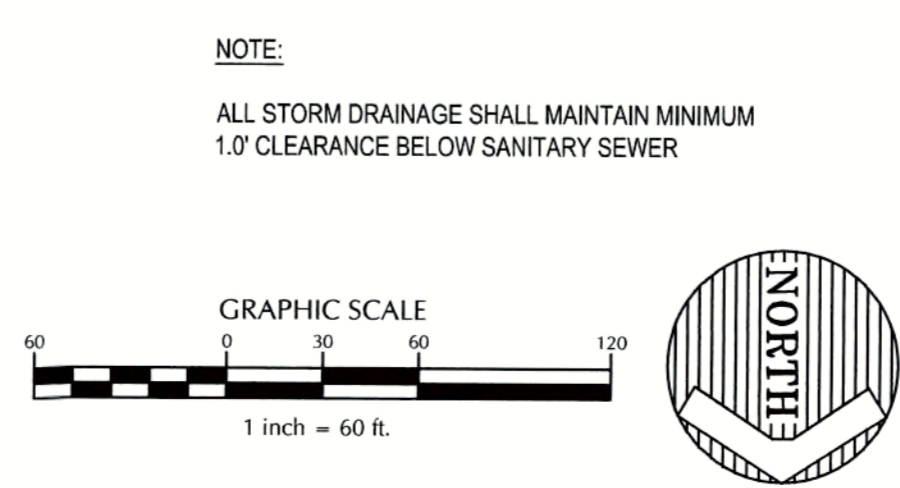
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City of Raleigh
Public Utilities Department Permit # S-4280
Authorization to Construct
Date 3/24/17 *Keith A. Jew*

CITY OF RALEIGH

All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION/FIELD SERVICES N/A
PUBLIC UTILITIES _____
STORMWATER N/A
PLANNING/ZONING N/A
FIRE N/A
URBAN FORESTRY N/A



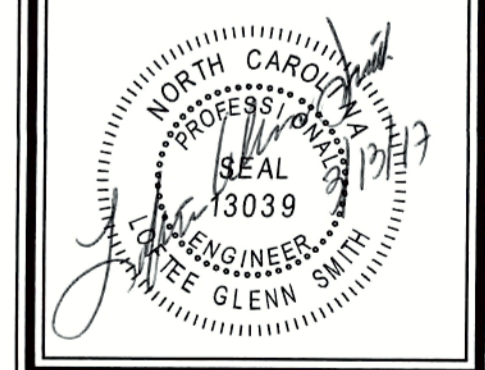
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: *Chris Hill* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

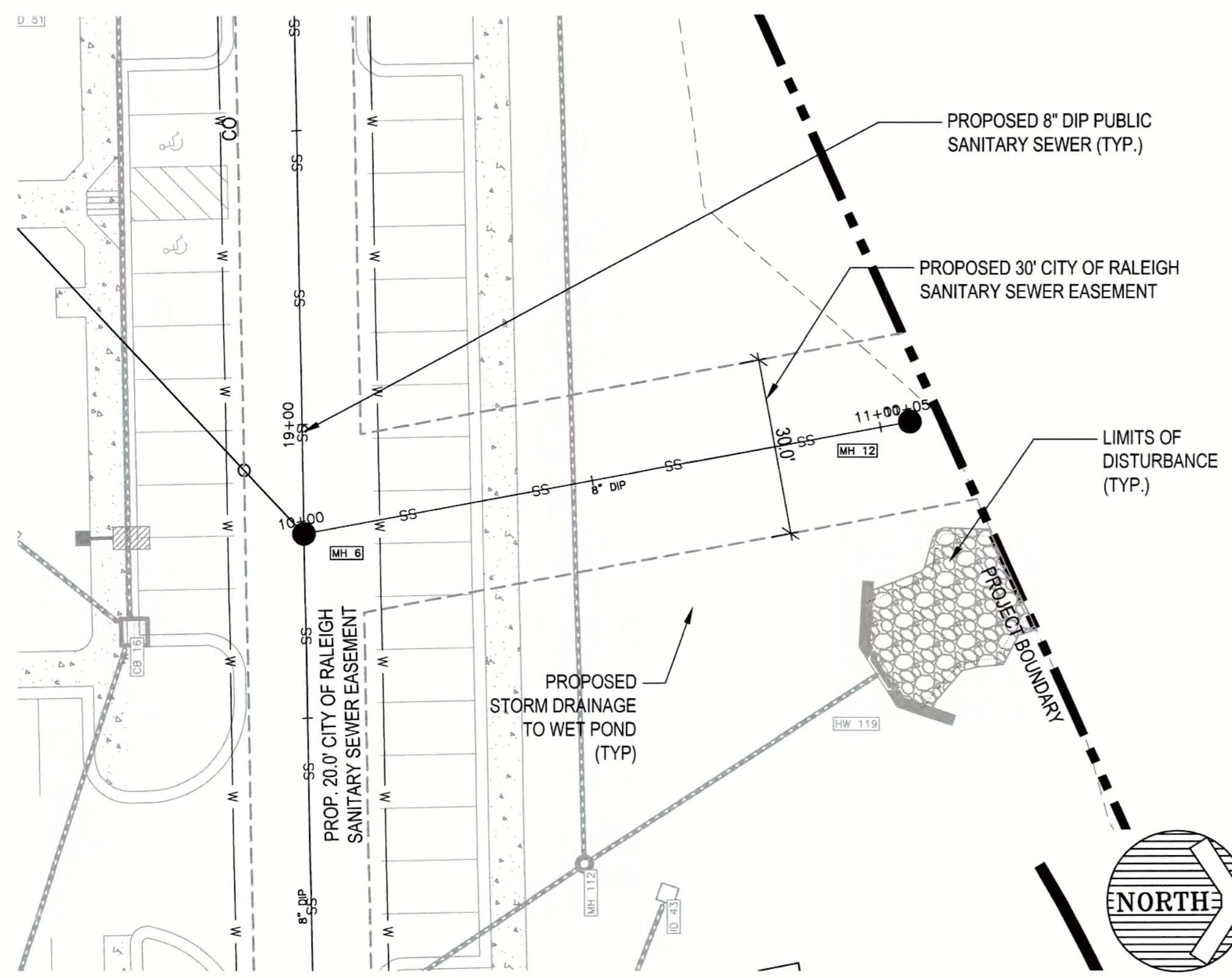
BY: *Chris Hill* DATE: 4-28-17
ADMINISTRATOR



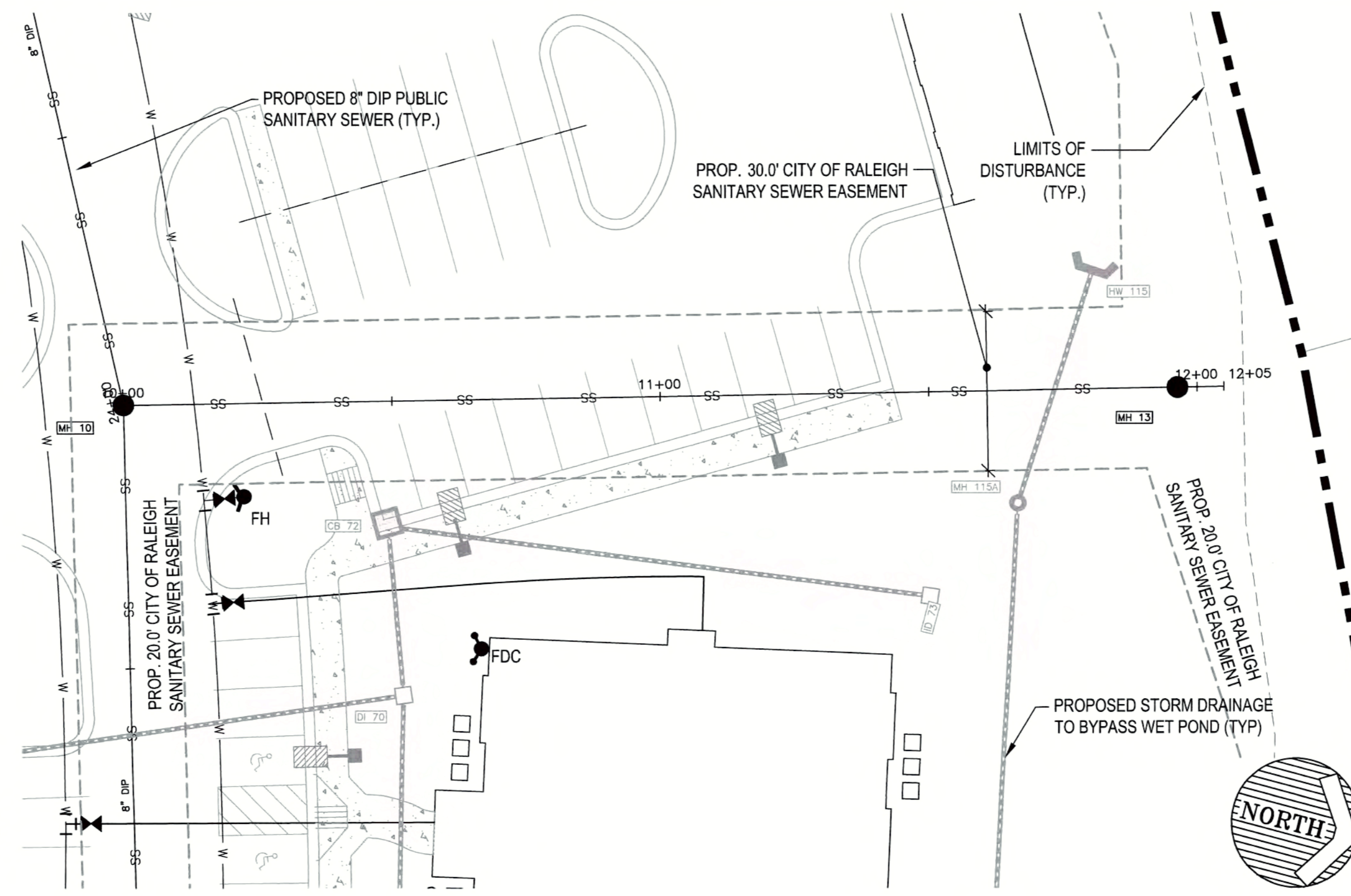
Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

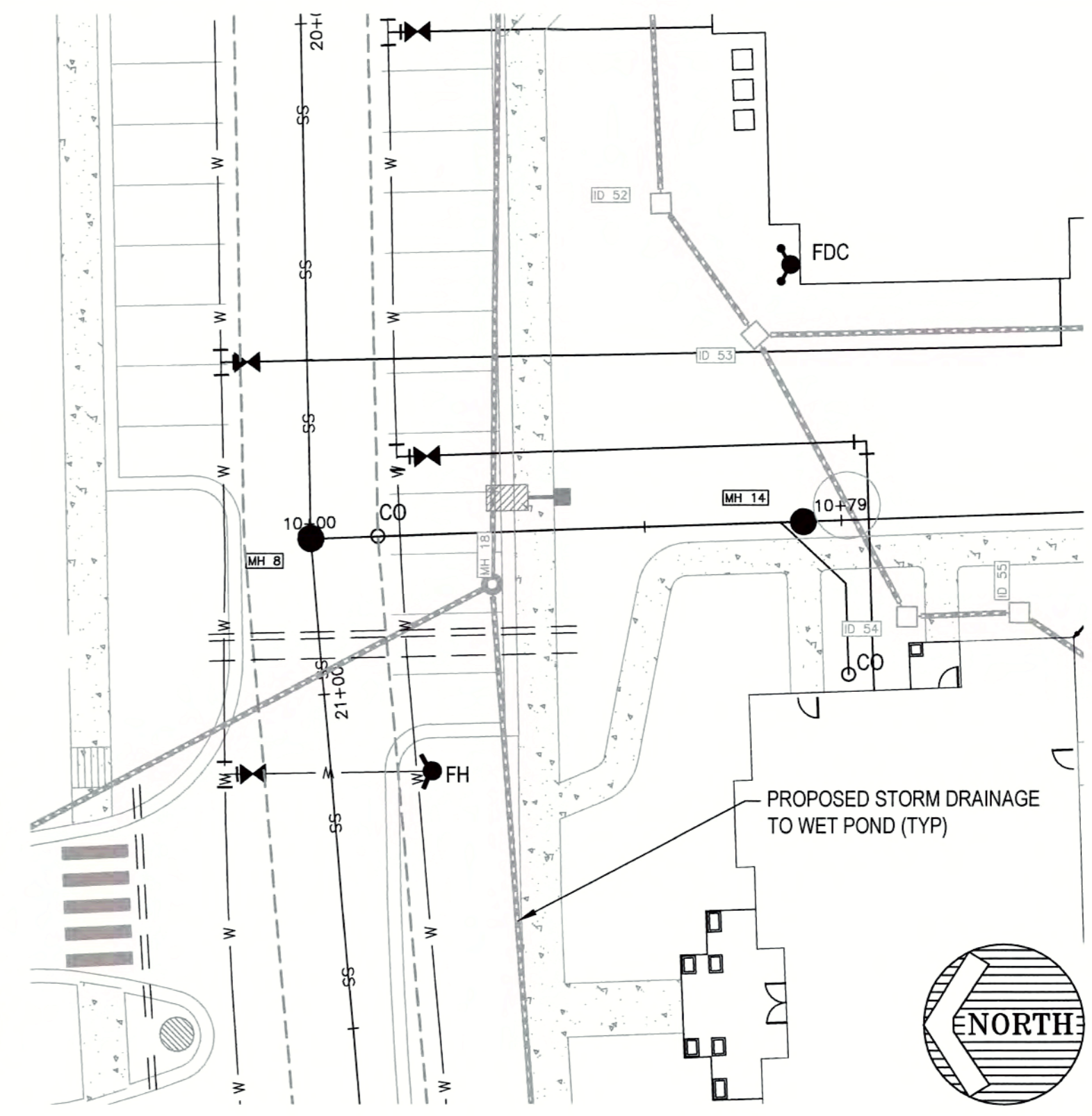
K:\18\18-0001\0003\Knightdale Station\CD\CD\15 - UTILITY PLAN PROFILE.dwg, Monday, March 13, 2017 1:05:56 PM - TOWNSEND, CHARLIE



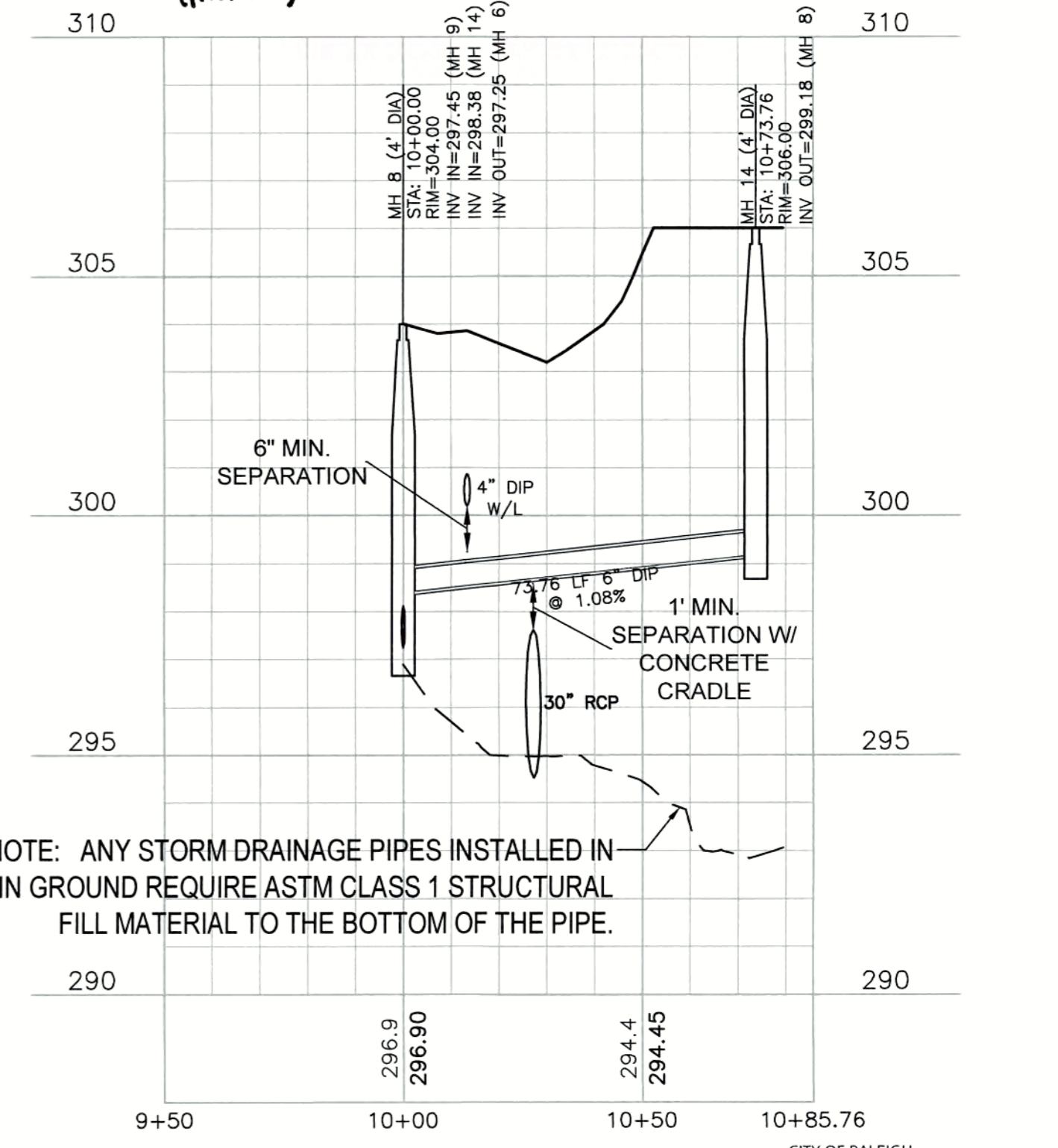
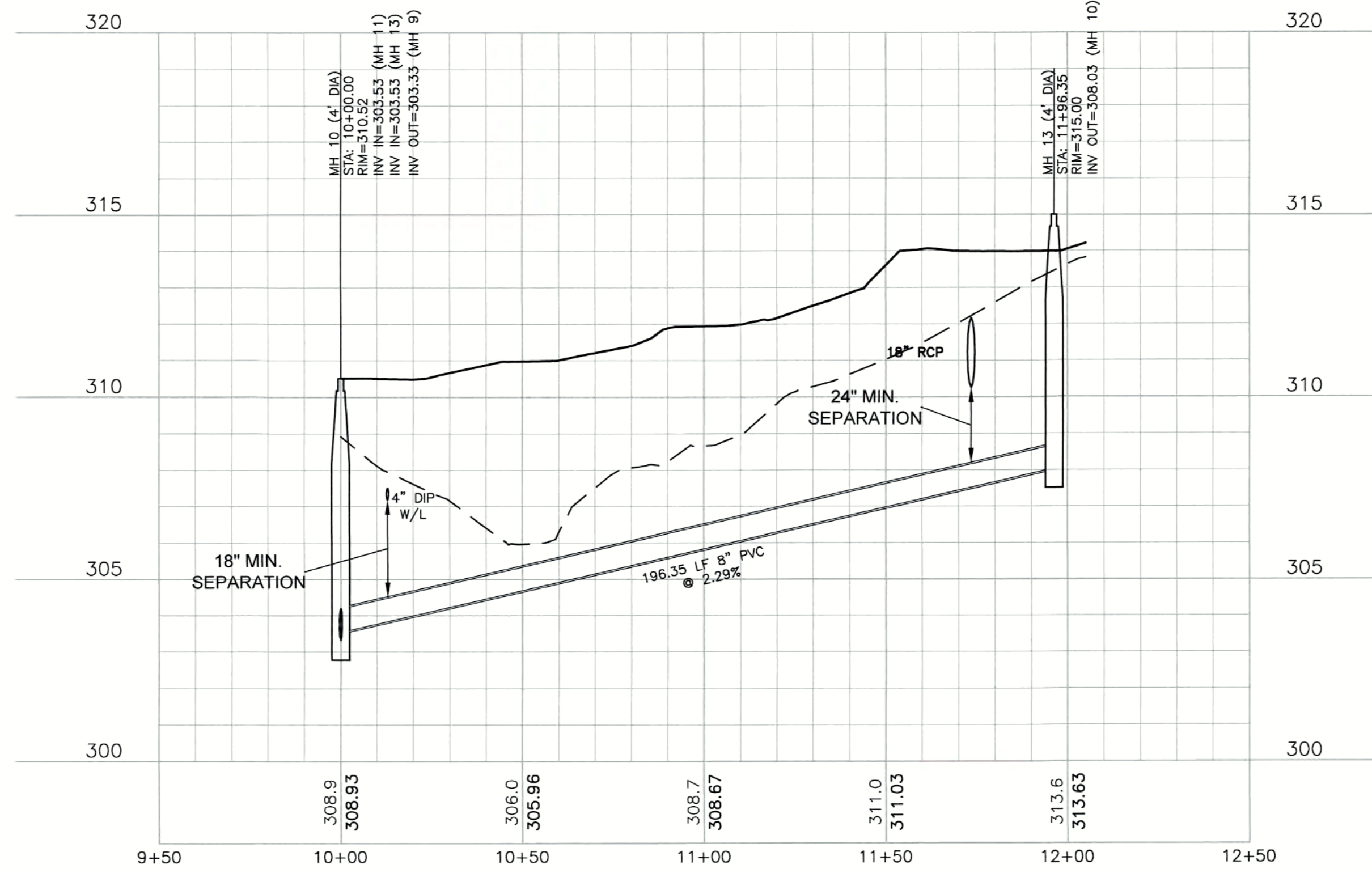
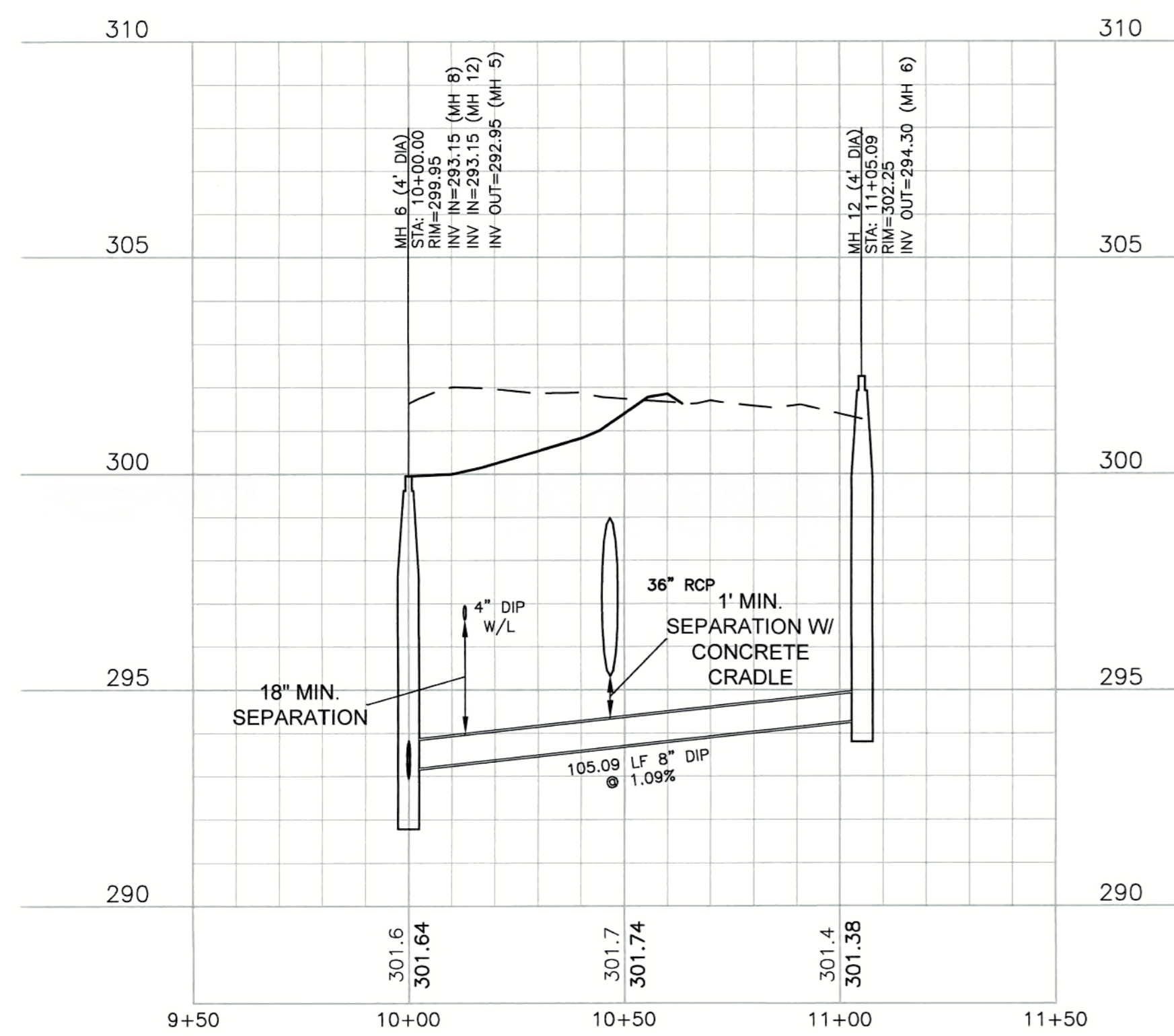
MH 6 TO MH 12 SANITARY SEWER



MH10 TO MH13 SANITARY SEWER



POOL HOUSE EXTENSION (private)



NOTE: ANY STORM DRAINAGE PIPES INSTALLED IN NON-VIRGIN GROUND REQUIRE ASTM CLASS 1 STRUCTURAL FILL MATERIAL TO THE BOTTOM OF THE PIPE.

ATTENTION CONTRACTORS

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Private Sewer Collection / Extension System

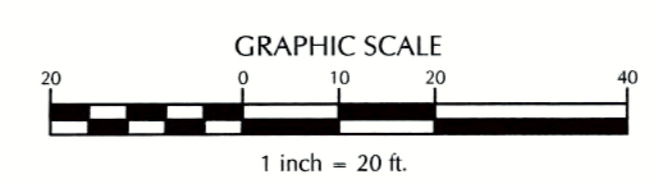
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City of Raleigh
Public Utilities Department Permit # S-4281 (P)
Authorization to Construct Keith A. Jew
Date 3/24/17

Public Sewer Collection / Extension System

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Authorization to Construct Keith A. Jew
Date 3/24/17



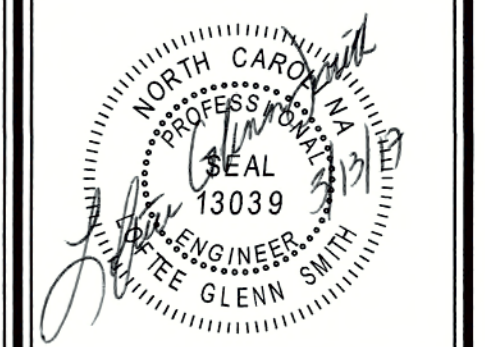
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

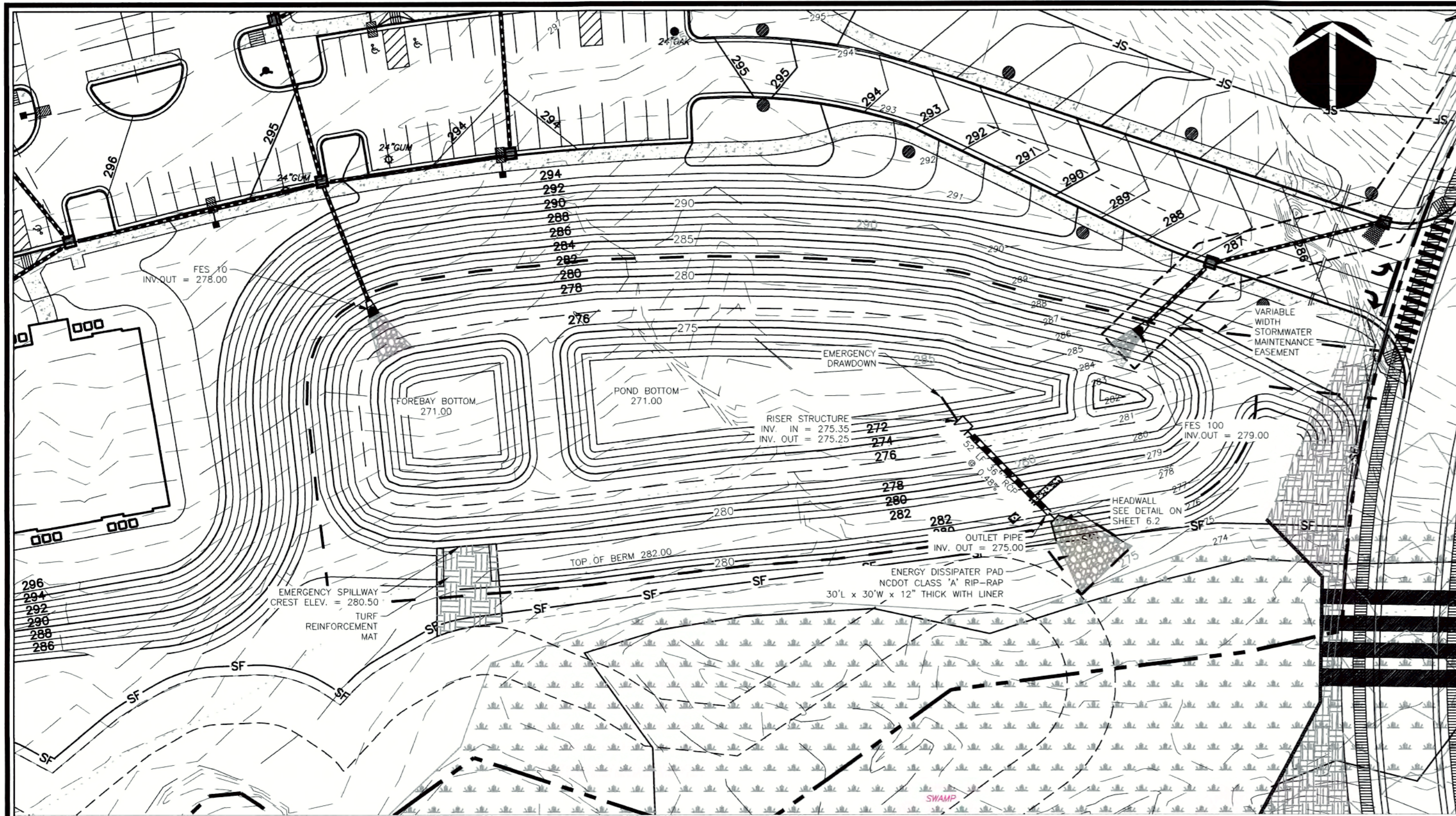
BY: [Signature] DATE: 4-28-17
ADMINISTRATOR



Revisions	
1	PER TOK COMMENTS 09/09/16
2	PER WAKE COMMENTS 11/15/16
3	PER TOK COMMENTS 12/28/16
4	PER TOK COMMENTS 03/01/17

Sheet No.
5.5

K:\1616-00001-00000-Knightdale Station-Design\CD\2016-05-03-10:28:17\PLAN\PROFILES.dwg Sunday, March 12, 2017 3:48:19 PM - TOWNSEND, CHARLIE

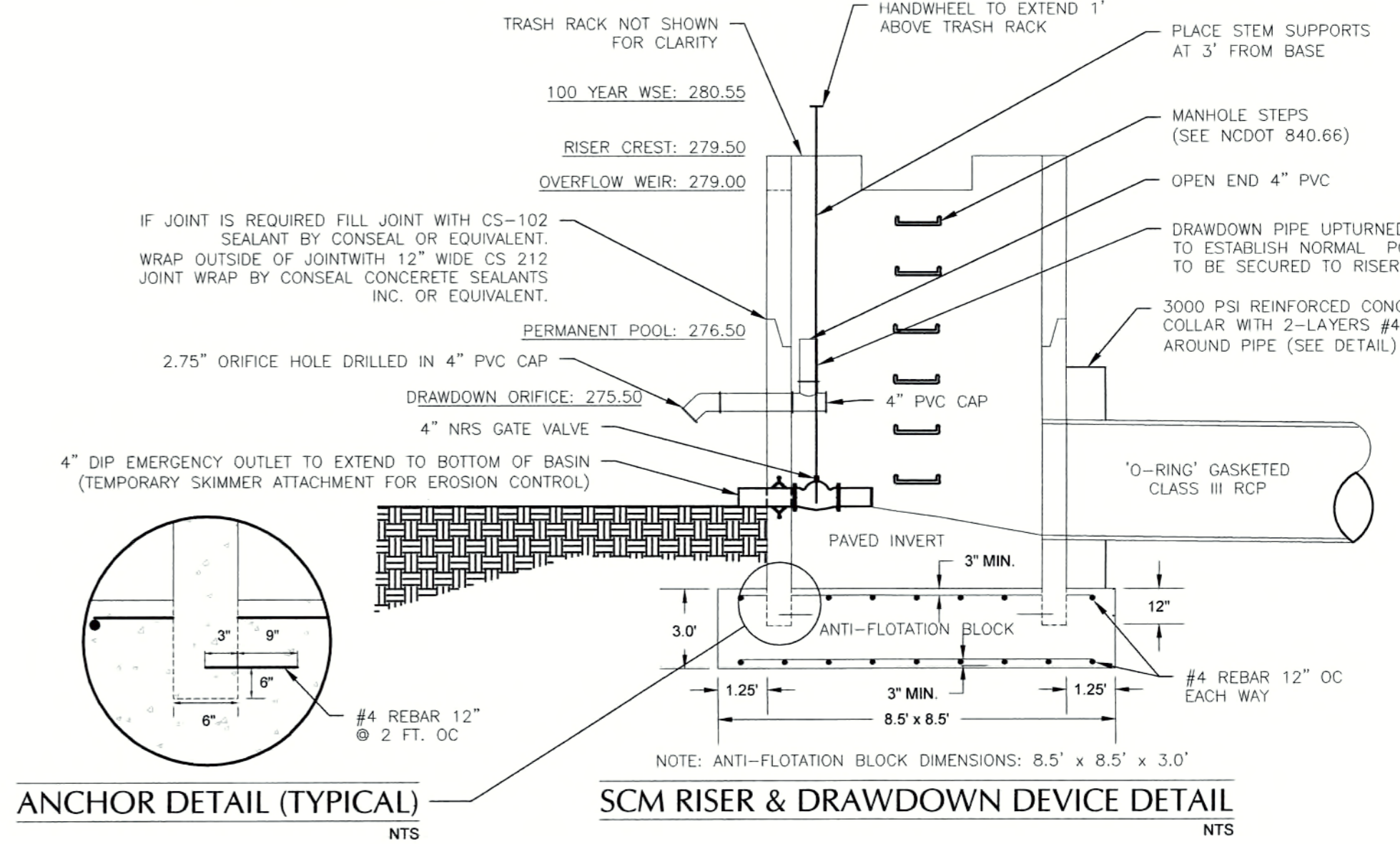


SCM#1 - WETPOND - PLAN VIEW
1" = 40'

SCM #1 DESIGN DETAILS		
COMPONENT	DIMENSIONS	ELEV.
TOP OF BERM	10' WIDE	282.00
EMERGENCY SPILLWAY CREST	12' WIDE	280.50
RISER CREST ELEVATION	5' ID x 5' ID RCP BOX	279.50
OVERFLOW WEIR	(3) 2' x 6"	279.00
NORMAL POOL		19,980 SQFT
DRAWDOWN ORIFICE *	2.75" DRILLED INTO 4" PVC	275.50
POND BOTTOM		5,395 SQFT
OUTLET PIPE INVERT UP	52 LF 36" RCP	275.25
OUTLET PIPE INVERT DOWN		275.00

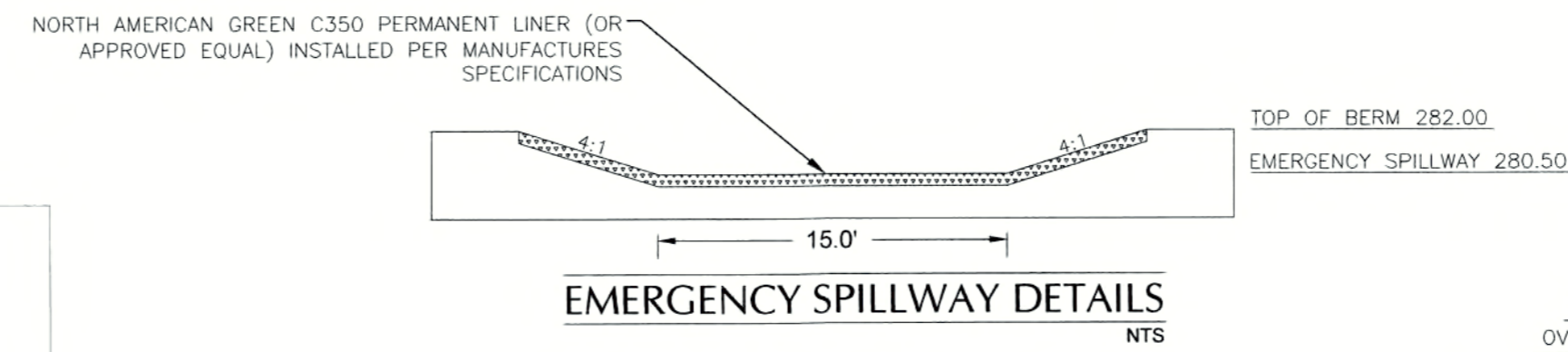
*DRAWDOWN PIPE TO TURN UP 1" INSIDE STRUCTURE TO ESTABLISH PERMANENT POOL

SCM #1 VOLUME DETENTION SUMMARY	
PRE-DEVELOPMENT	0.438 AC-FT
POST-DEVELOPMENT	1.849 AC-FT
VOLUME TO BE DETAINED	1.411 AC-FT
VOLUME PROVIDED	1.450 AC-FT

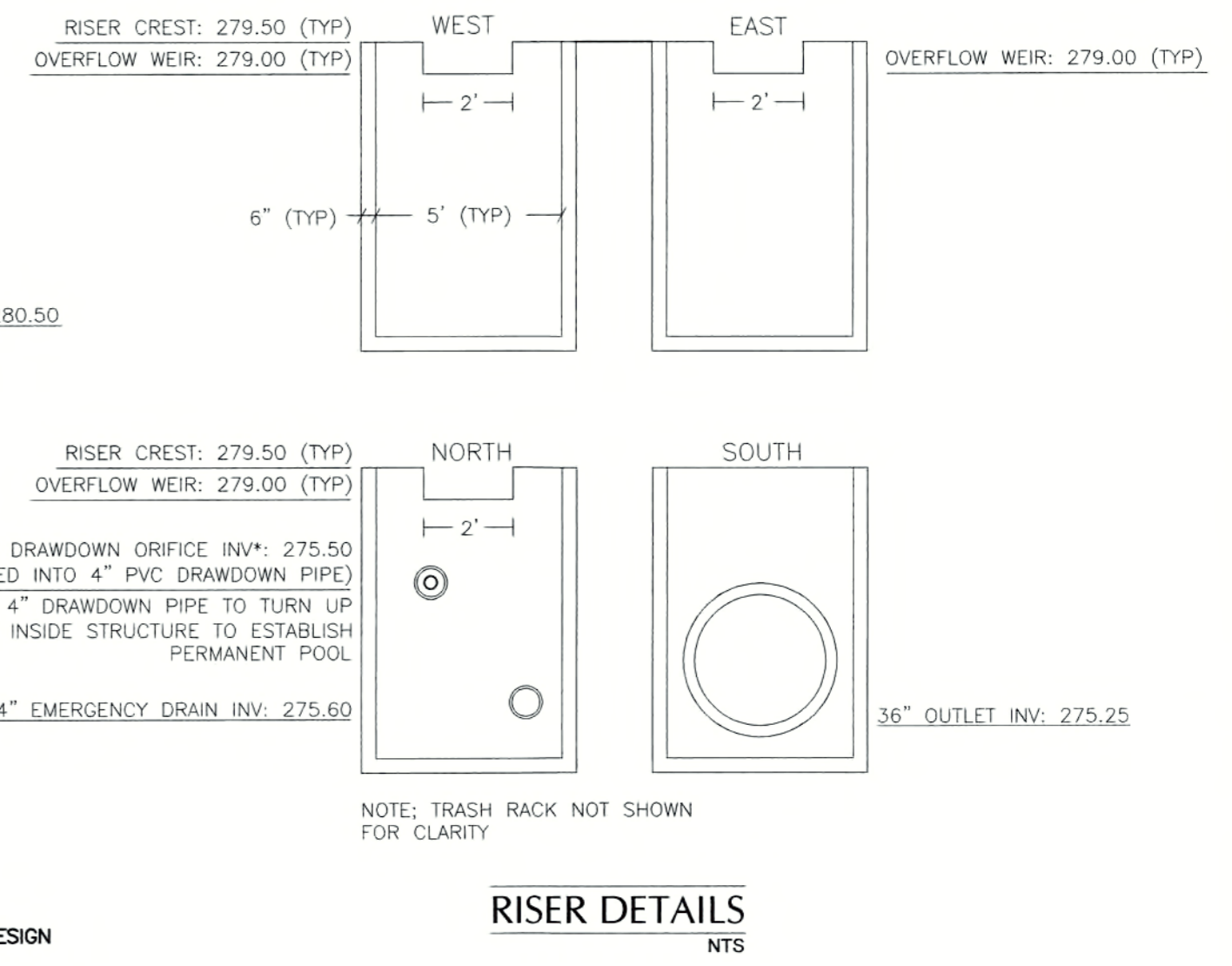


ANCHOR DETAIL (TYPICAL)
NTS

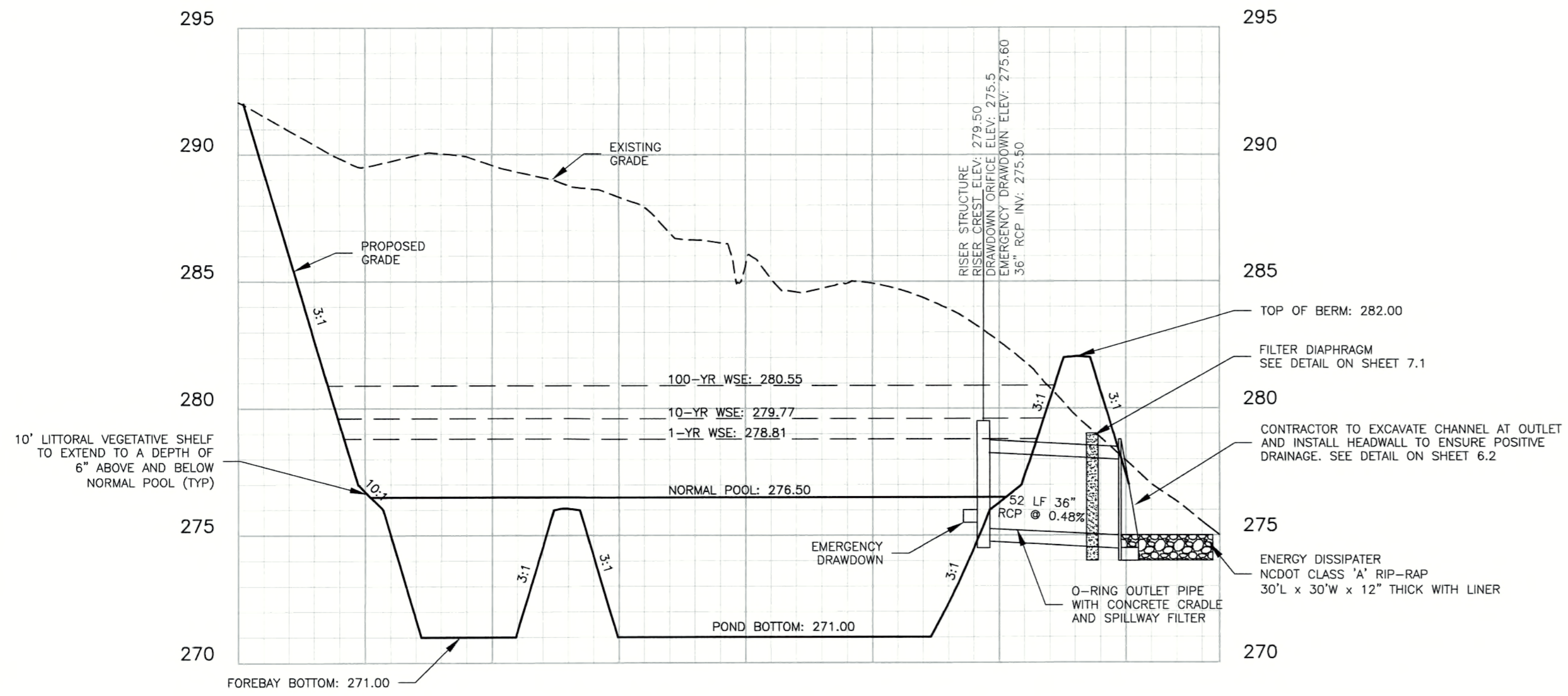
SCM RISER & DRAWDOWN DEVICE DETAIL
NTS



EMERGENCY SPILLWAY DETAILS
NTS



RISER DETAILS
NTS



SCM #1 - WETPOND - PROFILE VIEW
HORZ: 1" = 40'
VERT: 1" = 4'

STORMWATER SCM NOTES:

- PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGN ENGINEER FOR RESOLUTION.
- ALL CONSTRUCTION TO BE IN ACCORDANCE WITH ALL TOWN OF KNIGHTDALE STANDARDS AND SPECIFICATIONS.
- GEOTECHNICAL ENGINEER SHALL EVALUATE SOILS ON SITE FOR STABILITY OF DAM CONSTRUCTION AND SLOPE STABILITY. PROFESSIONAL CERTIFICATION OF EMBANKMENT CONSTRUCTION IS REQUIRED FOR AS-BUILT CERTIFICATION.
- DAM TO BE CONSTRUCTED PER THE FOLLOWING SPECIFICATIONS UNLESS SUPERSEDED BY GEOTECHNICAL ENGINEER'S RECOMMENDATIONS:
 - BORROW MATERIALS FOR USE AS EMBANKMENT FILL SHALL BE FREE OF ORGANICS, ROOTS AND OTHER WOODY VEGETATION OR ORGANIC DEBRIS. MATERIALS SHALL CONSIST OF SOILS WHICH CLASSIFY AS SC, SM, CL, CL-CR AND ML IN ACCORDANCE WITH THE UNIFIED CLASSIFICATION SYSTEM OR AS APPROVED BY THE GEOTECHNICAL ENGINEER WITH A MAXIMUM PARTICLE SIZE SHALL OF 3" OR LESS IN MEAN DIAMETER.
 - FILL SHALL BE PLACED IN 8" (MAXIMUM) LIFTS UNDER THE SUPERVISION OF THE GEOTECHNICAL ENGINEER. FILL SHALL BE BROUGHT UP BY BENCHING INTO THE EXISTING SLOPE. THE MAXIMUM HEIGHT OF 2FT SHALL BE USED FOR EACH BENCH LIFT TAKING CARE TO REMOVE ROOT STRUCTURES AS THE FILL PROCEEDS. SURFACE OF EACH LIFT SHALL BE SCARIFIED PRIOR TO PLACEMENT OF THE NEXT LIFT IN ORDER TO EFFECTIVELY TIE THE FILL LIFTS TOGETHER.
 - ALL COMPACTION SHALL BE TESTED BY THE SAND CONE METHOD (ASTM D-1586) OR NUCLEAR METHOD AT A RATE OF AT LEAST ONE TEST PER 5,000 SF PER ONE FOOT OF COMPACTED FILL THICKNESS IN GENERAL AREA FILLS AND ONE TEST PER 50 LINEAL FEET PER LIFT ALONG THE BARREL. THE MINIMUM COMPACTION SHOULD BE 95% OF THE MAXIMUM STANDARD PROCTOR DENSITY (ASTM D-698) AT MOISTURE CONTENTS VARYING FROM 2 PERCENT BELOW TO 3 PERCENT ABOVE OPTIMUM MOISTURE CONTENT TO WITHIN 3FT OF THE FINAL GRADE.
 - THE GEOTECHNICAL ENGINEER SHALL VERIFY PIPE BEDDING, RISER BEDDING, PIPE JOINT INTEGRITY AND PROPER COMPACTION AROUND THE PIPE, RISER AND ANTI-SEEP COLLAR.
- IF DURING CONSTRUCTION, THE SEASONAL HIGH WATER TABLE IS IDENTIFIED WITHIN 6 INCHES OF THE PROPOSED NORMAL POOL ELEVATION BY THE GEOTECHNICAL ENGINEER, THE INSTALLATION OF A CLAY LINER IS NOT NECESSARY. IF THE SEASONAL HIGH WATER TABLE IS IDENTIFIED OUTSIDE OF THE ABOVE LIMITS OR NOT ENCOUNTERED, IT IS RECOMMENDED THAT A CLAY LINER BE INSTALLED TO MAINTAIN NORMAL POOL ELEVATION, SUITABLE HABITAT FOR LITTORAL SHELF VEGETATION, AND DESIGN AESTHETICS. CONSULT ENGINEER AND OWNER REGARDING THE INSTALLATION OF A CLAY LINER PRIOR TO SCM CONVERSION.
- DURING CONSTRUCTION, THE SCM IS TO BE USED AS AN EROSION CONTROL DEVICE. THE FOREBAY WILL NOT BE REQUIRED WHILE SCM IS ACTING AS AN EROSION CONTROL DEVICE.
- ALL PERMANENT STRUCTURES (I.E. RISER BOX, OUTLET PIPES, CONCRETE CRADLES, SPILLWAY FILTER, ETC.) ARE TO BE INSTALLED WITH THE INITIAL DAM CONSTRUCTION.
- CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE DESIGN ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ORDERING STRUCTURES.
- ONCE THE SITE HAS BEEN STABILIZED, CONTRACTOR SHALL OBTAIN APPROVAL BY EROSION CONTROL INSPECTOR IN ORDER TO REMOVE EROSION CONTROL DEVICES.
- ONCE ALL SEDIMENT AND EROSION CONTROL DEVICES HAVE BEEN REMOVED, THE SCM SHALL BE CONVERTED TO A PERMANENT SCM.
 - ALL SEDIMENT SHALL BE REMOVED AND DISPOSED OF PROPERLY.
 - FOREBAY AND VEGETATED SHELF SHALL BE CONSTRUCTED PER THE LANDSCAPING PLAN.
 - VEGETATED SHELF SHALL BE PLANTED PER PLANT SCHEDULE ON SHEET L1.3.
 - TOWN OF KNIGHTDALE REQUIRES FINAL CERTIFICATION OF SCM BY PROFESSIONAL ENGINEER.
- STOCKPILED TOPSOILS USED IN PLANTING AREAS SHALL CONTAIN AT LEAST 10% ORGANIC MATERIAL. PROFESSIONAL CERTIFICATION OF PLANTING SOIL MATERIALS IS REQUIRED.
- FOLLOWING SCM CONVERSION TO A PERMANENT SCM, THE TOWN OF KNIGHTDALE WILL BE PROVIDED AS-BUILT PLANS OF THE SCM.
- CONTACT TOWN OF KNIGHTDALE FOR FINAL CERTIFICATION OF SCM ONCE CONSTRUCTION HAS BEEN COMPLETED.

CLAY LINER SPECIFICATIONS

THE CLAY LINER FOR THE WET POND SHALL BE AT LEAST 8" 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 8 INCHES. A MINIMUM OF 4 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.

CITY OF RALEIGH	
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.	
TRANSPORTATION/FIELD SERVICES	N/A
PUBLIC UTILITIES	N/A
STORMWATER	N/A
PLANNING/DESIGN	N/A
FIRE	N/A
URBAN FORESTRY	N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: *Sarah* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

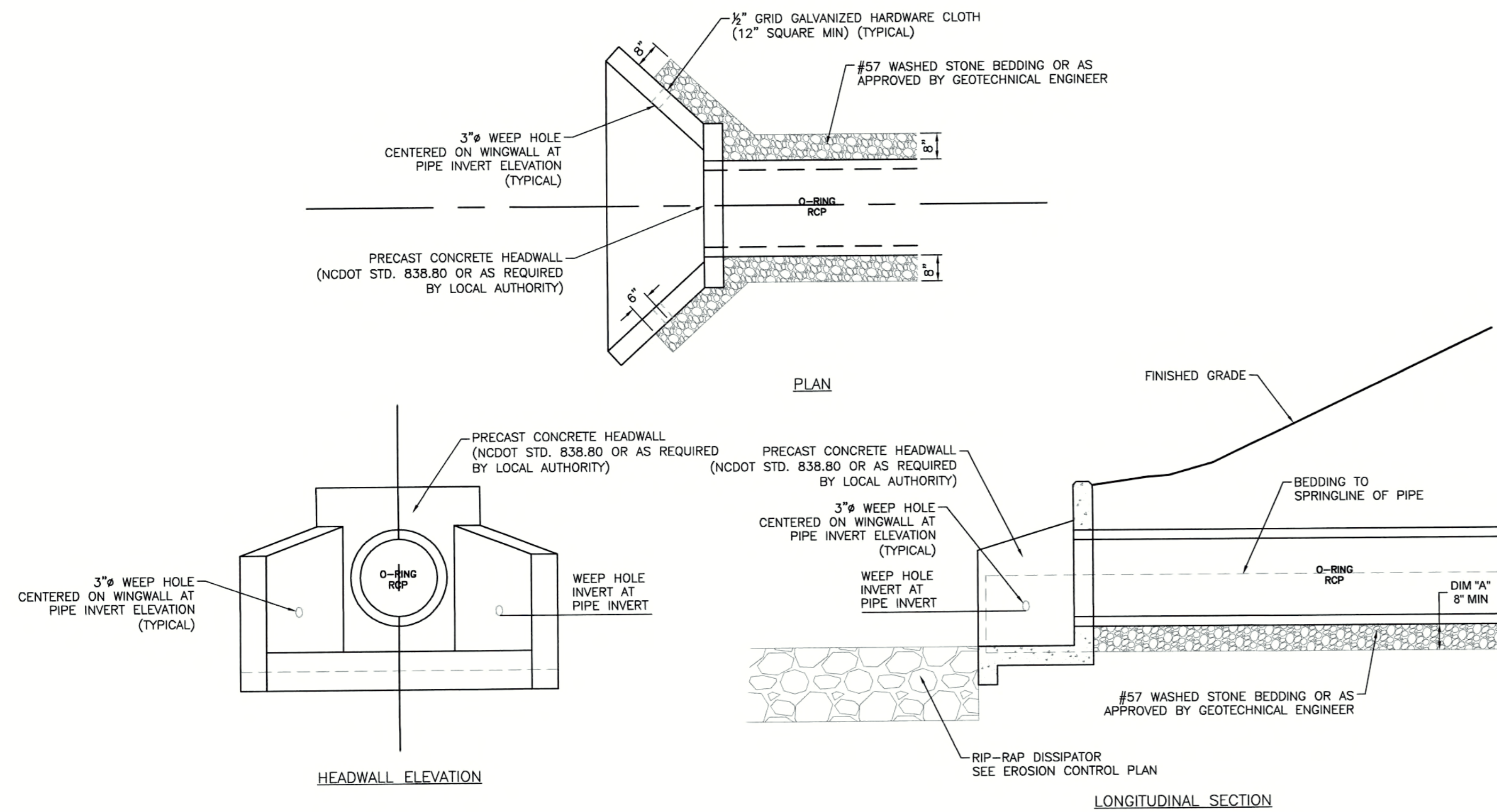
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *John* DATE: 4-28-17
ADMINISTRATOR

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR

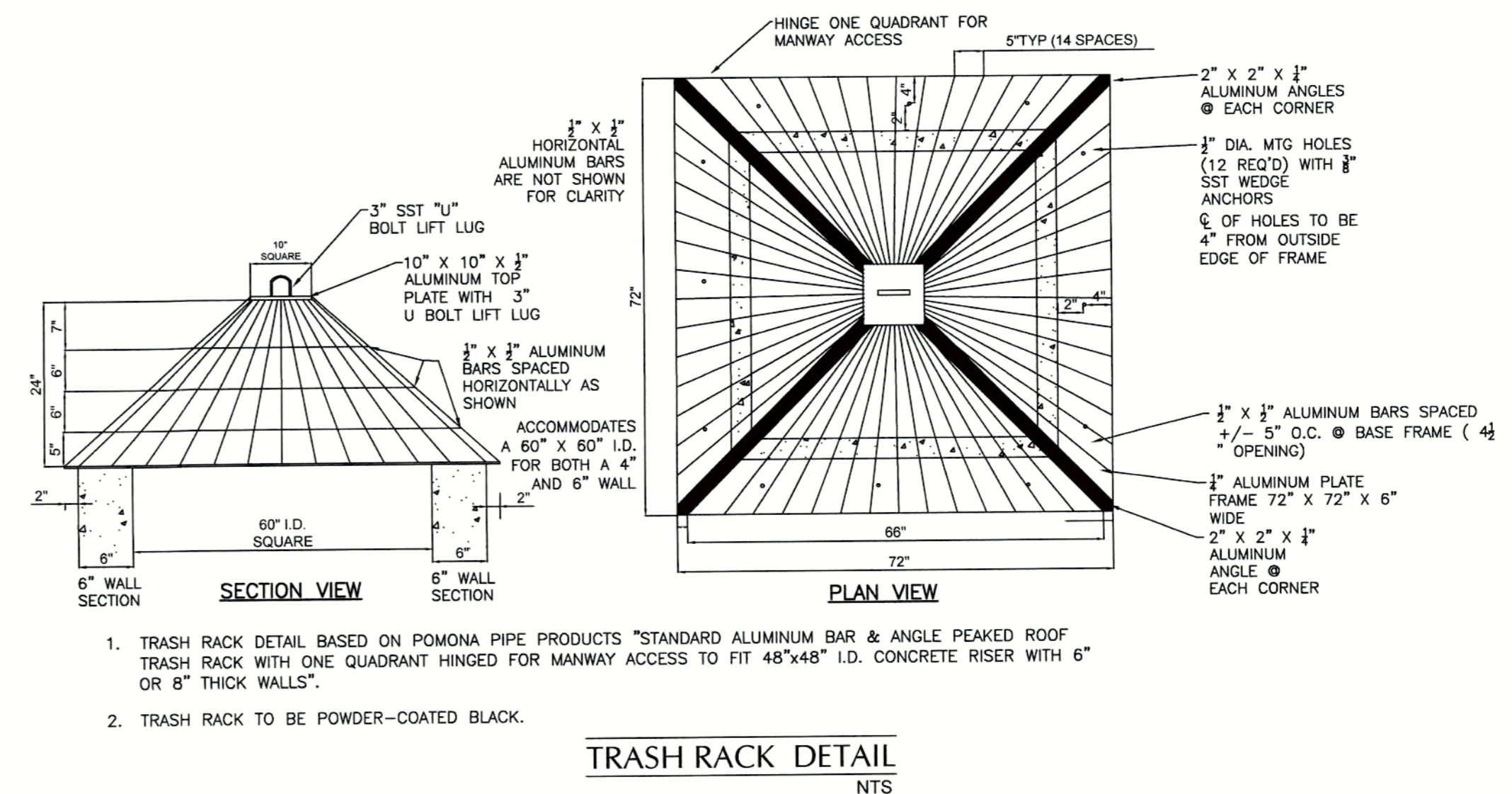


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**OUTLET PIPE FILTER DIAPHRAGM
OUTLET DETAIL (PRECAST HEADWALL)**

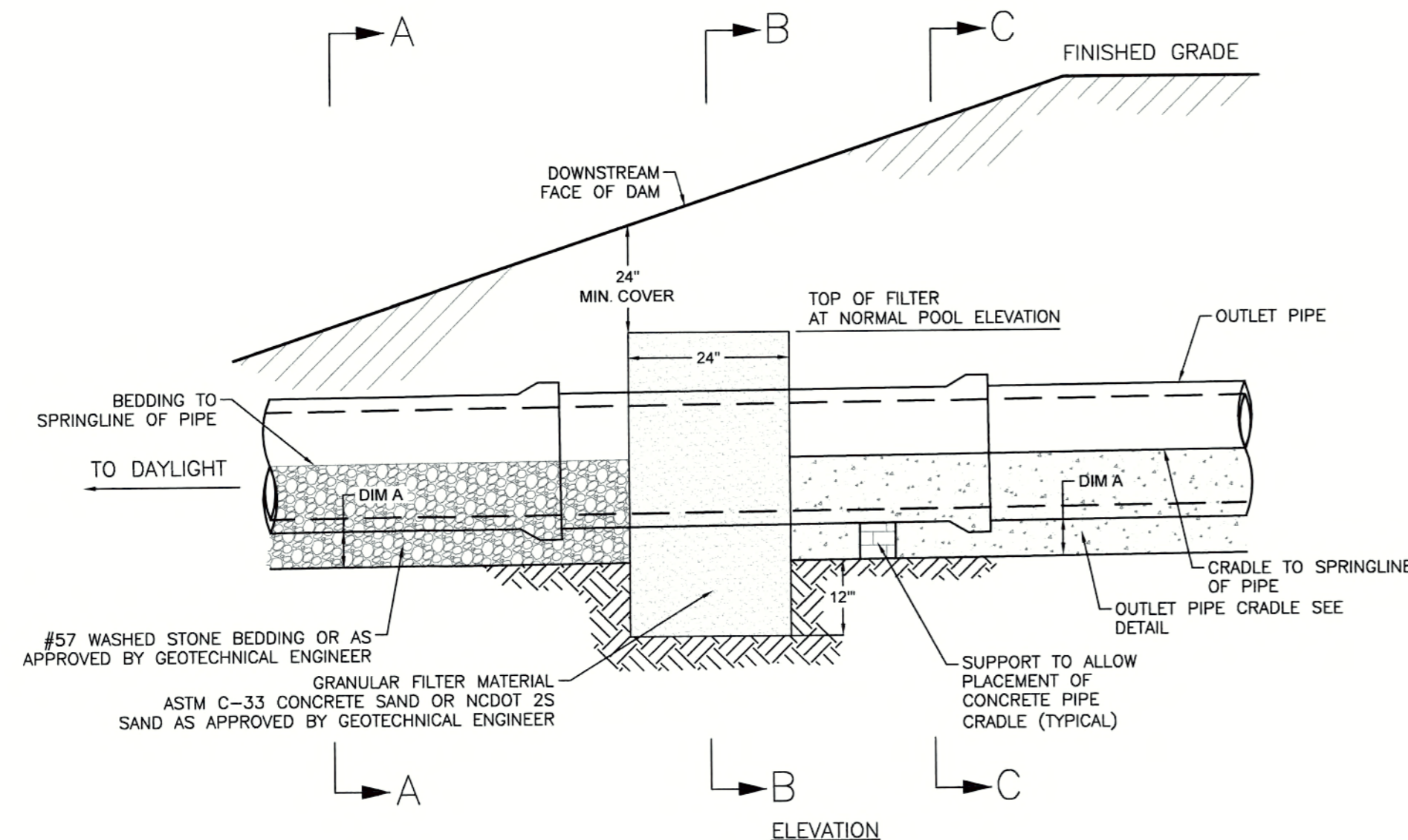
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TRASH RACK DETAIL

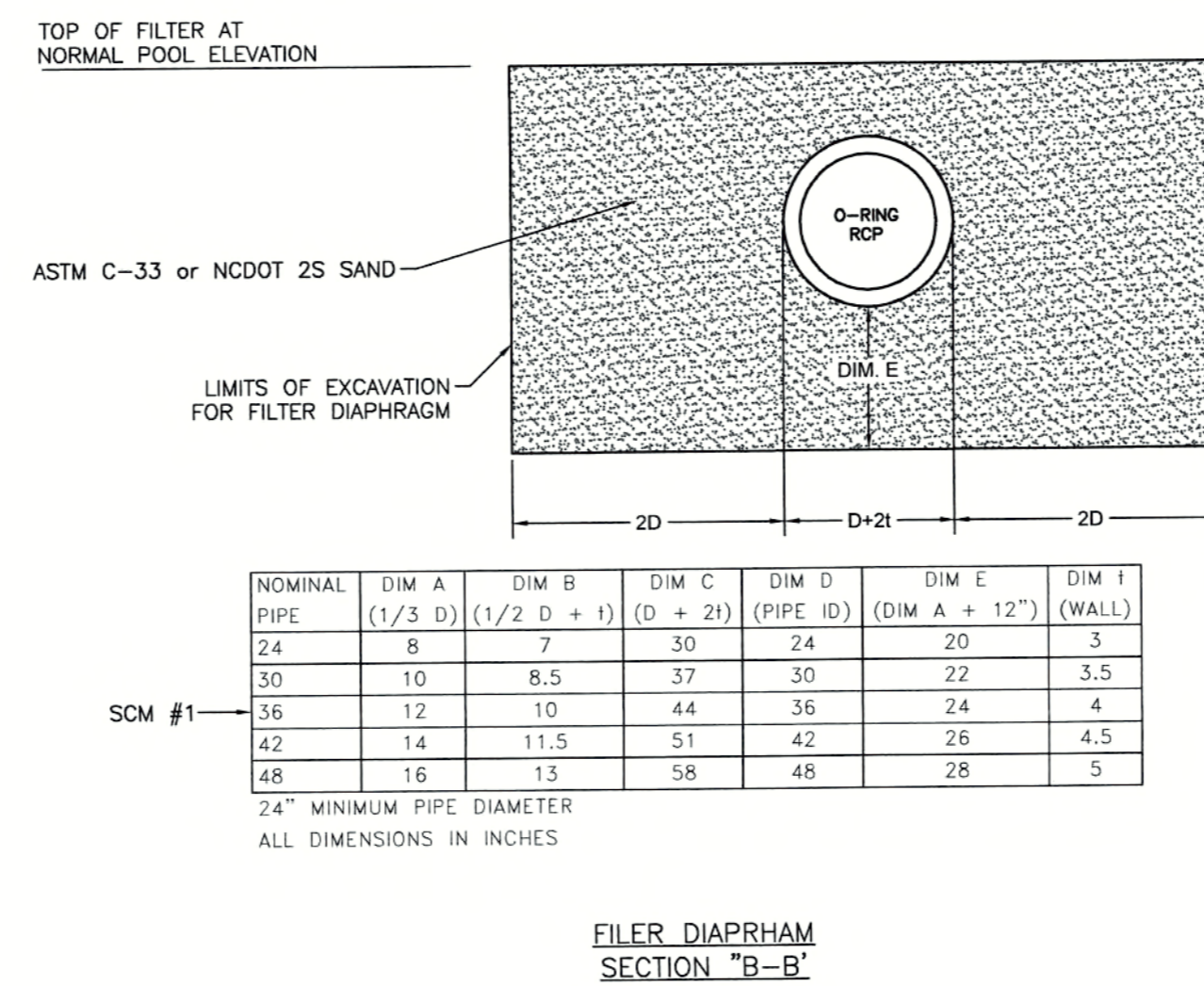
NTS

- TRASH RACK DETAIL BASED ON POMONA PIPE PRODUCTS "STANDARD ALUMINUM BAR & ANGLE PEAKED ROOF" TRASH RACK WITH ONE QUADRANT HINGED FOR MANWAY ACCESS TO FIT 48"x48" I.D. CONCRETE RISER WITH 6" OR 8" THICK WALLS".
- TRASH RACK TO BE POWDER-COATED BLACK.



**OUTLET PIPE FILTER DIAPHRAGM &
CONCRETE CRADLE DETAIL**

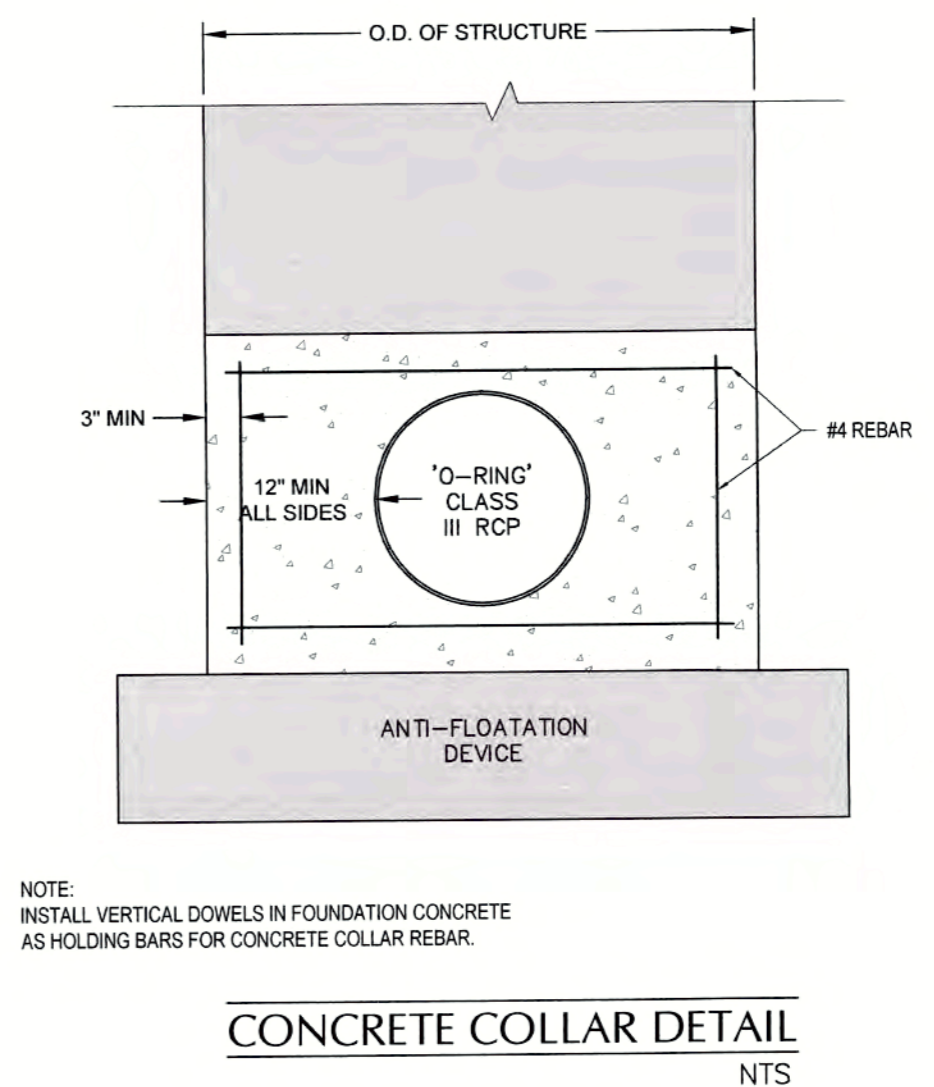
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**FILER DIAPHRAM
SECTION "B-B"**

NOMINAL PIPE	DIM A (1/3 D)	DIM B (1/2 D + 1)	DIM C (D + 2)	DIM D (PIPE ID)	DIM E (DIM A + 12") (WALL)	DIM F (WALL)
24	8	7	30	24	20	3
30	10	8.5	37	30	22	3.5
36	12	10	44	36	24	4
42	14	11.5	51	42	26	4.5
48	16	13	58	48	28	5

SCM #1
24" MINIMUM PIPE DIAMETER
ALL DIMENSIONS IN INCHES



CONCRETE COLLAR DETAIL

NTS

NOTE:
INSTALL VERTICAL DOWELS IN FOUNDATION CONCRETE AS HOLDING BARS FOR CONCRETE COLLAR REBAR.

CITY OF RALEIGH
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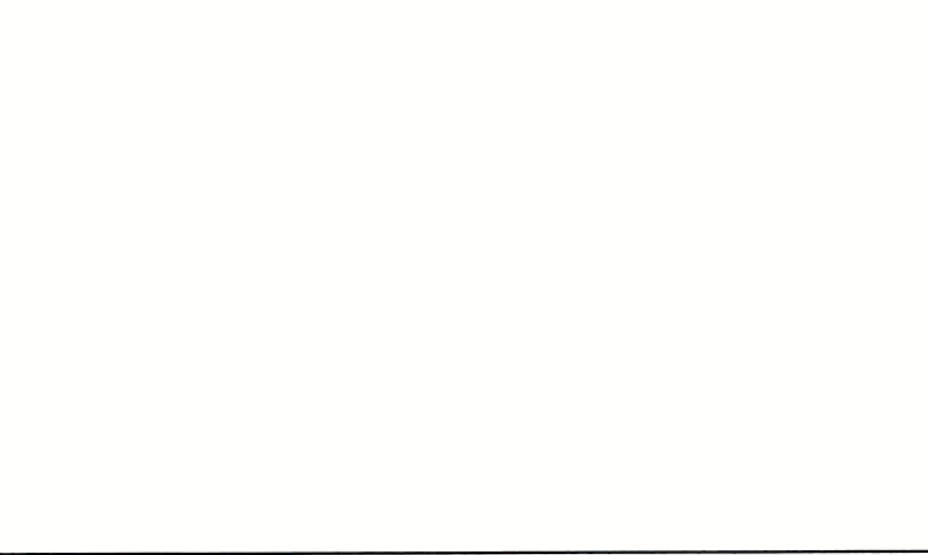
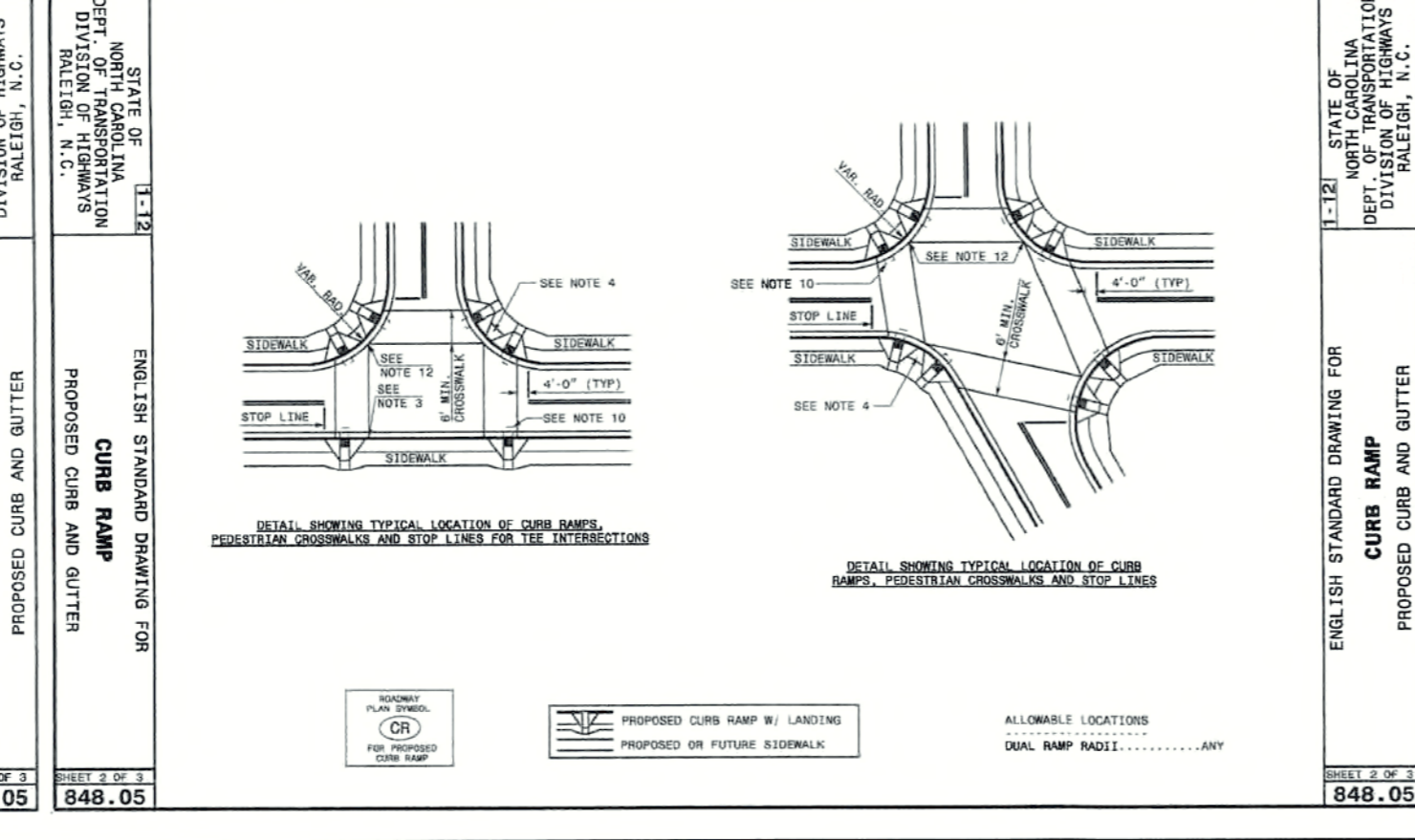
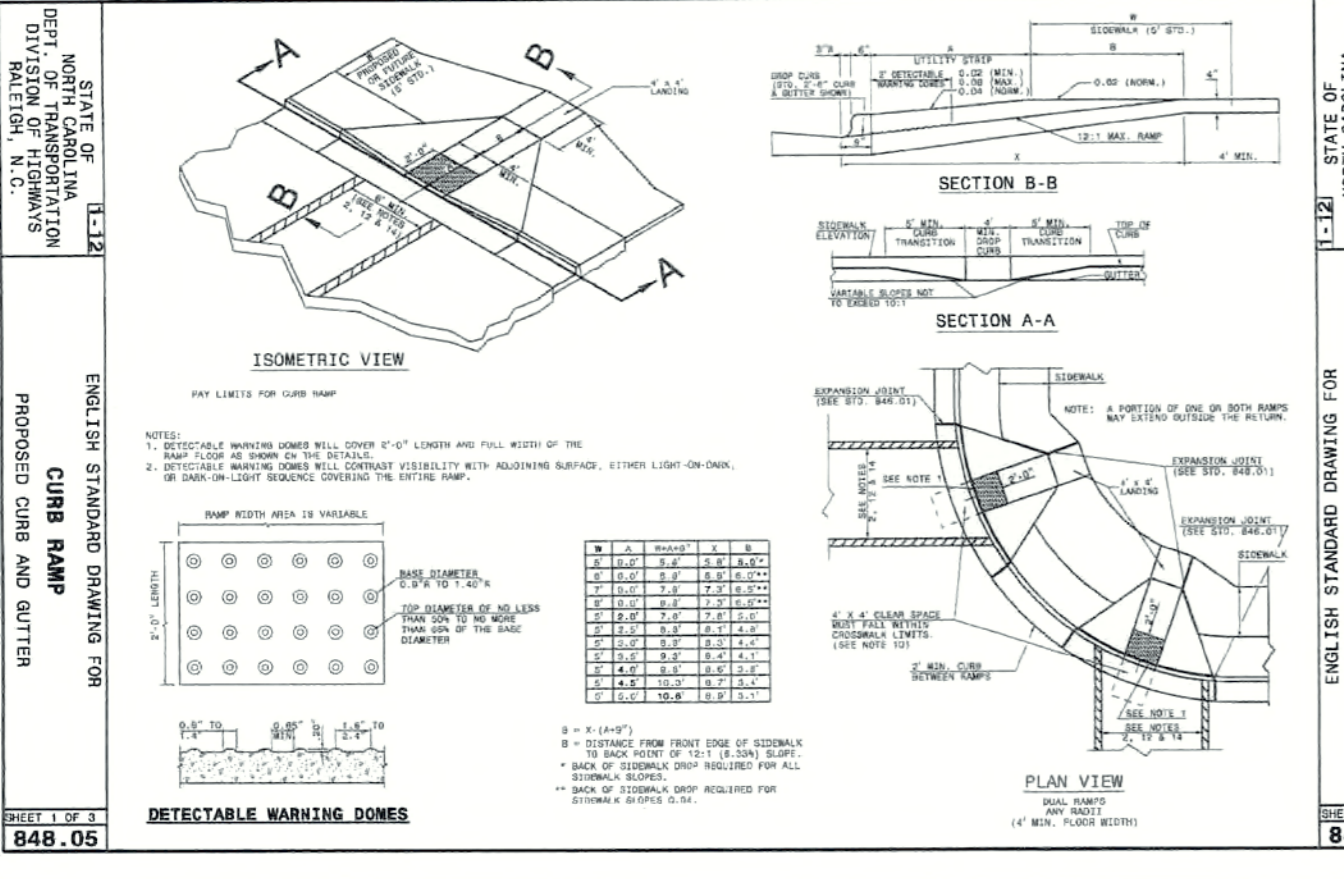
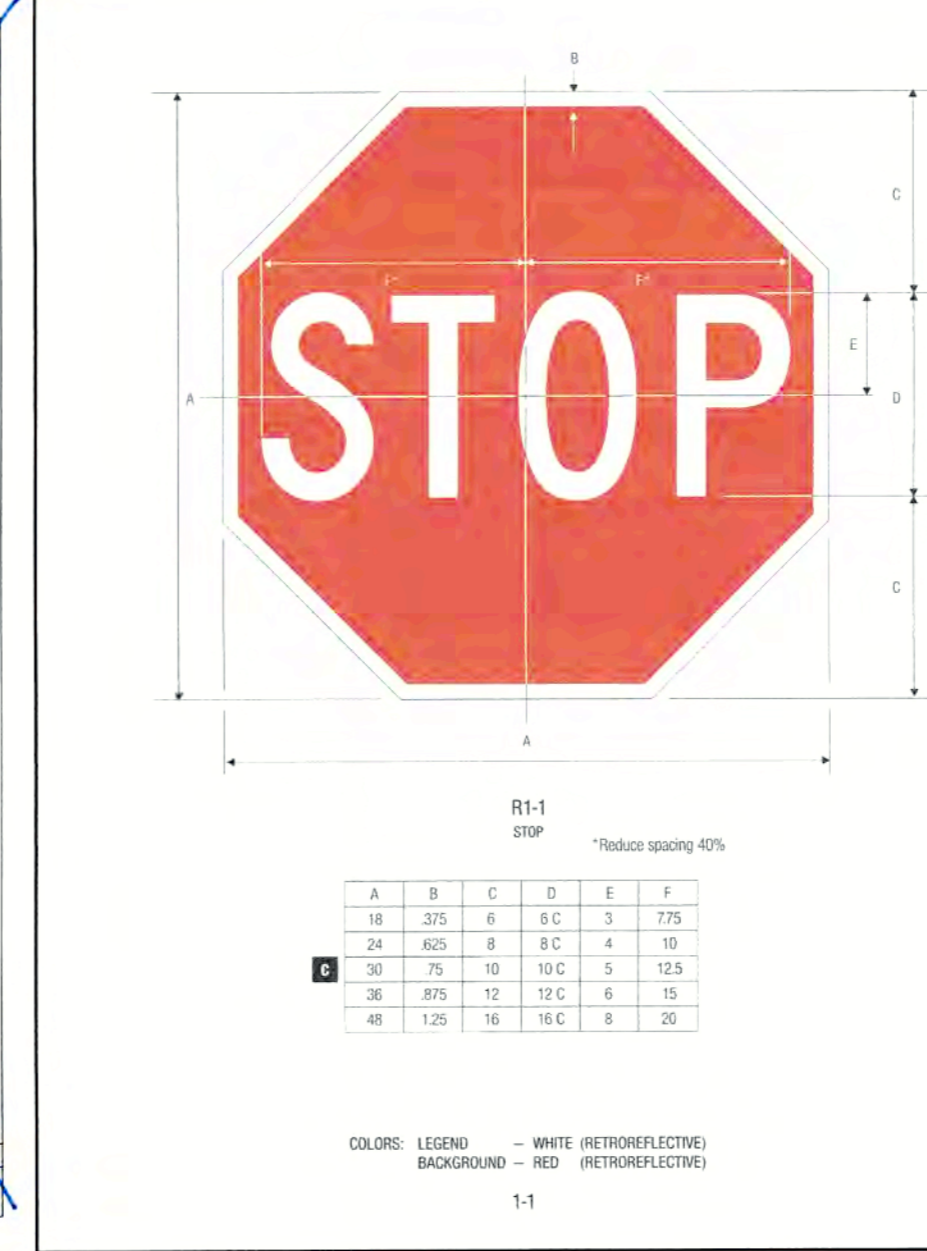
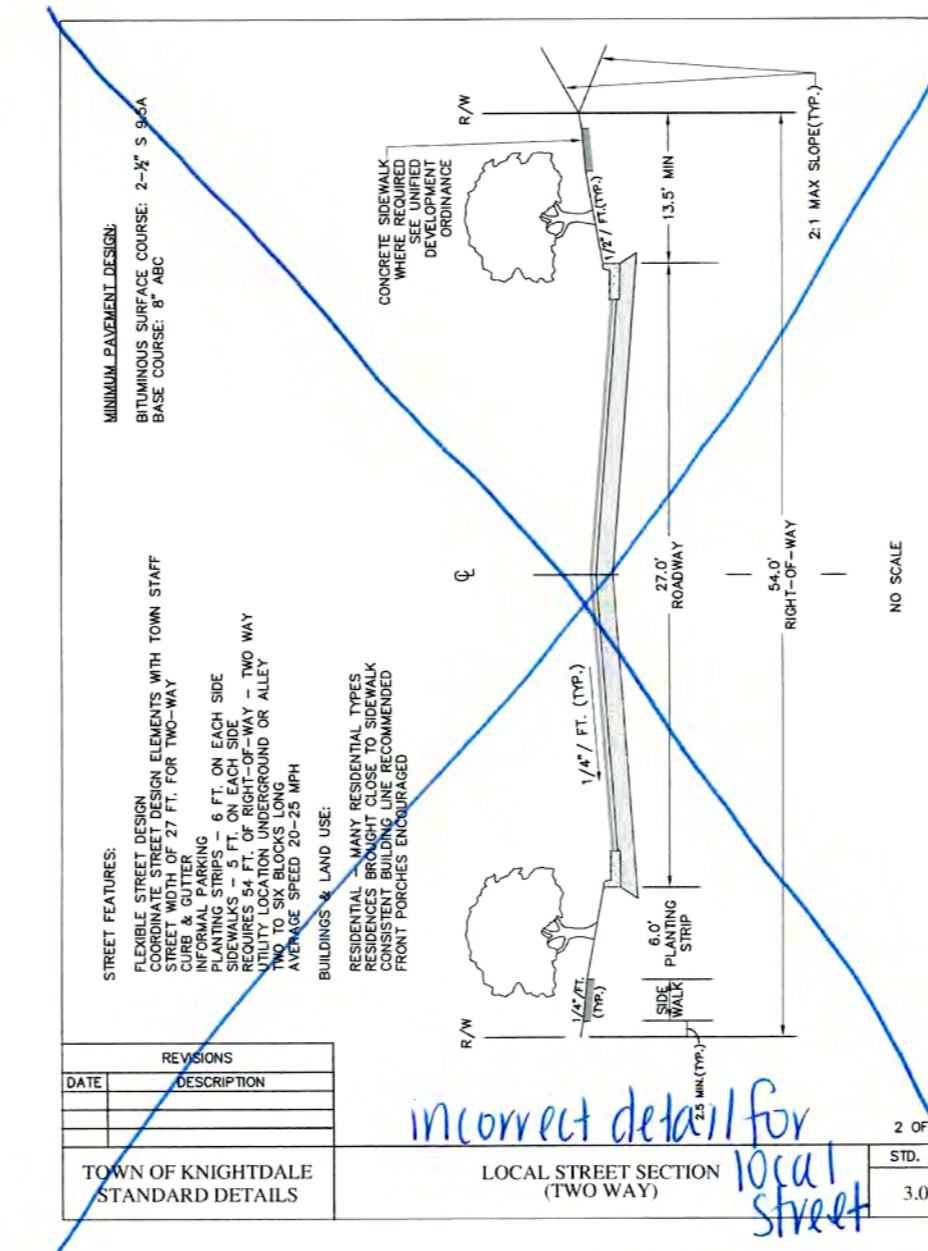
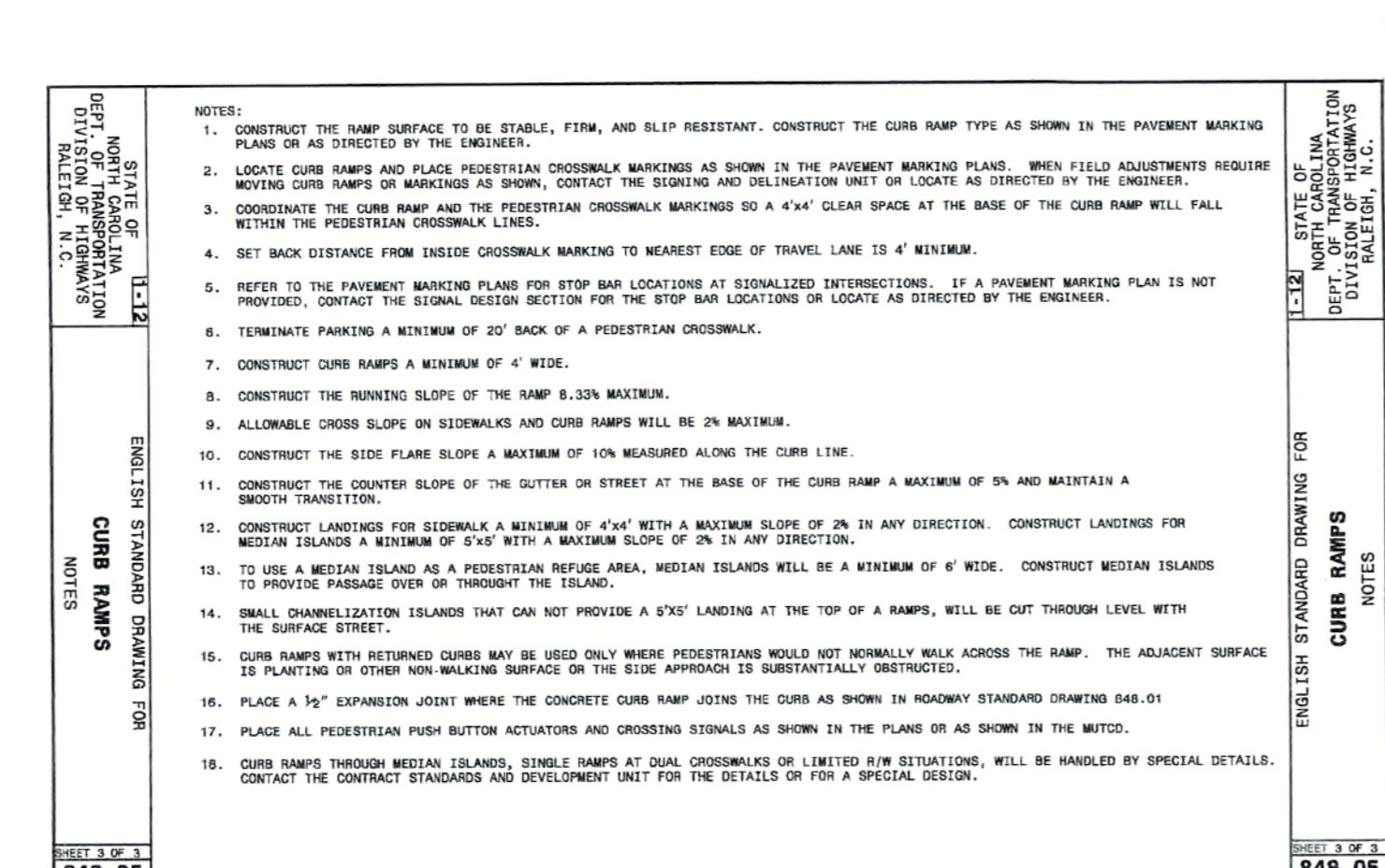
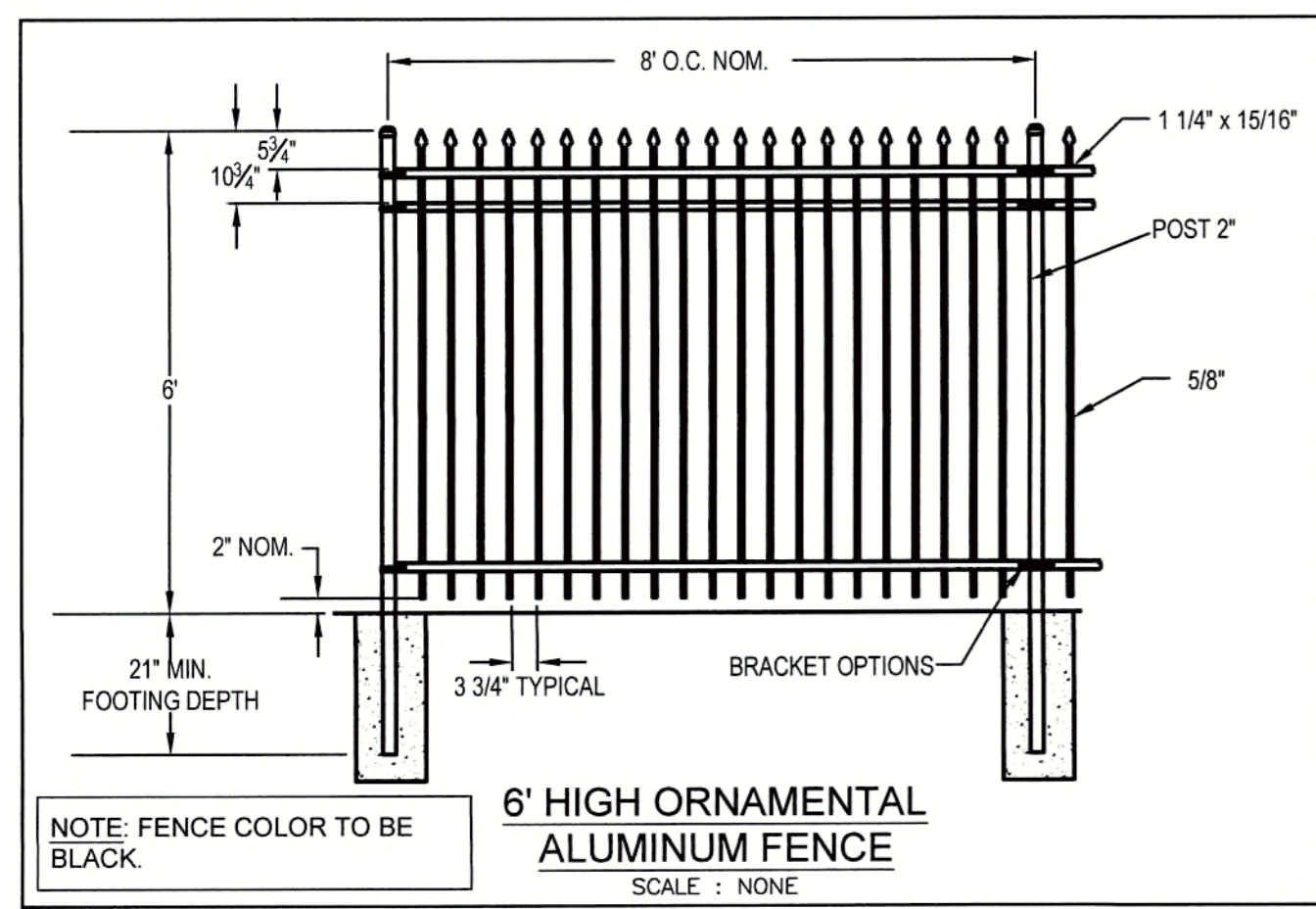
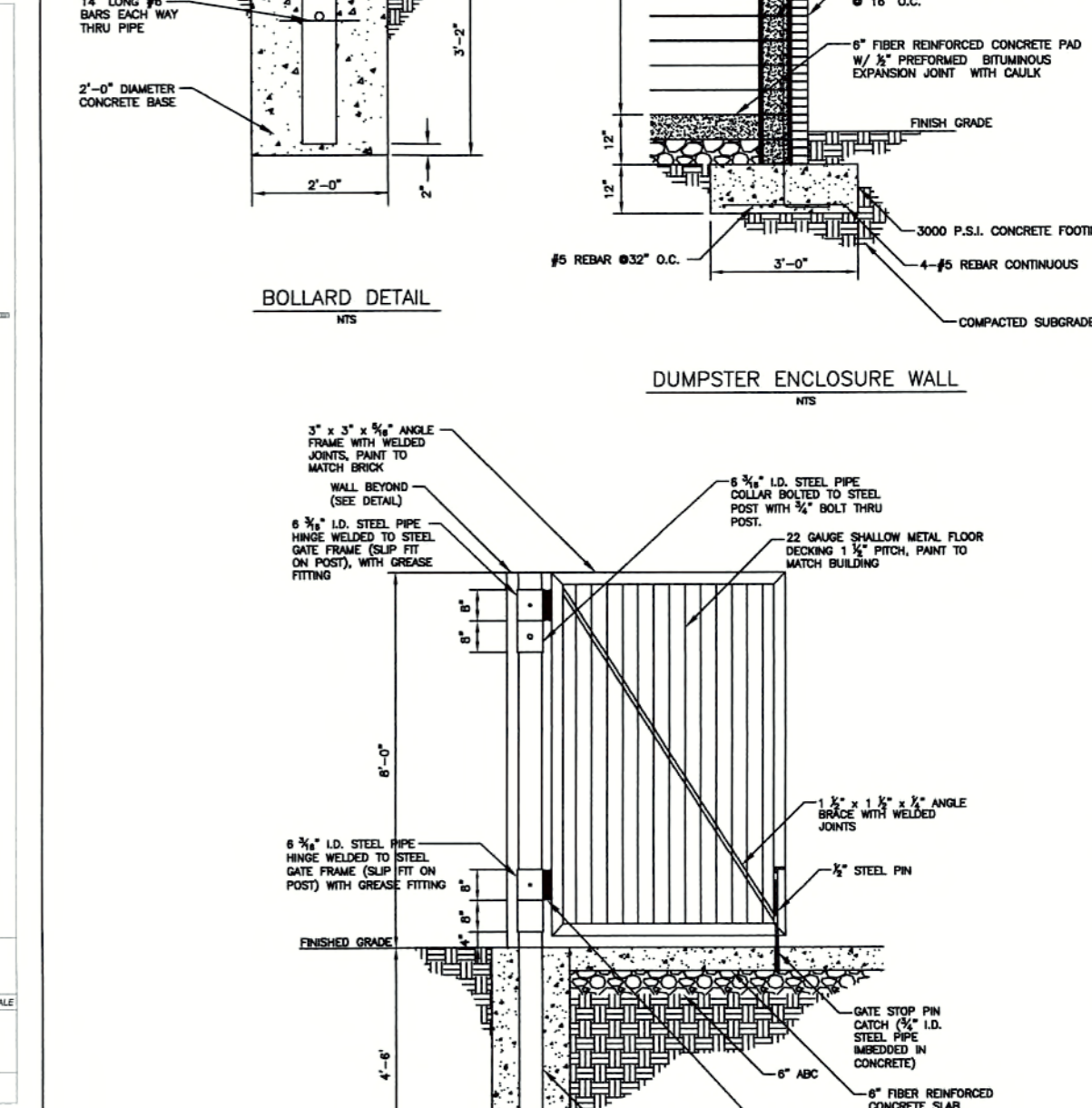
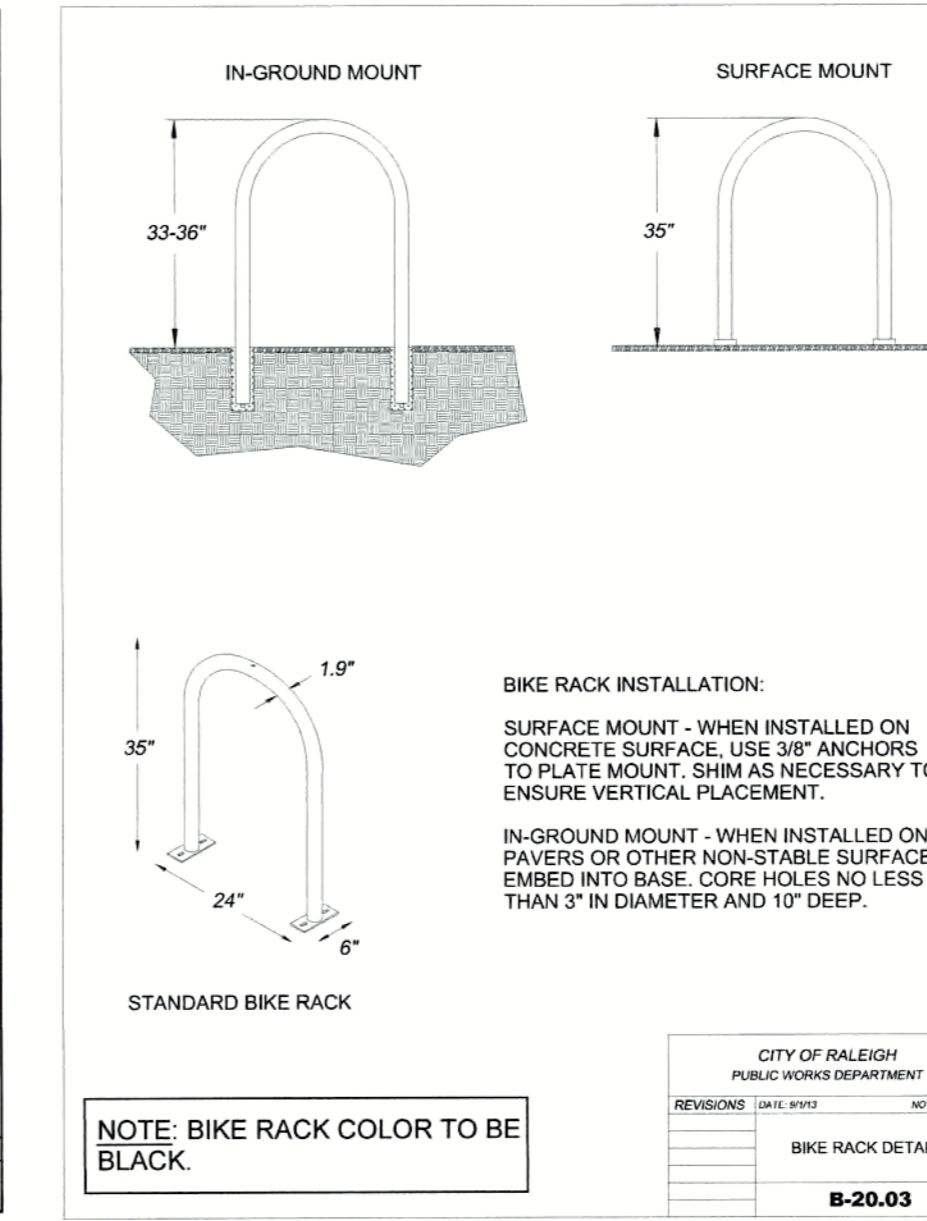
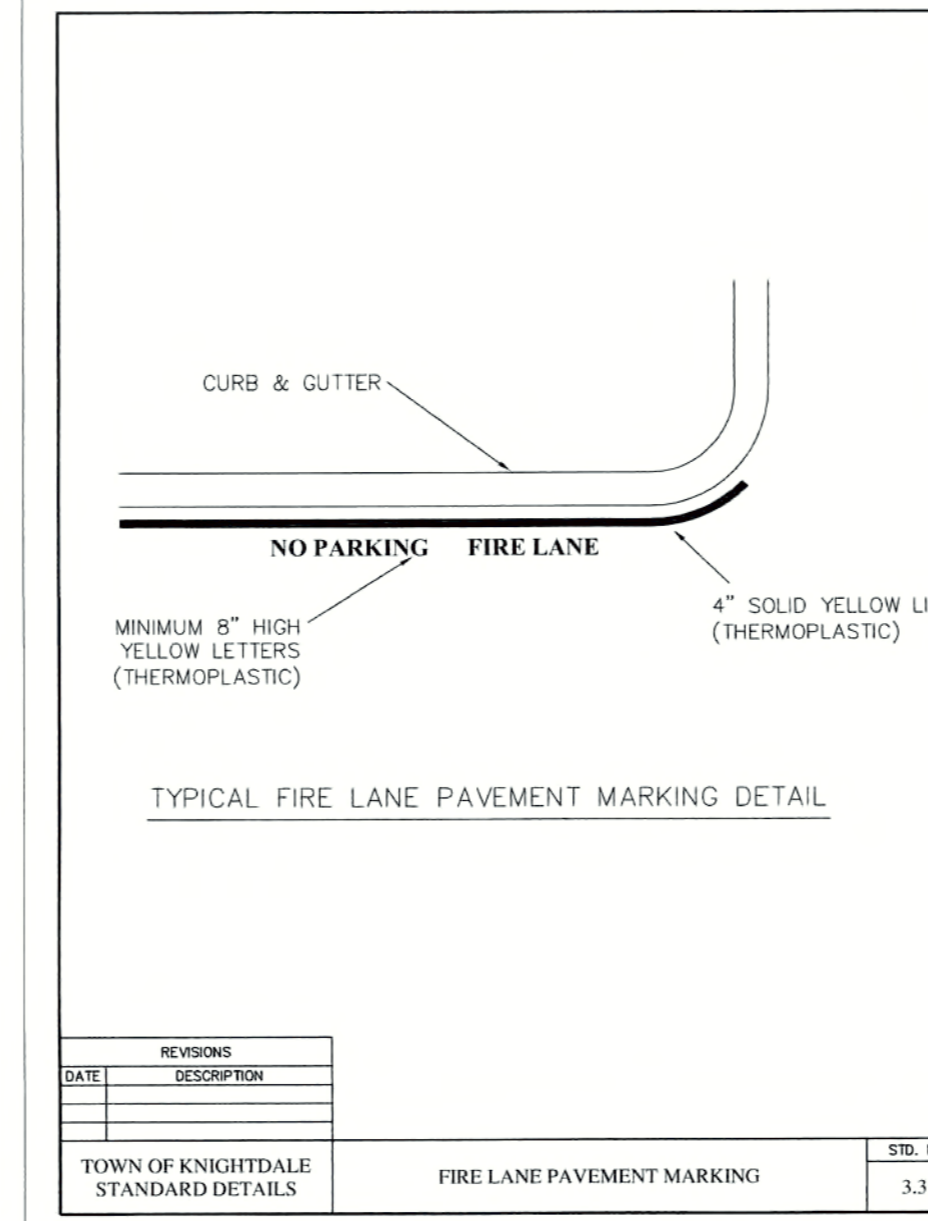
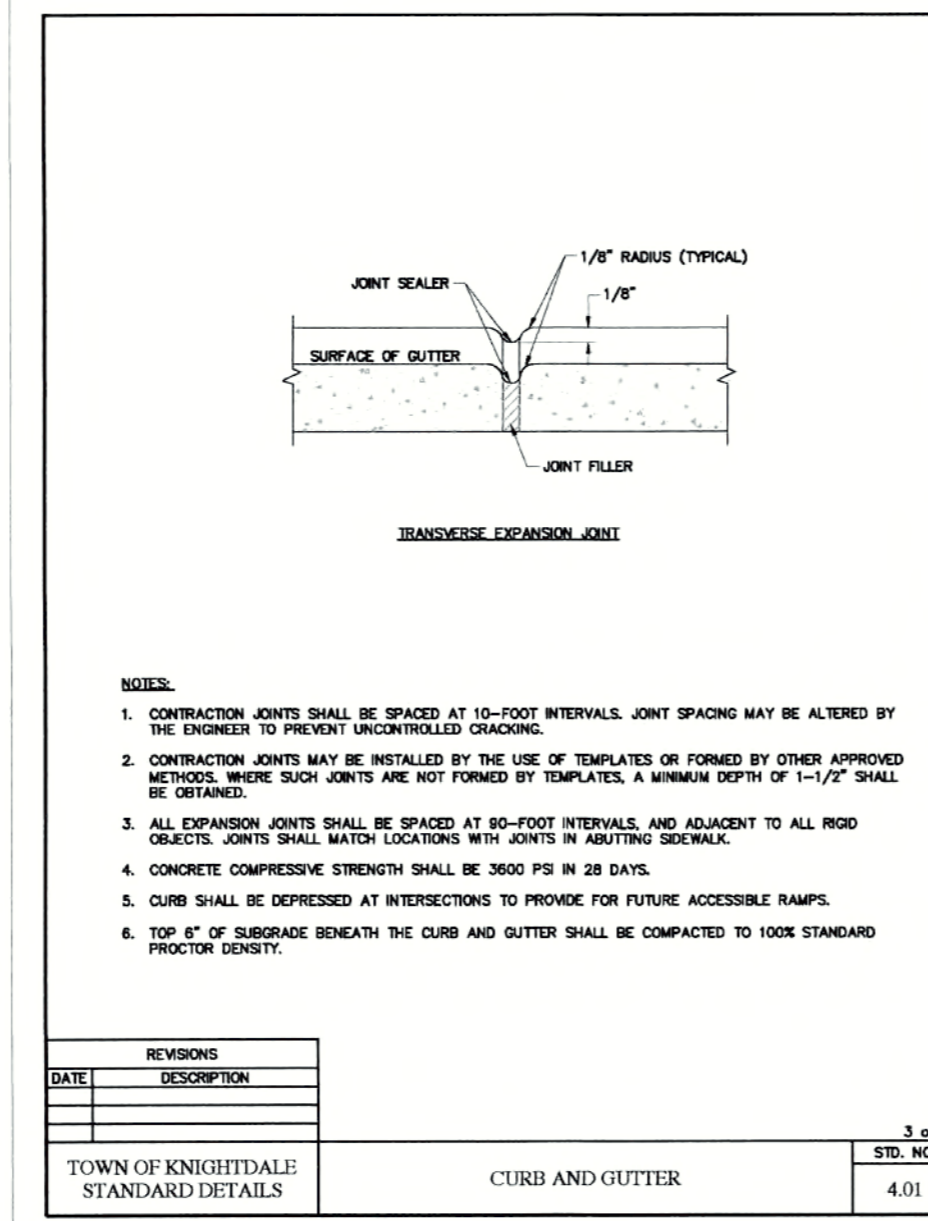
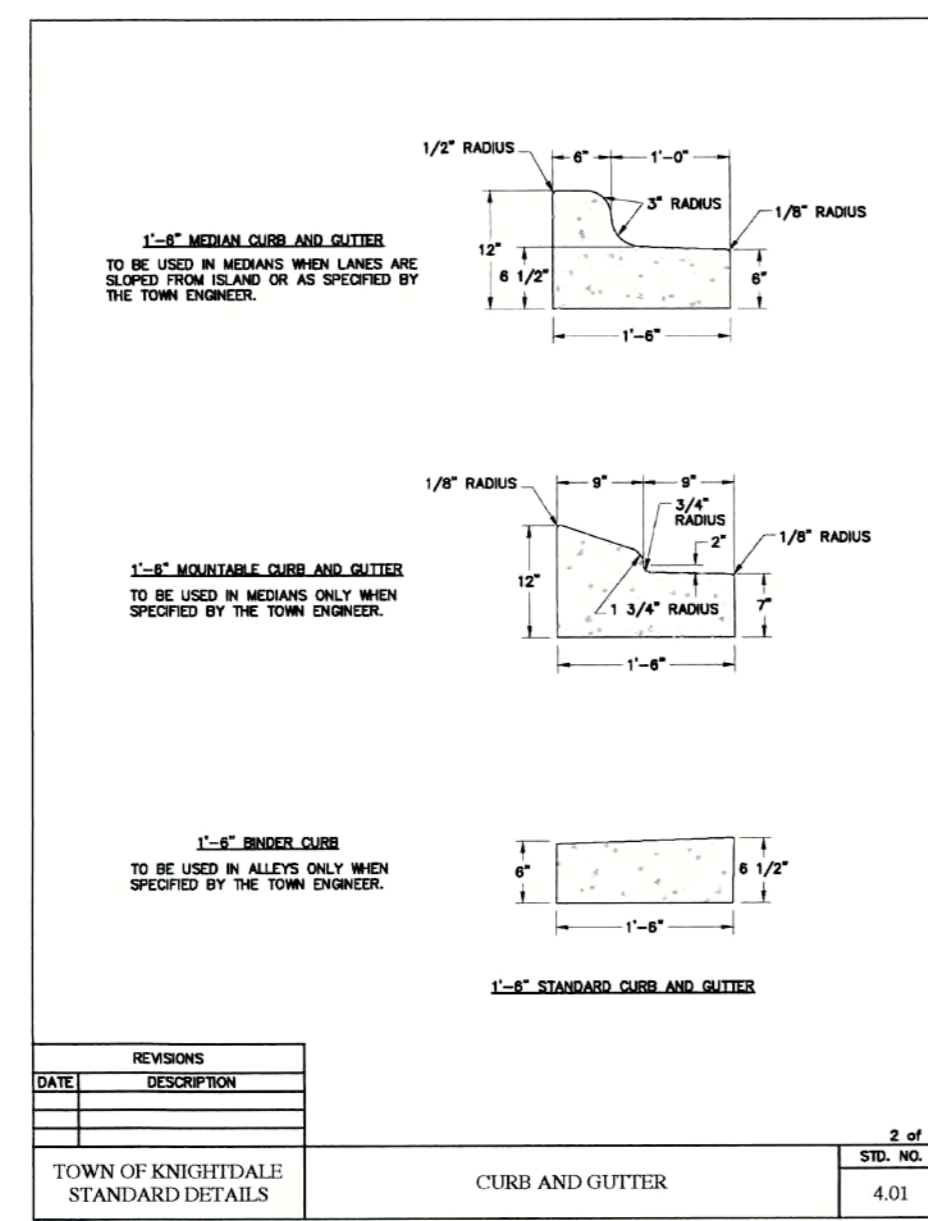
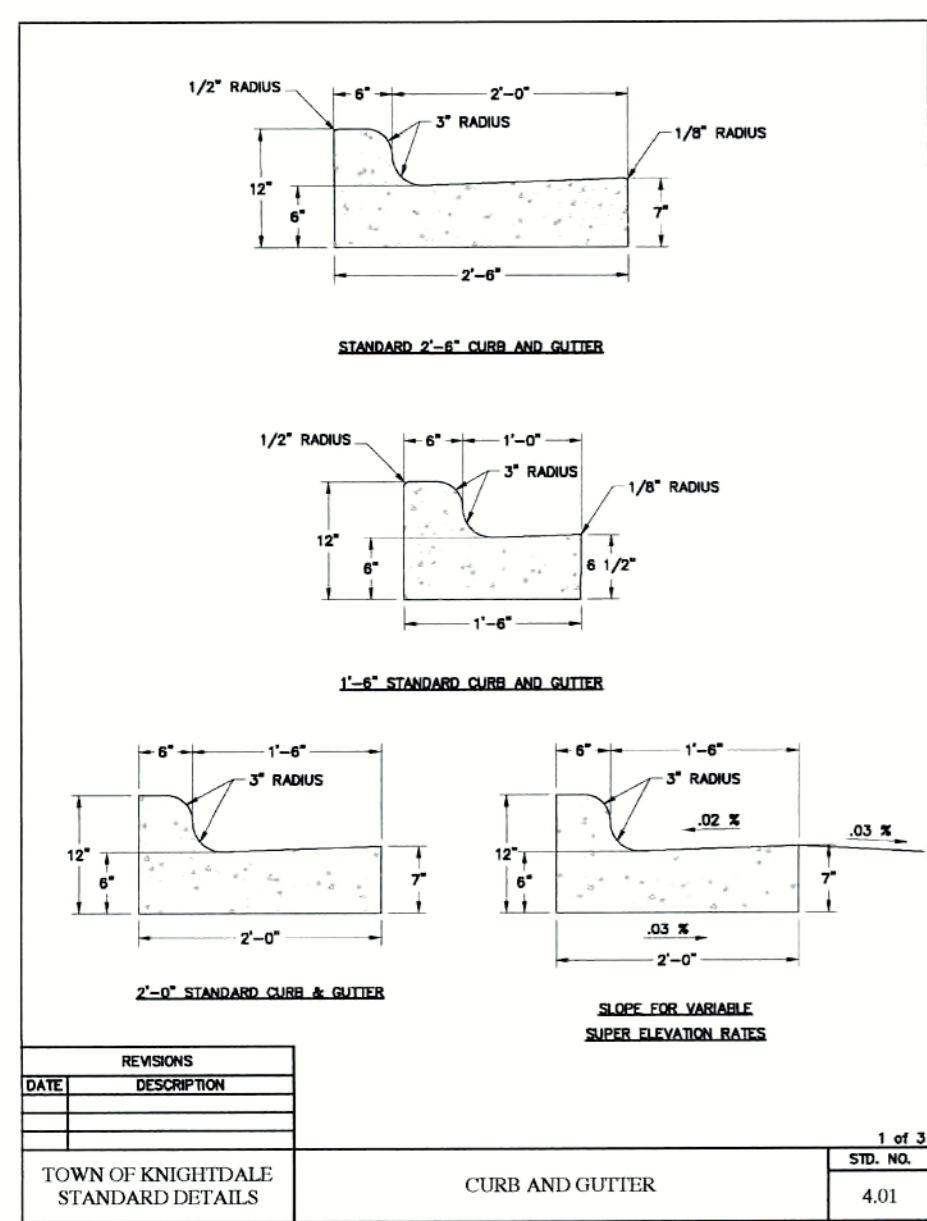
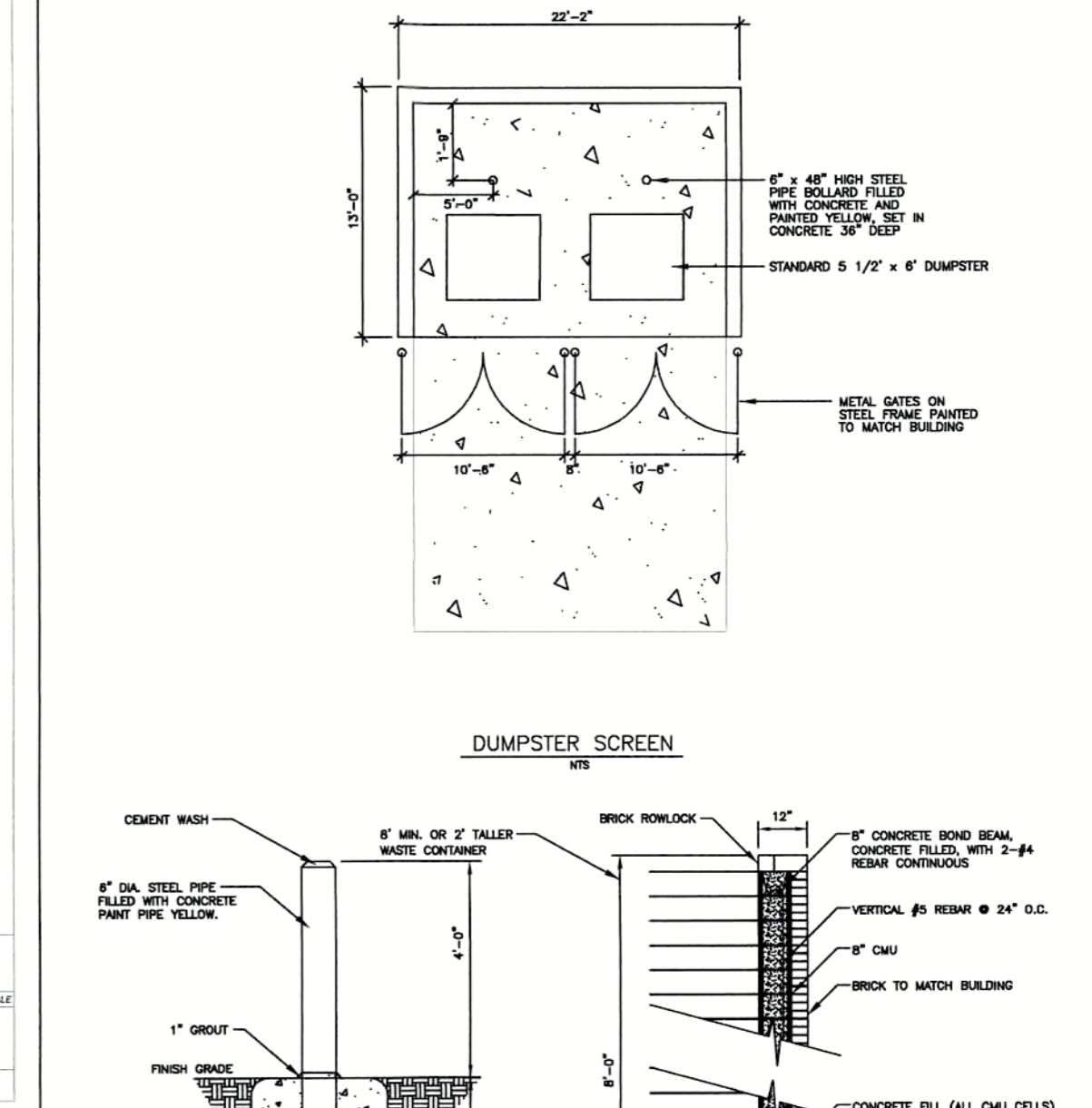
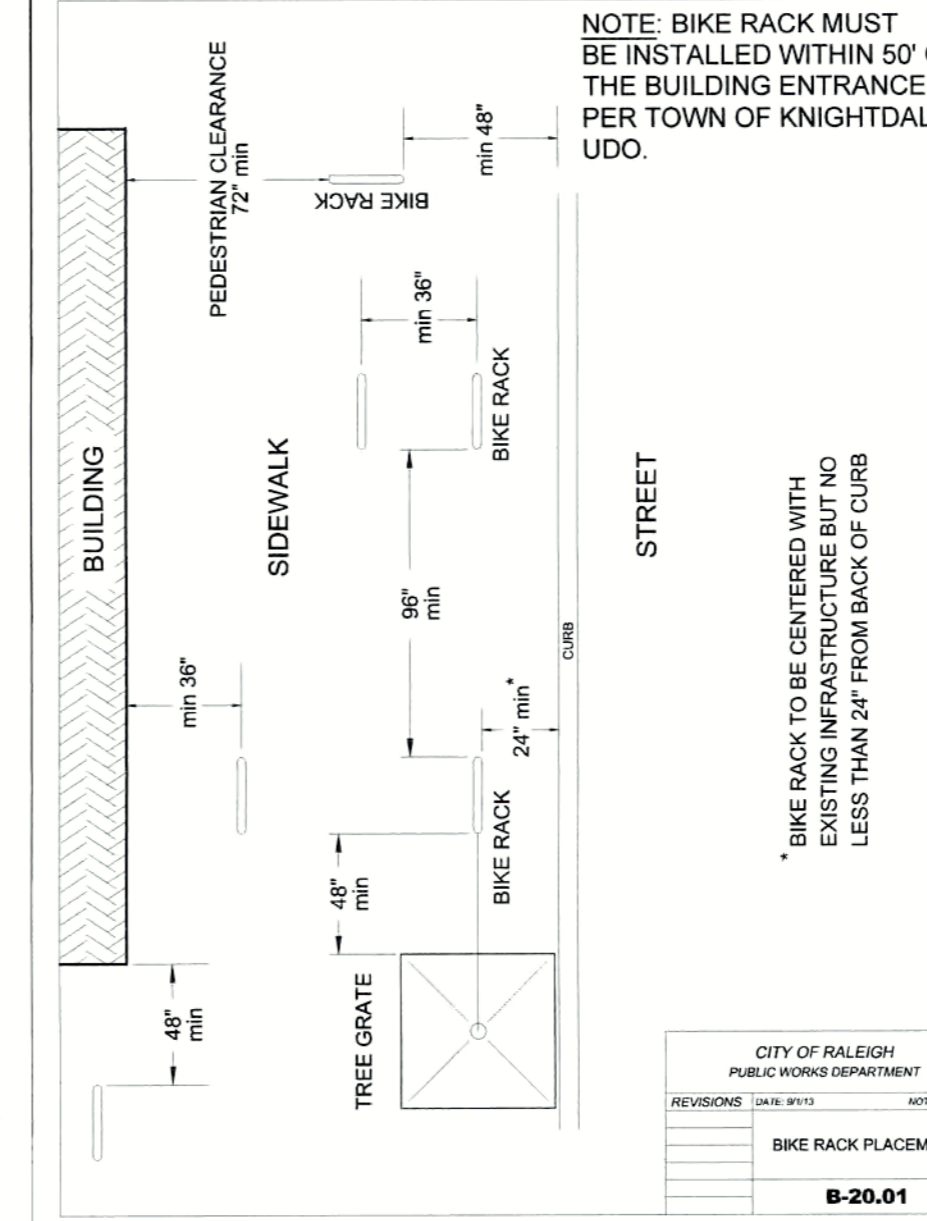
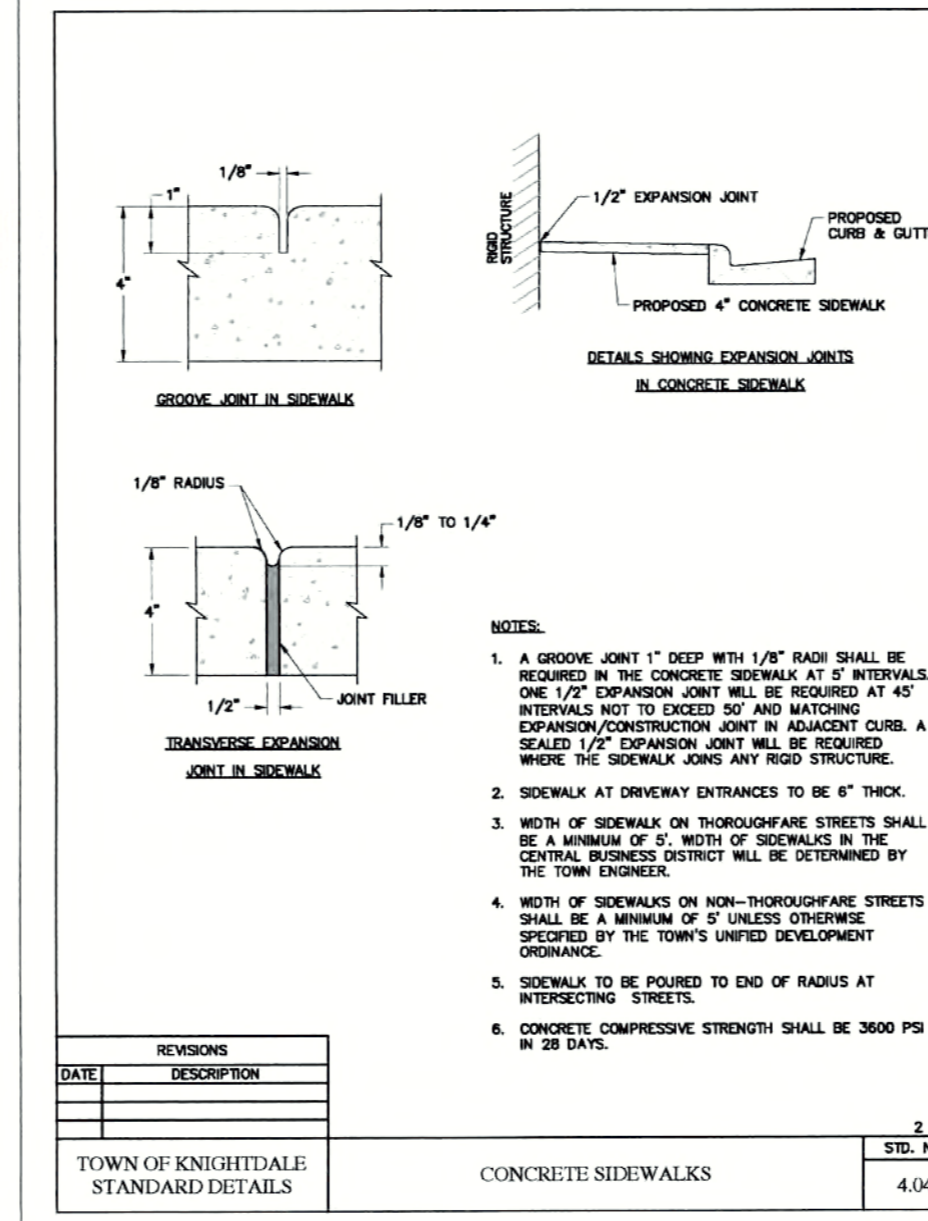
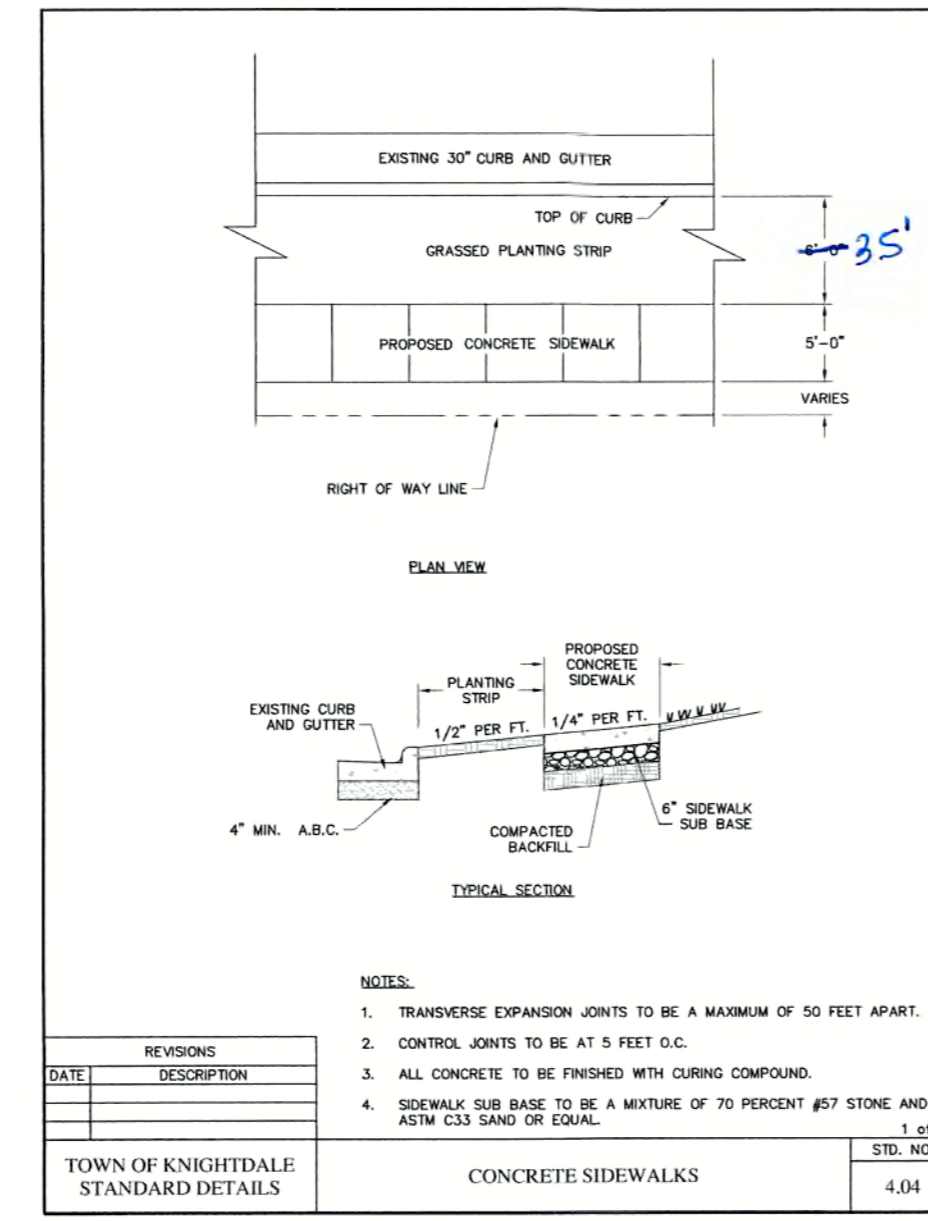
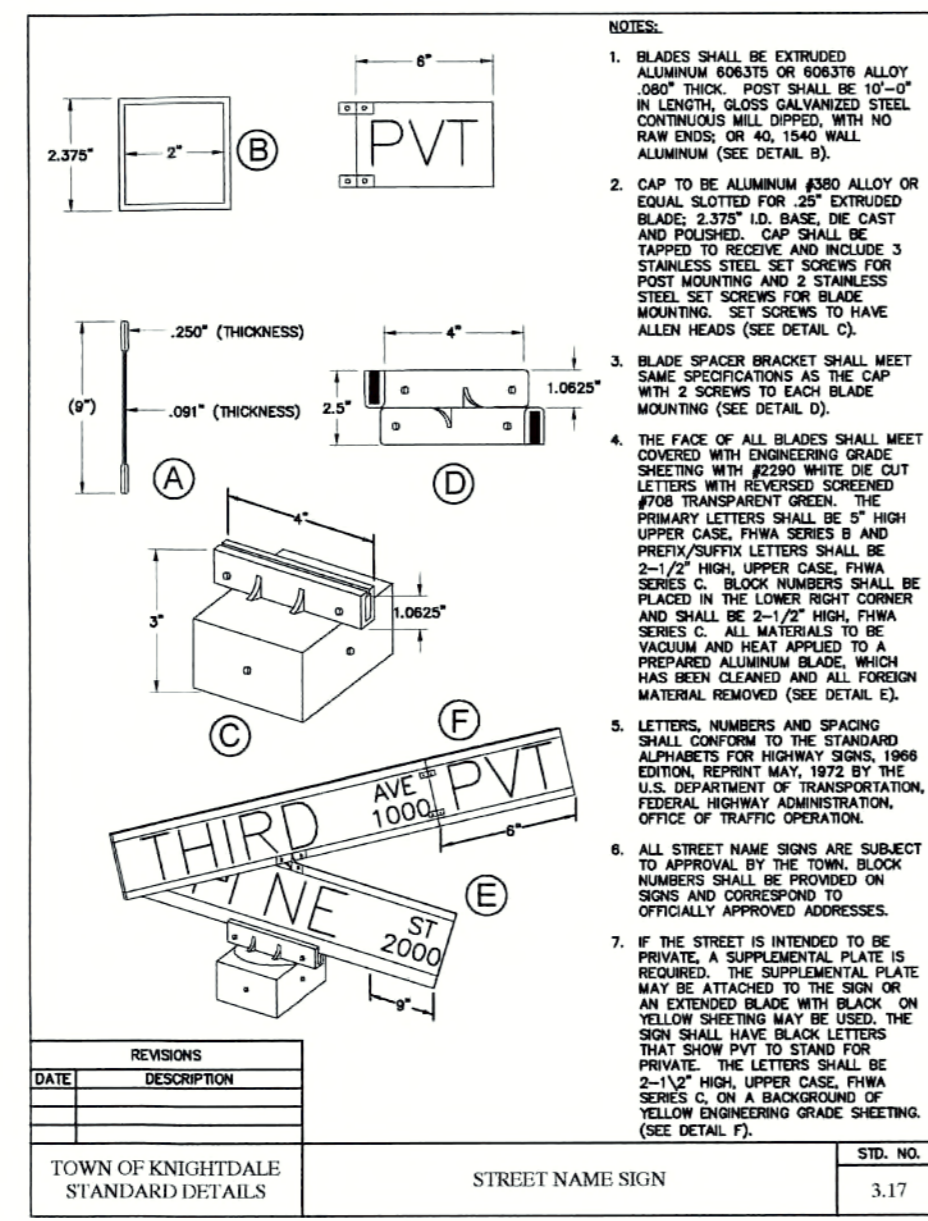
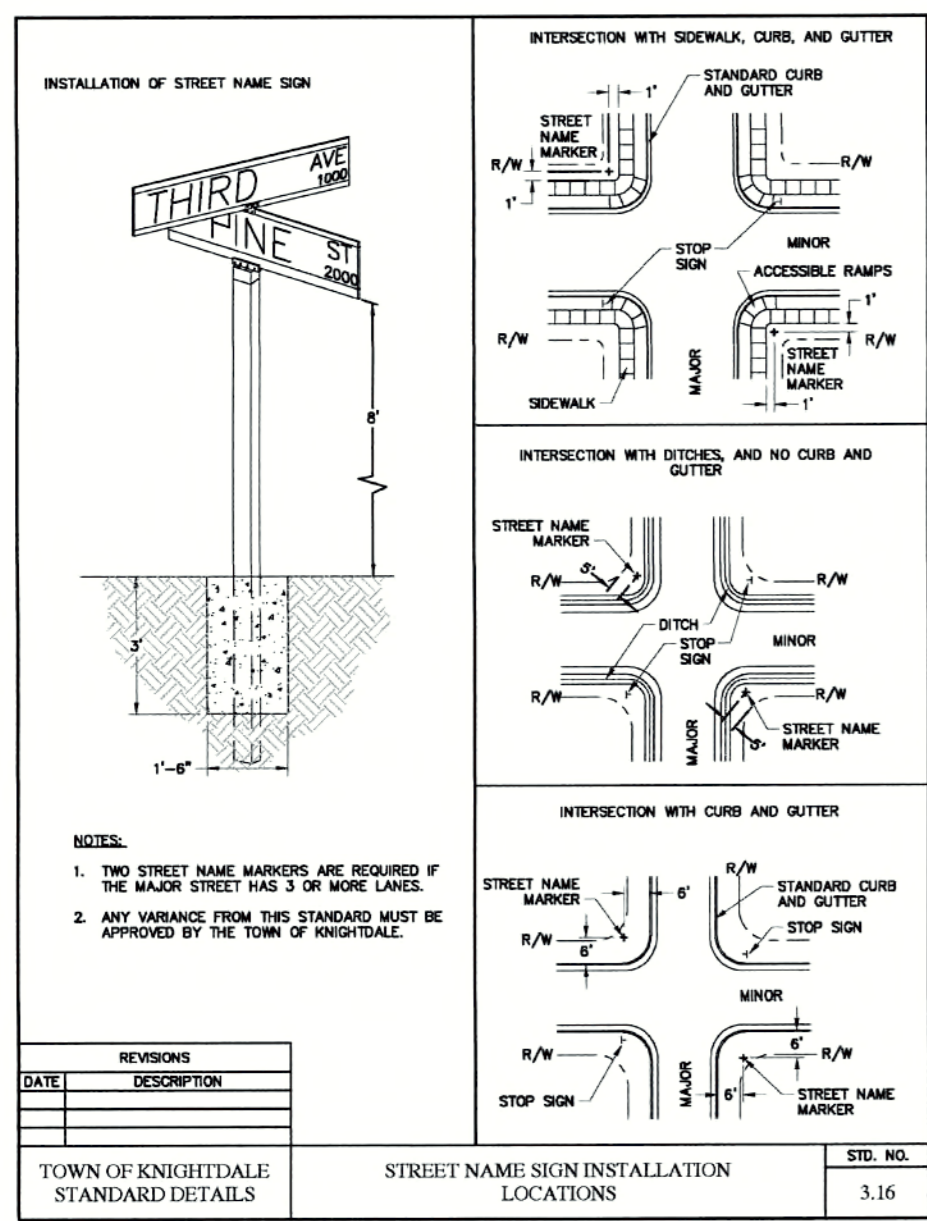
TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
STORMWATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A



Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
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BY: SAMU DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
BY: [Signature] DATE: 4-28-17
ADMINISTRATOR



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BY: Sarah Hill DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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BY: Chris Cur DATE: 4-28-17
 ADMINISTRATOR

WithersRavenel
 Engineers | Planners

THE COTTAGES AT KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

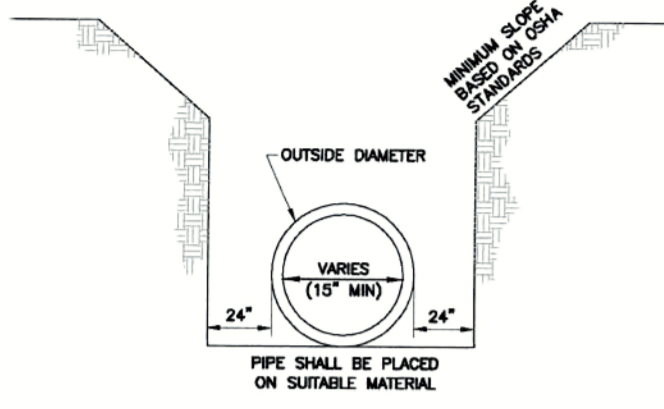
ROADWAY DETAILS

Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR

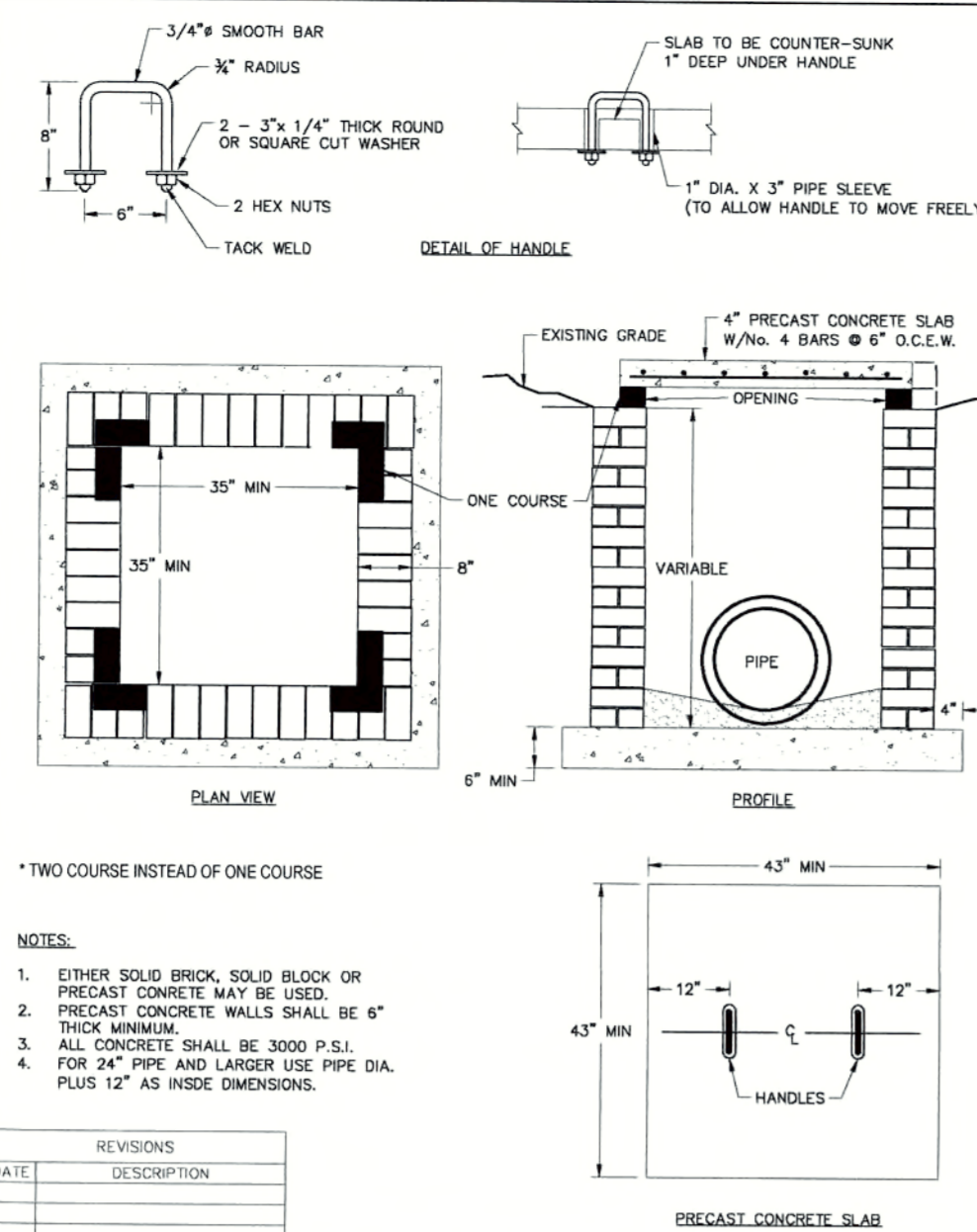
Revisions:
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Sheet No. 8.0

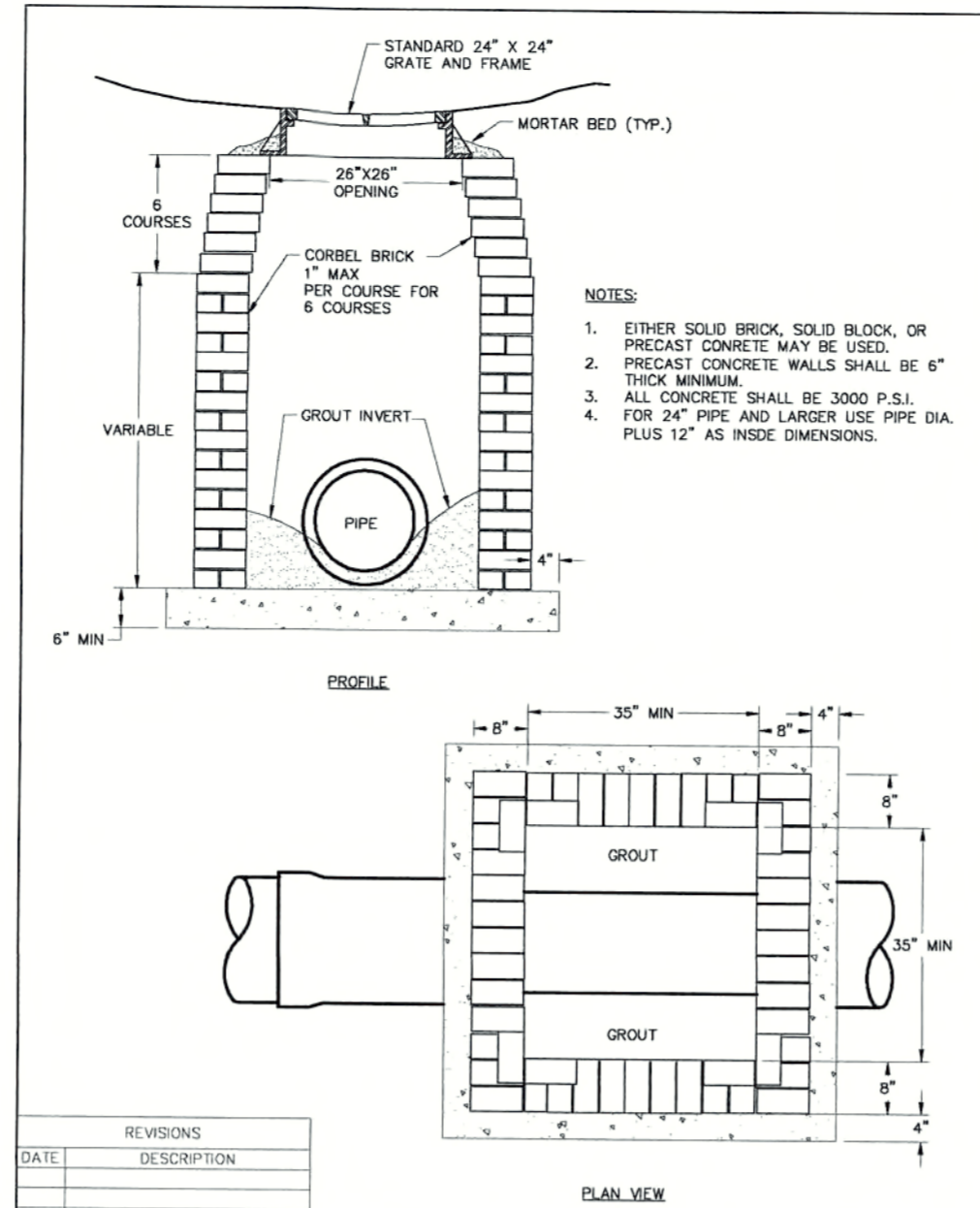
- NOTES:**
1. A MINIMUM OF 24" FROM OUTSIDE DIAMETER OF PIPE TO SIDE OF TRENCH MUST BE ALLOWED FOR COMPACTION OF FILL MATERIAL. SHOULDERING OF TRENCHES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER THE PIPE IS LAID. THE FILL AROUND THE PIPE SHALL BE PLACED IN LAYERS NOT TO EXCEED 6" UNDER NO CIRCUMSTANCES SHALL WATER BE PERMITTED TO RISE IN UNBACKFILLED TRENCHES AFTER THE PIPE HAS BEEN PLACED. COMPACTION REQUIREMENTS SHALL BE ATTAINED BY THE USE OF MECHANICAL TAMPS ONLY. EACH AND EVERY LAYER OF BACKFILL SHALL BE PLACED LOOSE AND THOROUGHLY COMPACTED INTO PLACE.
 2. ALL BACKFILL MATERIAL SHALL HAVE AN IN PLACE COMPACTION DENSITY OF AT LEAST 90% OF THE STANDARD PROCTOR MAXIMUM DENSITY.
 3. THE FINAL 24" OF BACKFILL MATERIAL SHALL BE COMPACTED TO 100% OF THE STANDARD PROCTOR MAXIMUM DENSITY.
 4. ALL TRENCHING OPERATIONS SHALL MEET OSHA STANDARDS.
 5. BACKFILL MATERIAL BENEATH ROADWAY SHALL BE SELECT BACKFILL MATERIAL.



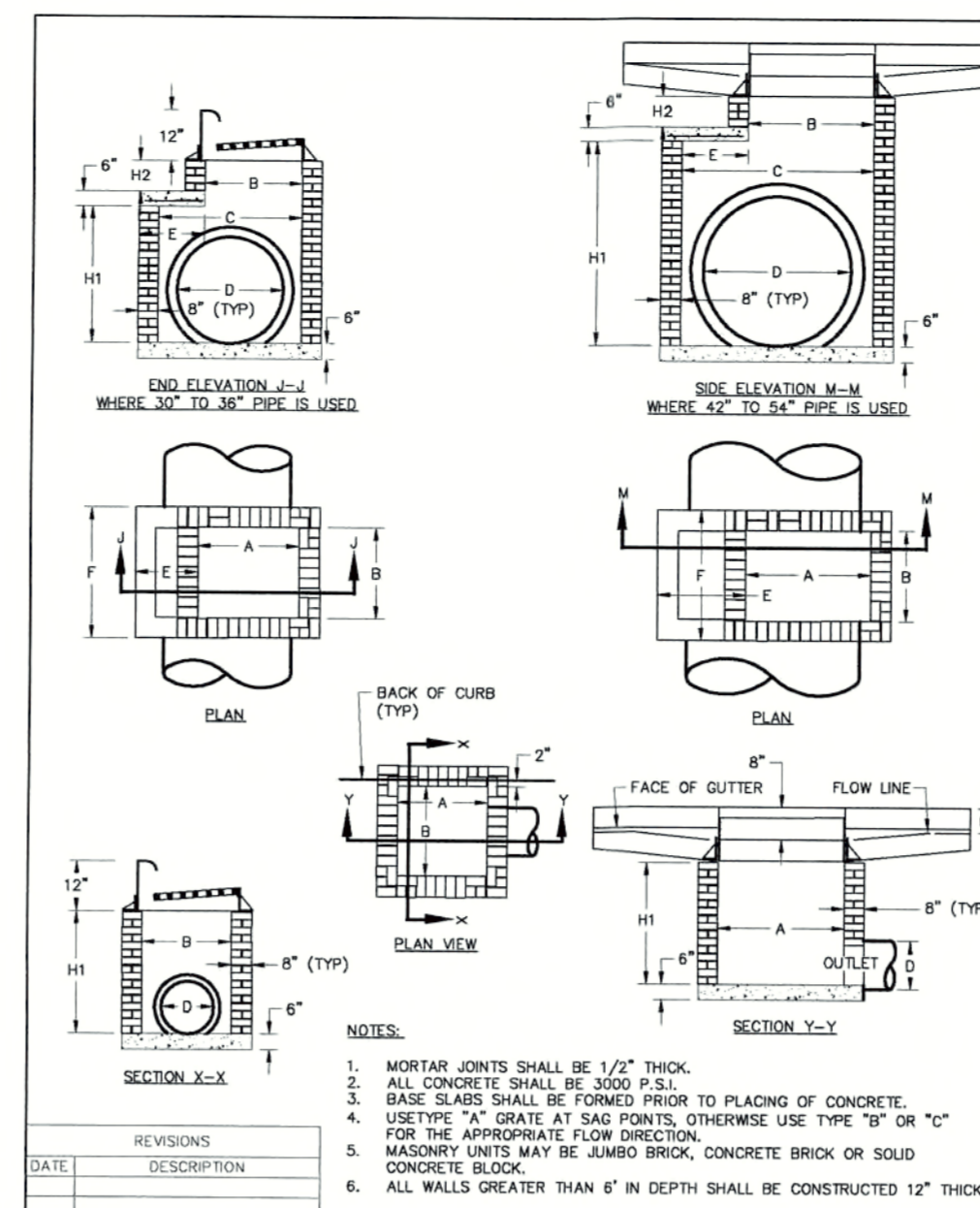
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		TRENCH FOR STORM DRAIN PIPES	5.02



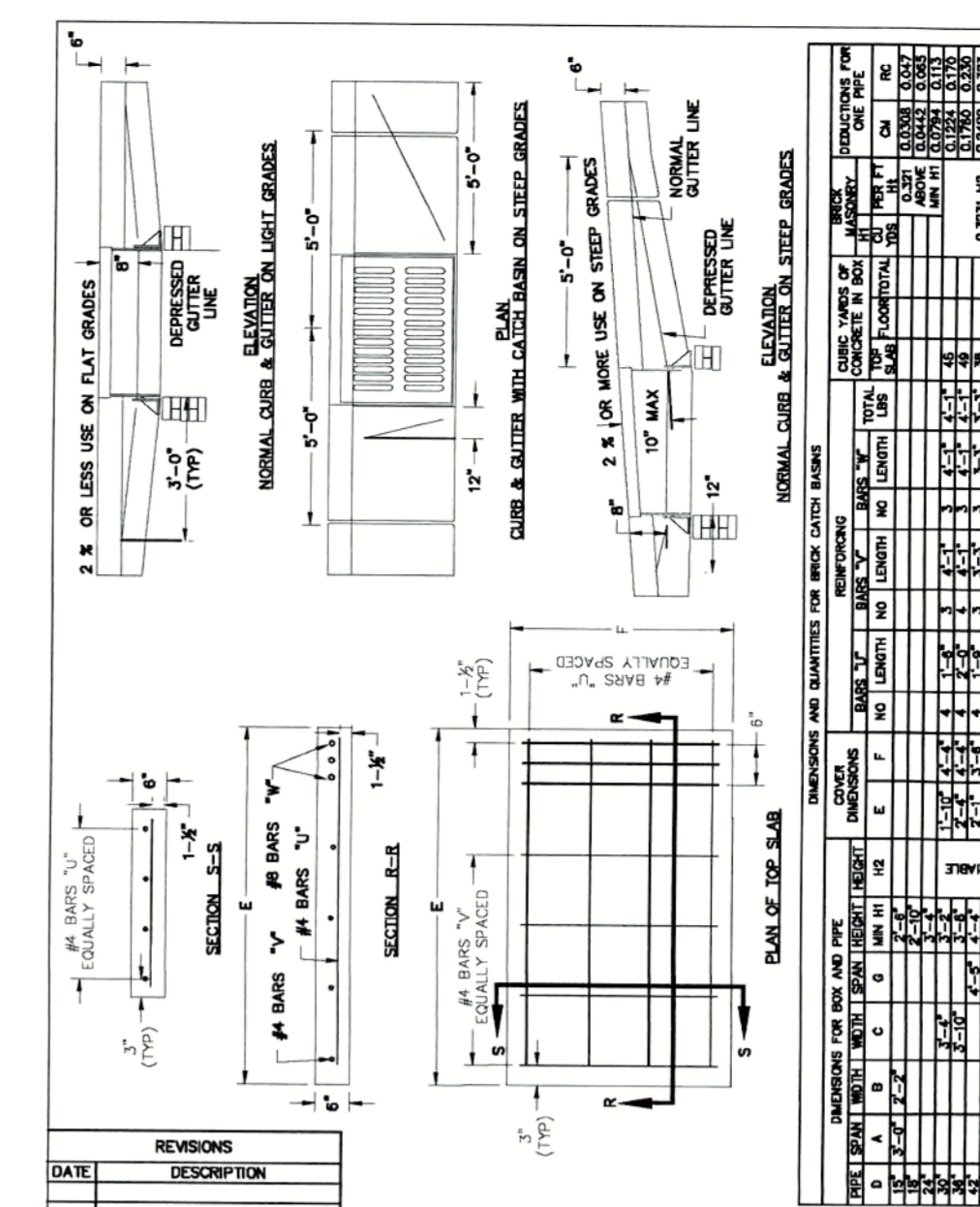
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD YARD INLET WITH CONCRETE SLAB	5.03



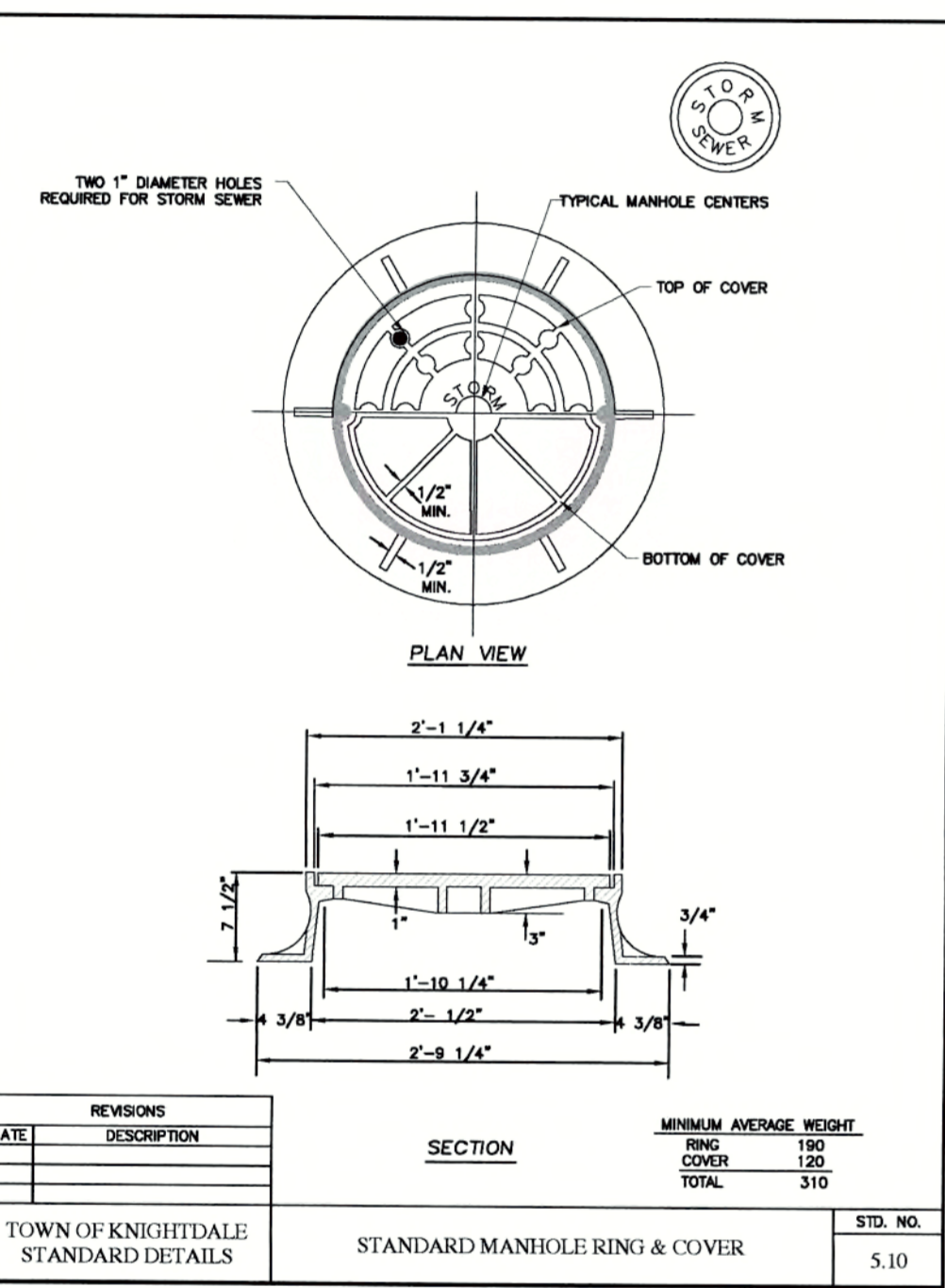
REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD DROP INLET WITH GRATE AND FRAME	5.04



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

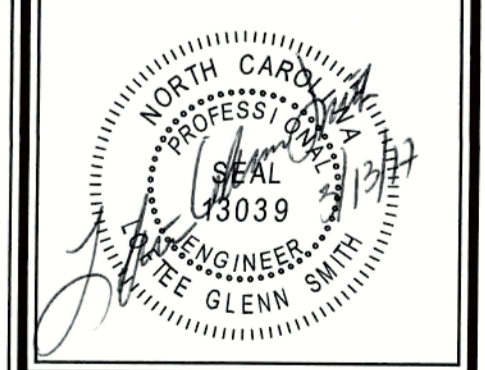


REVISIONS	DATE	DESCRIPTION	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD CURB INLET	5.05



REVISIONS	DATE	DESCRIPTION	MINIMUM AVERAGE HEIGHT	STD. NO.
TOWN OF KNIGHTDALE STANDARD DETAILS		STANDARD MANHOLE RING & COVER	RING COVER: 120 TOTAL: 310	5.10

Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR



Revisions	DATE	DESCRIPTION
1	09/09/16	PER TOK COMMENTS
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REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

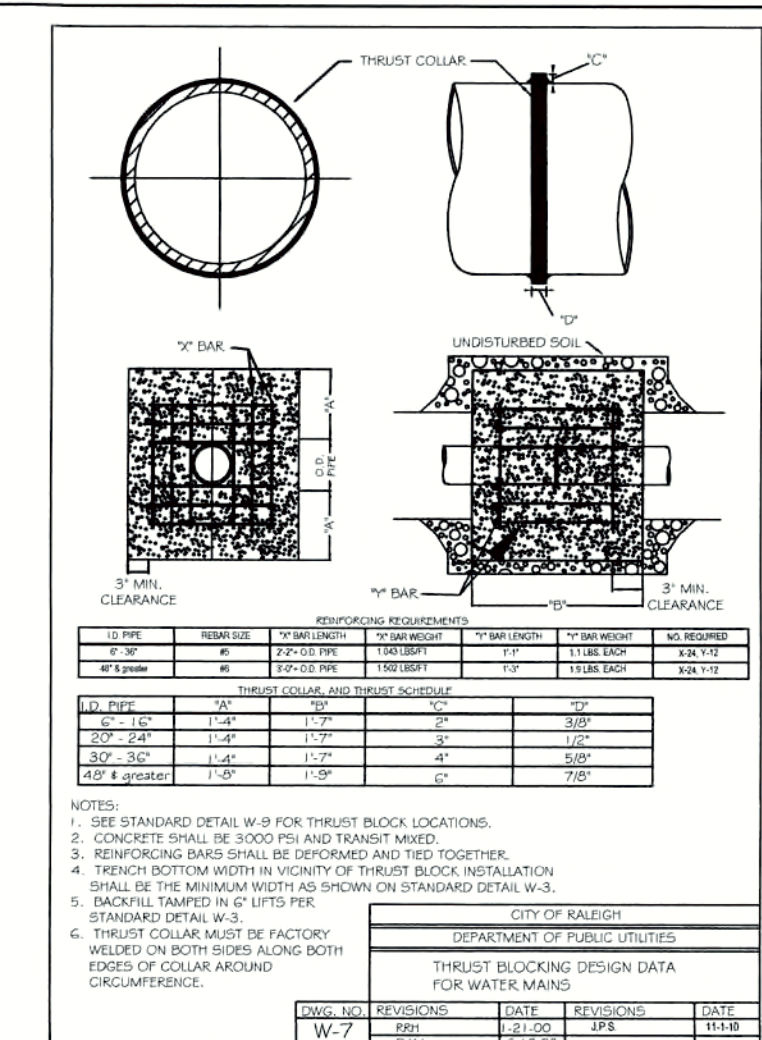
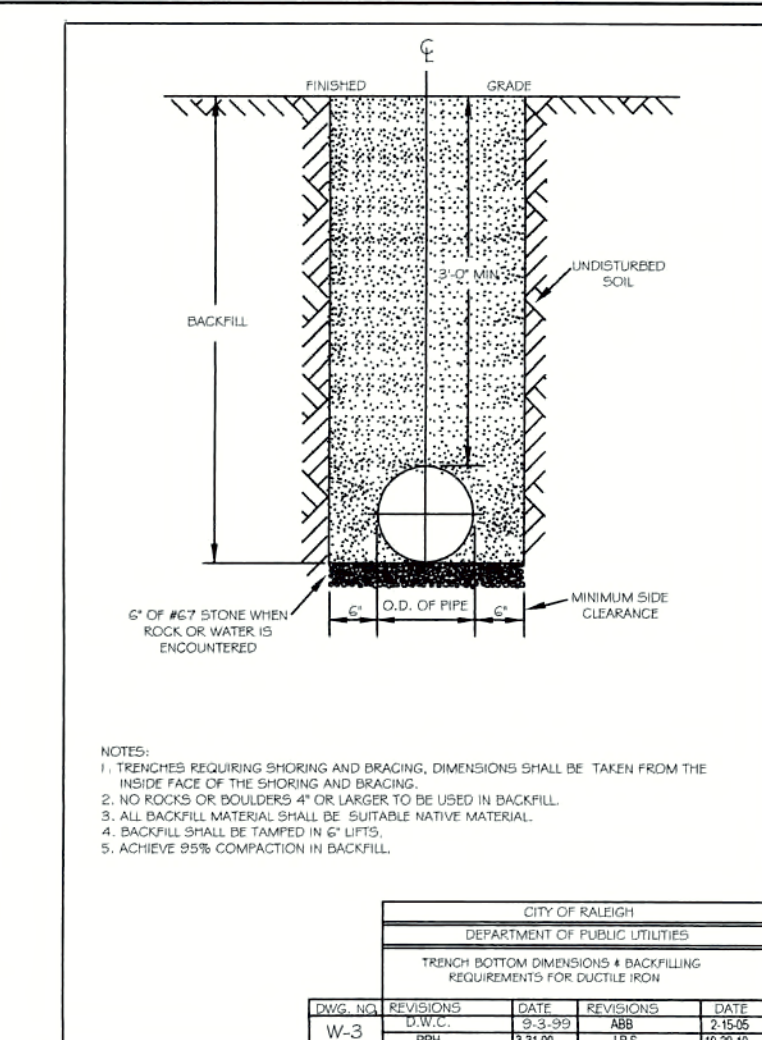
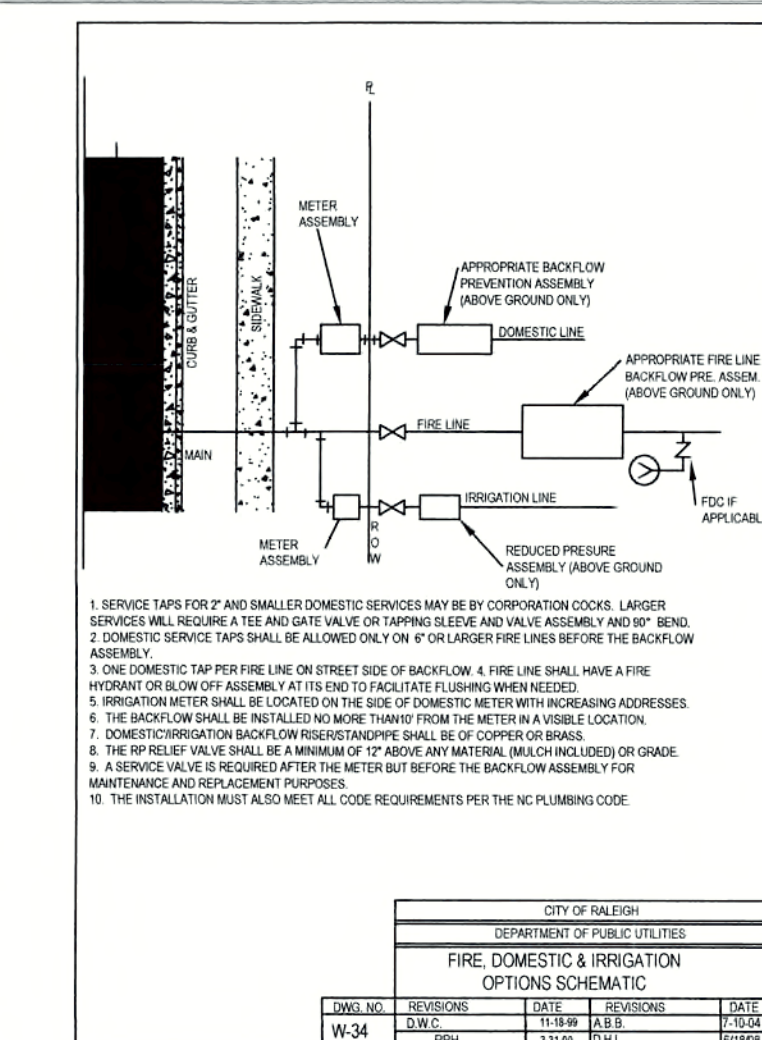
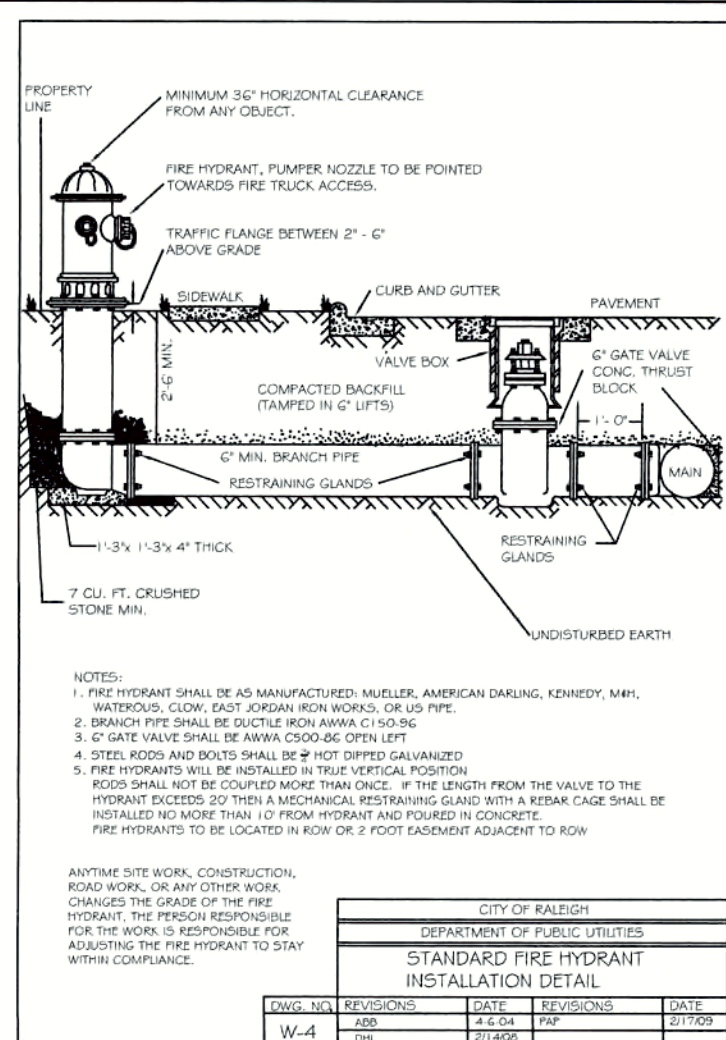
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BY: *Scott* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

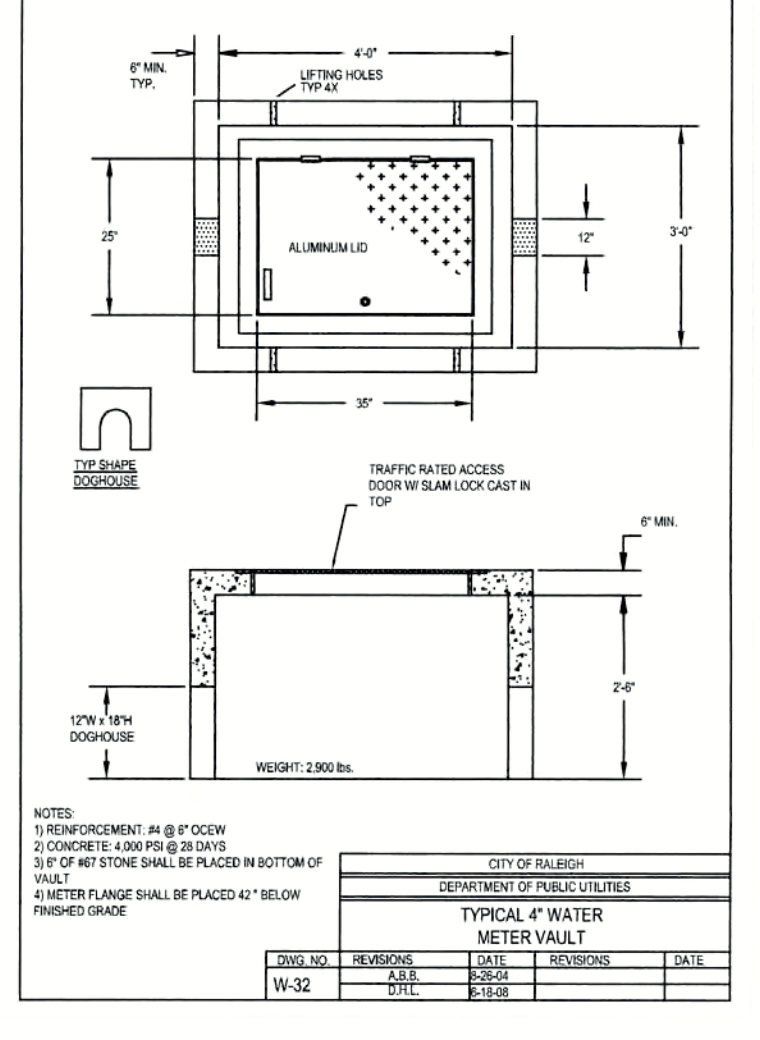
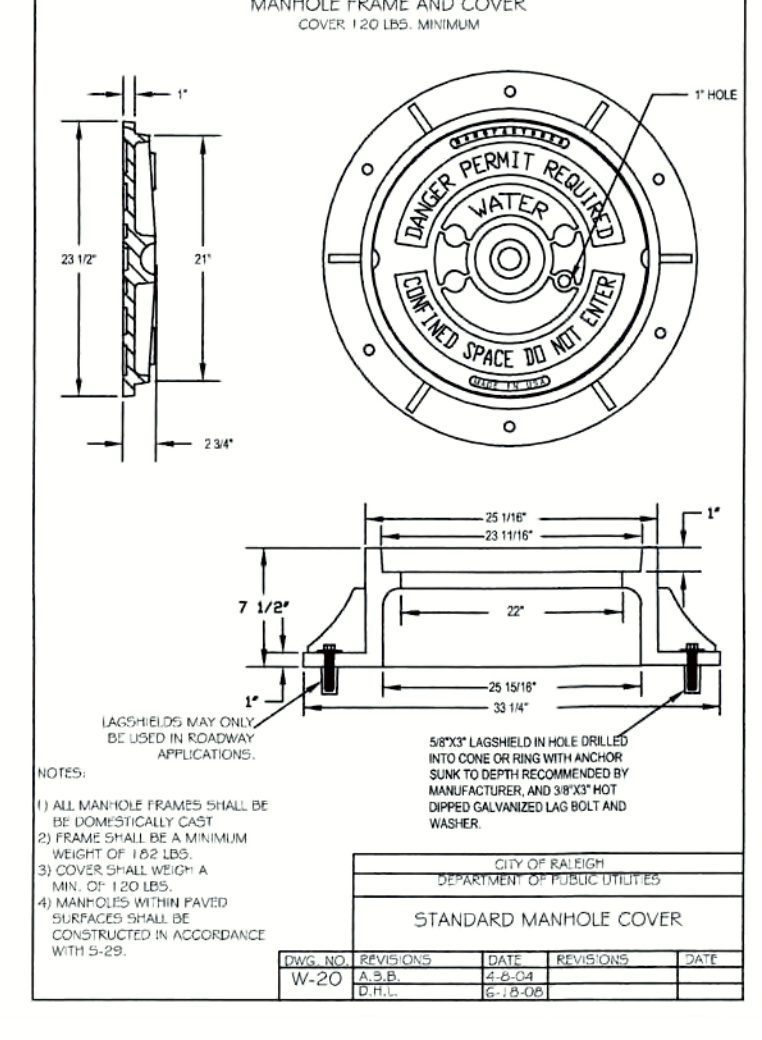
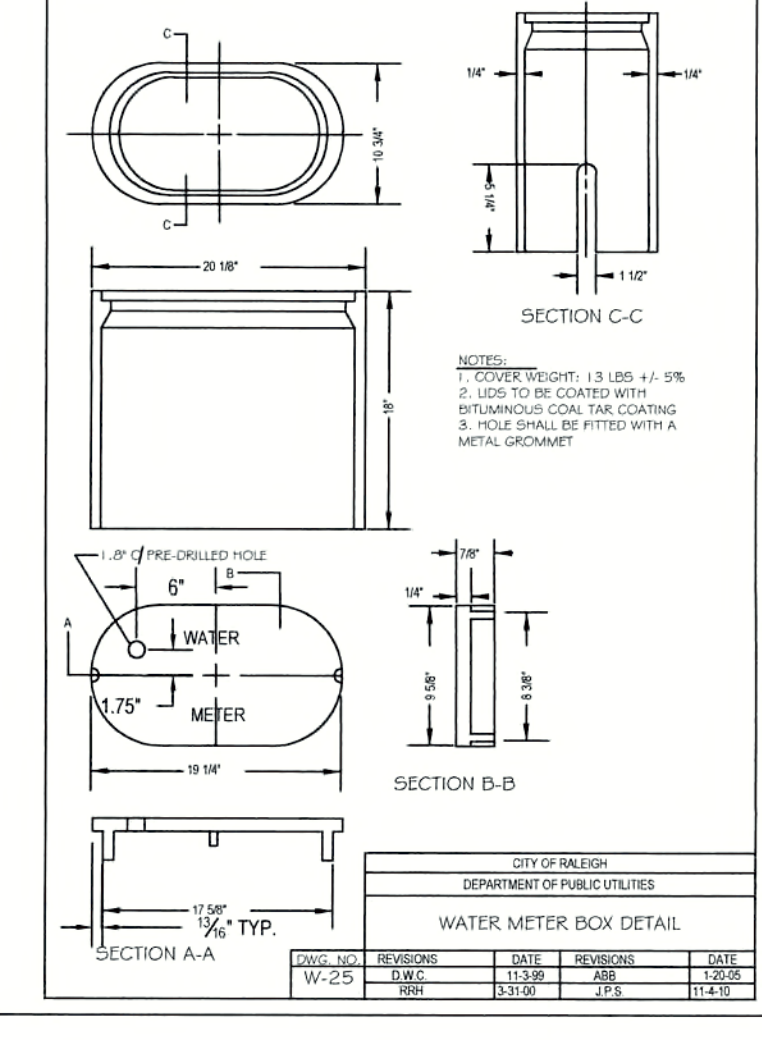
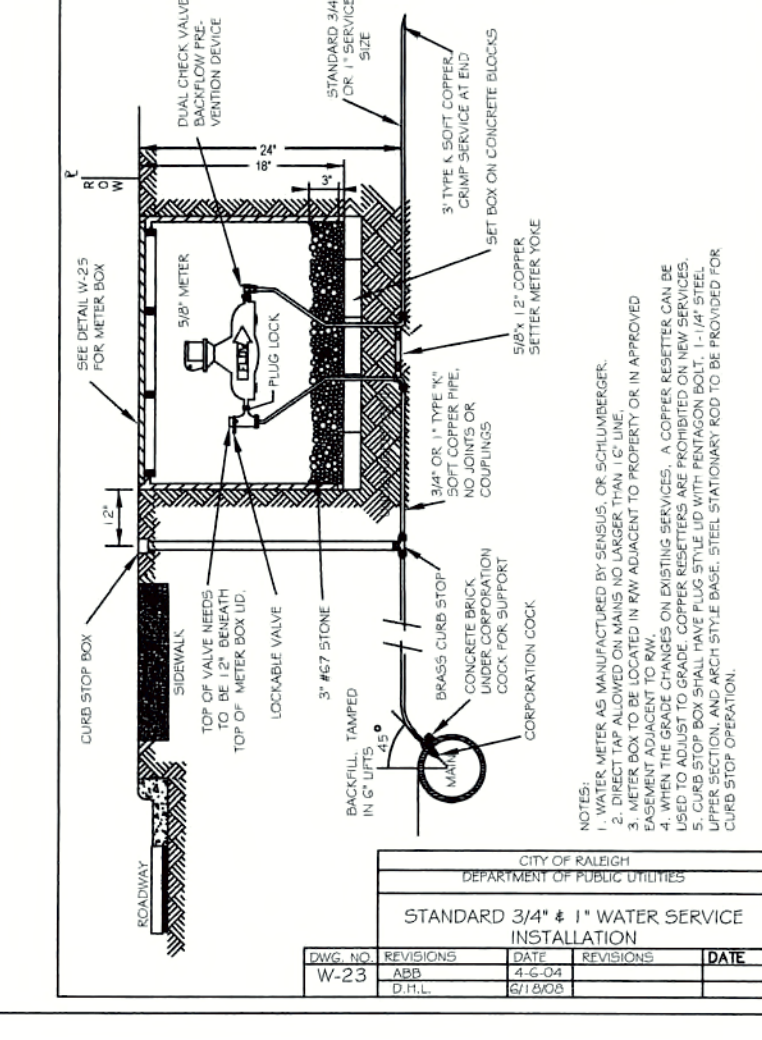
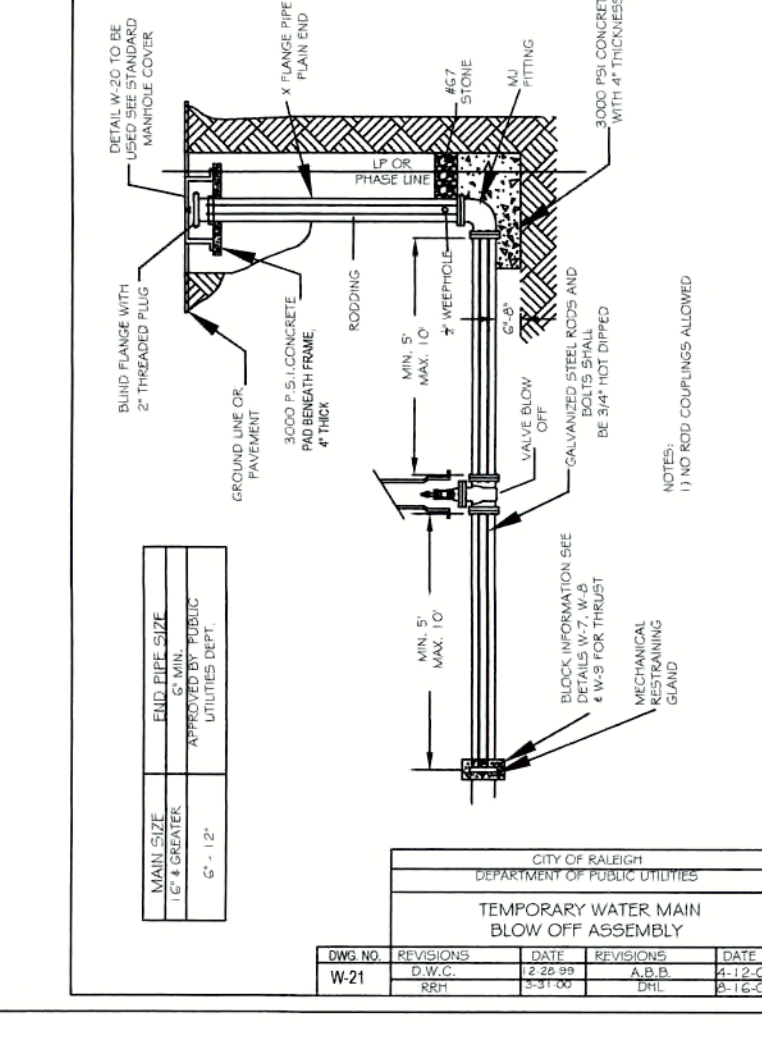
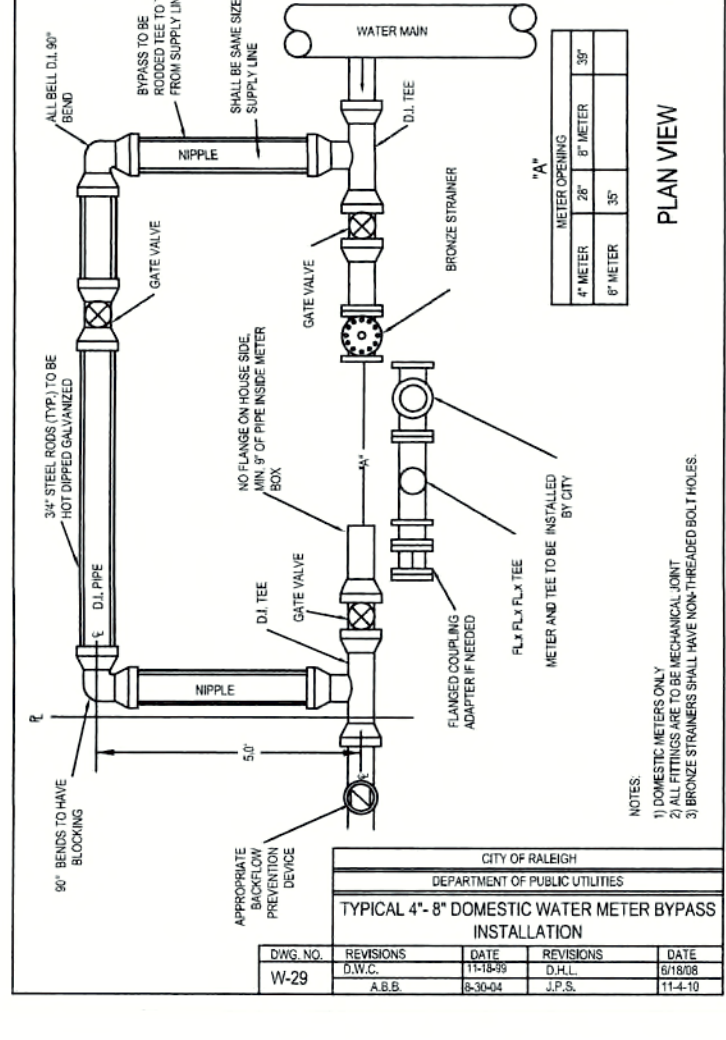
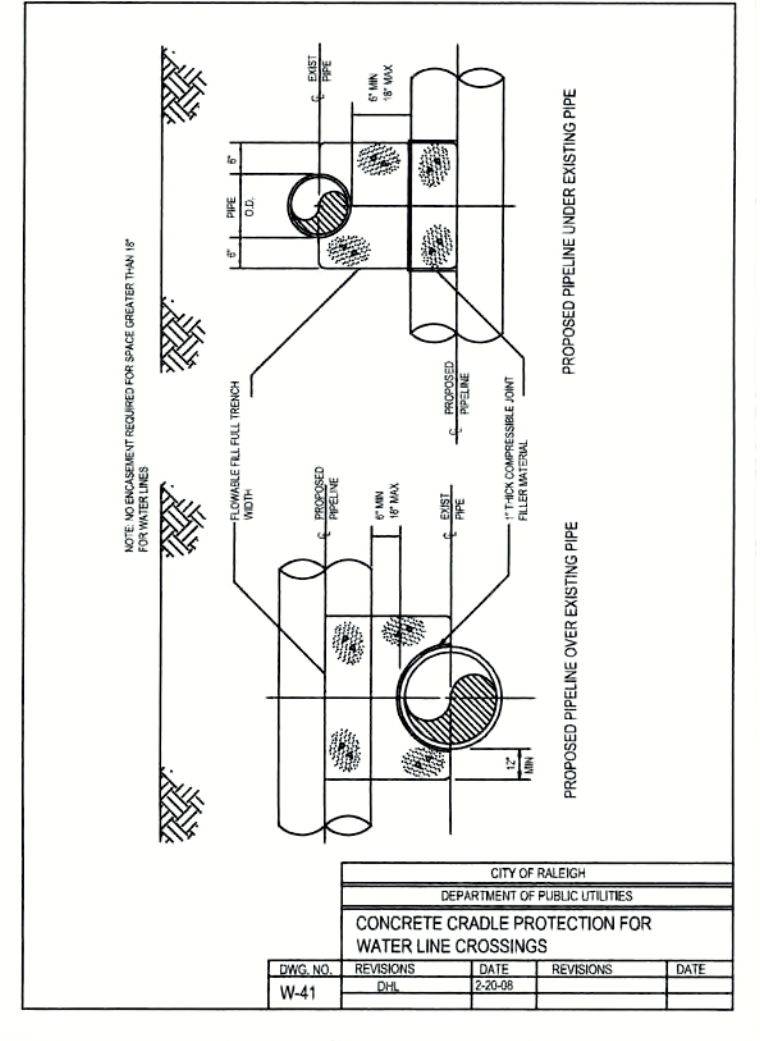
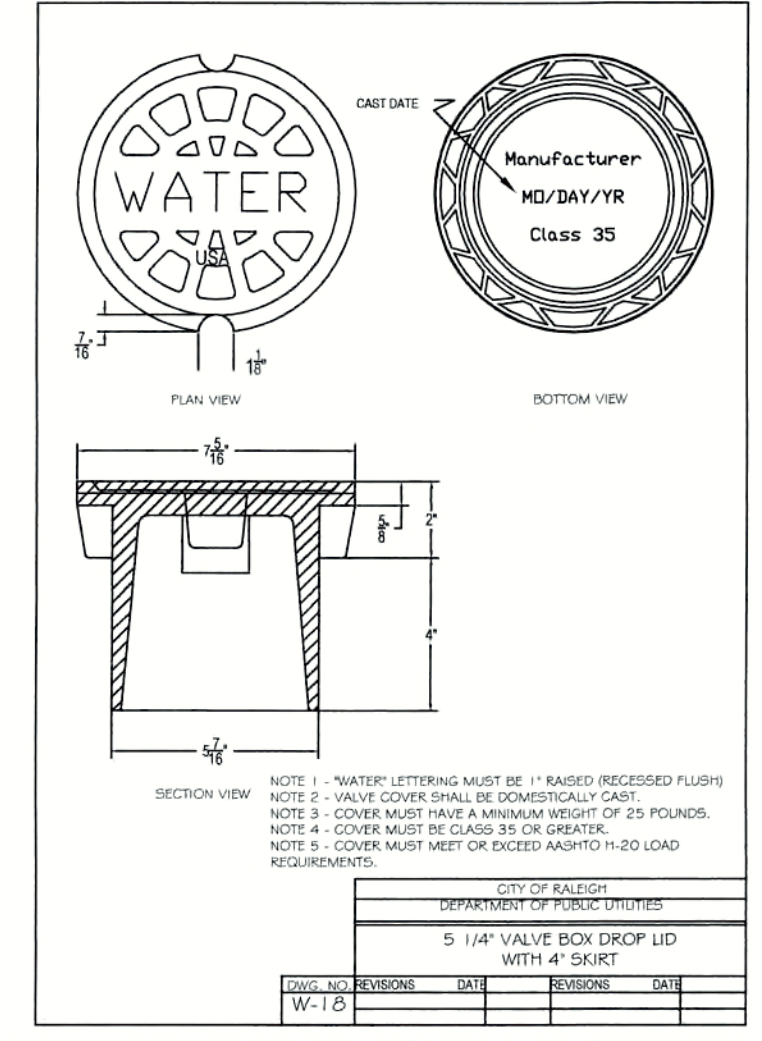
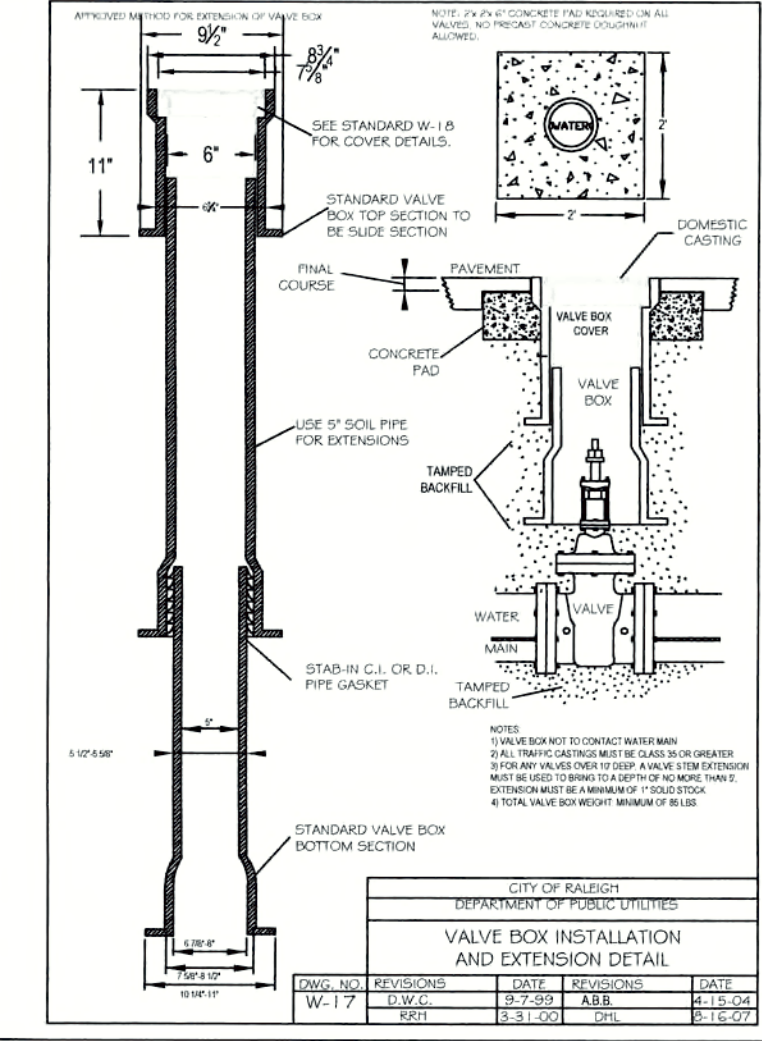
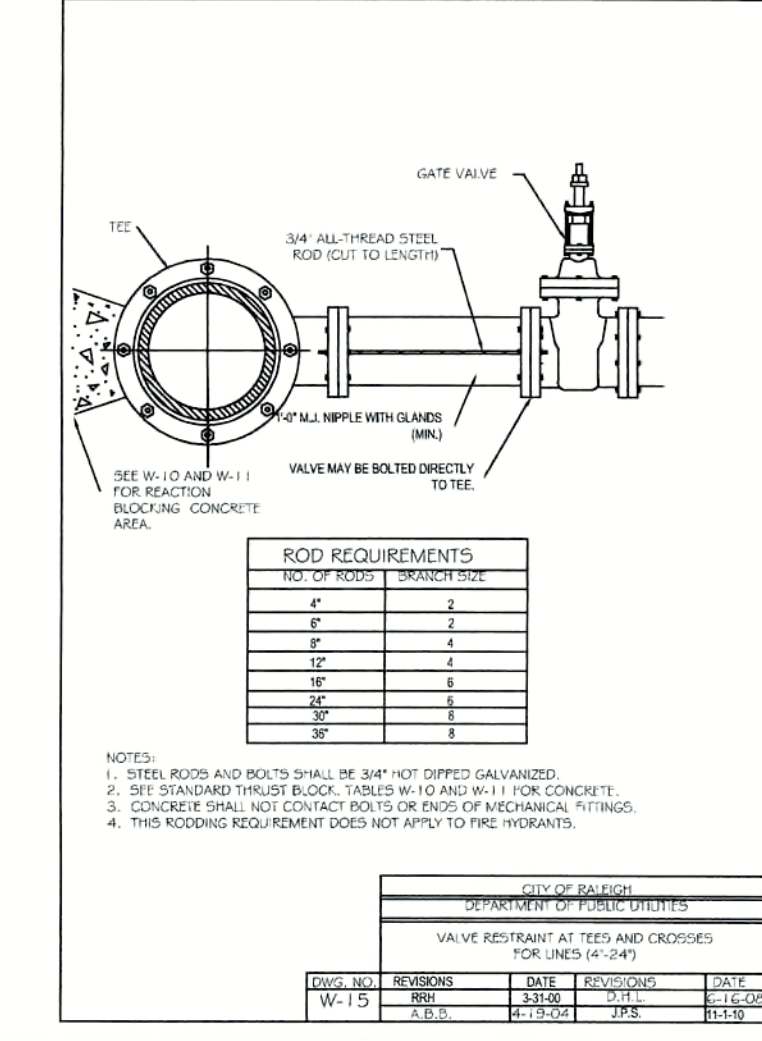
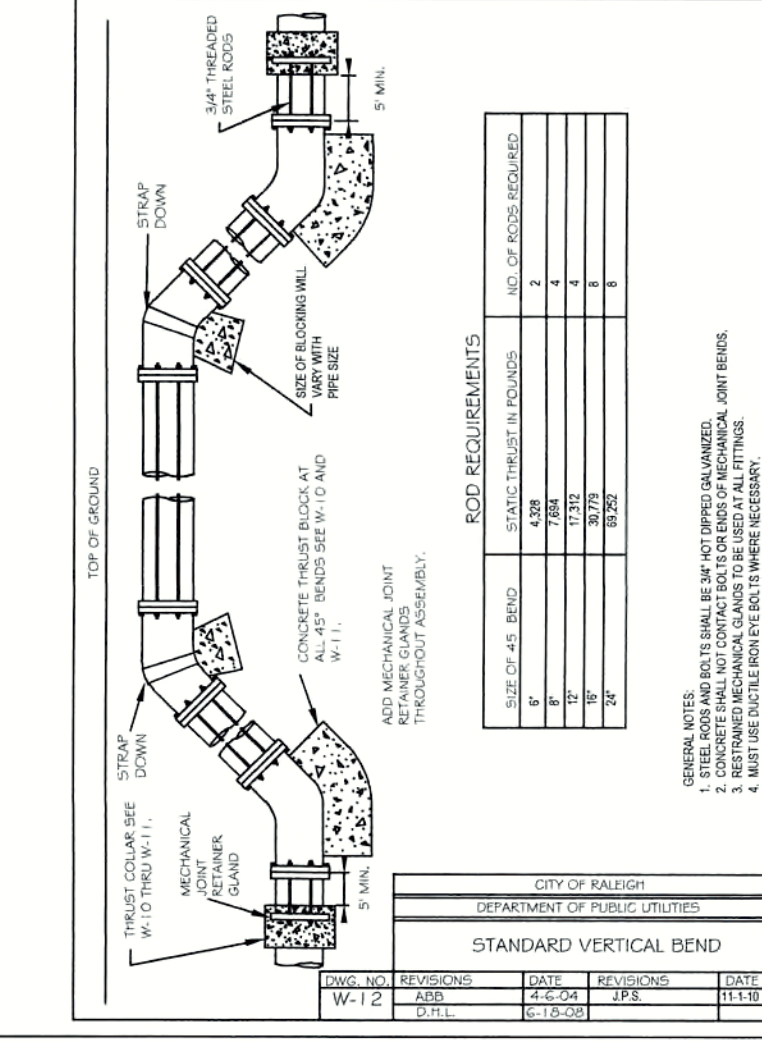
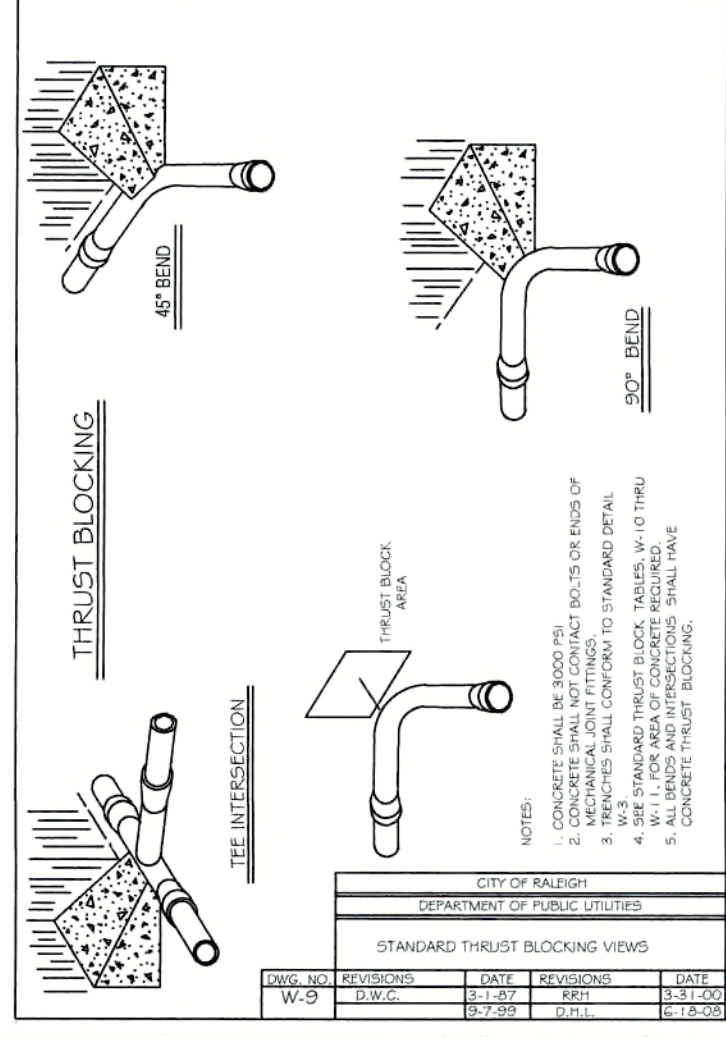
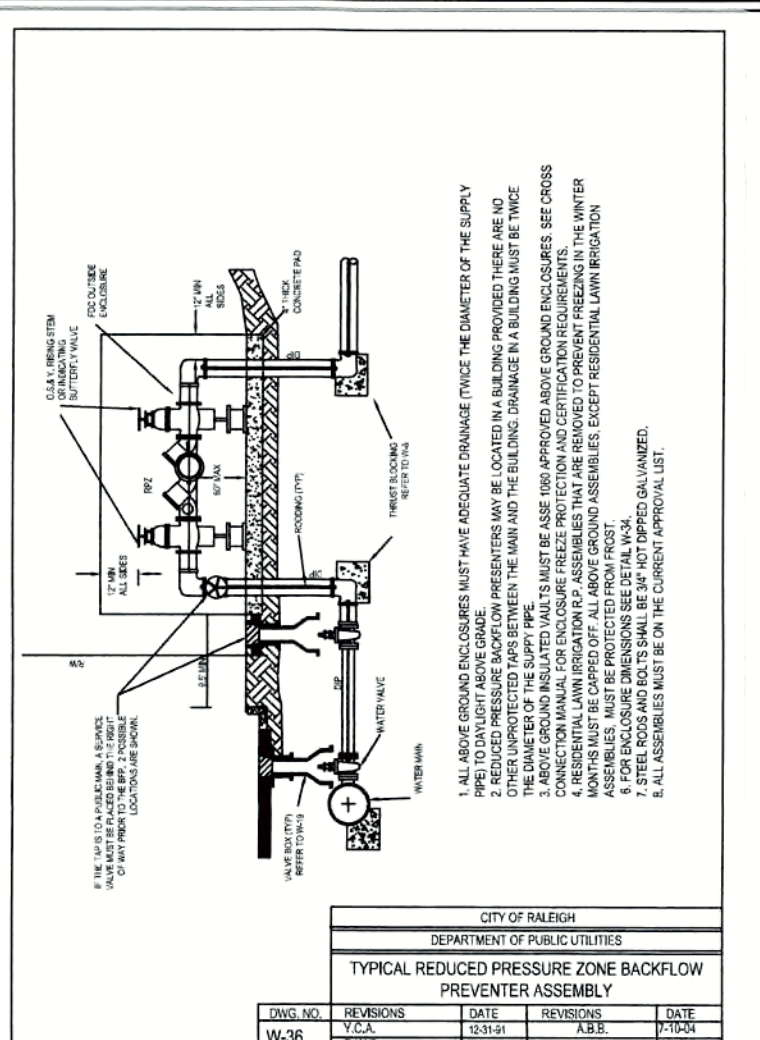
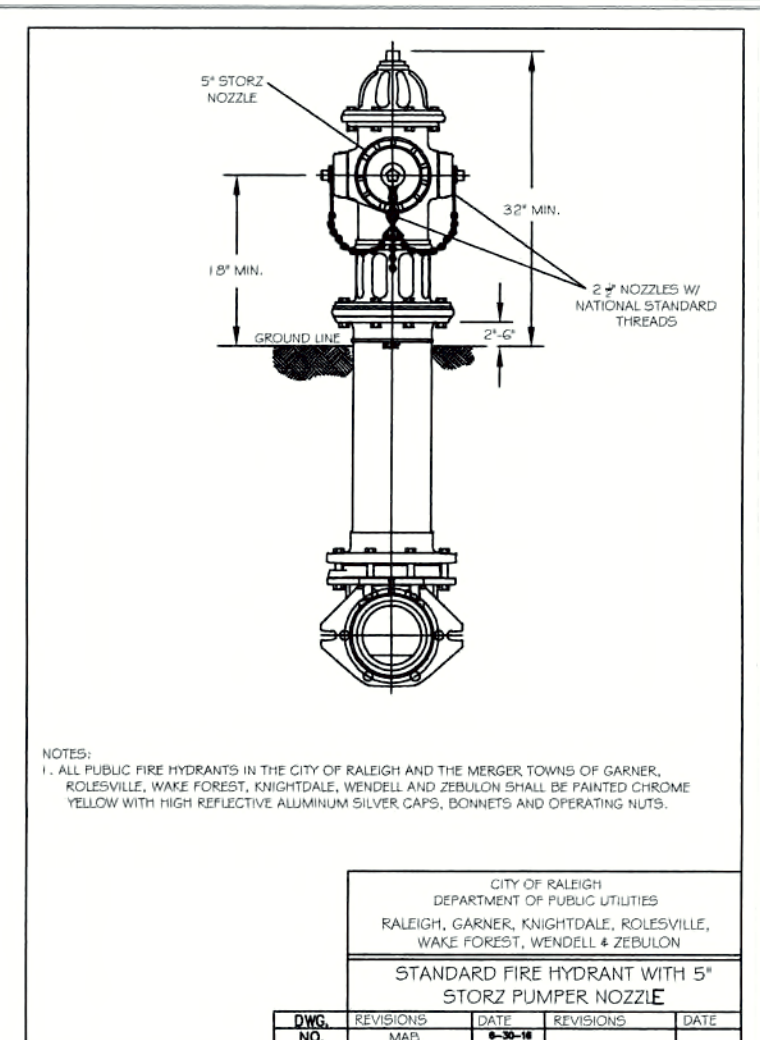
BY: *Scott* DATE: 4-28-17
ADMINISTRATOR

K:\016\020160032\020160032.dwg - Knightdale Station Cottages\CDT\016 - DETAIL.dwg - Sheet: March 10, 2017 3:32:18 PM - TOWNSEND CHARLIE



REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BEINGS BASED ON TEST PRESSURE OF 100 PSI

PIPE SIZE (IN)	PIPE WEIGHT (LB/FT)	PIPE WALL THICKNESS (IN)	PIPE STIFFNESS (EI)	PIPE STIFFNESS (EI)	PIPE STIFFNESS (EI)	PIPE STIFFNESS (EI)	PIPE STIFFNESS (EI)	PIPE STIFFNESS (EI)	PIPE STIFFNESS (EI)
12"	11.84	1.36	1.1	1.1	1.1	1.1	1.1	1.1	1.1
18"	22.07	1.2	2.5	1.1	1.1	1.1	1.1	1.1	1.1
24"	42.98	2.3	3.3	1.1	1.1	1.1	1.1	1.1	1.1
30"	73.96	2.4	4.5	1.1	1.1	1.1	1.1	1.1	1.1
36"	104.94	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
42"	135.92	1.1	2.1	1.1	1.1	1.1	1.1	1.1	1.1
48"	166.90	1.2	2.5	1.1	1.1	1.1	1.1	1.1	1.1
54"	197.88	2.4	4.1	1.1	1.1	1.1	1.1	1.1	1.1
60"	228.86	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
66"	259.84	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
72"	290.82	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
78"	321.80	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
84"	352.78	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
90"	383.76	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
96"	414.74	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1
102"	445.72	2.5	4.1	1.1	1.1	1.1	1.1	1.1	1.1



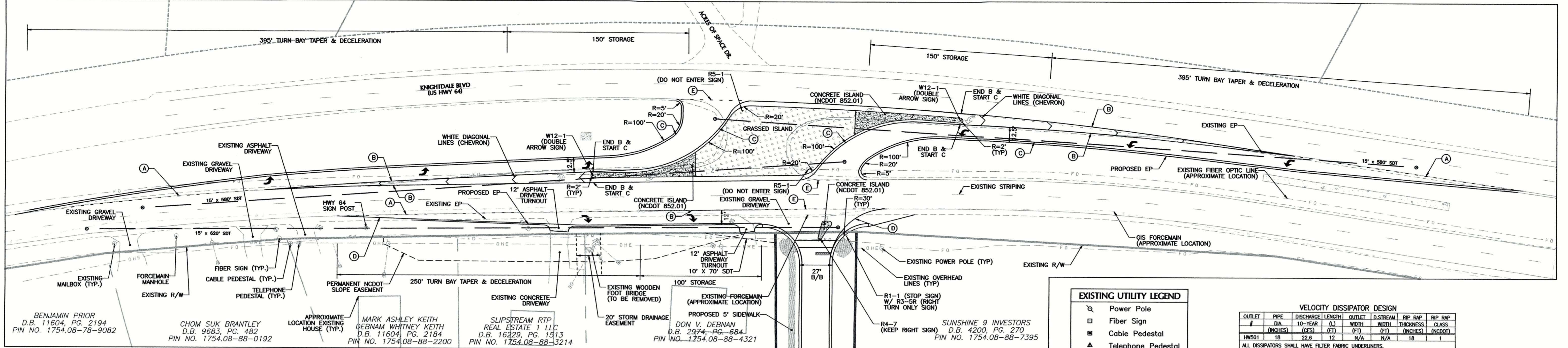
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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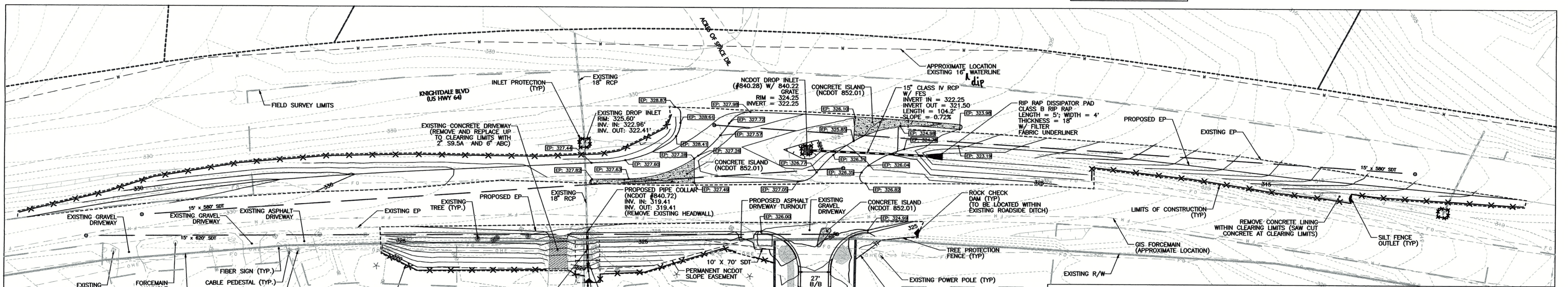
BY: S. Smith DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: E.A. Wilson DATE: 4-28-17
ADMINISTRATOR

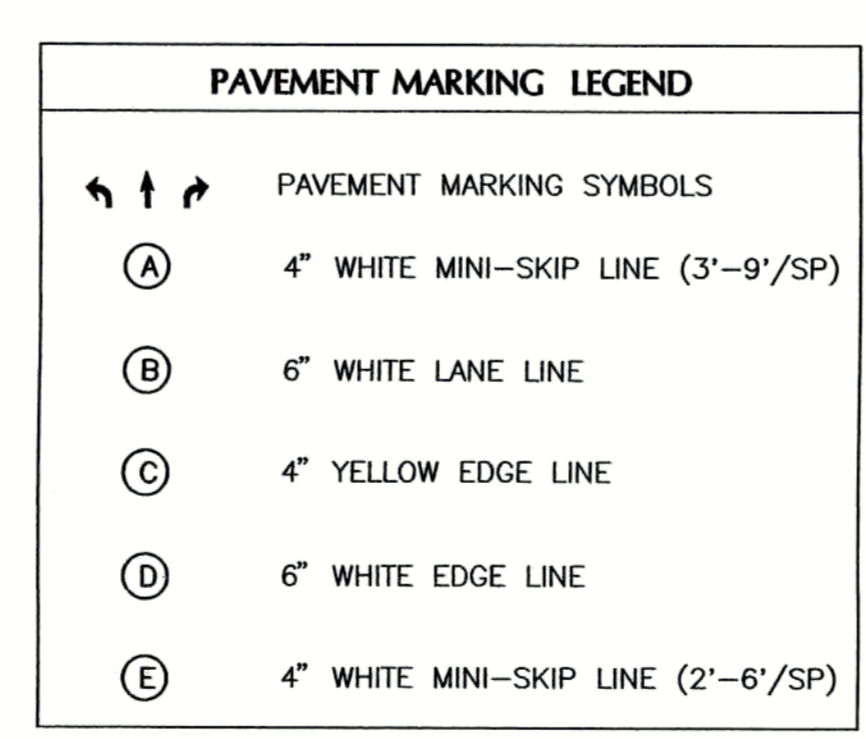
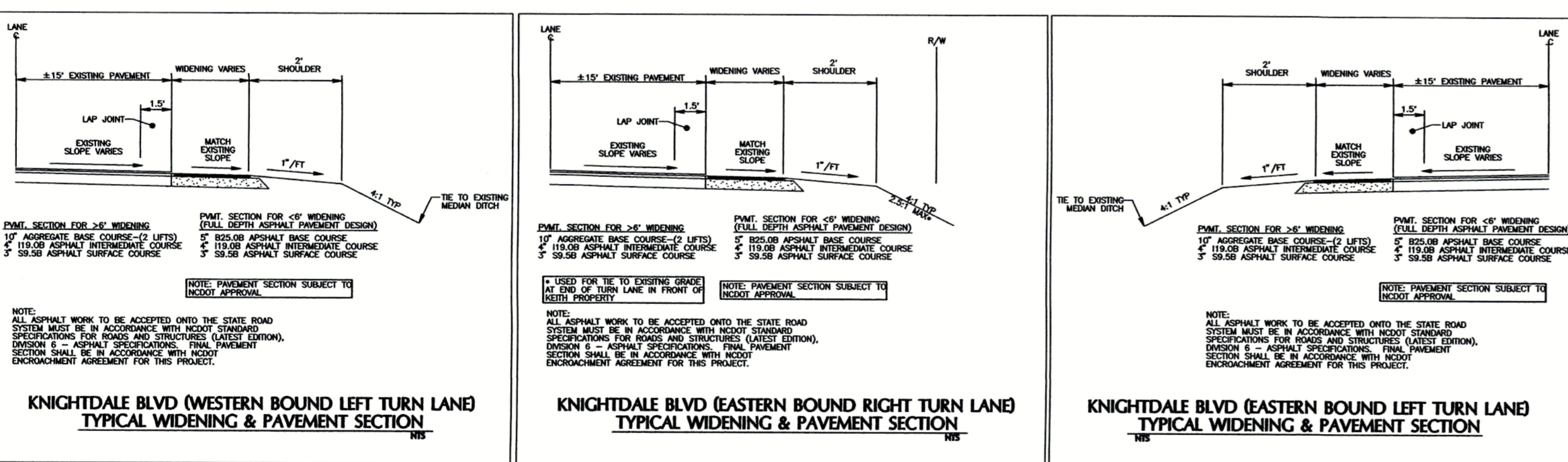


KNIGHTDALE BLVD. PAVEMENT MARKING PLAN



KNIGHTDALE BLVD. GRADING PLAN & EROSION CONTROL PLAN

STREET NAME (THROUGH TRAFFIC)	STREET NAME (STOP) (DIRECTION OF TRAVEL)	DESIGN SPEED OF STREET (MPH)	APPROACH GRADE OF STREET (%)	ADDITIONAL LANES FROM THE LEFT (#)	ADDITIONAL TIME FOR MULTILANE HIGHWAY (SEC.)	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)
KNIGHTDALE BLVD (EB)	APARTMENT ENTRANCE	60	5.00	0.00	0.00	N/A	7.00	N/A	617	N/A	620
KNIGHTDALE BLVD (WB)	KNIGHTDALE BLVD (WB)	60	1.00	2.00	1.00	6.50	N/A	573	N/A	580	N/A



GENERAL NOTES:

- ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE DESIGN STANDARDS AND SPECIFICATIONS AND NCDOT SPECIFICATIONS AND DETAILS.
- TOPOGRAPHIC SURVEY WITHIN FIELD SURVEY LIMITS PERFORMED BY WITHERSRAVENEL INC. SURVEY OUTSIDE OF LIMITS BASED ON LIDAR.
- 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.
- PRIOR TO BEGINNING WORK, AFFECTED PROPERTY OWNERS SHALL BE CONTACTED. A TEMPORARY CONSTRUCTION EASEMENT WILL BE REQUIRED TO BE ACQUIRED FROM THE AFFECTED PROPERTY OWNERS TO ENCOMPASS THE LIMITS OF CONSTRUCTION. THIS EASEMENT WILL BE TERMINATED UPON COMPLETION OF CONSTRUCTION.
- ALL IMPACTED DRIVEWAYS SHALL BE RECONSTRUCTED BY CONTRACTOR TO PROVIDE ACCESS TO PROPERTIES. ACCESS TO ALL AFFECTED PROPERTIES SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
- ALL MAILBOXES IMPACTED BY CONSTRUCTION SHALL BE RELOCATED PER TOWN OF KNIGHTDALE & USPS STANDARDS.
- PERMANENT SLOPE AND DRAINAGE EASEMENTS ARE REQUIRED PER NCDOT TO ALLOW FOR MAINTENANCE. THESE EASEMENTS SHALL BE ACQUIRED PRIOR TO STARTING CONSTRUCTION.

CITY OF RALEIGH

ALL CONSTRUCTION MUST BE IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS.

TRANSPORTATION SERVICES: N/A

PUBLIC UTILITIES: *K.A. JUNE 3/24/17*

STORMWATER: N/A

PLANNING: N/A

FIRE: N/A

URBAN FORESTRY: N/A

SCALE: 1" = 40'

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: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *[Signature]* DATE: 4/25/17
ADMINISTRATOR

NOTES:
1. PERMANENT MARKINGS SHALL BE THERMOPLASTIC AND INSTALLED AFTER FINAL OVERLAY IS COMPLETED.
2. ALL PAVEMENT MARKINGS ALONG KNIGHTDALE BLVD. SHALL BE INSTALLED IN ACCORDANCE WITH NCDOT STANDARDS & SPECIFICATIONS.
3. PREMARKINGS ALONG KNIGHTDALE BLVD. SHALL BE APPROVED BY NCDOT PRIOR TO COMPLETION.
4. PERMANENT PAVEMENT MARKERS SHALL BE INSTALLED IN ACCORDANCE WITH NCDOT STD 1250.01.

TRAFFIC CONTROL PLAN NOTE:
ALL LANE CLOSURES TO ACCOMMODATE ROAD WIDENING, MEDIAN WORK AND UTILITY INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATIONS AND DETAILS, SPECIFICALLY NCDOT #1101.02 SHEET 3 OF 15 AND #1101.11.

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No.	Revision	Date	By	Designer	W&R	Scale
1	NCDOT COMMENTS	06/05/16	JCI			1" = 40'
2	NCDOT COMMENTS	01/06/17	JCI			
3	FOK & COR COMMENTS	02/07/17	JCI			

COTTAGES AT KNIGHTDALE STATION
TOWN OF KNIGHTDALE WAKE COUNTY NORTH CAROLINA

KNIGHTDALE BLVD ROAD WIDENING

WithersRavenel
Engineers | Planners | Surveyors
115 MacKenan Drive Cary, NC 27511 | T: 919-498-3340 | License #C-0832 | www.withersravenel.com

Sheet No. **9A**



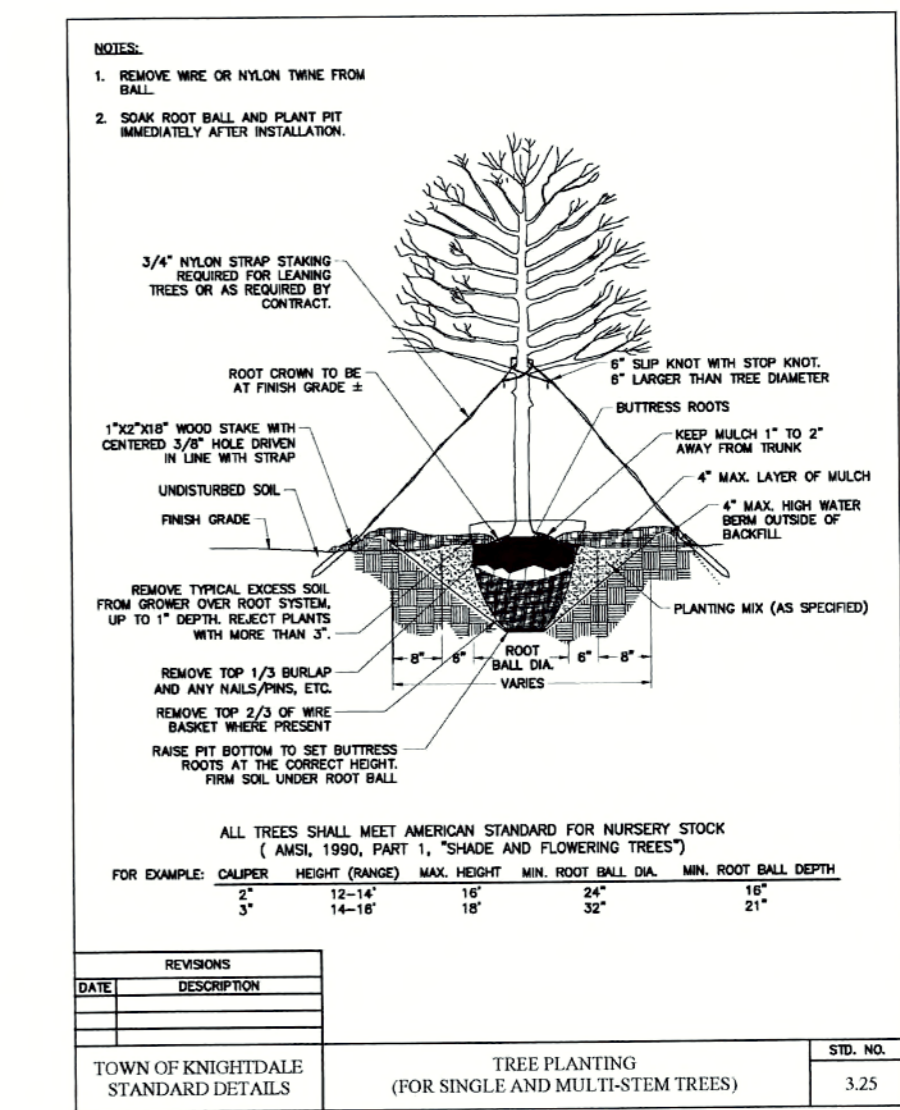
Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

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.
- 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 DEVELOPMENT 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.
- NO TREE SHALL BE LOCATED WITHIN 10 FEET OF A LIGHT POLE OR 12 FEET FROM ELECTRICAL TRANSFORMERS.
- THIS PLAN IS FOR PLANTING PURPOSES ONLY. FOR INFORMATION REGARDING GRADING, WALLS, ETC., REFER TO THE SITE AND GRADING PLANS.
- 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.
- 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 SHREDDED HARDWOOD BARK AT THE DISCRETION OF THE DEVELOPER. ALL PLANT GROUPINGS SHALL BE MULCHED AS ONE BED.
- PER UDO SECTION 8.4(C), NO PINE STRAW OR ANY OTHER MATERIAL WITH A FIRE RATE OF SPREAD MORE THAN 24" PER MINUTE AS DETERMINED BY THE MOST RECENT STUDY OF THE NATIONAL STANDARDS AND TECHNOLOGY SHALL BE PLACED, KEPT OR STORED WITHIN 10' OF BUILDINGS WITH ANY PORTION OF THE EXTERIOR WALL COVERED WITH COMBUSTIBLE MATERIAL.

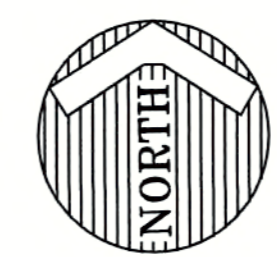
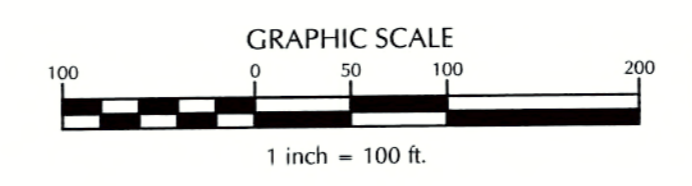
U.D.O. LANDSCAPE REQUIREMENTS

- PARKING LOT SCREENING: TYPE A BUFFER:**
- IN BUFFERS, 40-60% OF CANOPY TREES AND 40-60% OF UNDERSTORY TREES HAVE TO BE EVERGREEN PER UDO SECTION 8.8
 - FOR EVERY 100 LINEAR FEET, THERE SHALL BE AT LEAST THREE (3) CANOPY TREES, TWO (2) UNDERSTORY TREES AND 20 SHRUBS.
 - 326LF - 30LF SS EASEMENT = 296 LF
 - 296 LF = 9 CANOPY TREES, 6 UNDERSTORY TREES, AND 60 SHRUBS REQUIRED
 - 10 CANOPY TREES, 8 UNDERSTORY TREES, AND 60 SHRUBS PROVIDED
- PARKING LOT LANDSCAPING:**
- NO PARKING SPACE SHALL BE MORE THAN 60 FT FROM THE BASE OF A DECIDUOUS CANOPY TREE. IN ADDITION, LANDSCAPE AREAS SHALL BE PROVIDED AT THE END OF EACH PARKING ROW AND SHALL CONTAIN A DECIDUOUS CANOPY TREE.



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES	N/A
PUBLIC UTILITIES	K.A. JIM 3/24/14
STORMWATER	N/A
PLANNING/RECORDING	N/A
HAZ	N/A
URBAN FORESTRY	N/A



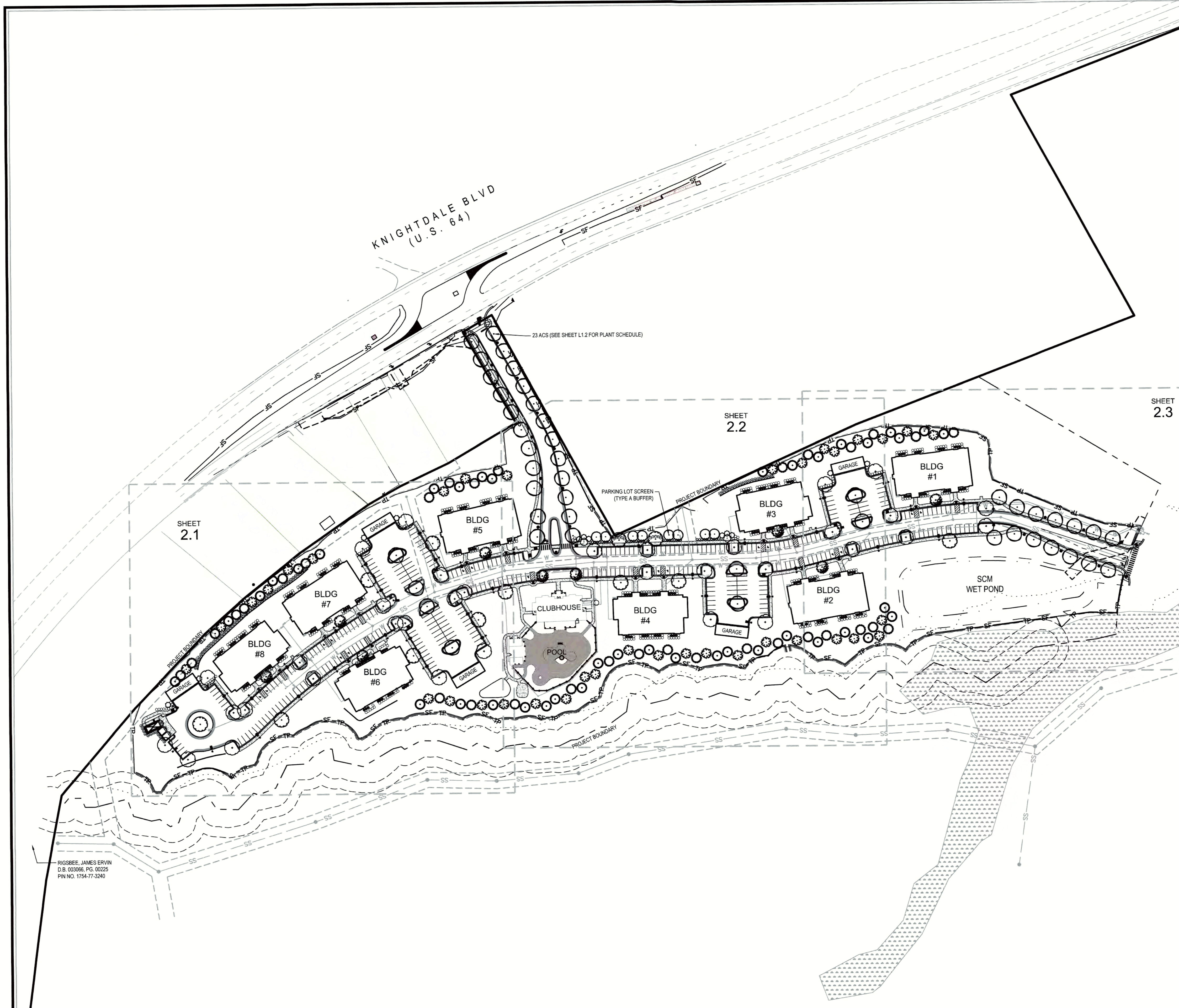
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

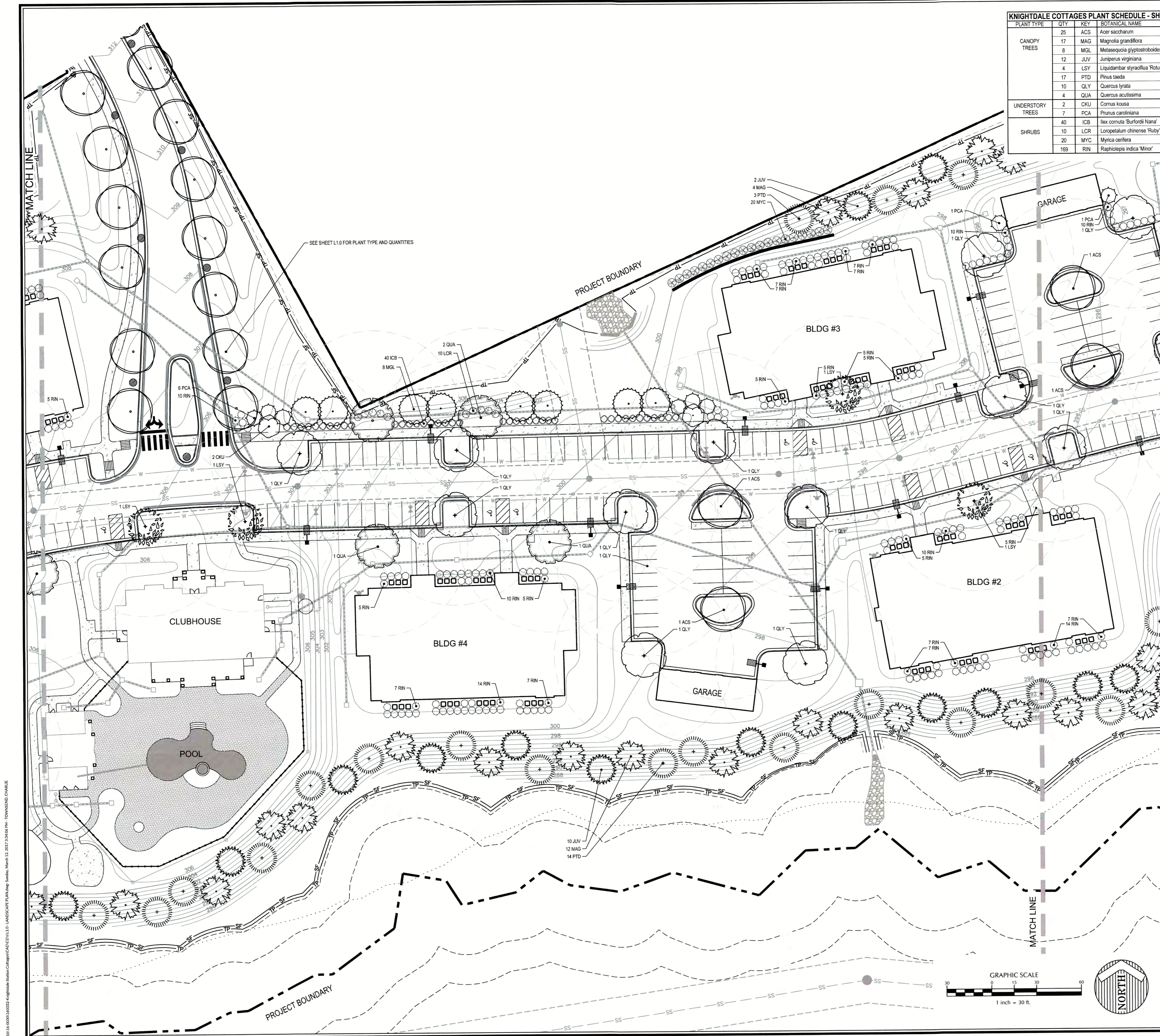
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BY: S. M. Wall DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4.28.17
ADMINISTRATOR





KNIGHTDALE COTTAGES PLANT SCHEDULE - SHEET L1.2 03.09.17

PLANT TYPE	QTY	KEY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	HEIGHT	NOTES
CANOPY TREES	25	ACS	Acer saccharum	Sugar Maple	B&B	2 1/2"	12'-14'	MATCHED
	17	MAG	Magnolia grandiflora	Southern Magnolia	B&B	2"	8'-10'	MATCHED
	8	MGL	Metasequoia glyptostroboides	Dawn Redwood	B&B	2 1/2"	12'-14'	MATCHED
	12	JUV	Juniperus virginiana	Eastern Red Cedar	B&B	2"	8'-10'	MATCHED
	4	LSY	Liquidambar styraciflua 'Rotundiloba'	Fruitless Sweetgum	B&B	2 1/2"	12'-14'	MATCHED
	17	PTD	Pinus taeda	Loblolly Pine	B&B	2"	8'-10'	MATCHED
	10	QLY	Quercus lyrata	Overcup Oak	B&B	2 1/2"	12'-14'	MATCHED
	4	QUA	Quercus acutissima	Sawtooth Oak	B&B	2 1/2"	12'-14'	MATCHED
	2	CKU	Cornus kousa	Chinese Dogwood	B&B	2"	8'-10'	MATCHED
	7	PCA	Prunus caroliniana	Carolina Cherry Laurel	B&B	2"	8'-10'	MATCHED
UNDERSTORY TREES	40	ICB	Ilex cornuta 'Burfordii Nana'	Dwarf Burford Holly	CONT.	3 Gal.	18'-24"	MATCHED; 5' O.C.
	10	LCR	Loropetalum chinense 'Ruby'	Ruby Chinese Witchhazel	CONT.	3 Gal.	18'-24"	MATCHED; 5' O.C.
	20	MYC	Myrica cerifera	Wax Myrtle	CONT.	3 Gal.	18'-24"	MATCHED; 6' O.C.
SHRUBS	169	RIN	Raphiolepis indica 'Minor'	India Hawthorne	CONT.	3 Gal.	18'-24"	MATCHED; 5' O.C.

CITY OF RALEIGH
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TRANSPORTATION FIELD SERVICES: N/A
 PUBLIC UTILITIES: K.A. JIM 3/24/16
 GEOWATER: N/A
 PLANNING/ZONING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

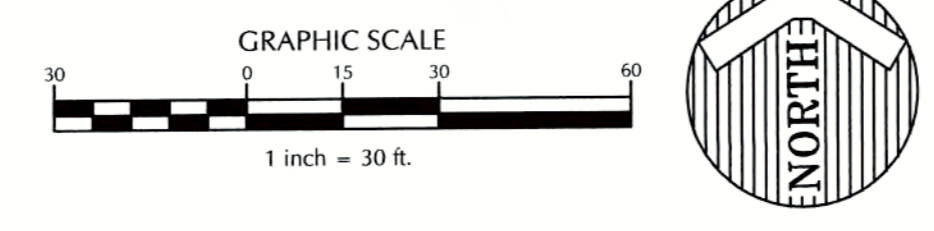
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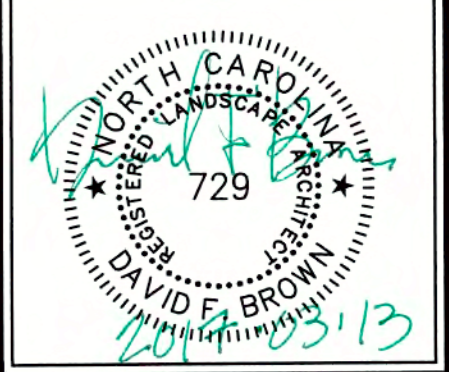
BY: S. M. J. DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4.28.17
 ADMINISTRATOR



Job No. 02160032 Drawn By CDT
 Date 06/03/2016 Designer WR



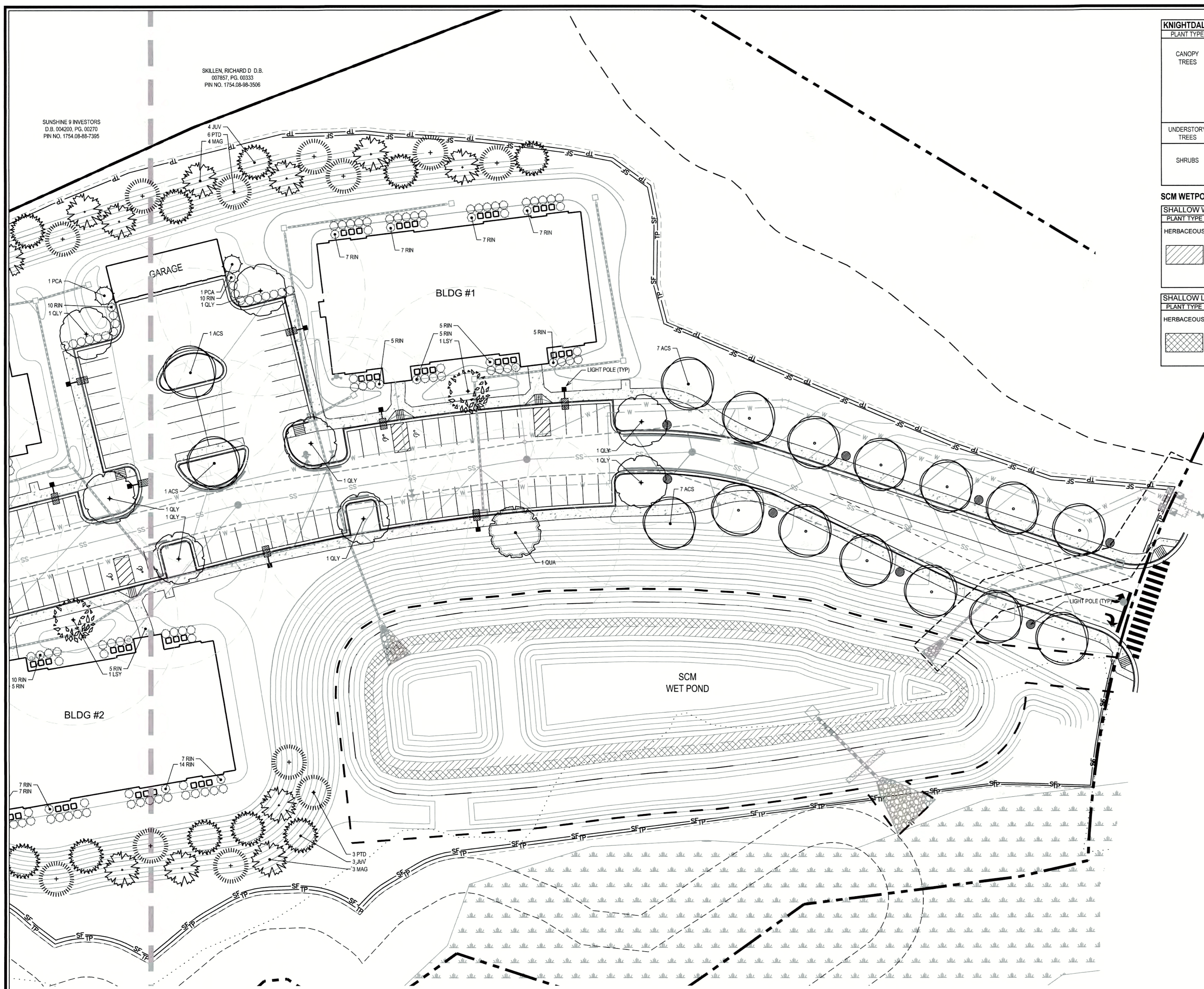
Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

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SKILLEN, RICHARD D. D.B.
007857, PG. 00333
PIN NO. 1754-08-98-3506

SUNSHINE 9 INVESTORS
D.B. 004020, PG. 00270
PIN NO. 1754-08-88-7395



KNIGHTDALE COTTAGES PLANT SCHEDULE - SHEET L1.3 03.09.17

PLANT TYPE	QTY	KEY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	HEIGHT	NOTES
CANOPY TREES	16	ACS	Acer saccharum	Sugar Maple	B&B	2 1/2"	12'-14'	MATCHED
	7	MAG	Magnolia grandiflora	Southern Magnolia	B&B	2"	8'-10'	MATCHED
	X	MGL	Metasequoia glyptostroboides	Dawn Redwood	B&B	2 1/2"	12'-14'	MATCHED
	7	JUV	Juniperus virginiana	Eastern Red Cedar	B&B	2"	8'-10'	MATCHED
	1	LSY	Liquidambar styraciflua 'Rotundiloba'	Fruitless Sweetgum	B&B	2 1/2"	12'-14'	MATCHED
	8	PTD	Pinus taeda	Loblolly Pine	B&B	2"	8'-10'	MATCHED
	6	QLY	Quercus lyrata	Overcup Oak	B&B	2 1/2"	12'-14'	MATCHED
UNDERSTORY TREES	1	QUA	Quercus acutissima	Sawtooth Oak	B&B	2 1/2"	12'-14'	MATCHED
	X	CKU	Cornus kousa	Chinese Dogwood	B&B	2"	8'-10'	MATCHED
SHRUBS	1	PCA	Prunus caroliniana	Carolina Cherry Laurel	B&B	2"	8'-10'	MATCHED
	X	ICB	Ilex cornuta 'Burfordii Nana'	Dwarf Burford Holly	CONT.	3 Gal.	18"-24"	MATCHED; 5' O.C.
	X	LGR	Loropetalum chinense 'Ruby'	Ruby Chinese Witchhazel	CONT.	3 Gal.	18"-24"	MATCHED; 5' O.C.
	X	MYC	Myrica cerifera	Wax Myrtle	CONT.	3 Gal.	18"-24"	MATCHED; 6' O.C.
	58	RIN	Raphiolepis indica 'Minor'	India Hawthorne	CONT.	3 Gal.	18"-24"	MATCHED; 5' O.C.

SCM WETPOND PLANTING REQUIREMENTS

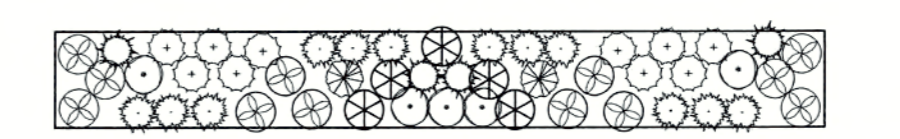
SHALLOW WATER (NORMAL POOL TO 6" BELOW) = 3,624 SF 50 HERB. PLANTS / 200 SF = 906 PLANTS

PLANT TYPE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	NOTES
HERBACEOUS	221	Aconis calamus	Sweet Flag	CONT.	1 Gal.	24" O.C.
	48	Aconis calamus 'Variegata'	Variegated Sweet Flag	CONT.	1 Gal.	24" O.C.
	49	Peltandra virginica	Arrow arum	CONT.	1 Gal.	24" O.C.
	252	Pontederia cordata	Pickersweeed	CONT.	4" Pot	24" O.C.
	80	Sagittaria latifolia	Broadleaf Arrowhead	CONT.	1 Gal.	24" O.C.
	81	Saururus cernuus	Lizard's tail	CONT.	4" Pot	24" O.C.
	165	Schoenoplectus tabernaemontani	Softstem Bulrush	CONT.	4" Pot	24" O.C.

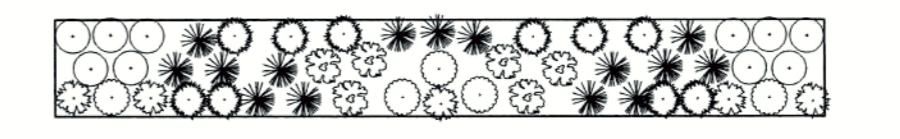
SHALLOW LAND (NORMAL POOL TO 6" ABOVE) = 3,781 SF 50 HERB. PLANTS / 200 SF = 947 PLANTS

PLANT TYPE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	NOTES
HERBACEOUS	159	Carex stricta	Tussock Sedge	CONT.	4" Pot	24" O.C.
	95	Iris versicolor	Northern Blue Flag Iris	CONT.	4" Pot	24" O.C.
	95	Iris virginica	Southern Blue Flag Iris	CONT.	4" Pot	24" O.C.
	285	Juncus effusus	Soft Rush	CONT.	4" Pot	24" O.C.
	189	Lobelia cardinalis	Cardinal Flower	CONT.	4" Pot	24" O.C.
	95	Scirpus cyperinus	Woolgrass	CONT.	1 Gal.	24" O.C.

NOTE: WHERE THE STREAM BUFFER DOES NOT MEET THE TYPE B REQUIREMENTS BETWEEN THE UR-12 AND GR-8 ZONING DISTRICTS, SUPPLEMENTAL VEGETATION WILL BE REQUIRED TO MEET THE TYPE B PLANTING STANDARDS.



TYPICAL WETLAND SHALLOW WATER HERBACEOUS PLANTING DETAIL (SCM #7) (+/- 200 S.F.) NTS



TYPICAL WETLAND SHALLOW LAND HERBACEOUS PLANTING DETAIL (SCM #7) (+/- 200 S.F.) NTS

NCDDQ BMP MANUAL SECTION 6.6.2 (2007) : PLANTING AND AFTER CARE IN GENERAL, FALL AND WINTER ARE OPTIMAL FOR PLANTING IN NORTH CAROLINA. THERE ARE SOME EXCEPTIONS. SHALLOW WATER PLANTS SHOULD BE INSTALLED BETWEEN APRIL 1 AND JULY 15 IN NORTH CAROLINA. WINTER PLANTING IS DIFFICULT WITH SHALLOW WATER PLANTS.

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION SERVICES: N/A
PUBLIC UTILITIES: K.A. JAW 3/24/17
SEWER/WATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
HUMAN SERVICES: N/A

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

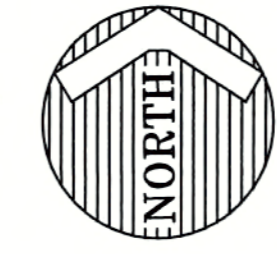
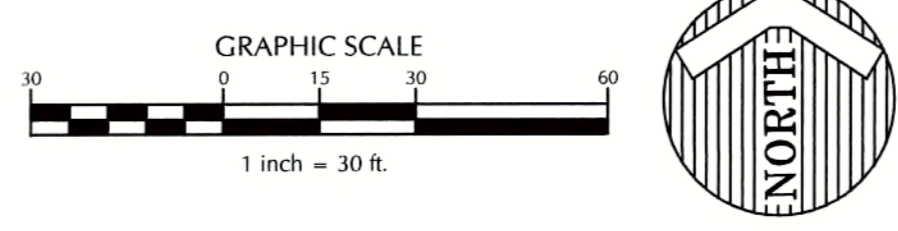
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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.

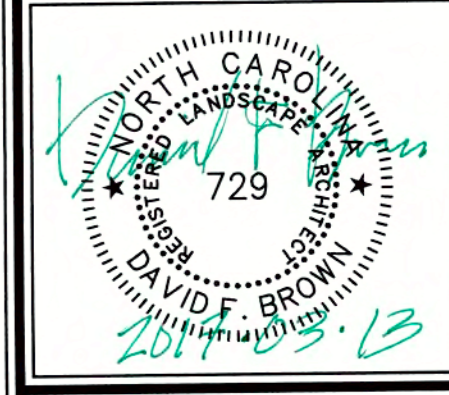
BY: S.A.M. DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4.25.17
ADMINISTRATOR



K:\1616-0000\00032-Knightdale Cottages Station\02160032-16-Landscape\Plan\Map\Map.dwg, March 13, 2017 3:54:07PM, TOWNSEND, CHARLIE



Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

U.D.O. TREE SAVE AREAS REQUIREMENTS

PRIORITY TIER 2:

- SLOPE AREAS OF 15 - 25%;
- 746 TOTAL DBH / 12" DBH = (62) REPLACEMENT TREES REQUIRED; (62) REPLACEMENT TREES PROVIDED;

PRIORITY TIER 3:

- ALL TREES GREATER THAN 24" DBH DISTURBED IN ALL OTHER LOCATIONS;
- 536 TOTAL DBH / 12" DBH = (45) REPLACEMENT TREES REQUIRED; (45) REPLACEMENT TREES PROVIDED;

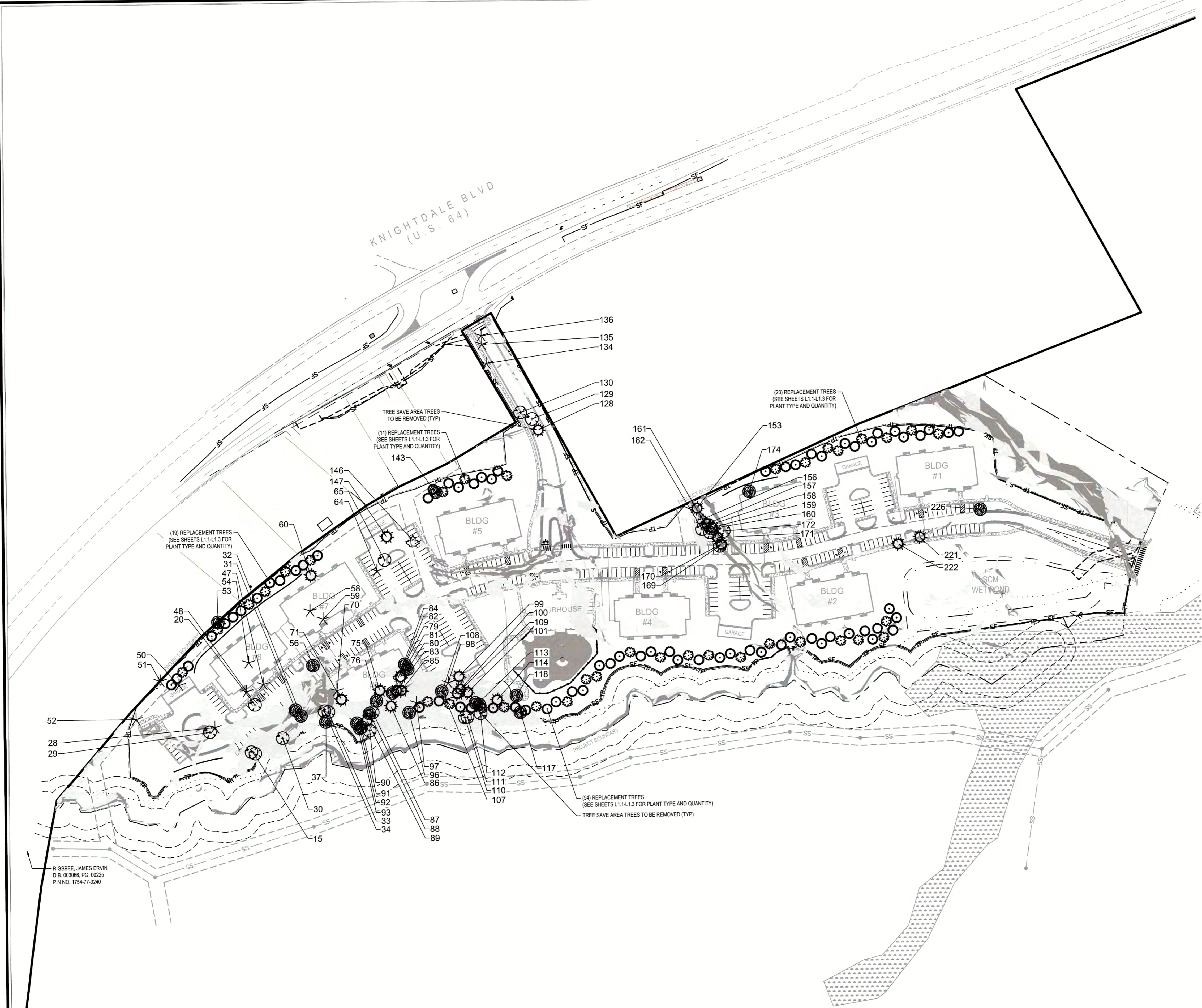
TREE LEGEND

TREE DESCRIPTION

	SLOPES BETWEEN 15%-25%
	SLOPES >25%

Tier 2 Trees Removed		Tier 2 Trees Removed	
Point	Description	Point	Description
15	12" TWPO	93	12" OAK
20	12" POP	96	12" OAK
28	14" PN	97	14" PN
29	12" POP	98	12" PN
30	12" POP	99	12" GUM
31	12" OAK	100	12" GUM
32	12" OAK	101	12" GUM
33	18" POP	107	14" PN
34	14" POP	108	16" OAK
37	12" OAK	109	12" GUM
51	18" TRPN	110	12" POP
56	12" OAK	111	14" POP
70	14" PN	112	12" OAK
79	12" OAK	118	12" OAK
80	12" OAK	130	22" POP
81	12" GUM	153	12" GUM
82	12" MPL	156	12" MPL
83	12" GUM	157	14" GUM
84	12" OAK	158	12" POP
85	12" GUM	159	14" GUM
86	12" GUM	160	12" POP
87	14" POP	161	14" POP
88	14" OAK	162	14" POP
89	12" GUM	169	18" POP
90	12" POP	170	12" GUM
91	14" POP	171	12" GUM
92	12" OAK	172	12" POP
Total	746" DBH	Total	746" DBH

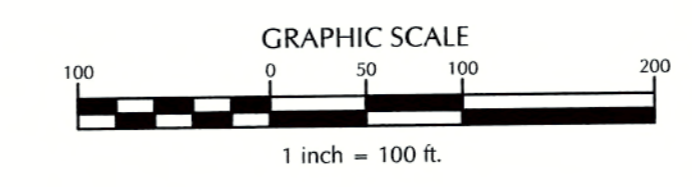
Tier 3 Trees Removed		Tier 3 Trees Removed	
Point	Description	Point	Description
47	24" PN	129	24" POP
48	24" PN	134	24" PN
50	24" PN	135	24" PN
52	28" PN	138	24" PN
53	24" OAK	143	24" OAK
54	24" PN	146	24" MPL
58	24" PN	147	24" GUM
59	24" PN	174	24" OAK
60	26" GUM	221	24" GUM
64	24" PN	222	24" GUM
65	24" POP	226	24" OAK
128	26" GUM	Total	536" DBH



RIGSBEE, JAMES ERVIN
D.B. 003056, PG. 00225
PIN NO. 1754-77-3240

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSFORMATION FIELD SERVICES: N/A
PUBLIC UTILITIES: *K.D. Jew 3/24/14*
SEWER/WATER: N/A
PLANNING/DESIGNING: N/A
FIRE: N/A
URBAN FORESTRY: N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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.

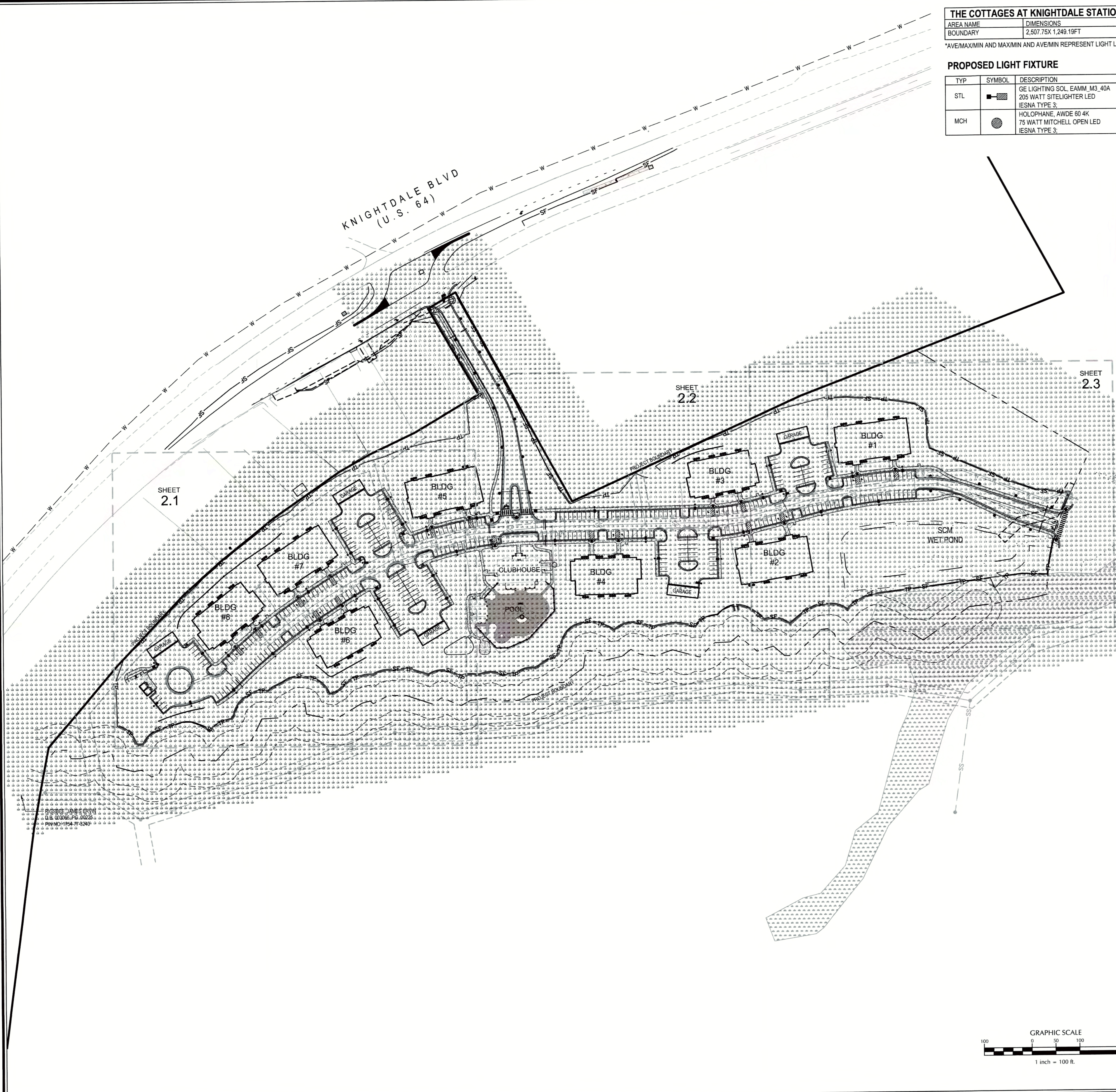
BY: *SWAN* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *J. Curran* DATE: 4-28-17
ADMINISTRATOR

K:\1416-0000\160032 Knightdale Station Cottages\CD\11.1-1.1.3 Tree Save Areas Plan.dwg, Sunday, March 12, 2017 3:24:17 PM - TOWN OF RALEIGH

K:\1616-02010-00202 Knightdale Station Cottage\CAD\13.2.0 - LIGHTING PLAN.dwg - Sunday, March 12, 2017 3:36:48 PM - TOWN/AND CHAIR



THE COTTAGES AT KNIGHTDALE STATION PARKING LOT CALCULATION SUMMARY											10.25.16
AREA NAME	DIMENSIONS	GRID / TYPE	# PTS	PAC	GROUP	AVE	MAX	MIN	MAX/MIN	AVE/MIN	
BOUNDARY	2,507.75X 1,249.19FT	PARKING / H/H	17,646	10.00	<>	1.85	4.06	.51	7.90	3.61	

*AVE/MAX/MIN AND MAX/MIN AND AVE/MIN REPRESENT LIGHT LEVELS WITHIN PARKING LOT.

PROPOSED LIGHT FIXTURE												
TYP	SYMBOL	DESCRIPTION	LAMP	TEMP.	BUG RATING	CRI	LUMENS	MOUNTING	LLF	QTY	CUTOFF TYPE	PROVIDED BY
STL		GE LIGHTING SOL EMM M3 40A 205 WATT SITELIGHTER LED IESNA TYPE 3	LED ARRAY	4000K	B2-U0-G2	70 MIN.	13,620	30' Black Aluminum	0.85	39	FULL CUTOFF	DUKE ENERGY PROGRESS
MCH		HOLOPHANE AWDE 60 4K 75 WATT MITCHELL OPEN LED IESNA TYPE 3	LED ARRAY	4000K	B1-U0-G1	70 MIN.	4,332	13' Black Style VII	0.85	21	FULL CUTOFF	DUKE ENERGY PROGRESS

NOTES:
1. ALL EXTERIOR SITE LIGHTING SHALL BE DESIGNED TO PREVENT OFF-SITE GLARE.

Lighting System: Straylight LED

Light source: LED Array
Lumens: 13,620 lumens
Wattage: 205W (90% eff)
LED CRI: EDAK (CRI 70)
LED CRI: EDAK (CRI 70)
LED CRI: EDAK (CRI 70)
Color temperature: 4,000K
Warmup and hold time: Instant on (no pre-heat or warmup time)

Photo availability:

Photo	Mounting height	Color
Front view (optional cut-off)	30, 35	Black
Front view (optional 'HOLD')	30	Black
Close-up view (optional)	30	Black

Features:

- Meets industry standards and lighting ordinances
- Eliminates light and color cast
- Low maintenance
- Warranty: 5-year
- One-year warranty on the LED light source
- Provides trouble-free installation and service
- Backed by over 40 years of experience

*If used in accordance with the approved specifications, they will be covered by the Duke Energy Progress. They will be covered by the Duke Energy Progress. They will be covered by the Duke Energy Progress.

Lighting System: Straylight LED

Light source: LED Array
Lumens: 4,332 lumens
Wattage: 75W (90% eff)
LED CRI: EDAK (CRI 70)
LED CRI: EDAK (CRI 70)
LED CRI: EDAK (CRI 70)
Color temperature: 4,000K
Warmup and hold time: Instant on (no pre-heat or warmup time)

Photo availability:

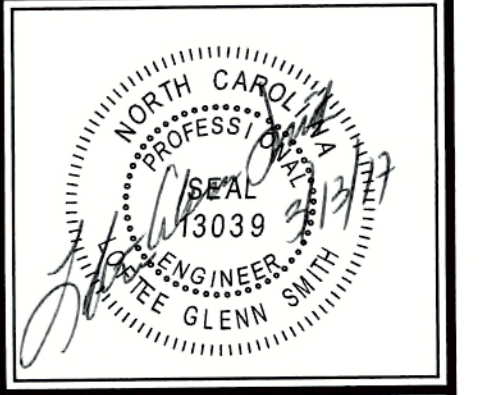
Photo	Mounting height	Color
Front view (optional cut-off)	30, 35	Black
Front view (optional 'HOLD')	30	Black
Close-up view (optional)	30	Black

Features:

- Meets industry standards and lighting ordinances
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Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



Revisions	Comments	Date
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No.
L2.0

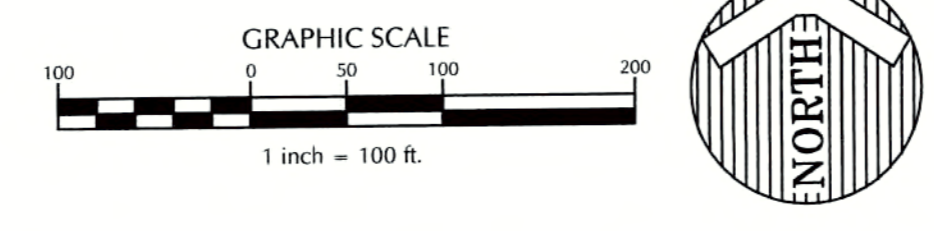
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

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BY: *[Signature]* DATE: 4.21.2017
DEVELOPMENT SERVICES ENGINEER

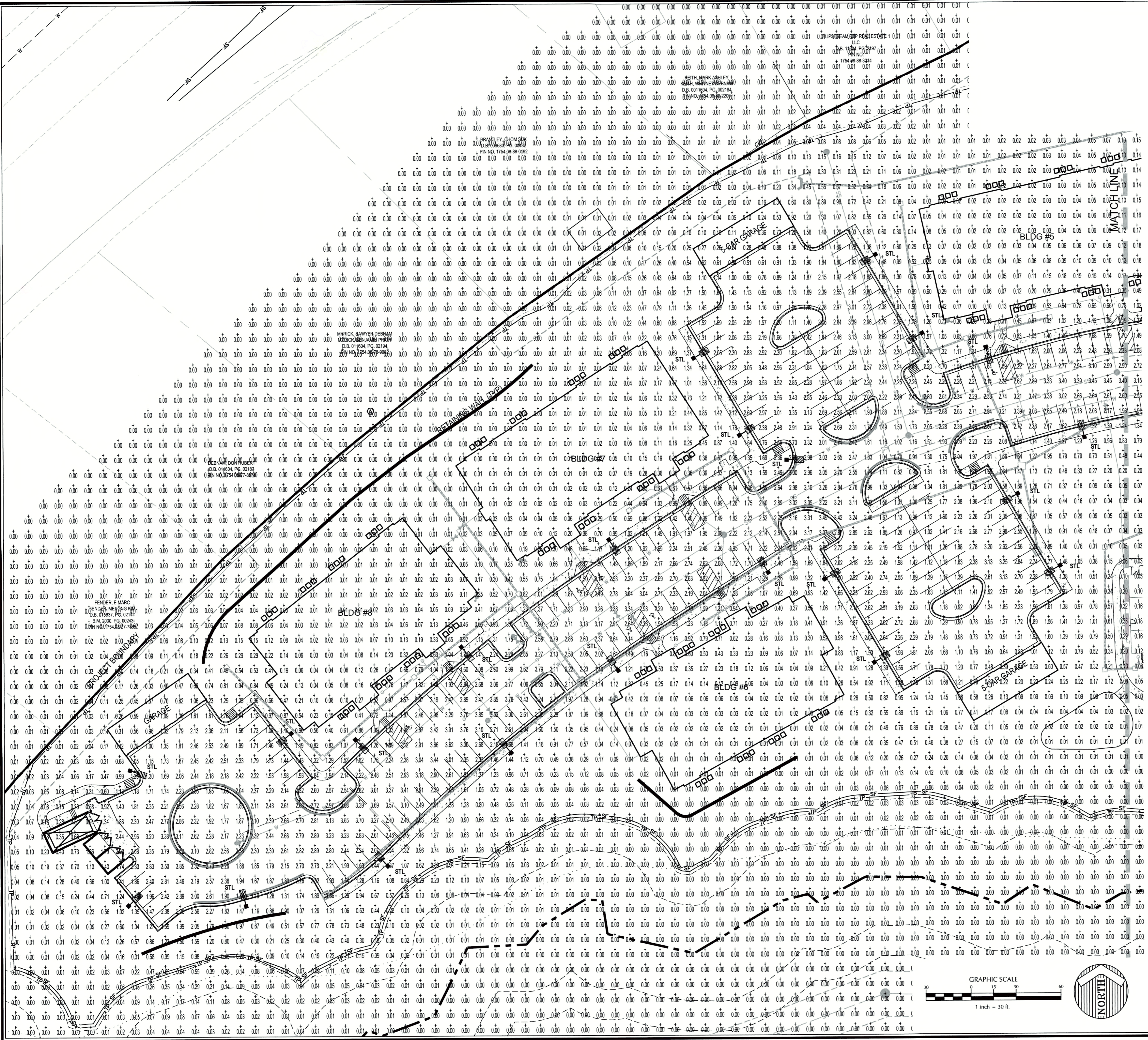
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.

BY: *[Signature]* DATE: 4.28.17
ADMINISTRATOR



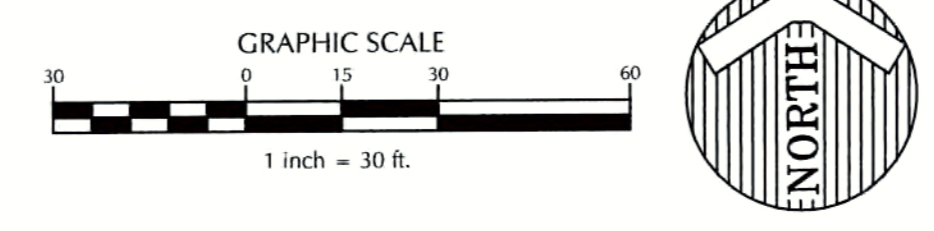
CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
SEWER/WATER: N/A
PLANNING/ECONOMY: N/A
HHS: N/A
URBAN FORESTRY: N/A



CITY OF RALEIGH
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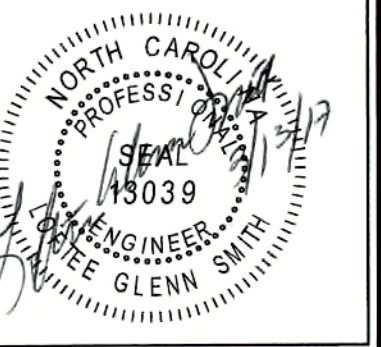
TRANSPORTATION FEEDBACKS: N/A
 PUBLIC UTILITIES: N/A
 STORMWATER: N/A
 PLANNING/DESIGNING: N/A
 FIRE: N/A
 URBAN FORESTRY: N/A

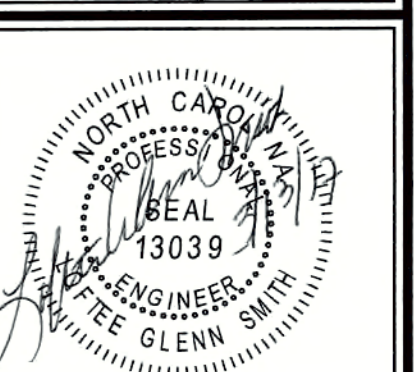
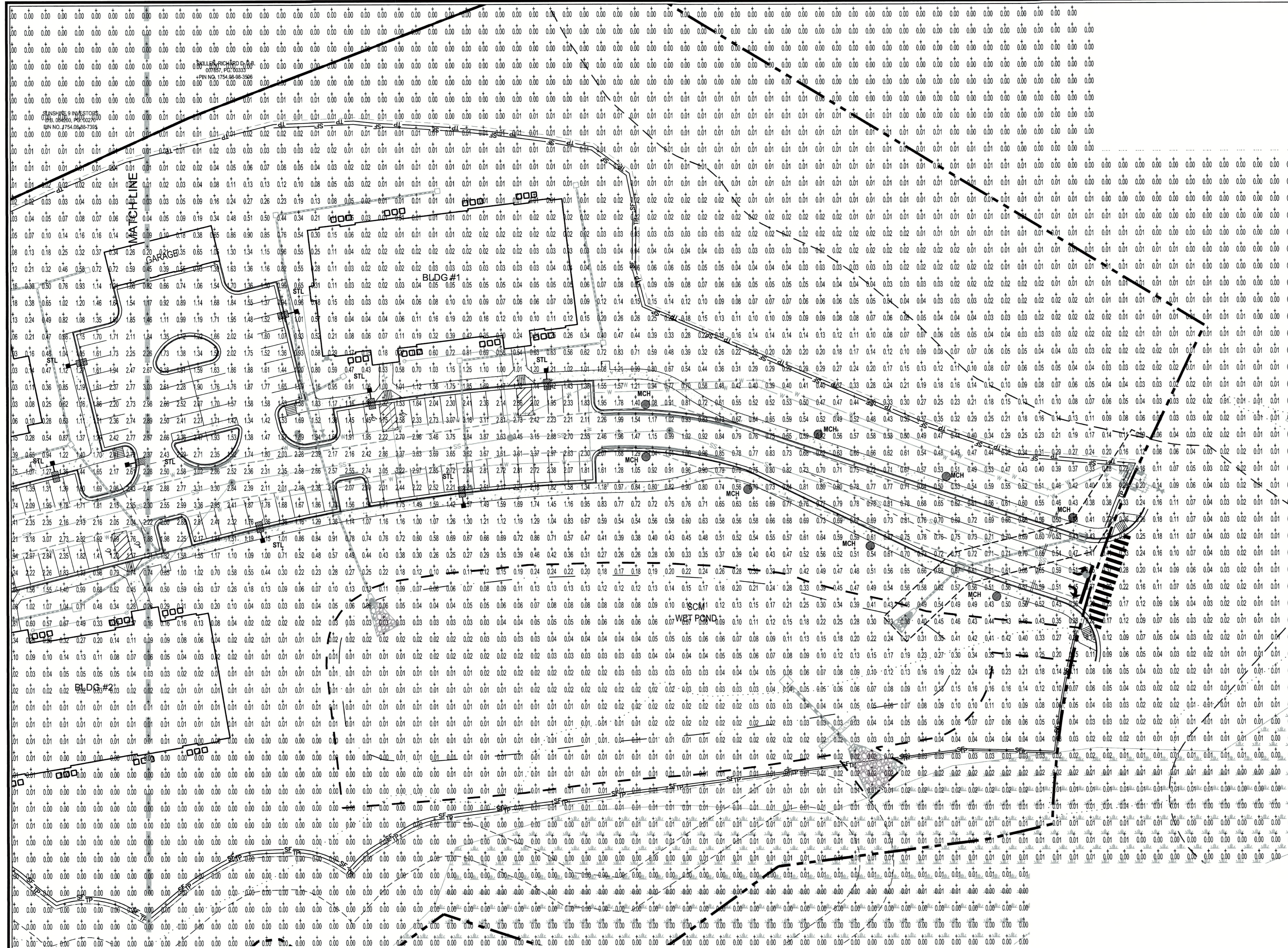


REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
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BY: S. MULL DATE: 4-21-2017
 DEVELOPMENT SERVICES ENGINEER

THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
 BY: [Signature] DATE: 4-28-17
 ADMINISTRATOR





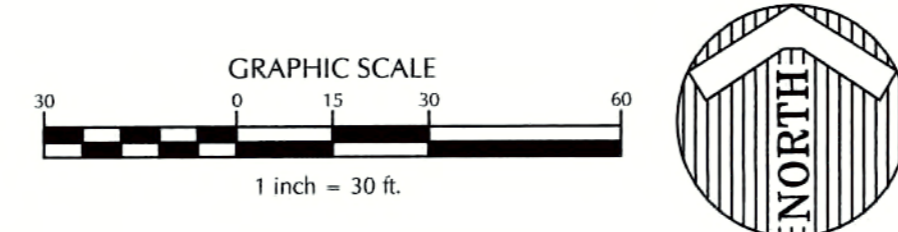
Job No.	02160032	Drawn By	CDT
Date	06/03/2016	Designer	WR
<p>CITY OF RALEIGH All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.</p> <p>TRANSPORTATION/FIELD SERVICES: N/A PUBLIC UTILITIES: N/A PLANNING/ENGINEERING: N/A FIRE: N/A URBAN FORESTRY: N/A</p>			
<p>Revisions</p> <p>1 PER TOK COMMENTS 09/09/16</p> <p>2 PER WAKE COMMENTS 12/15/16</p> <p>3 PER TOK COMMENTS 12/28/16</p> <p>4 PER TOK COMMENTS 03/01/17</p>			
<p>Sheet No.</p> <p>L2.3</p>			

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: *S. Smith* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

BY: *J. Smith* DATE: 4-28-17
ADMINISTRATOR



K:\1514\0001\100023_Knightdale Station Cottages\CD\PL2.3 LIGHTING PLAN EAST.dwg, March 12, 2017 2:35:11 PM - TOWNSEND CHARLE

ARCHITECTURAL PLANS WALL LEGEND

	STANDARD STUD WALL, INTERIOR OR EXTERIOR IF EXT SEE ELEVATIONS FOR SIDING. STYLE THICKNESS OF WALL NOTED IN PLAN NOTES OR AT WALL LOCATIONS.		STANDARD STUD WALL WITH 5" BRICK VENEER FOUNDATION WALL LEDGE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS.
	STANDARD STUD WALL WITH LOW APPLIED STONE WAINSCOTING. SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL. AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS.		STANDARD STUD WALL WITH STACKED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS. (NOTE: NOTIFY PLAN DESIGNER IF THICKNESS IS MORE THAN 5" BEFORE FOOTINGS ARE POURED)
	STANDARD STUD WALL WITH 5" FOUNDATION LEDGE FOR LOW BRICK OR STACKED STONE WAINSCOTING. SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL. AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS.		STANDARD STUD WALL WITH APPLIED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS. (NOTE: NO FOUNDATION SUPPORT IS REPRESENTED ON STRUCTURAL PLANS) IF STACKED STONE IS TO BE USED, BUILDER MUST NOTIFY PLAN DESIGNER BEFORE FOOTINGS ARE POURED.
	HALF WALL WITH 1x CAP (42" HEIGHT UNLESS NOTED OTHERWISE ON PLANS)		CMU BLOCK WALL
	POURED CONCRETE WALL (THICKNESS PER PLANS)		

NOTE: NOT ALL WALL TYPES SHOWN IN LEGEND MAY BE USED IN PROJECT/ON BLDG. PLAN

APARTMENT FLOOR PLAN GENERAL NOTES

- DIMENSIONS ARE TO THE EXTERIOR FACE OF STUDS, UNO
- SLOPE CONCRETE AT BREEZEWAY ENTRY CORRIDOR PER THE BUILDING AND/OR THE FOUNDATION PLAN AND FOR LOCATIONS AND EXTENT OF SLOPE.
- F.E. DENOTES THE LOCATION OF A FIRE EXTINGUISHER IN A RECESSED WALL MOUNTED CABINET.
- BEARING WALLS ARE SHOWN ON BUILDING FRAMING PLANS.
- REFER TO ENLARGED UNIT PLANS FOR WINDOW & DOOR DIMENSIONS.
- REFER TO 'CS' SHEET SET FOR ALL APPLICABLE UL DETAILS AND ALL OTHER CODE REQUIREMENTS.
- ALL ROOMS/GROUND FLOOR UNIT DOORS TO HAVE IDENTIFICATION SIGNS MOUNTED ON LATCH SIDE OF DOOR WHICH INCLUDE RAISED CHARACTERS & BRAILLE MOUNTED AT CONSISTENT HGT. PER ANS 103
- REFER TO WINDOW AND DOOR SCHEDULE FOR MORE INFORMATION.

WALL LEGEND

SEE SHEET SET C3 FOR ALL ASSOCIATED WALL TYPES.

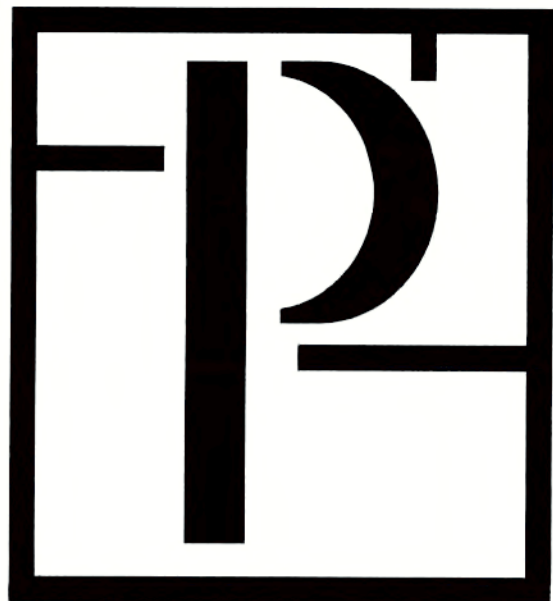
MARK	UL WALL TYPE	REMARKS
1	U396	1 HOUR RATED EXTERIOR WALL
2	U341	1 HOUR RATED INT. DBL. STUD WALL (UNIT SEPERATION)
3	GA-WP8105	1 HOUR RATED EXTERIOR WALL (BREEZEWAY)
4	U305	1 HOUR RATED INTERIOR BEARING WALL *SEE FRAMING PLANS FOR INTERIOR BEARING LOCATIONS

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.

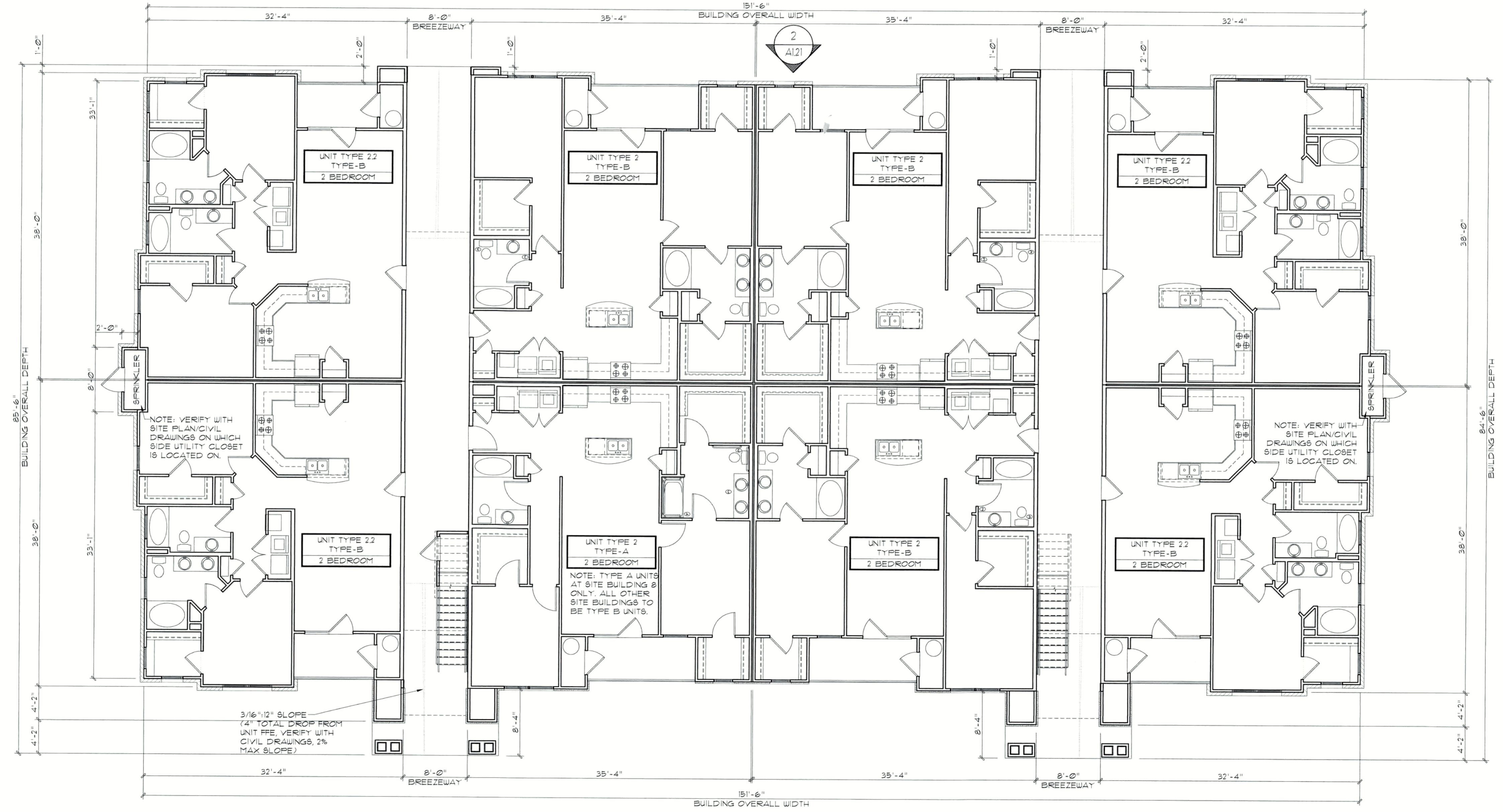
By: S. M. M. M. Date: 4-21-2017
Town Engineer

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

By: [Signature] Date: 4-28-17
Administrator



Planworx
ARCHITECTURE, P.A.
5711 Six Forks Road, Suite 100
Raleigh NC 27609
office (919) 846-8100
fax (919) 846-2661
website www.planworx.com



SITE BUILDING #5, 7

BUILDING FLOOR PLAN - FIRST
Scale: 1/8" = 1'-0"

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans.

Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DESCRIPTION
04.05.17			

PROJECT NO: **027015**
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: **Building Type 1 First Floor Plan**

SHEET NUMBER: **A1.10**



Planworx ARCHITECTURE, P.A.

571 Six Forks Road, Suite 100
Raleigh NC 27609

office (919) 846-8100

fax (919) 846-2661

website www.planworx.com



ARCHITECTURAL PLANS WALL LEGEND

	STANDARD STUD WALL INTERIOR OR EXTERIOR IF EXT SEE ELEVATIONS FOR SIDING STYLE THICKNESS OF WALL NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH 5" BRICK VENEER FOUNDATION WALL LEDGE, STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS.
	STANDARD STUD WALL WITH LOW APPLIED STONE WAINSCOTING SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH STACKED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS (NOTE: BUILDER TO VERIFY STONE THICKNESS & NOTIFY PLAN DESIGNER IF THICKNESS IS MORE THAN 5" BEFORE FOOTINGS ARE POURED)
	STANDARD STUD WALL WITH 5" FOUNDATION LEDGE FOR LOW BRICK OR STACKED STONE WAINSCOTING. SEE ELEVATIONS FOR HEIGHT & FINISH MATERIAL AT EXT STUD WALL ABOVE. STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS		STANDARD STUD WALL WITH APPLIED STONE VENEER STUD THICKNESS AS NOTED IN PLAN NOTES OR AT WALL LOCATIONS (NOTE: NO FOUNDATION SUPPORT IS REPRESENTED ON STRUCTURAL PLANS) IF STACKED STONE IS TO BE USED BUILDER MUST NOTIFY PLAN DESIGNER BEFORE FOOTINGS ARE POURED
	HALF WALL WITH 1x CAP (42" HEIGHT UNLESS NOTED OTHERWISE ON PLANS)		POURED CONCRETE WALL (THICKNESS PER PLANS)
	CMU BLOCK WALL		

NOTE: NOT ALL WALL TYPES SHOW IN LEGEND MAY BE USED IN PROJECT/ON BLDG. PLAN

APARTMENT FLOOR PLAN GENERAL NOTES

- DIMENSIONS ARE TO THE EXTERIOR FACE OF STUDS, UNO
- SLOPE CONCRETE AT BREEZEWAY ENTRY CORRIDOR PER THE BUILDING AND/OR THE FOUNDATION PLAN AND FOR LOCATIONS AND EXTENT OF SLOPE.
- F.E. DENOTES THE LOCATION OF A FIRE EXTINGUISHER IN A RECESSED WALL MOUNTED CABINET.
- BEARING WALLS ARE SHOWN ON BUILDING FRAMING PLANS.
- REFER TO ENLARGED UNIT PLANS FOR WINDOW & DOOR DIMENSIONS.
- REFER TO 'CS' SHEET SET FOR ALL APPLICABLE UL DETAILS AND ALL OTHER CODE REQUIREMENTS.
- ALL ROOMS/GROUND FLOOR UNIT DOORS TO HAVE IDENTIFICATION SIGNS MOUNTED ON LATCH SIDE OF DOOR WHICH INCLUDE RAISED CHARACTERS & BRAILLE MOUNTED AT CONSISTENT HGT. PER ANS1 103
- REFER TO WINDOW AND DOOR SCHEDULE FOR MORE INFORMATION.

WALL LEGEND

MARK	UL WALL TYPE	REMARKS
1	U356	1 HOUR RATED EXTERIOR WALL
2	U341	1 HOUR RATED INT. DBL. STUD WALL (UNIT SEPERATION)
3	GA-WP2105	1 HOUR RATED EXTERIOR WALL (BREEZEWAY)
4	U305	1 HOUR RATED INTERIOR BEARING WALL *SEE FRAMING PLANS FOR INTERIOR BEARING LOCATIONS

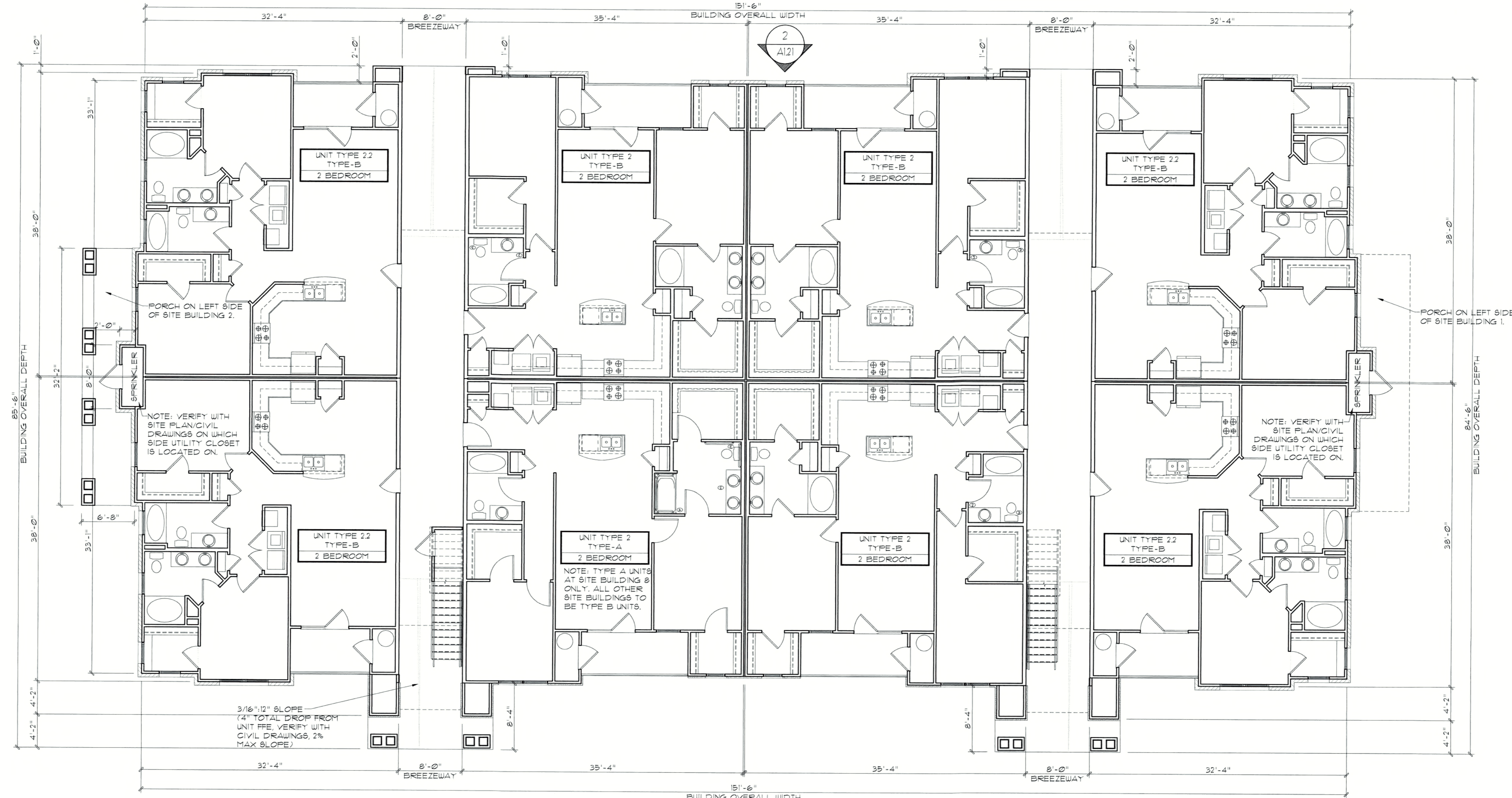
SEE SHEET SET C3 FOR ALL ASSOCIATED WALL TYPES.

a. **Town Certification.** This design has been reviewed by the Engineer for use in 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: *Michael McNeil* Date: 4-21-2017
Town Engineer

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

By: *[Signature]* Date: 4-28-17
Administrator



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	04-05-17
ISSUE DATE:	
REVISIONS NUMBER	DATE
	INITIALS

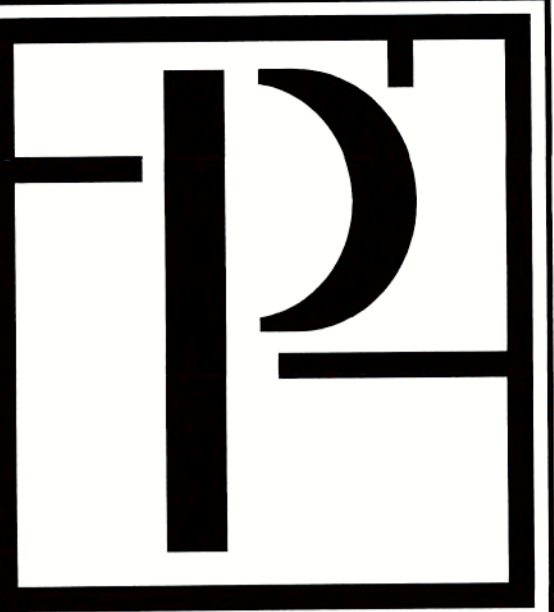
PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Building Type 1.1 First Floor Plan

1 BUILDING FLOOR PLAN - FIRST
Scale: 1/8" = 1'-0"

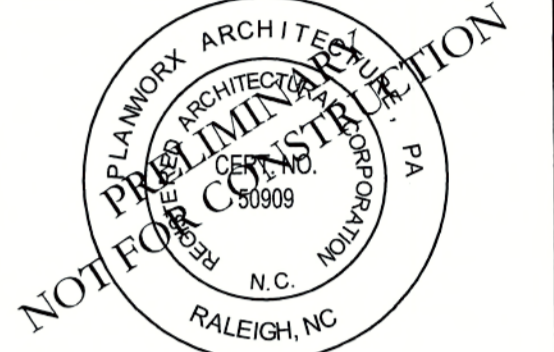
SITE BUILDING #1, 2

SHEET NUMBER: A1.13

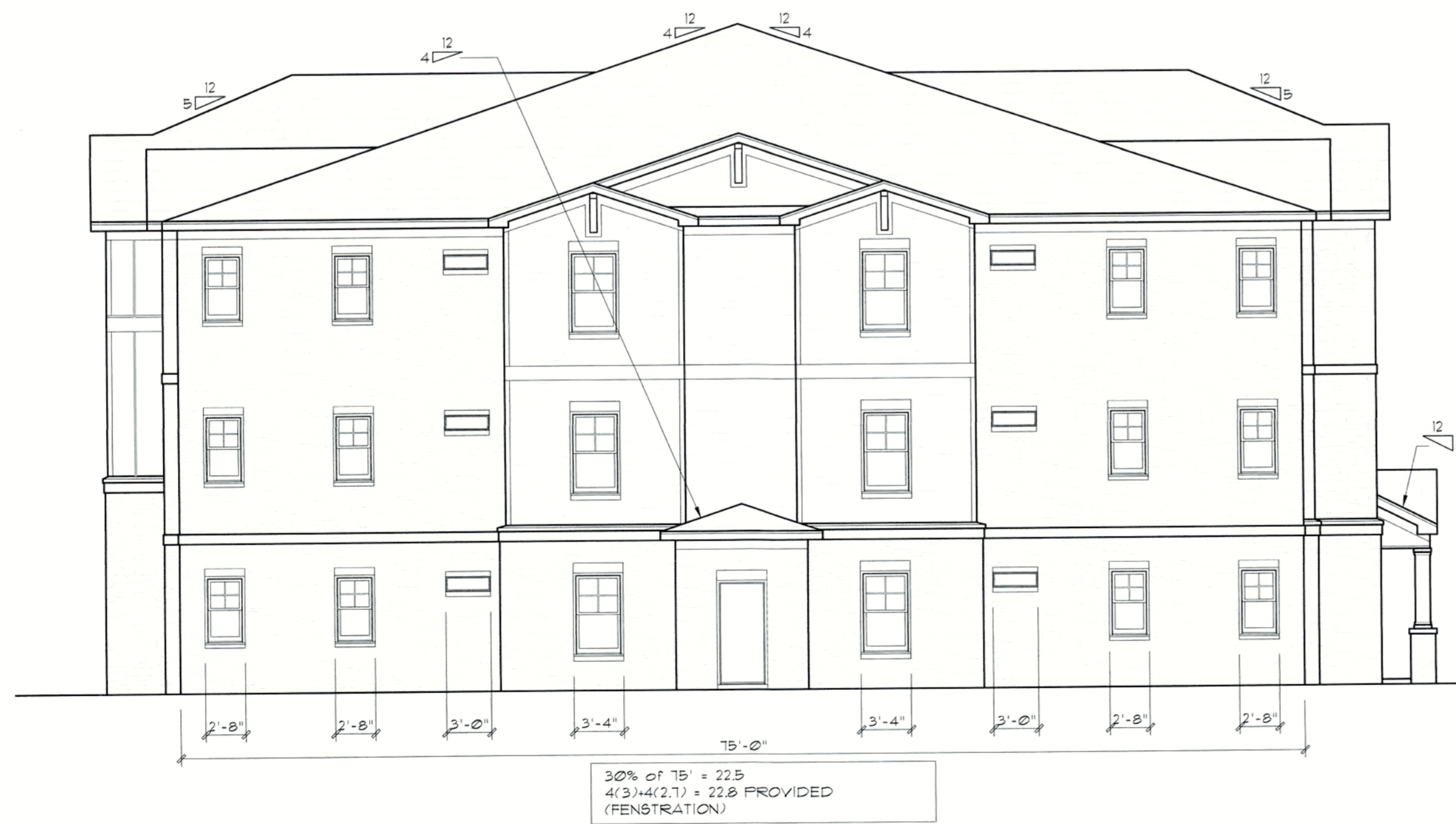
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fax (919) 846-2661
website www.planworx.com



1 BT 1 FRONT ELEVATION
Scale: 1/8" = 1'-0"



ARCHITECTURAL PLANS EXTERIOR MATERIALS	
	* SHINGLE ROOF PER BUILDER
	* METAL ROOF PER BUILDER
	* SIDING PER BUILDER
	* BRICK PER BUILDER
	* B&B SIDING * ALIGN CENTER OF B&B PANEL WITH CENTER OF GABLE OR WINDOW TOP
	* CULTURED OR STACKED STONE (SEE FOUNDATION)
	* BRICK OR STONE ROULOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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: SMH Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: Andrew Date: 4-28-17
Administrator

SITE BUILDING #5, 7

2 BT 1 TYP. SIDE ELEVATION (LEFT SHOWN)
Scale: 1/8" = 1'-0"

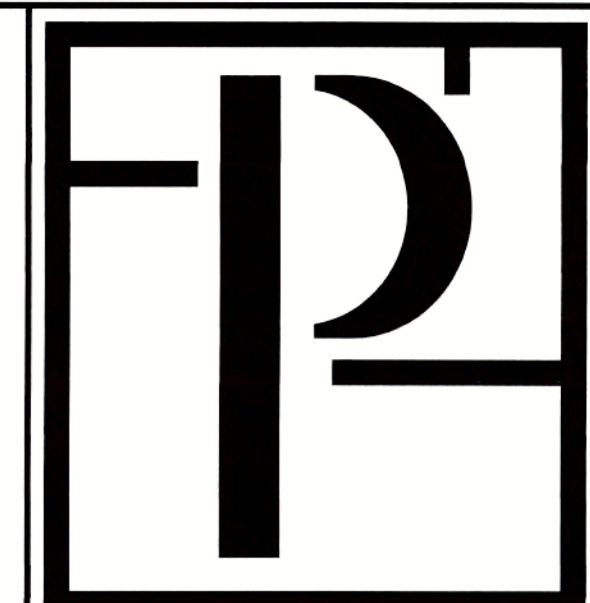
Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	04/05/17
ISSUE DATE:	
REVISIONS	DESCRIPTION
NUMBER	DATE INITIALS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
PROJECT NO:	027015
DRAWN BY:	JK
CHECKED BY:	
SHEET TITLE:	Building Type 1 Elevations
SHEET NUMBER:	A1.20

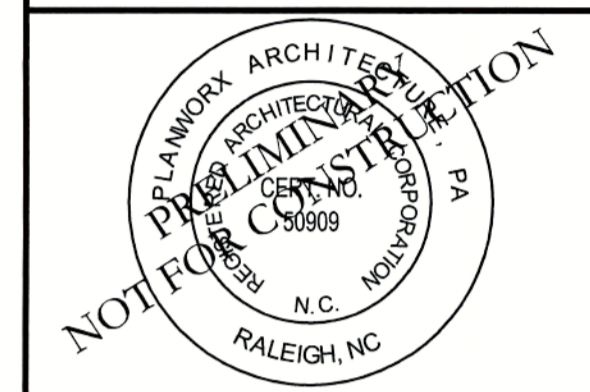
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1 BT 1 REAR ELEVATION
Scale: 1/8" = 1'-0"



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Cottages at Knightdale
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Town Site Submittal Set

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: S. A. All Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: [Signature] Date: 4-28-17
Administrator

ARCHITECTURAL PLANS	
EXTERIOR MATERIALS	
	SHINGLE ROOF PER BUILDER
	METAL ROOF PER BUILDER
	SIDING PER BUILDER
	BRICK PER BUILDER
	S4S SIDING ALIGN CENTER OF S4S PANEL WITH CENTER OF GABLE OR WINDOW TOP.
	CULTURED OR STACKED STONE (SEE FOUNDATION)
	BRICK OR STONE ROULOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

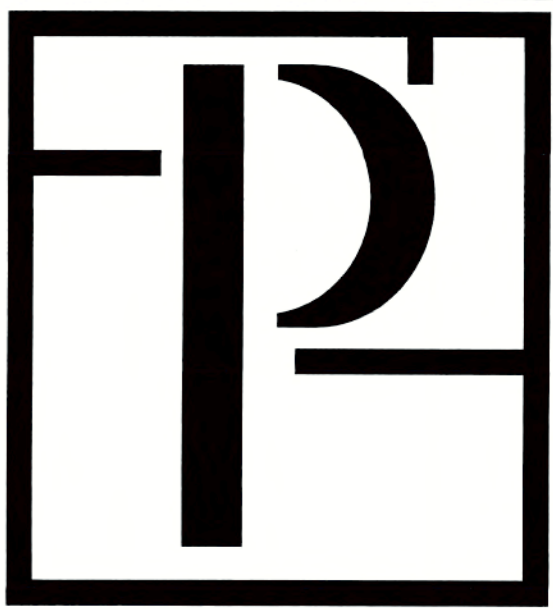
PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DATE	INITIALS	DESCRIPTION
04-05-17					

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Building Type 1 Elevations

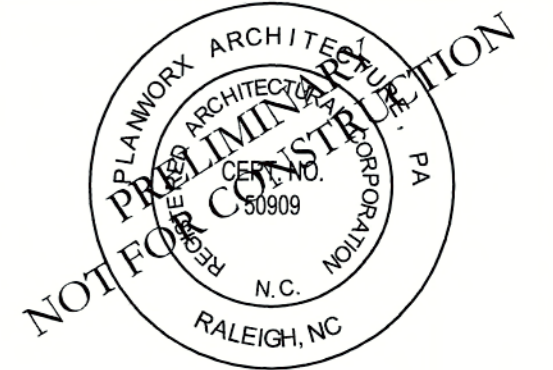
SITE BUILDING #5, 1

SHEET NUMBER: A1.21

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1 BT 1.1 FRONT ELEVATION
Scale: 1/8" = 1'-0"



ARCHITECTURAL PLANS EXTERIOR MATERIALS	
	* SHINGLE ROOF PER BUILDER
	* METAL ROOF PER BUILDER
	* SIDING PER BUILDER
	* BRICK PER BUILDER
	* B&B SIDING * ALIGN CENTER OF B&B PANEL WITH CENTER OF GABLE OR WINDOW TYP.
	* CULTURED OR STACKED STONE (SEE FOUNDATION)
	* BRICK OR STONE ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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: SAMU Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: [Signature] Date: 4-28-17
Administrator

SITE BUILDING #1, 2

2 BT 1.1 LEFT ELEVATION (SITE BUILDING #2 SHOWN. PORCH ON RIGHT ELEVATION OF SITE BUILDING #1)
Scale: 1/8" = 1'-0"

Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DESCRIPTION
04.05.17			

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Building Type 1.1 Elevations

SHEET NUMBER: A1.22

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1 BT 2 FRONT ELEVATION
Scale: 1/8" = 1'-0"



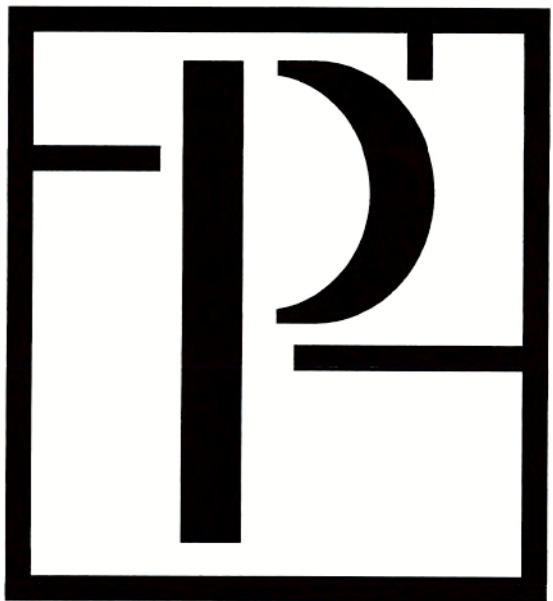
2 BT 2 TYP. SIDE ELEVATION (LEFT SHOWN)
Scale: 1/8" = 1'-0"

ARCHITECTURAL PLANS EXTERIOR MATERIALS	
	• SHINGLE ROOF PER BUILDER
	• METAL ROOF PER BUILDER
	• SIDING PER BUILDER
	• BRICK PER BUILDER
	• B&B SIDING *ALIGN CENTER OF B&B PANEL WITH CENTER OF GABLE OR WINDOW TYP.
	• CULTURED OR STACKED STONE (SEE FOUNDATION)
	• BRICK OR STONE ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
 * USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
 SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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: S. Alan Date: 4-21-2017
 Town Engineer
 These plans are approved by the Town of Knightdale and serve as construction plans for this project.
 By: [Signature] Date: 4-28-17
 Administrator

SITE BUILDING #3, 4, 6, 8



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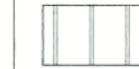

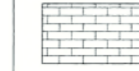
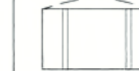


Caviness and Cates
 Cottages at Knightdale
 Knightdale NC
 Town Site Submittal Set

PROGRESS DATE:	ISSUE DATE:	REVISIONS	DESCRIPTION
		NUMBER	INITIALS
04-05-17			

PROJECT NO: 027015
 DRAWN BY: JK
 CHECKED BY:
 SHEET TITLE: Building Type 2 Elevations

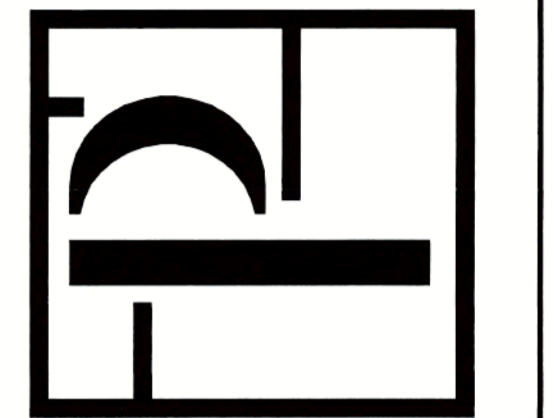
SHEET NUMBER:
A2.20

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- ARCHITECTURAL PLANS**
EXTERIOR MATERIALS
-  SHINGLE ROOF PER BUILDER
 -  METAL ROOF PER BUILDER
 -  SIDING PER BUILDER
 -  BRICK PER BUILDER
 -  B&B SIDING
ALIGN CENTER OF B&B PANEL WITH
CENTER OF GABLE OR WINDOW TYP.
 -  CULTURED OR STACKED STONE
(SEE FOUNDATION)
 -  BRICK OR STONE
ROLLLOCK-SOLDIER PER BUILDER

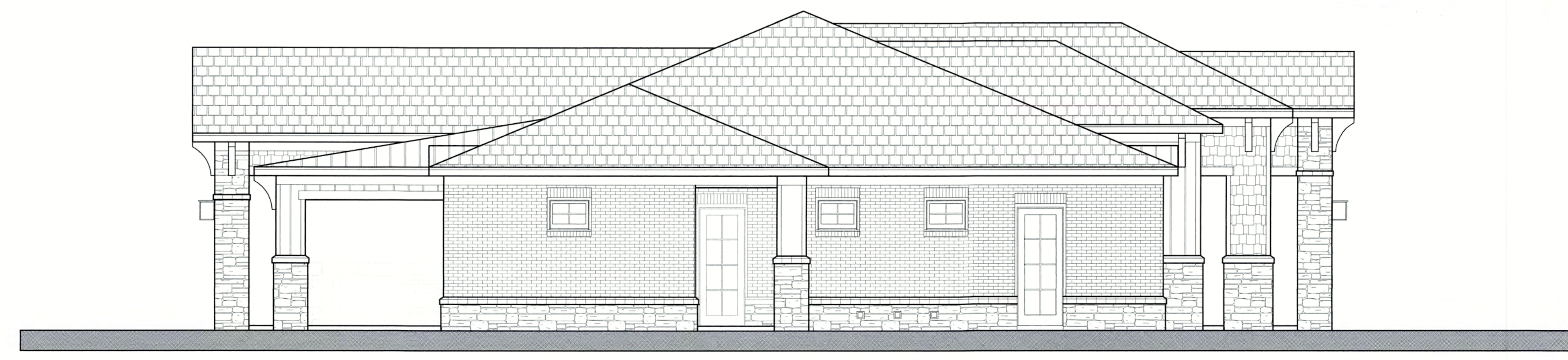
ELEVATION GENERAL NOTES
ROOFS
 USE ICE AND WATER SHIELD AT ALL ROOF PLACES SLOPED BELOW 4:12.
ROOF VENTILATION
 SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

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 website www.planworx.com



1 FRONT ELEVATION
 Scale: 3/16" = 1'-0"

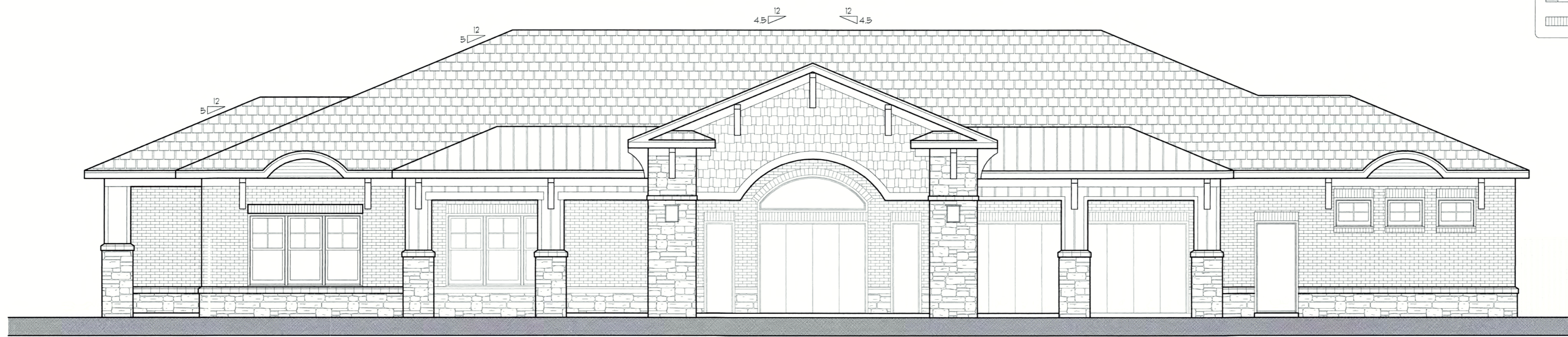
a. Town Certification. This design has been reviewed by the Engineer for use in the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
 By: *[Signature]* Date: 4-21-2017
 Town Engineer
 These plans are approved by the Town of Knightdale and serve as construction plans for this project.
 By: *[Signature]* Date: 4-28-17
 Administrator










2 LEFT ELEVATION
 Scale: 3/16" = 1'-0"

Caviness and Cates		Cottages at Knightdale		Knightdale NC		Final TRC Approval Comments	
PROGRESS DATE:	04.15.16	DESCRIPTION					
ISSUE DATE:		REVISIONS NUMBER		DATE		INITIALS	
PROJECT NO:		027015					
DRAWN BY:		JK					
CHECKED BY:							
SHEET TITLE:		Clubhouse Elevations					
SHEET NUMBER:		A3.20					

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- ARCHITECTURAL PLANS**
EXTERIOR MATERIALS
-  • SHINGLE ROOF PER BUILDER
 -  • METAL ROOF PER BUILDER
 -  • SIDING PER BUILDER
 -  • BRICK PER BUILDER
 -  • 8x8 SIDING
ALIGN CENTER OF 8x8 PANEL WITH
CENTER OF GABLE OR WINDOW TOP
 -  • CULTURED OR STACKED STONE
(SEE FOUNDATION)
 -  • BRICK OR STONE
ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
 F USE ICE AND WATER SHIELD AT ALL ROOF PLACES SLOPED BELOW 4:12.
ROOF VENTILATION
 SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

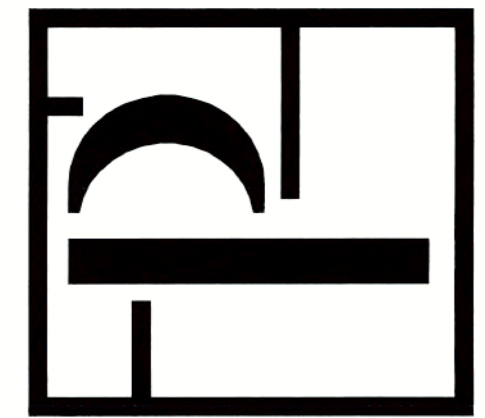
1 REAR ELEVATION
Scale: 3/16"=1'-0"



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: S. M. Allen Date: 4-21-2017
 Town Engineer
 These plans are approved by the Town of Knightdale and serve as construction plans for this project.
 By: [Signature] Date: 4-28-17
 Administrator

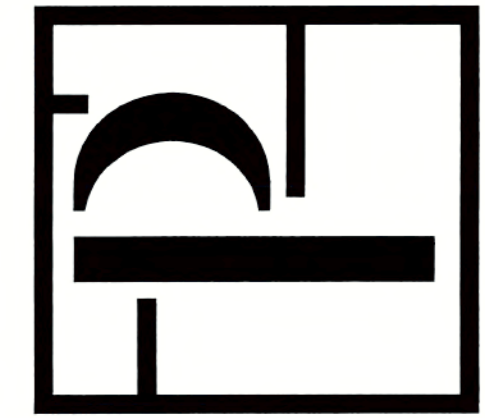
2 RIGHT ELEVATION
Scale: 3/16"=1'-0"

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Caviness and Cates	
Cottages at Knightdale	
Knightdale NC	
Final TRC Approval Comments	
PROGRESS DATE:	04.15.16
ISSUE DATE:	
REVISIONS NUMBER	DESCRIPTION
1	
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10	
PROJECT NO:	027015
DRAWN BY:	JK
CHECKED BY:	
SHEET TITLE:	Clubhouse Elevations
SHEET NUMBER:	A3.21

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1 HR RATED WALL (SEE FLOOR PLAN FOR TYPE)

CEILING/ ROOF ASSEMBLY OF UL* F522

SQUARE FOOTAGE	
BATHROOMS + D.F. =	385
BAR + PORCH =	787
CHEM. + POOL EQUIP. + SHOWER =	385
TOTAL =	1557

DESIGN CASE 1 BUILDING CODE FOR POOL AND DECK

Pool Deck Area plus Pool area:	9480
Gross Pool Deck (Deck Minus Pool Area):	7159
Deck occ. load:	15 sq ft/person
Other occ. Load (eg clubhouse):	477.3 people on deck
Other occ. Load (eg cabinet):	0.0 people
Gross deck occ. load:	477.3
Pool Area:	2281 (x' x y') state size of rectangle if an assumption is made.
Pool occ load:	30 sq ft/person
Net deck occupant load:	431.6 Minimum value allowed is zero
Net deck plus pool occ loads:	477.3 Occupant load
	238 50% Male and 50% Females

DESIGN CASE 2 HEALTH DEPARTMENT RULES FOR POOLS AND BUILDING CODE FOR DECK

Health Dept occupant (at water surface level)	
5 ft or less	1.35
Greater than 5 feet	1.34
Deck area	1 PER 300
Spa	1.25
Interactive play attractions	1.25
Pool deck for area within the pool fence	1.35 minus 8' walking space around pool

Gross deck area:	7159
Area of perimeter around pool area:	3265
Net pool deck:	5254
Deck occ. load:	15 sq ft/person
Other occ. Load (eg clubhouse):	0.0 people
Other occ. Load (eg cabinet):	0.0 people
Gross deck occ. load:	390.3
Pool Area:	2281 5 ft or less
	30 sq ft/person
	152.3 people in pool
Net Occupant load on deck:	188.2
Net Occupant load on deck:	188.2
Net Occupant load on deck:	188.2

GENERAL NOTES:

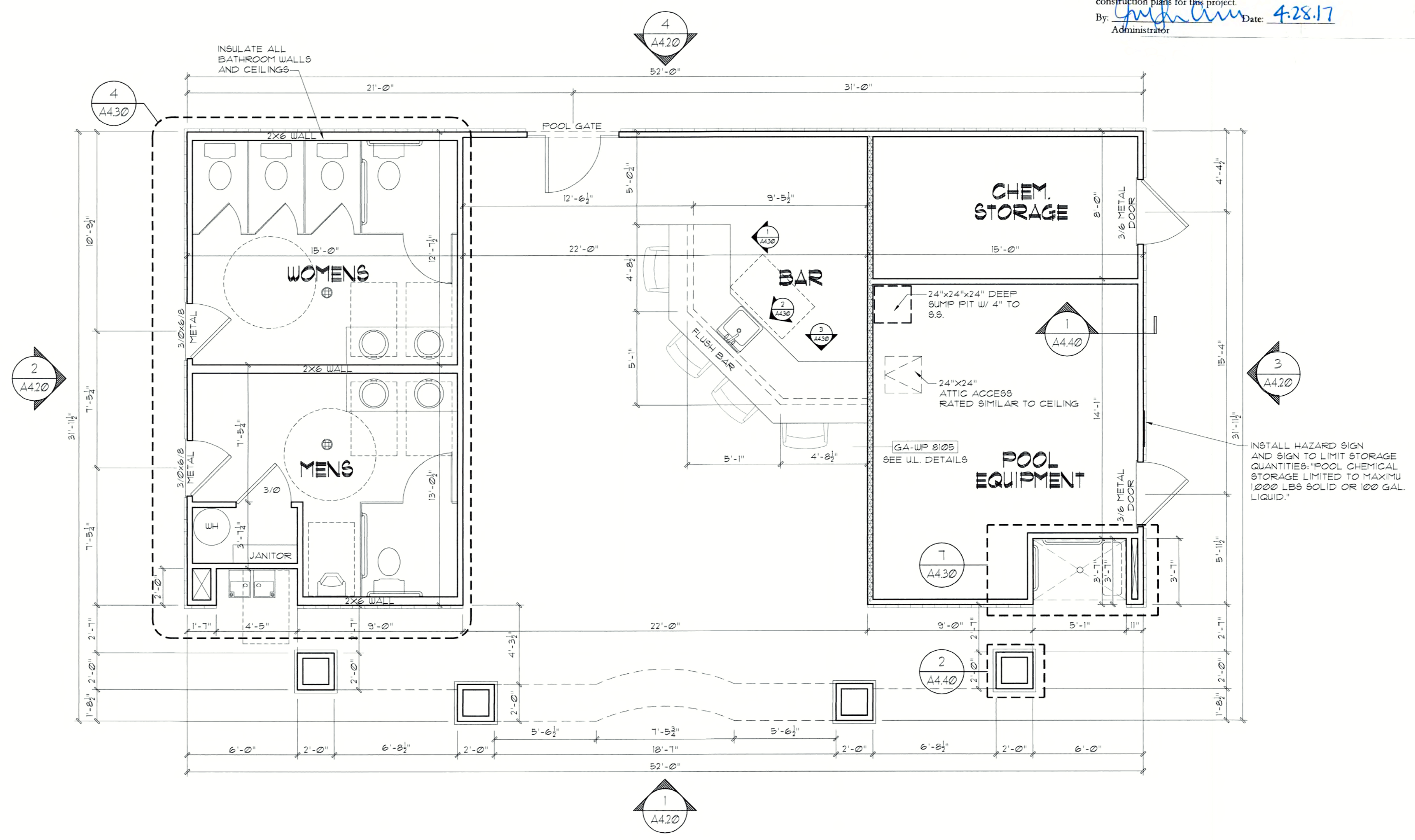
- ALL EXTERIOR WALLS ARE DIMENSIONED TO STUD, ALL INTERIOR WALLS DIMENSIONED TO STUD.
- ALL WALLS ARE DRAWN TO TRUE DIMENSIONS.
- ALL EGRESS COMPLIANCE CALCULATIONS ARE LISTED IN CODE SUMMARY.
- ATTIC ACCESS AS SHOWN ON FLOOR PLANS.
- WALL AND CEILING HEIGHT NOTES ARE BASED ON NOMINAL WALL SIZE (IE 10' 1-1/8" ACTUAL WALL HEIGHT IS LABELED 10'-0" ON PLANS)
- KNEEWALL HEIGHT LABELS FOR WALLS UNDER RAFTERS ASSUME AN EXTRA 3/8" OF FURRING (IN HEATED SPACES) FOR INSULATION. THE WALL HEIGHT REFERS TO THE HEIGHT FROM THE ROUGH FLOOR TO THE BOTTOM OF FURRING, NOT THE BOTTOM OF RAFTER.
- ALL EXTERIOR THRESHOLDS TO BE BARRIER FREE DESIGN.
- SUMP PIT, POOL EQUIPMENT ROOM SIZE / LAYOUT, FLOOR DRAINS & HOSE BIBS TO BE VERIFIED BEFORE CONSTRUCTION BEGINS TO COORDINATE WITH POOL MANUFACTURER'S SPECS & DRAWINGS BY OTHERS. IF NOT SUPPLIED PRIOR TO PERMITTING DRAWING RELEASE ARCHITECT HOLDS NO LIABILITY FOR FUTURE COORDINATION (TYP).
- ANY STRUCTURAL INFORMATION SHOWN IS FOR REFERENCE ONLY & TO BE CONFIRMED ON THE APPROPRIATE STRUCTURAL SHEETS. IF THERE ARE ANY DISCREPANCIES BETWEEN THE ARCHITECTURAL AND STRUCTURAL SHEETS, THE INFORMATION SHOWN ON THE STRUCTURAL SHEETS WILL OVERRIDE ANY ARCHITECTURAL INFORMATION SHOWN AND SHOULD BE REPORTED TO PLANWORX ARCHITECTURE, P.A. FOR CONFIRMATION BEFORE CONSTRUCTION.

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: 4-21-2017
Town Engineer

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

By: [Signature] Date: 4-28-17
Administrator



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Final TRC Approval Comments

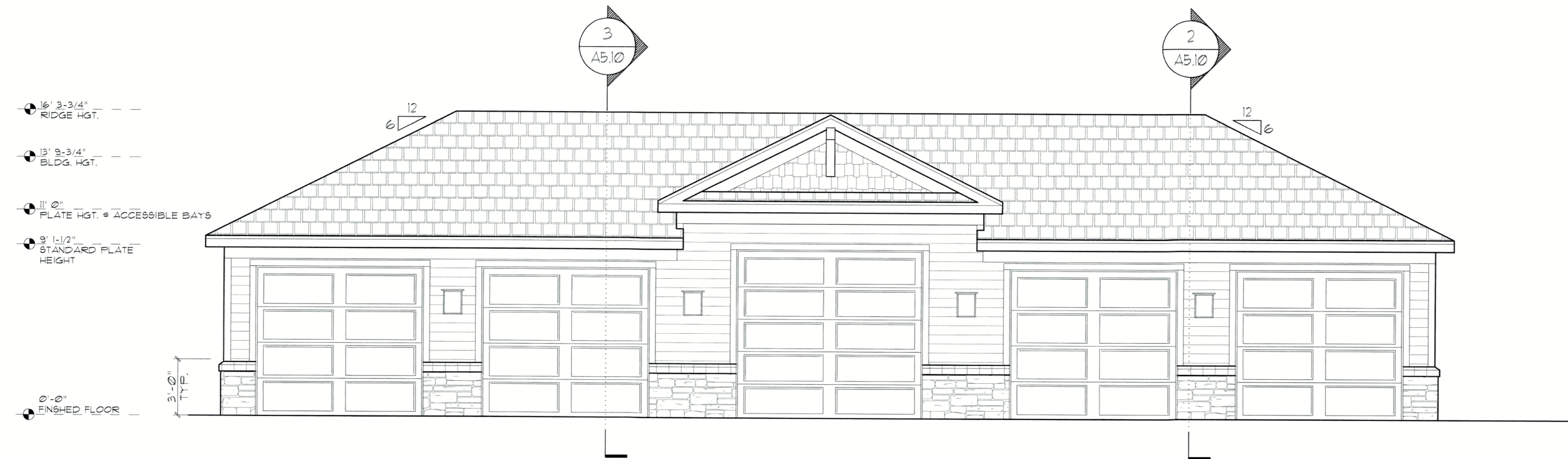
PROGRESS DATE:	DESCRIPTION
04.15.16	
ISSUE DATE:	
REVISIONS NUMBER	INITIALS
DATE	

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Poolhouse Floor Plan

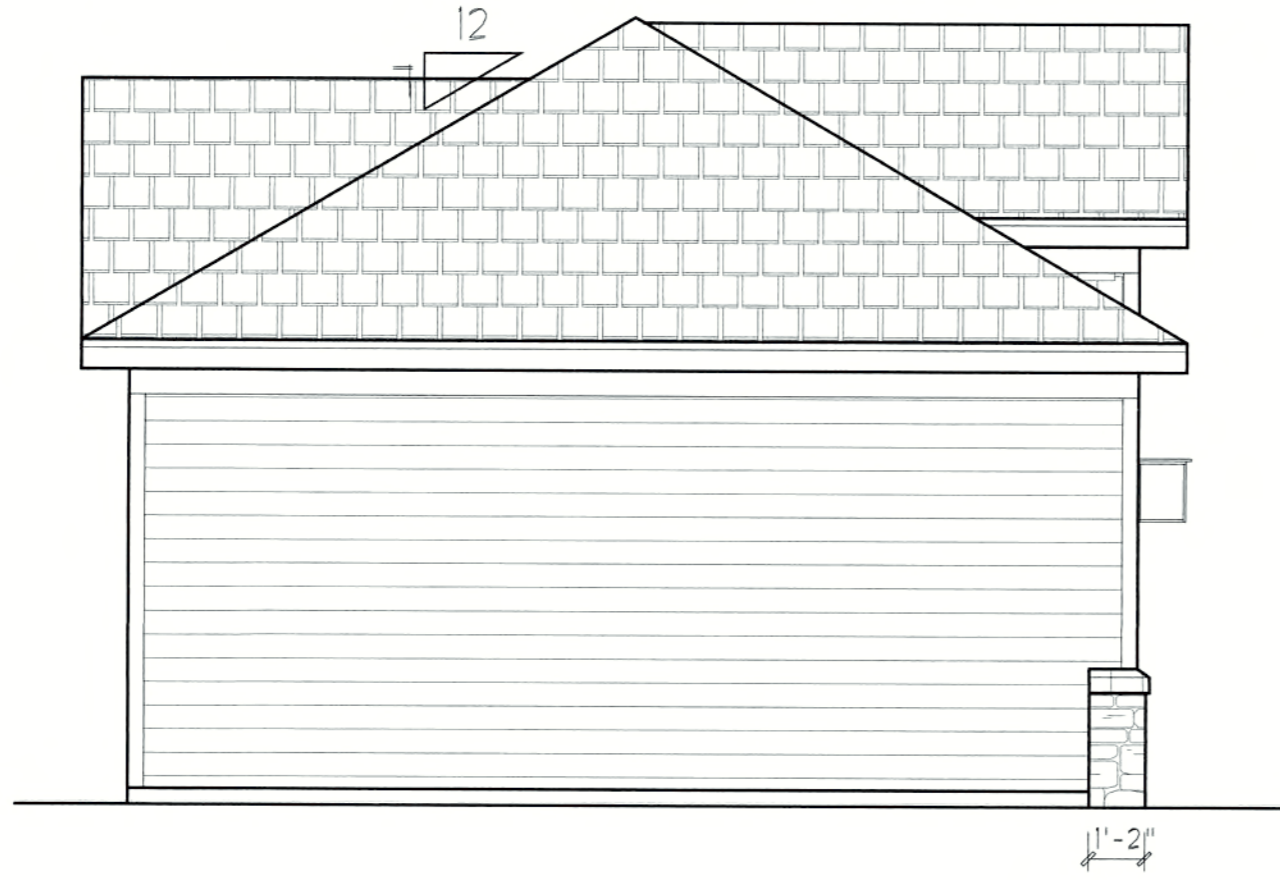
SHEET NUMBER: A4.10

1. POOLHOUSE FLOOR PLAN
Scale: 1/4" = 1'-0"

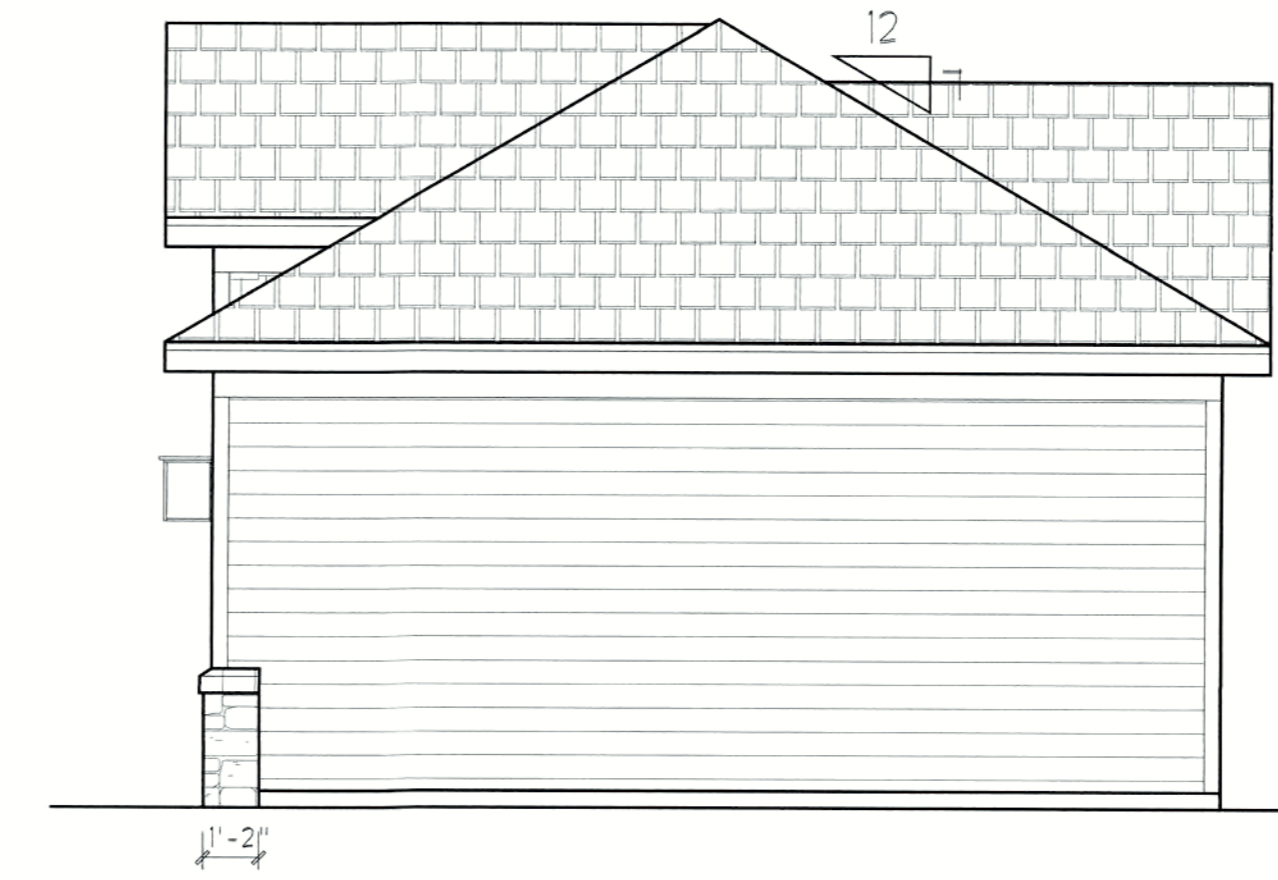
1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. Copyright 2015 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



1 FRONT ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"

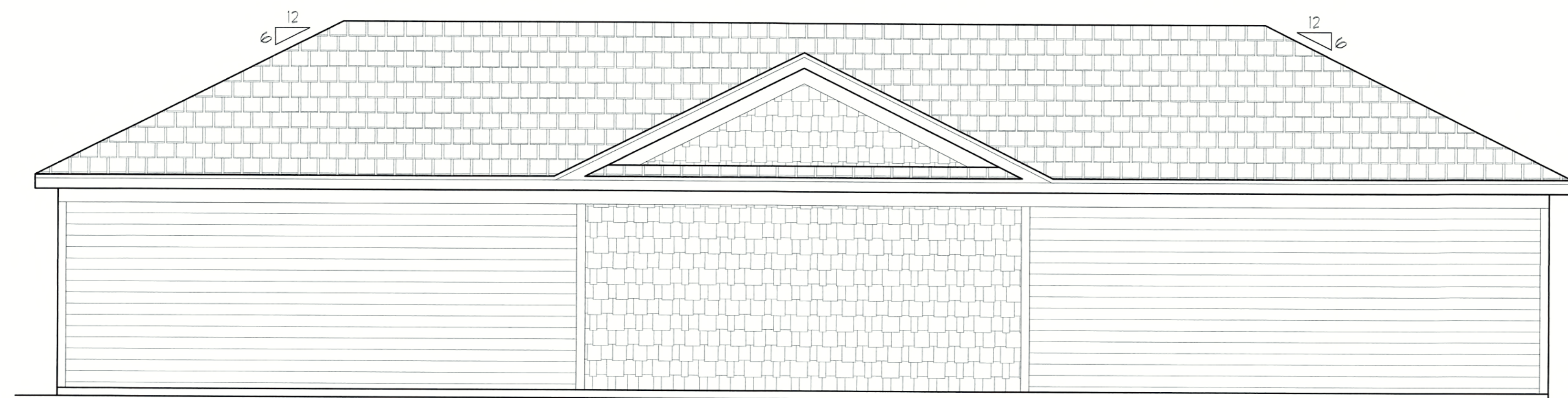


2 LEFT SIDE ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"



3 RIGHT SIDE ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"

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: *SMH* Date: 4-21-2017
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: *Amg* Date: 4-28-17
Administrator



4 REAR ELEVATION - GARAGE TYPE 1
Scale: 1/4" = 1'-0"

ARCHITECTURAL PLANS EXTERIOR MATERIALS

- = SHINGLE ROOF PER BUILDER
- = METAL ROOF PER BUILDER
- = SIDING PER BUILDER
- = BRICK PER BUILDER
- = B4B SIDING
*ALIGN CENTER OF B4B PANEL WITH CENTER OF GABLE OR WINDOW TYP.
- = CULTURED OR STACKED STONE (SEE FOUNDATION)
- = BRICK OR STONE ROWLOCK/SOLDIER PER BUILDER

ELEVATION GENERAL NOTES
ROOFS
* USE ICE AND WATER SHIELD AT ALL ROOF PLANES SLOPED BELOW 4:12.
ROOF VENTILATION
SEE ROOF PLANS FOR ATTIC VENTILATION CALCULATION REQUIREMENTS.

Caviness and Cates
Cottages at Knightdale
Knightdale NC
Final TRC Approval Comments

PROGRESS DATE:	04.15.16	DESCRIPTION	
ISSUE DATE:		INITIALS	
REVISIONS NUMBER	DATE	INITIALS	
PROJECT NO:	027015		
DRAWN BY:	JK		
CHECKED BY:			
SHEET TITLE:	Garage Elevations Elevations		
SHEET NUMBER:	A5.20		

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 3. Contractor is to notify architect immediately of conditions or items varying from depicted information. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. © Copyright 2015 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. Plans may be used once by client. Unauthorized use strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



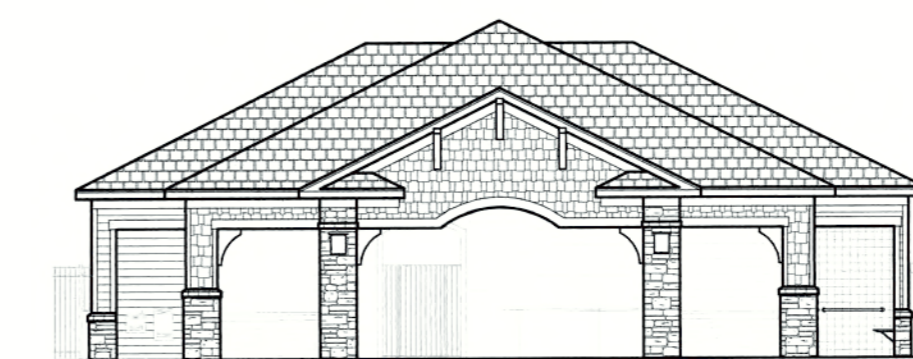
Bldg Type 1



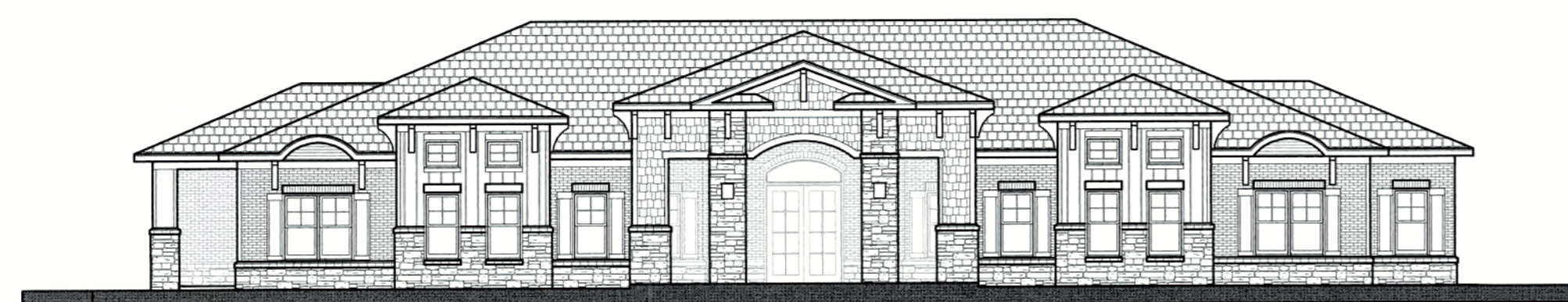
Bldg Type 2



Bldg Type 1.1



Poolhouse



Clubhouse



Garage

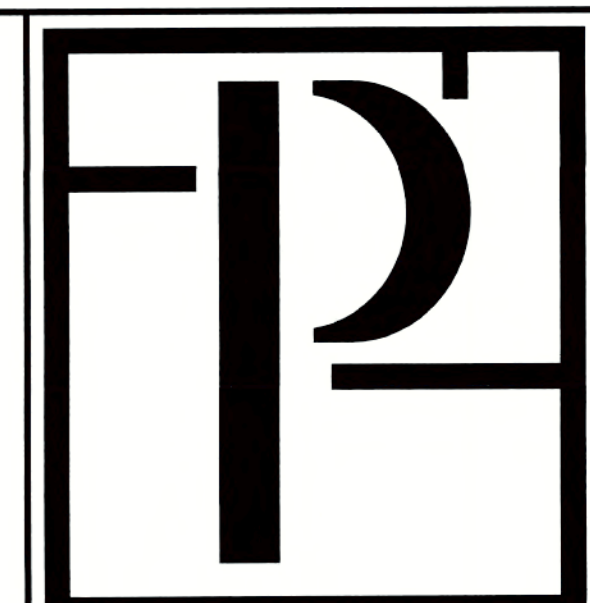
Project: Cottages at Knightdale
Date: 4/5/2017

Site Building #	Building Type	1 Bed Unit	2 Bed Unit	3 Bed Unit	Total Units Per Floor	Number of Stories	Total Units Per Building Type	Building Types on Site	Site Units
5, 7	1	0	8	0	8	3	24	2	48
1, 2	1.1	0	8	0	8	3	24	2	48
3, 4, 6, 8	2	4	2	2	8	3	24	4	96
								TOTAL BLDGS ON SITE	8
								TOTAL UNITS ON SITE	192

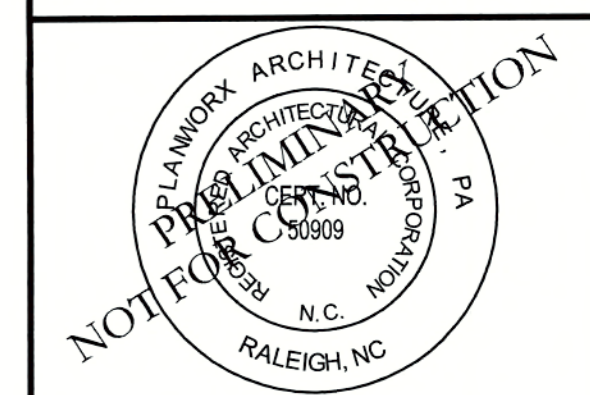
Site Building #	Building Type	1 bedroom units on site	2 bedroom units on site	3 bedroom units on site	Beds on site
5, 7	1	0	48	0	96
1, 2	1.1	0	48	0	96
3, 4, 6, 8	2	48	24	24	168
Site Unit Type Count		48	120	24	
Percentage		25.0%	62.5%	12.5%	
Total Beds On Site					360

Apartment	Footprint First Floor	Footprint Typ Upper Floors	Total SQFT
1	11,771	11,595	34,961
1.1	11,969	11,601	35,171
2	10,732	10,494	31,720
Clubhouse	5,902		
Poolhouse	1,557		
Garage (5 bldgs)	1,365		

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: *S. McCall* Date: **4-21-2017**
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: *J. Smith* Date: **4-28-17**
Administrator



Planworx
ARCHITECTURE, P.A.
5711 Six Forks Road, Suite 100
Raleigh, NC 27609
office (919) 846-8100
fax (919) 846-2661
website www.planworx.com



Caviness and Cates
Cottages at Knightdale
Knightdale NC
Town Site Submittal Set

PROGRESS DATE:	ISSUE DATE:	REVISIONS NUMBER	DESCRIPTION
04.05.17			

PROJECT NO: 027015
DRAWN BY: JK
CHECKED BY:
SHEET TITLE: Cover Sheet

SHEET NUMBER:
CS1.10

1. All drawings are to be coordinated with all site information by owner and contractor, and applicable codes. 2. Contractor is to notify architect immediately of conditions or items varying from depicted information. 3. Planworx Architecture, P.A. is not responsible for constructed variations from the information depicted. 4. Planworx Architecture, P.A. will not assume any liability for expenses associated with errors and omissions on these drawings unless offset by verified construction savings as a result of planworx architecture, p.a. Design. 5. Planworx Architecture, P.A. retains ownership of all of designs depicted and implied herein. 6. Planworx Architecture, P.A. is not responsible for estimating, maintaining, or regulating construction costs associated with these plans. © Copyright 2017 - PLANWORX ARCHITECTURE, P.A. All rights reserved. Reproduction of this sheet, in whole or in part, is strictly prohibited. Plans may be used once by client. Unauthorized use strictly prohibited. PLANS NOT VALID FOR CONSTRUCTION W/O APPROPRIATE PROFESSIONAL SEALS.



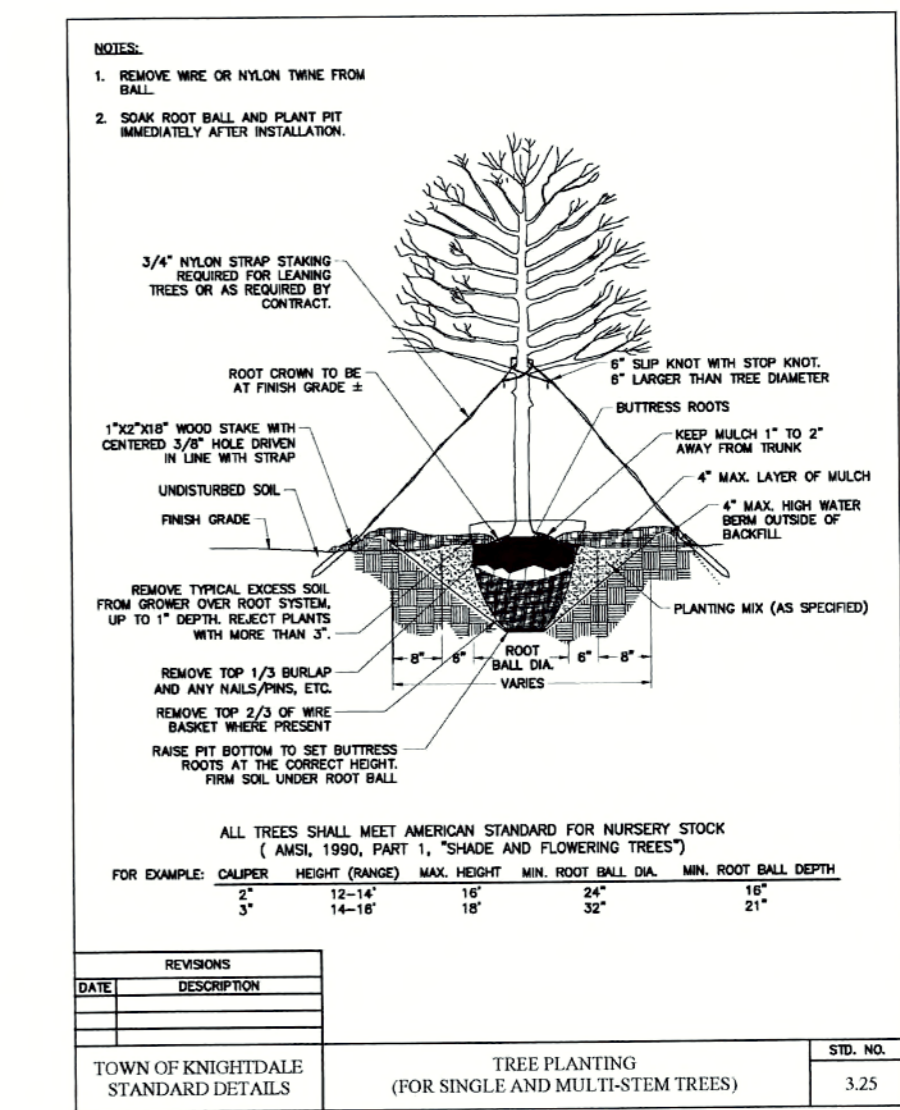
Revisions	Date
1 PER TOK COMMENTS	09/09/16
2 PER WAKE COMMENTS	11/15/16
3 PER TOK COMMENTS	12/28/16
4 PER TOK COMMENTS	03/01/17

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.
- 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 DEVELOPMENT 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.
- NO TREE SHALL BE LOCATED WITHIN 10 FEET OF A LIGHT POLE OR 12 FEET FROM ELECTRICAL TRANSFORMERS.
- THIS PLAN IS FOR PLANTING PURPOSES ONLY. FOR INFORMATION REGARDING GRADING, WALLS, ETC., REFER TO THE SITE AND GRADING PLANS.
- 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.
- 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 SHREDDED HARDWOOD BARK AT THE DISCRETION OF THE DEVELOPER. ALL PLANT GROUPINGS SHALL BE MULCHED AS ONE BED.
- PER UDO SECTION 8.4(C), NO PINE STRAW OR ANY OTHER MATERIAL WITH A FIRE RATE OF SPREAD MORE THAN 24" PER MINUTE AS DETERMINED BY THE MOST RECENT STUDY OF THE NATIONAL STANDARDS AND TECHNOLOGY SHALL BE PLACED, KEPT OR STORED WITHIN 10' OF BUILDINGS WITH ANY PORTION OF THE EXTERIOR WALL COVERED WITH COMBUSTIBLE MATERIAL.

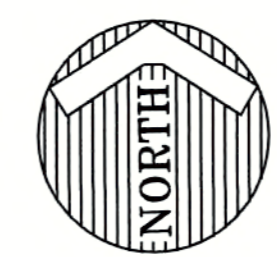
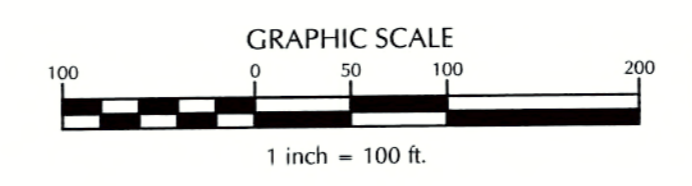
U.D.O. LANDSCAPE REQUIREMENTS

- PARKING LOT SCREENING: TYPE A BUFFER:**
- IN BUFFERS, 40-60% OF CANOPY TREES AND 40-60% OF UNDERSTORY TREES HAVE TO BE EVERGREEN PER UDO SECTION 8.8.
 - FOR EVERY 100 LINEAR FEET, THERE SHALL BE AT LEAST THREE (3) CANOPY TREES, TWO (2) UNDERSTORY TREES AND 20 SHRUBS.
 - 326LF - 30LF SS EASEMENT = 296 LF
 - 296 LF = 9 CANOPY TREES, 6 UNDERSTORY TREES, AND 60 SHRUBS REQUIRED
 - 10 CANOPY TREES, 8 UNDERSTORY TREES, AND 60 SHRUBS PROVIDED
- PARKING LOT LANDSCAPING:**
- NO PARKING SPACE SHALL BE MORE THAN 60 FT FROM THE BASE OF A DECIDUOUS CANOPY TREE. IN ADDITION, LANDSCAPE AREAS SHALL BE PROVIDED AT THE END OF EACH PARKING ROW AND SHALL CONTAIN A DECIDUOUS CANOPY TREE.



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES	N/A
PUBLIC UTILITIES	K.A. JIM 3/24/14
STORMWATER	N/A
PLANNING/RECORDING	N/A
HAZ	N/A
URBAN FORESTRY	N/A



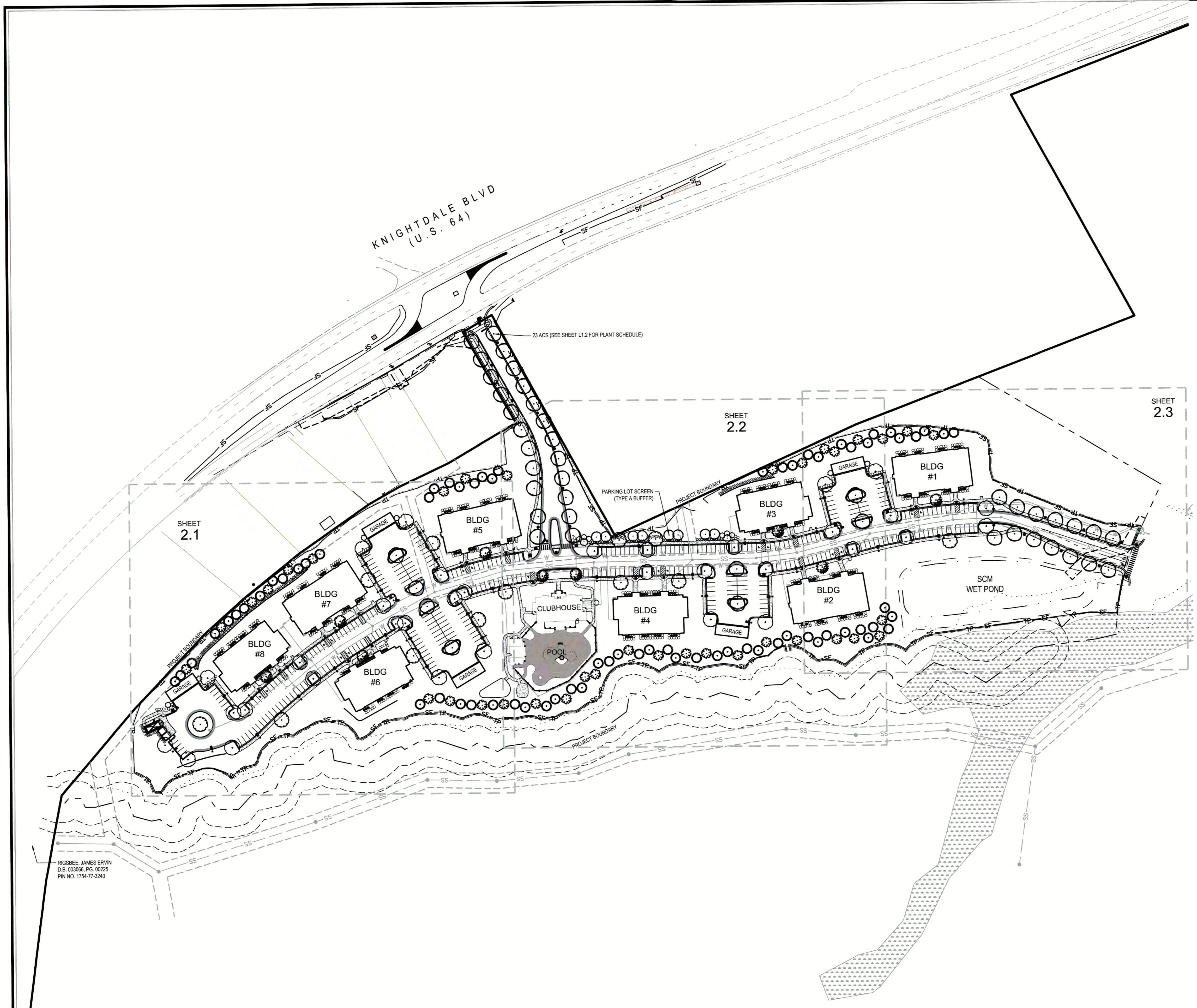
REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

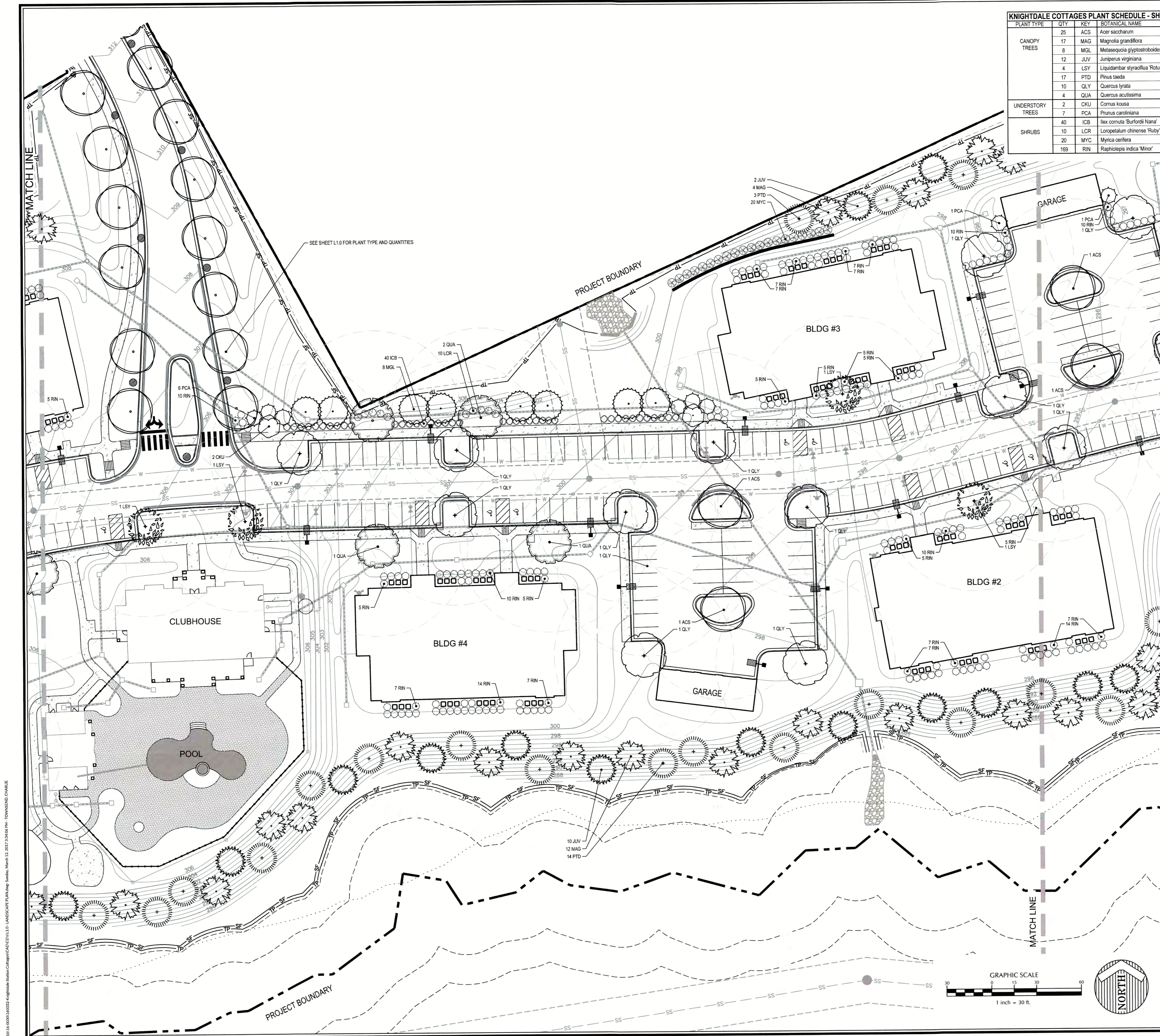
THIS DRAWING HAS BEEN REVIEWED BY THE ENGINEER FOR THE TOWN OF KNIGHTDALE, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT CONFORMS TO THE REQUIREMENTS ESTABLISHED IN THE STANDARD SPECIFICATIONS OF THE TOWN OF KNIGHTDALE.

BY: S. M. Wall DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4.28.17
ADMINISTRATOR





KNIGHTDALE COTTAGES PLANT SCHEDULE - SHEET L1.2 03.09.17

PLANT TYPE	QTY	KEY	BOTANICAL NAME	COMMON NAME	ROOT	CALIPER	HEIGHT	NOTES
CANOPY TREES	25	ACS	Acer saccharum	Sugar Maple	B&B	2 1/2"	12'-14'	MATCHED
	17	MAG	Magnolia grandiflora	Southern Magnolia	B&B	2"	8'-10'	MATCHED
	8	MGL	Metasequoia glyptostroboides	Dawn Redwood	B&B	2 1/2"	12'-14'	MATCHED
	12	JUV	Juniperus virginiana	Eastern Red Cedar	B&B	2"	8'-10'	MATCHED
	4	LSY	Liquidambar styraciflua 'Rotundiloba'	Fruitless Sweetgum	B&B	2 1/2"	12'-14'	MATCHED
	17	PTD	Pinus taeda	Loblolly Pine	B&B	2"	8'-10'	MATCHED
	10	QLY	Quercus lyrata	Overcup Oak	B&B	2 1/2"	12'-14'	MATCHED
	4	QUA	Quercus acutissima	Sawtooth Oak	B&B	2 1/2"	12'-14'	MATCHED
	2	CKU	Cornus kousa	Chinese Dogwood	B&B	2"	8'-10'	MATCHED
	7	PCA	Prunus caroliniana	Carolina Cherry Laurel	B&B	2"	8'-10'	MATCHED
UNDERSTORY TREES	40	ICB	Ilex cornuta 'Burfordii Nana'	Dwarf Burford Holly	CONT.	3 Gal.	18'-24"	MATCHED; 5' O.C.
	10	LCR	Loropetalum chinense 'Ruby'	Ruby Chinese Witchhazel	CONT.	3 Gal.	18'-24"	MATCHED; 5' O.C.
	20	MYC	Myrica cerifera	Wax Myrtle	CONT.	3 Gal.	18'-24"	MATCHED; 6' O.C.
SHRUBS	169	RIN	Raphiolepis indica 'Minor'	India Hawthorne	CONT.	3 Gal.	18'-24"	MATCHED; 5' O.C.

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: K.A. JIM 3/24/16
SEWER/WATER: N/A
PLANNING/ZONING: N/A
FIRE: N/A
URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: S. M. J. DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4.28.17
ADMINISTRATOR

Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

K:\1616-00070-160032-Knightdale Cottages\Drawings\LANDSCAPE PLAN.dwg - Sunday, March 12, 2017 3:36:58 PM - TOWNSEND, CHARLIE



Revisions

1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

U.D.O. TREE SAVE AREAS REQUIREMENTS

PRIORITY TIER 2:

- SLOPE AREAS OF 15 - 25%;
- 746 TOTAL DBH / 12" DBH = (62) REPLACEMENT TREES REQUIRED; (62) REPLACEMENT TREES PROVIDED;

PRIORITY TIER 3:

- ALL TREES GREATER THAN 24" DBH DISTURBED IN ALL OTHER LOCATIONS;
- 536 TOTAL DBH / 12" DBH = (45) REPLACEMENT TREES REQUIRED; (45) REPLACEMENT TREES PROVIDED;

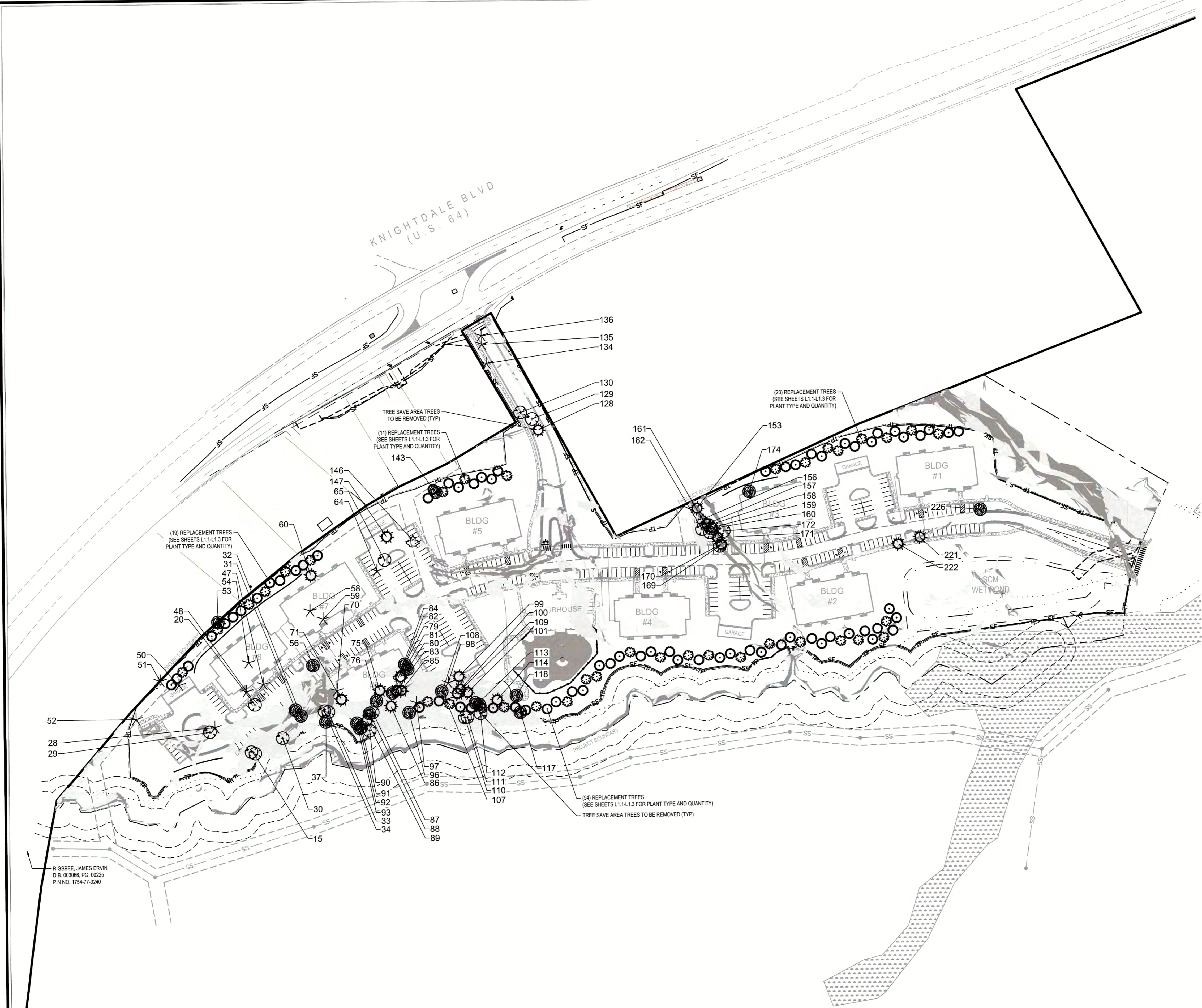
TREE LEGEND

TREE DESCRIPTION

	SLOPES BETWEEN 15%-25%
	SLOPES >25%

Tier 2 Trees Removed		Tier 2 Trees Removed	
Point	Description	Point	Description
15	12" TWPO	93	12" OAK
20	12" POP	96	12" OAK
28	14" PN	97	14" PN
29	12" POP	98	12" PN
30	12" POP	99	12" GUM
31	12" OAK	100	12" GUM
32	12" OAK	101	12" GUM
33	18" POP	107	14" PN
34	14" POP	108	16" OAK
37	12" OAK	109	12" GUM
51	18" TRPN	110	12" POP
56	12" OAK	111	14" POP
70	14" PN	112	12" OAK
79	12" OAK	118	12" OAK
80	12" OAK	130	22" POP
81	12" GUM	153	12" GUM
82	12" MPL	156	12" MPL
83	12" GUM	157	14" GUM
84	12" OAK	158	12" POP
85	12" GUM	159	14" GUM
86	12" GUM	160	12" POP
87	14" POP	161	14" POP
88	14" OAK	162	14" POP
89	12" GUM	169	18" POP
90	12" POP	170	12" GUM
91	14" POP	171	12" GUM
92	12" OAK	172	12" POP
Total	746" DBH	Total	746" DBH

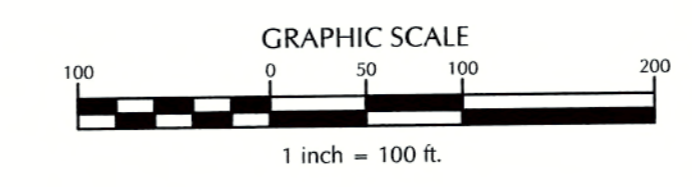
Tier 3 Trees Removed		Tier 3 Trees Removed	
Point	Description	Point	Description
47	24" PN	129	24" POP
48	24" PN	134	24" PN
50	24" PN	135	24" PN
52	28" PN	138	24" PN
53	24" OAK	143	24" OAK
54	24" PN	146	24" MPL
58	24" PN	147	24" GUM
59	24" PN	174	24" OAK
60	26" GUM	221	24" GUM
64	24" PN	222	24" GUM
65	24" POP	226	24" OAK
128	26" GUM	Total	536" DBH



RIGSBEE, JAMES ERVIN
D.B. 003056, PG. 00225
PIN NO. 1754-77-3240

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSFORMATION FIELD SERVICES: N/A
PUBLIC UTILITIES: *K.D. JEW 3/24/14*
SEWER/WATER: N/A
PLANNING/DESIGNING: N/A
FIRE: N/A
URBAN FORESTRY: N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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.

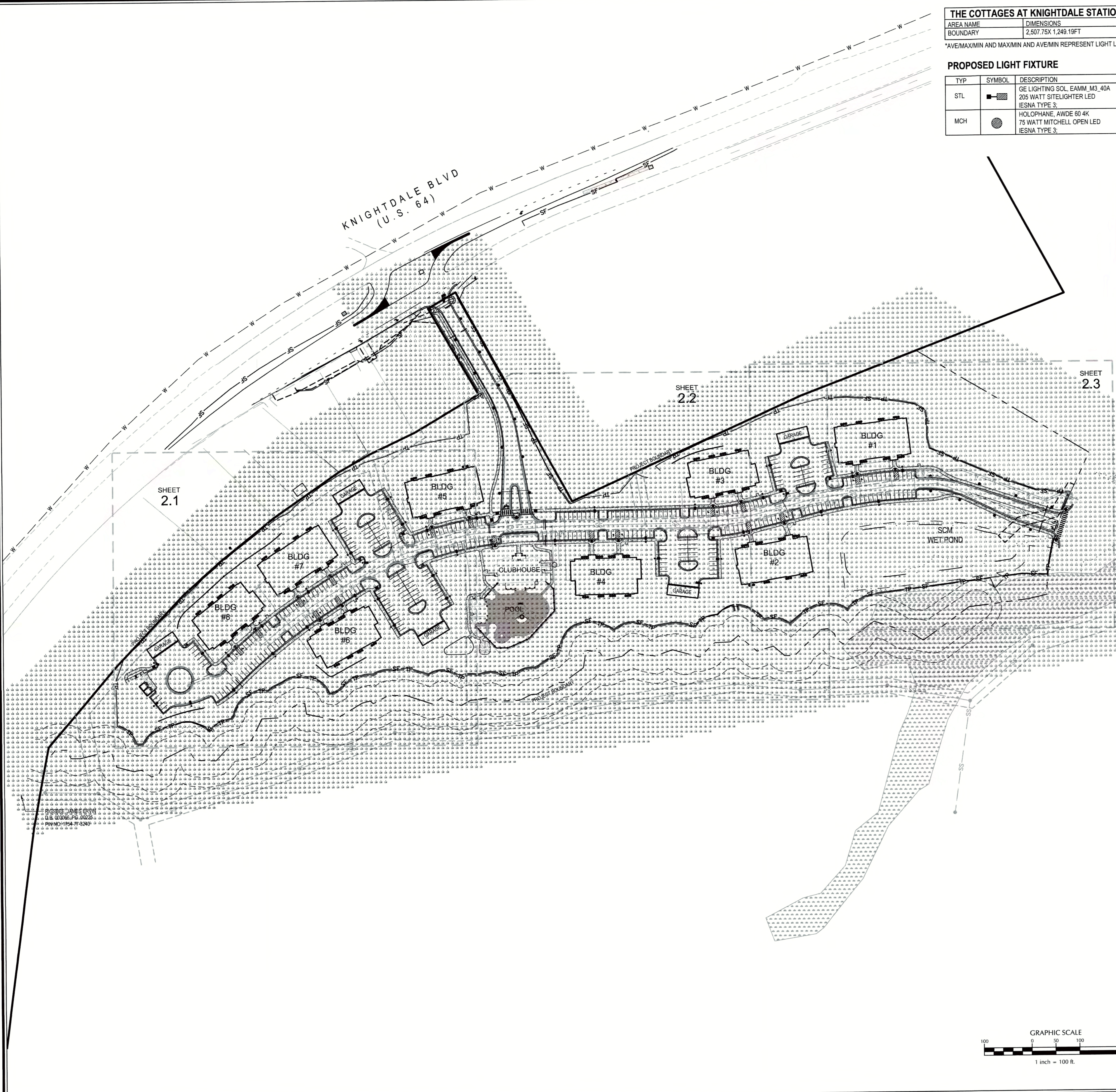
BY: *SWAN* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER

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

BY: *J. Curran* DATE: 4-28-17
ADMINISTRATOR

K:\1416-0000\160032 Knightdale Station Cottages\CD\11.1.D - LANDSCAPE PLAN.dwg, Sunday, March 13, 2017 3:24:17 PM - TOWN OF RALEIGH

K:\1616-02010-00202 Knightdale Station Cottage\CAD\13.2.0 - LIGHTING PLAN.dwg - Sunday, March 12, 2017 3:36:48 PM - TOWN/AND CHAIR



THE COTTAGES AT KNIGHTDALE STATION PARKING LOT CALCULATION SUMMARY											10.25.16
AREA NAME	DIMENSIONS	GRID / TYPE	# PTS	PAC	GROUP	AVE	MAX	MIN	MAX/MIN	AVE/MIN	
BOUNDARY	2,507.75X 1,249.19FT	PARKING / H/H	17,646	10.00	<>	1.85	4.06	.51	7.90	3.61	

*AVE/MAX/MIN AND MAX/MIN AND AVE/MIN REPRESENT LIGHT LEVELS WITHIN PARKING LOT.

PROPOSED LIGHT FIXTURE												
TYP	SYMBOL	DESCRIPTION	LAMP	TEMP.	BUG RATING	CRI	LUMENS	MOUNTING	LLF	QTY	CUTOFF TYPE	PROVIDED BY
STL		GE LIGHTING SOL EMM M3 40A 205 WATT SITELIGHTER LED IESNA TYPE 3	LED ARRAY	4000K	B2-U0-G2	70 MIN.	13,620	30' Black Aluminum	0.85	39	FULL CUTOFF	DUKE ENERGY PROGRESS
MCH		HOLOPHANE AWDE 60 4K 75 WATT MITCHELL OPEN LED IESNA TYPE 3	LED ARRAY	4000K	B1-U0-G1	70 MIN.	4,332	13' Black Style VII	0.85	21	FULL CUTOFF	DUKE ENERGY PROGRESS

NOTES:
1. ALL EXTERIOR SITE LIGHTING SHALL BE DESIGNED TO PREVENT OFF-SITE GLARE.

Light Fixture 1
50 watts, 70 watts (Mitchell) Qty=1
Light Fixture Depth: 30, 30"
Mounting Height: 12, 13, 16"
Color: Black
Features: Double beam concrete, Style V, Style VI, Style VII

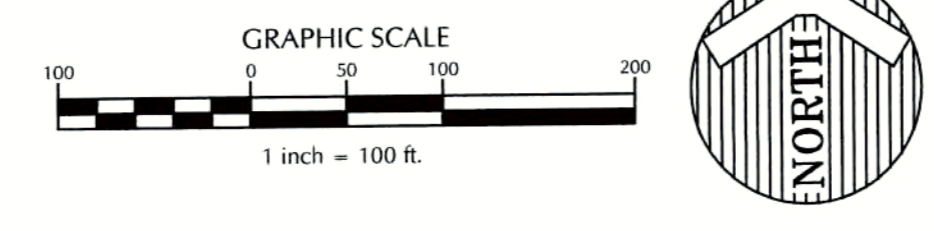
Light Fixture 2
200 watts
Light Fixture Depth: 30, 30"
Color: Black
Features: Decorative tapered metal, Decorative square metal
Note: These fixtures and poles are not shown by Duke Energy Progress. They must be ordered and installed by the contractor.

Light Fixture 3
Light Fixture: LED fixture
Lumens: 13,620 (30' pole)
Wattage: 13,620 (30' pole)
LED CRI: 70 (30' pole)
LED CRI: 70 (30' pole)
Color Temperature: 4,000K
Warranty and details: See notes on the page for installation.

Light Fixture 4
Light Fixture: LED fixture
Lumens: 13,620 (30' pole)
Wattage: 13,620 (30' pole)
LED CRI: 70 (30' pole)
LED CRI: 70 (30' pole)
Color Temperature: 4,000K
Warranty and details: See notes on the page for installation.

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

TRANSPORTATION FIELD SERVICES: N/A
PUBLIC UTILITIES: N/A
SEWER/WATER: N/A
PLANNING/ENGINEERING: N/A
FHFF: N/A
URBAN FORESTRY: N/A



REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE

THIS DRAWING 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: S.M. Hall DATE: 4.21.2017
DEVELOPMENT SERVICES ENGINEER

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

BY: [Signature] DATE: 4.28.17
ADMINISTRATOR

WithersRavenel
Engineers | Planners

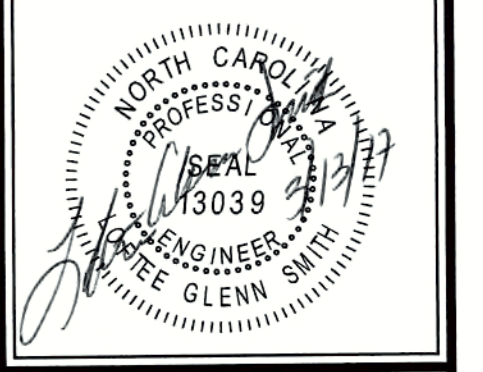
131 S.W. Wilmington Street | Raleigh, NC 27601 | 919.469.6300 | License # C-0832 | www.withersravenel.com

THE COTTAGES AT KNIGHTDALE STATION

KNIGHTDALE, NORTH CAROLINA

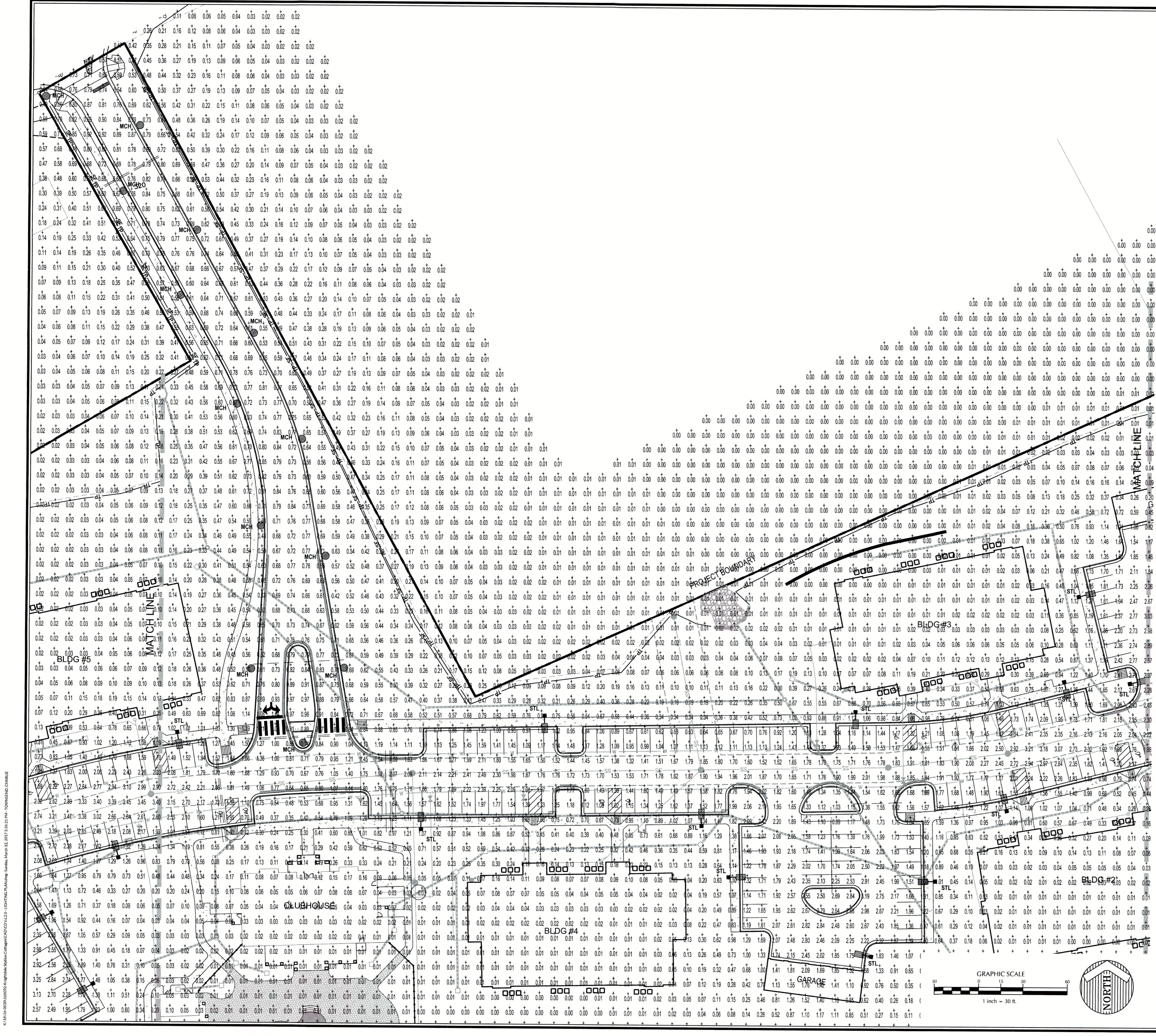
OVERALL LIGHTING PLAN

Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR

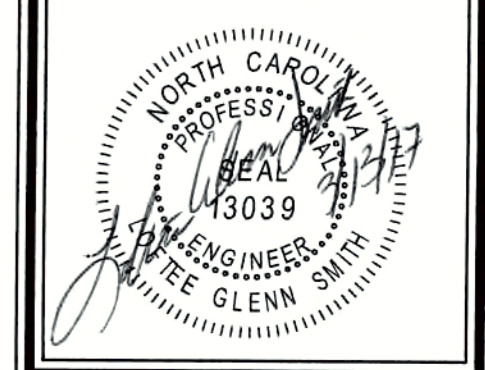


Revisions	Comments	Date
1	PER TOK COMMENTS	09/09/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

Sheet No.
L2.0



Job No. 02160032 Drawn By CDT
Date 06/03/2016 Designer WR



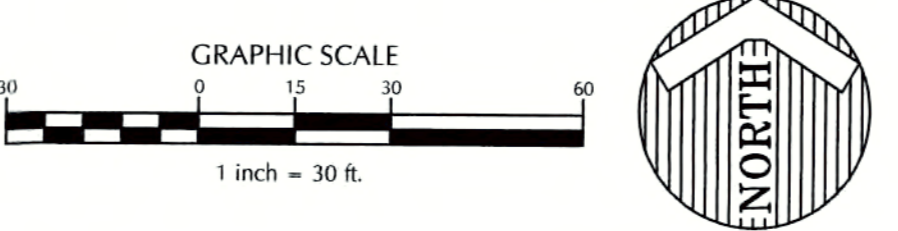
Revisions		
1	PER TOK COMMENTS	09/05/16
2	PER WAKE COMMENTS	11/15/16
3	PER TOK COMMENTS	12/28/16
4	PER TOK COMMENTS	03/01/17

CITY OF RALEIGH
All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

- TRANSPORTATION FIELD SERVICES: N/A
- PUBLIC UTILITIES: N/A
- GROUNDWATER: N/A
- PLANNING/ZONING: N/A
- FIRE: N/A
- URBAN FORESTRY: N/A

REVIEW CERTIFICATION BY THE TOWN OF KNIGHTDALE
THIS DRAWING 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: *S. Smith* DATE: 4-21-2017
DEVELOPMENT SERVICES ENGINEER
THESE PLANS ARE APPROVED BY THE TOWN OF KNIGHTDALE AND SERVE AS CONSTRUCTION PLANS FOR THIS PROJECT.
BY: *[Signature]* DATE: 4-28-17
ADMINISTRATOR



K:\16-0000\160032\Knightdale Station\CD\12- LIGHTING PLAN\Map_Series_Match_11_2017_3.26.21.PLT - TOWNSEND.CML#E

