BRIO - PHASE 1

1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA, 27545
ST. MATTHEWS TOWNSHIP
ZMA-9-21

CONSTRUCTION DRAWINGS

PROJECT NUMBER: 2020110062

DATE: DECEMBER 22, 2022

SITE DATA

PIN	1755485119, 1755579649, 1755672258, 1755254643, 1755466872, 1755155783	
SITE AREA	GROSS AREA: 286.48 AC NCDOT R/W DEDICATION: 2.47 AC NET AREA: 284.01 AC	
ZONING	PUD (NMX) ORDINANCE #22-07-20-003	
WATERSHED CLASSIFICATION	LOWER NEUSE RIVER	
RIVER BASIN	NEUSE	
FEMA DATA	FIRM PANEL #3720175500J, DATED JULY 19, 2022	
EXISTING USE	VACANT / AGRICULTURAL	
PROPOSED USE	RESIDENTIAL - NMX - PUD	
DENSITY	900 UNITS / 284.01 AC = 3.17 DU/AC SINGLE FAMILY = 558 UNITS (62.00%) TOWNHOMES = 230 UNITS (25.56%) APARTMENT = 112 UNITS (12.44%) (3.40 AC - 5.40 AC (4.38 AC SHOWN)) COMMERCIAL (3.00 AC - 5.00 AC (4.02 AC SHOWN))	
SETBACKS (SFD FRONT LOAD - AGE RESTRICTED)	(PER PUD)	MINIMUM LOT SIZE: 6,000 SF LOT WIDTH (MIN): 50' FRONT SETBACK (MIN): 20' (25' FOR FACE OF GARAGE) MINIMUM DRIVEWAY LENGTH: 25' SIDE SETBACK: 5' (10' ON CORNER SIDES) REAR SETBACK: 15' MAXIMUM BUILDING HEIGHT: 3 STORIES
SETBACKS (SFD FRONT LOAD - NO AGE RESTRICTION)	(PER PUD)	MINIMUM LOT SIZE: 6,800 SF LOT WIDTH (MIN): 60' FRONT SETBACK (MIN): 20' (25' FOR FACE OF GARAGE) MINIMUM DRIVEWAY LENGTH: 25' SIDE SETBACK (MIN): 5' (10' ON CORNER SIDES) REAR SETBACK: 15' MAXIMUM BUILDING HEIGHT: 3 STORIES
SETBACKS (SFD REAR LOAD)	(PER PUD)	MINIMUM LOT SIZE: 3,500 SF LOT WIDTH (MIN): 32' FRONT SETBACK (MIN): 10' DRIVEWAY LENGTH (MIN): 20' (MEASURED FROM EDGE OF PAVEMENT) SIDE SETBACK (MIN): 3' SIDE SETBACK AGGREGATE (MIN): 6' REAR SETBACK (MIN): 15' MAXIMUM BUILDING HEIGHT: 3 STORIES
SETBACKS (TOWNHOMES REAR LOAD)	(PER PUD)	FRONT SETBACK (MIN): 0' FRONT SETBACK (MAX): 25' BUILDING SEPARATION (MIN): 10' (10' ON CORNER SIDES) REAR SETBACK FROM REAR LANE/ALLEY (MIN): 15' BUILDING HEIGHT (MAX): 3 STORIES MIN. DRIVEWAY LENGTH: 20' (MEASURED FROM EDGE OF PAVEMENT)
SETBACKS (TOWNHOMES FRONT LOAD)	(PER PUD)	FRONT SETBACK (MIN): 20' REAR SETBACK (MIN): 15' BUILDING SEPARATION (MIN): 10' (10' ON CORNER SIDES) DRIVEWAY LENGTH (MIN): 20' (MEASURED FROM RIGHT-OF-WAY) BUILDING HEIGHT (MAX): 3 STORIES
PARKING NOTE: FINAL PARKING COUNTS TO VARY BASED ON UNIT CONFIGURATION BETWEEN MULTIFAMILY & COMMERCIAL PODS AND FINAL CLUBHOUSE LAYOUTS.		1,494 GARAGE SPACES 1,494 DRIVEWAY SPACES 165 APARTMENT (CONCEPTUAL) 3,153 TOTAL SPACES
	ADDITIONAL	117 ON-STREET SPACES 32 ON-ALLEY SPACES 107 AMENITY SPACES (CONCEPTUAL) 105 COMMERCIAL (CONCEPTUAL) 361 TOTAL ADDITIONAL SPACES
TOTAL OPEN SPACE (TOTAL PROJECT)		32.73 AC - PASSIVE & ACTIVE 57.65 AC - COMMON OPEN SPACE 90.38 AC - TOTAL
ADDITIONAL OPEN SPACE WITHIN FLOODPLAIN AND RIPARIAN BUFFERS (PHASE 1)		20.07 AC (TREE SAVE AREA)
PASSIVE OPEN SPACE (PHASE 1)		10.68 AC (OUTSIDE OF FLOODPLAIN AND RIPARIAN BUFFERS) PHASE 1
ACTIVE OPEN SPACE (PHASE 1)		6.69 AC ACTIVE OPEN SPACE AREAS 1.65 AC GREENWAY (2,408 LF x 30' ESMT = 72,240 SF) 8.34 AC TOTAL
TREE SAVE (PERIMETER OF SITE x 20')		19.92 AC (INCLUDES FLOODPLAIN AND RIPARIAN BUFFERS)
CONNECTIVITY		1.36 (94 LINKS/69 NODES)

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PUBLIC INFRASTRUCTURE TABLE

	PHASE 1A	PHASE 1B	PHASE 1C	PHASE 2	PHASE 3	TOTAL
TOTAL NUMBER OF LOTS	150	41	0	40	57	288
NUMBER OF FRONT SFD LOTS	0	14	-	40	42	-
NUMBER OF REAR SFD LOTS	0	27	-	0	15	-
NUMBER OF TOWNHOME LOTS	150	0	-	0	0	-
OPEN SPACE	-	-	-	-	-	YES
TREE PROTECTION FENCING	-	-	-	-	-	14,167
6" PUBLIC WATER (LF)	-	-	-	-	-	-
8" PUBLIC WATER (LF)	3,697	1,178	-	1,914	2,755	-
8" PUBLIC SEWER (LF)	3,171	1,580	-	1,196	3,074	-
12" PUBLIC SEWER (LF)	0	0	-	1,388	0	-
PUBLIC STREET (LF)	2,356	1,903	-	2,848	4,596	-
PUBLIC SIDEWALK (LF)	7,245	2,460	-	3,578	4,668	-
CURB AND GUTTER (LF)	6,256	2,280	-	3,486	4,718	-
STREET SIGNS	16	14	-	11	30	-
WATER SERVICE STUBS	149	40	-	35	57	-
SEWER SERVICE STUBS	149	40	-	35	57	-

WATER ALLOCATION POINTS

PROPOSED POINTS	65 POINTS (15 BASE POINTS + 50 BONUS POINTS)
CONSTRUCT A FOUNTAIN WITHIN THE BMP	4 POINTS
IPEMA CERTIFIED PLAYGROUND EQUIPMENT	4 POINTS
ON-STREET PUBLIC PARKING	4 POINTS
RESIDENTIAL ARCHITECTURAL STANDARDS	15 POINTS
2 POOLS (ONE JR OLYMPIC AND ONE 4-LANE LAP POOL)	8 POINTS
2 CLUBHOUSES (MEETING SPACE WITHOUT KITCHEN, 1,500-2,499 SQUARE FEET)	10 POINTS
2 PATIOS (1 MORE THAN 2,000 SQ. FT AND 1 MORE THAN 1,000 SQ. FT.)	3 POINTS
WATER PLAYGROUND	2 POINTS

ZONING CONDITIONS

THE PROPOSED MASTER PLAN HAS AN ASSOCIATED PLANNED UNIT DEVELOPMENT (PUD) DOCUMENT (ORIGINALLY DATED 3-28-22) WHICH DETAILS MODIFICATIONS TO TYPICAL UDO STANDARDS AND BINDING ARCHITECTURAL CONDITIONS WHICH WOULD APPLY TO THE APPROVED MASTER PLAN.

IN ADDITION TO PRESCRIBED ARCHITECTURAL STANDARDS CONTAINED WITHIN THE PUD DOCUMENT, THE FOLLOWING ZONING CONDITIONS SHALL APPLY:

1. SECTION 3.4K OF THE KNIGHTDALE UNIFIED DEVELOPMENT ORDINANCE REQUIRES THAT ANY LOT LESS THAN 80' IN WIDTH BE ACCESSED VIA AN ALLEY OR REAR LANE ACCESS. IN ORDER TO ACCOMMODATE A MORE COMPACT DESIGN THAT SUPPORTS UTILIZATION OF OPEN SPACE, PRESERVATION OF ENVIRONMENTAL SENSITIVE FEATURES, AND NON-RESIDENTIAL INCORPORATION, UP TO 10% OF THE TOTAL PROJECT UNITS MAY BE FRONT-LOADED SINGLE FAMILY DWELLING UNITS WITH NO AGE RESTRICTION ON LOTS LESS THAN 80' IN WIDTH. AGE RESTRICTED UNITS SHALL BE EXEMPT FROM THIS REQUIREMENT.

2. FOR FRONT LOADED SFD LOTS, THE MINIMUM DRIVEWAY LENGTH SHALL BE 25 FEET. FURTHERMORE, REAR SETBACKS OF 15' SHALL BE APPLIED RATHER THAN 25'. MINIMUM SIDE SETBACKS SHALL BE A STANDARD 5' RATHER THAN A VARIABLE PERCENTAGE.

3. REAR LOADED LOTS SHALL HAVE A MINIMUM DRIVEWAY LENGTH OF 20' (RATHER THAN 35'). FURTHERMORE, REAR SETBACKS OF 15' SHALL BE APPLIED RATHER THAN 25'.

4. SECTION 11.1B OF THE UDO ESTABLISHED A MINIMUM AND MAXIMUM DISTRIBUTION OF USES FOR DEVELOPMENT PROJECTS. THE BRIO PUD SHALL DEVIATE FROM THESE STANDARD RANGES AND INCLUDES A SPECIFIED USE DISTRIBUTION TARGET WITHIN THE PUD DOCUMENT.

5. MASS GRADING SHALL BE PERMITTED FOR FRONT-LOADED LOTS 60' OR GREATER. ADDITIONAL DETAILS AND JUSTIFICATION IS PROVIDED IN THE PUD DOCUMENT. A 3" CALIPER FRONT-YARD TREE SHALL BE PLANTED WITHIN ANY LOT WHERE AN EXCEPTION IS GRANTED TO ALLOW MASS GRADING WHERE IT WOULD OTHERWISE NOT BE PERMITTED (IN ADDITION TO REQUIRED STREET TREES).

6. SECTION 11.3,E,7 OF THE KNIGHTDALE UNIFIED DEVELOPMENT ORDINANCE REQUIRES A CONNECTIVITY INDEX OF 1.5 FOR DEVELOPMENT WITHIN THE NMX ZONING DISTRICT. THIS IS CALCULATED AS THE RATIO OF THE NUMBER OF STREET LINKS DIVIDED BY THE NUMBER OF STREET NODES. DUE TO THE SIGNIFICANT NUMBER OF NATURAL BARRIERS TO STREET CONNECTION, ACHIEVING THIS FIGURE WOULD REQUIRE SIGNIFICANT AND UNNECESSARY ENVIRONMENTAL IMPACT TO STREAMS AND FLOODPLAIN PRESENT ON THE SITE. AS A RESULT, THE BRIO PUD REQUESTS A DEVIATION TO PERMIT A MINIMUM CONNECTIVITY INDEX OF 1.3.

7. THE LAYOUT OF THE 4-ACRE COMMERCIAL POD AND 4.3-ACRE MULTIFAMILY POD ARE CONCEPTUAL IN NATURE. THE COMMERCIAL POD SHALL BE FURTHER LIMITED TO THE COMMERCIAL USES SPECIFIED IN THE PUD DOCUMENT. DEVELOPMENT OF THESE PODS SHALL REQUIRE A SEPARATE/SUBSEQUENT SITE PLAN SUBMITTAL AND REVIEW, SUBJECT TO ALL APPLICABLE DEVELOPMENT STANDARDS FOR THE NMX ZONING DISTRICT. THE DIVIDE BETWEEN THESE TWO PODS MAY VARY BY UP TO 1-ACRE (I.E. ADDING 1-ACRE TO THE COMMERCIAL POD AND SUBTRACTING 1-ACRE FROM THE MULTIFAMILY POD, OR VICE VERSA).

8. DUE TO THE NUMEROUS ENVIRONMENTAL FEATURES PRESENT IN BRIO WHICH PREVENTS A MORE INTERCONNECTED ROAD NETWORK, UP TO 8 CUL-DE-SACS SHALL BE PERMITTED WITHIN BRIO (AS SHOWN IN THE MASTER PLAN).

9. WITH THE EXCEPTION OF ALONG ITS COMMERCIAL AND MULTIFAMILY PODS, BRIO SHALL UTILIZE A 20' TYPE B PERIMETER BUFFER INSTEAD OF THE TYPE C BUFFER TYPICALLY REQUIRED FOR DEVELOPMENT WITHIN AN NMX ZONING DISTRICT ABUTTING THE RT ZONING DISTRICT. THE NMX ZONING DISTRICT WAS CHOSEN SOLELY DUE TO THE COMMERCIAL TRACT INCLUSION. OUTSIDE OF THE COMMERCIAL TRACT, THE DEVELOPMENT IS MORE CONSISTENT WITH THE GR3 DISTRICT, WHICH WOULD NOT REQUIRE A TYPE C BUFFER.

10. DUE TO THE EXISTENCE OF CONSERVATION LANDS ON THE WESTERN SIDE OF OLD CREWS ROAD ADJACENT TO THIS SITE, THE TOWNHOMES ABUTTING OLD CREWS ROAD SHALL FRONT INTERNALLY WITHIN THE BRIO DEVELOPMENT (RATHER THAN FRONTING OLD CREWS ROAD). THIS REPRESENTS A DEVIATION FROM THE STANDARD REQUIREMENT INCLUDED IN SECTION 6.6 OF THE UDO. A PLANTED BERM SHALL BE PROVIDED ALONG THE EAST SIDE OF OLD CREWS ROAD.

11. ALL FRONT-LOADED TOWNHOMES SHALL INCORPORATE A REAR DECK OR PATIO (MIN 80 SQ. FT). THESE DECKS OR PATIOS MAY ENCROACH INTO THE REAR SETBACK, DUE TO THE PRESENCE OF BUFFERS BEHIND ALL UNITS.

12. ON FRONT-LOADED TOWNHOMES, ALL INTERIOR UNITS SHALL HAVE A 1-CAR GARAGE. ALL END UNITS MAY HAVE A 1-CAR OR 2-CAR GARAGE. FRONT-LOADED TOWNHOMES SHALL BE PERMITTED TO USE A 20' DRIVEWAY LENGTH, INSTEAD OF 35' (NOT TO EXCEED 75 UNITS).

MCADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CONTACT

RYAN AKERS
akers@mcadamsco.com
PHONE: 919. 361. 5000

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8566

SUNCREST Real Estate & Land

PROJECT DIRECTORY

OWNERS
BUFFALOE COUNTRY LLC
15720 BRIXHAM HILL AVE, STE 300
CHARLOTTE, NC 28277
PIN: 1755485119

WATER TOWER LLC
PO BOX 31346
RALEIGH, NC 27622
PIN: 1755579649
PIN: 1755672258

SALUDA PROPERTIES LLC
6732 MILLORY STREAMS LN
CARY, NC 27519
PIN: 1755254643

RAMSEY, GRACE D
1832 OLD MILBURNIE RD
RALEIGH, NC 27604
PIN: 1755466872

OC 25 LLC
1201 EDWARDS MILL RD, STE 300
RALEIGH, NC 27607
PIN: 1755155783

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

CONSTRUCTION DRAWINGS FOR:

BRIO
KNIGHTDALE, NORTH CAROLINA
PROJECT NUMBER: 2020110062

Town Approved Standards Shall Control. In the event of a conflict or inconsistency between these construction drawings and the Town of Knightdale's Approved Standards for this project, the Approved Standards shall control. Town of Knightdale Approved Standards shall mean all development documents necessary for approval for the Property including, but not limited to, any special use permit, subdivision plan, site plan, subdivision plat(s), phasing schedule, Development Agreement, Utility Allocation Agreement, Annexation Agreement, the Town of Knightdale Standard Specification and Details Manual and applicable provisions of the North Carolina State Building Code.

ATTENTION CONTRACTORS

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

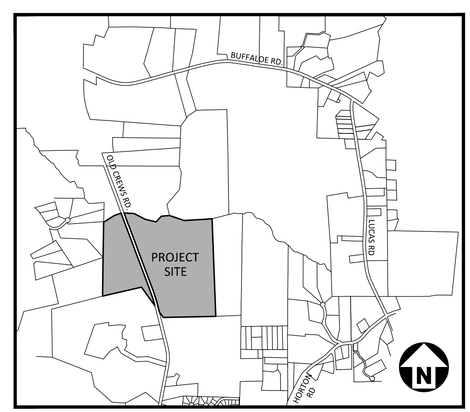
Failure to notify both **City Departments** in advance of beginning construction, will result in the issuance of **monetary fines**, and require reinstallation of any water or sewer facilities not inspected as a result of this notification failure.

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

811 Know what's below. Call before you dig.

Professional Design Engineer Certification. These improvements shall be constructed in accordance with the following drawings and with the Standard Specifications of the Town of Knightdale.
I, _____, PE, certify that the Standard Specifications of the Town of Knightdale have been thoroughly checked and found to be applicable to this project. All exceptions to the applicable Town standards have been previously approved by the Town of Knightdale and said exceptions are shown on Sheet(s) _____ of these drawings.
Seal By: _____, PE
Date: _____

CONTRACTOR SHALL NOTIFY "NC811" (811) OR (1-800-632-4949) AT LEAST 3 FULL BUSINESS DAYS PRIOR TO BEGINNING CONSTRUCTION OR EXCAVATION TO HAVE EXISTING UTILITIES LOCATED. CONTRACTOR SHALL CONTACT ANY LOCAL UTILITIES THAT PROVIDE THEIR OWN LOCATOR SERVICES INDEPENDENT OF "NC811". REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.



VICINITY MAP
N.T.S.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

SITE PERMITTING APPROVAL

Water and Sewer Permits (if applicable)

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-5170

The City of Raleigh consents to the connection and extension of the City's Public Water System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # W-4005

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 constructions 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 # _____

CITY OF RALEIGH – PLANS AUTHORIZED FOR CONSTRUCTION

Plans for the proposed use have been reviewed for general compliance with applicable codes. This limited review, and authorization for construction is not to be considered to represent total compliance with all legal requirements for development and construction. The property owner, design consultants, and contractors are each responsible for compliance with all applicable City, State and Federal laws. This specific authorization below is not a permit, nor shall it be construed to permit any violation of City, State or Federal Law. All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

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

City of Raleigh Development Approval _____
City of Raleigh Review Officer

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

M:\Projects\SA\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-CS1.dwg, 7/26/2024 3:27:58 PM, Katie Anderson

GENERAL NOTES

1. CONTRACTOR SHALL NOTIFY "NC811" (811) OR (1-800-632-4949) AT LEAST 3 FULL BUSINESS DAYS PRIOR TO BEGINNING CONSTRUCTION OR EXCAVATION TO HAVE EXISTING UTILITIES LOCATED. CONTRACTOR SHALL CONTACT ANY LOCAL UTILITIES THAT PROVIDE THEIR OWN LOCATOR SERVICES INDEPENDENT OF "NC811". REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
2. PRIOR TO BEGINNING CONSTRUCTION, THE GENERAL CONTRACTOR SHALL SCHEDULE AND ATTEND A PRECONSTRUCTION CONFERENCE WITH THE TOWN OF KNIGHTDALE, A REPRESENTATIVE OF THE OWNER, THE GRADING COMPANY, THE EROSION CONTROL INSTALLER, AND A REPRESENTATIVE FOR THE ENGINEER OF RECORD.
3. CONSTRUCTION, MAINTENANCE AND REMOVAL OF ALL EROSION CONTROL DEVICES ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. SEE EROSION CONTROL PLAN FOR SEQUENCING.
4. GRADING CONTRACTOR SHALL BE RESPONSIBLE TO GRADE EACH LOT SUCH THAT POSITIVE DRAINAGE FROM THE HOUSE FOUNDATION IS PROVIDED AND WATER FROM A HIGHER ELEVATION ON ADJOINING LOTS IS DIVERTED THROUGH THE USE OF SWALES ALONG LOT LINES. THE GRADING CONTRACTOR SHALL ALSO ENSURE THAT PONDING ON INDIVIDUAL LOTS WILL NOT BE CREATED.
5. EXISTING VEGETATION AND NATURAL AREAS SHALL BE PROTECTED TO THE GREATEST EXTENT POSSIBLE.
6. ALL PUBLIC STREETS & LANES MUST BE INSTALLED TO THE MINIMUM TOWN OF KNIGHTDALE STANDARDS SET FORTH IN THE STREET/SUBDIVISION DESIGN MANUAL OR THE CONDITIONS NOTED ON THE PLANS, WHICHEVER IS MORE STRINGENT.
7. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE, CITY OF RALEIGH AND NCDOT STANDARDS, SPECIFICATIONS AND DETAILS.
8. ALL EXISTING UTILITIES ARE SHOWN AT APPROXIMATE LOCATIONS. ACTUAL LOCATIONS AND DEPTHS TO BE CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION.
9. ALL DIMENSIONS SHOWN ARE TO BACK OF CURB UNLESS NOTED OTHERWISE.
10. PRIOR TO STARTING ANY CONSTRUCTION OF IMPROVEMENTS WITHIN ANY TOWN OR NCDOT STREET OR HIGHWAY RIGHT-OF-WAY, THE FOLLOWING PROCEDURES SHALL BE UNDERTAKEN: TOWN RIGHT-OF-WAY: CONTACT TOWN OF KNIGHTDALE ENGINEERING DEPARTMENT (919-217-2200) FOR INFORMATION ON DETOURS, OPEN CUTTING OF STREETS OR FOR ANY CONSTRUCTION WITHIN THE RIGHT-OF-WAY. NCDOT RIGHT-OF-WAY: CONTACT McADAMS COMPANY PROJECT ENGINEERS (919-361-5000) AND OBTAIN ALL PERMITS AND ENCROACHMENTS (KEEP COPIES ON CONSTRUCTION SITE), ALSO CONTACT NCDOT DISTRICT OFFICE (919-733-3213) 24 HOURS IN ADVANCE PRIOR TO PLACING CURB AND GUTTER AND TOWN OF WAKE FOREST FOR SIDEWALKS AND RAMPS WITHIN NCDOT R/W.
11. ALL DIMENSIONS AND GRADES SHOWN ON THE PLANS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY DISCREPANCIES EXIST PRIOR TO PROCEEDING WITH CONSTRUCTION FOR NECESSARY PLAN OR GRADING CHANGES. NO EXTRA COMPENSATION SHALL BE PAID TO THE CONTRACTOR FOR ANY WORK DONE DUE TO DIMENSIONS OR GRADES SHOWN INCORRECTLY ON THESE PLANS IF SUCH NOTIFICATION HAS NOT BEEN GIVEN.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL CONTROL POINTS AND BENCH MARKS NECESSARY.
13. DISPOSAL OF ALL DEMOLISHED MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE TAKEN OFF-SITE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL MUNICIPAL REQUIREMENTS.
14. THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
15. NO SUBSTITUTION FOR SPECIFIED MATERIALS SHALL TAKE PLACE WITHOUT WRITTEN APPROVAL FROM THE OWNER. SAID APPROVAL MUST BE ACQUIRED PRIOR TO INSTALLATION. ANY COSTS FOR TESTING OR ENGINEERING SERVICES REQUIRED TO PROVE PROPOSED SUBSTITUTIONS ARE ACCEPTABLE SHALL BE PAID BY THE CONTRACTOR.
16. ALL SIGNS AND TRAFFIC CONTROL DEVICES SHALL BE IN COMPLIANCE WITH THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.).
17. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS FOR EXCAVATIONS; FINAL RULE 29CFR PART 1926, SUBPART "P" APPLIES TO ALL EXCAVATIONS EXCEEDING FIVE (5) FEET IN DEPTH. EXCAVATION EXCEEDING TWENTY (20) FEET IN DEPTH REQUIRES THE DESIGN OF A TRENCH SAFETY SYSTEM BY A REGISTERED PROFESSIONAL ENGINEER, PROVIDED BY CONTRACTOR RESPONSIBLE FOR EXCAVATION.
18. EXISTING IMPROVEMENTS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED/RESTORED TO THEIR ORIGINAL CONDITION OR TO THE SATISFACTION OF THE OWNER BY THE CONTRACTOR RESPONSIBLE FOR THE DAMAGE.
19. CONTRACTOR IS RESPONSIBLE FOR COORDINATING CONSTRUCTION ACTIVITIES WITH THE APPROPRIATE UTILITY COMPANIES FOR ANY REQUIRED RELOCATION (I.E. POWER POLES, TELEPHONE PEDESTALS, WATER METERS, ETC.).
20. STREET LIGHTING WILL BE INSTALLED IN ACCORDANCE WITH THE TOWN OF KNIGHTDALE UNIFIED DEVELOPMENT ORDINANCE – LIGHTING PLANS SHALL BE BY OTHERS.
21. NONE OF THE SUBJECT PROPERTY IS WITHIN A SPECIAL FLOOD HAZARD AREA.
22. CURB & GUTTER DETAILS ARE SPECIFIC TO TOWN OF KNIGHTDALE UDO AND MSSD STANDARDS.
23. PAVEMENT DESIGN IS SHOWN AS A MINIMUM AND FINAL DESIGN TO BE DETERMINED BY GEOTECHNICAL ENGINEER.
24. AMENITY AREA DRAWINGS WILL BE SUBMITTED UNDER SEPARATE COVER SHOWING COMPLIANCE WITH REZONING CONDITIONS 6,7, AND 12.

SITE NOTES

1. OPEN SPACE TO BE MAINTAINED BY THE HOMEOWNERS ASSOCIATION.
2. LANDSCAPE, IRRIGATION AND SITE LIGHTING DESIGN TO BE PROVIDED BY OTHERS AND SHALL BE SUBMITTED UNDER SEPARATE COVER.
3. ALL HOUSING DESIGN INFORMATION SHALL BE SUBMITTED TO THE TOWN OF KNIGHTDALE IN CONJUNCTION WITH BUILDING PERMIT PROCESS.
4. SITE PLANS WILL BE SUBMITTED TO THE TOWN OF KNIGHTDALE AND THE CITY OF RALEIGH FOR THE REMAINING FUTURE DEVELOPMENT AREAS WITHIN THE REMAINING PHASES.
5. EXISTING VEGETATION AND NATURAL AREAS SHALL BE PROTECTED TO THE GREATEST EXTENT POSSIBLE AND THAT MINIMUM CLEARING OF LAND SHALL BE UNDERTAKEN DURING DEVELOPMENT.
6. ALL PUBLIC SIDEWALKS/CROSSWALKS ACROSS ALLEY ENTRANCES SHALL BE FLUSH, CONCRETE PAVEMENT (SEE DETAIL).
7. CURB RADII ARE DIMENSIONED TO THE BACK OF CURB
8. ALL DIRECTIONAL ARROWS, PEDESTRIAN CROSSINGS, AND STOP BARS ON THE DEVELOPMENT SHALL BE THERMOPLASTIC.

PAVEMENT MARKINGS & SIGNAGE NOTES:

1. ALL PAVEMENT MARKINGS SHALL BE IN ACCORDANCE TO TOWN OF KNIGHTDALE STANDARD AND SPECIFICATIONS, LATEST REVISIONS.
2. ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARDS.
3. ALL SIGNAGE SHALL BE IN ACCORDANCE WITH MUTCD, LATEST REVISION.
4. STREET NAME SIGNS SHALL FOLLOW THE TOWN OF KNIGHTDALE DETAIL 3.17.

Know what's below. Call before you dig.

CONTRACTOR SHALL NOTIFY "NC811" (811) OR (1-800-632-4949) AT LEAST 3 FULL BUSINESS DAYS PRIOR TO BEGINNING CONSTRUCTION OR EXCAVATION TO HAVE EXISTING UTILITIES LOCATED. CONTRACTOR SHALL CONTACT ANY LOCAL UTILITIES THAT PROVIDE THEIR OWN LOCATOR SERVICES INDEPENDENT OF "NC811". REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.

STORM DRAINAGE NOTES

1. ALL STORM DRAINAGE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST TOWN OF KNIGHTDALE STANDARDS.
2. ALL CONCRETE SHALL MEET A MINIMUM 3000 PSI COMPRESSIVE STRENGTH.
3. ALL PIPE IN STORM DRAIN STRUCTURES SHALL BE STRUCK EVEN WITH INSIDE WALL.
4. ALL PIPE JOINTS SHALL BE MADE WITH PREFORMED JOINT SEALER, WHICH CONFORMS TO AASHTO SPECIFICATION M-198 FOR TYPE B FLEXIBLE PLASTIC GASKETS UNLESS OTHERWISE NOTED.
5. THE INTERIOR SURFACES OF ALL STORM DRAINAGE STRUCTURES SHALL BE POINTED UP AND SMOOTHED TO AN ACCEPTABLE STANDARD USING MORTAR MIXED TO MANUFACTURER'S SPECIFICATIONS.
6. ALL BACKFILL SHALL BE NON-PLASTIC IN NATURE, FREE FROM ROOTS, VEGETATION MATTER, WASTE CONSTRUCTION MATERIAL OR OTHER OBJECTIONABLE MATERIAL. SAID MATERIAL SHALL BE CAPABLE OF BEING COMPACTED BY MECHANICAL MEANS AND SHALL HAVE NO TENDENCY TO FLOW OR BEHAVE IN A PLASTIC MANNER UNDER THE TAMPING BLOWS OR PROOF ROLLING.
7. MATERIALS DEEMED BY THE OWNER'S REPRESENTATIVE AS UNSUITABLE FOR BACKFILL PURPOSES SHALL BE REMOVED AND REPLACED WITH SUITABLE MATERIAL.
8. BACKFILLING OF TRENCHES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER PIPE IS LAID. THE FILL AROUND THE PIPE SHALL BE THOROUGHLY COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY OBTAINABLE WITH THE STANDARD PROCTOR TEST. THE TOP EIGHT (8) INCHES SHALL BE COMPACTED TO 100 PERCENT STANDARD PROCTOR.
9. UNDER NO CIRCUMSTANCES SHALL WATER BE ALLOWED TO RISE IN UNBACKFILLED TRENCHES AFTER PIPE HAS BEEN PLACED.
10. CONTRACTOR SHALL GRADE & INSTALL PREFORMED SCOUR HOLES, LEVEL SPREADERS AND VELOCITY DISSIPATERS PER DETAILS.
11. CONTRACTOR SHALL DETERMINE SPILL CURB LOCATIONS PRIOR TO PLACEMENT TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE STRUCTURES. NO BIRD-BATHS SHALL BE ALLOWED WITHIN CURB AND GUTTER OR ASPHALT AREAS.

GRADING AND DRAINAGE NOTES

1. ALL DIMENSIONS AND GRADES SHOWN ON THE PLANS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY DISCREPANCIES EXIST PRIOR TO PROCEEDING WITH CONSTRUCTION, FOR NECESSARY PLAN OR GRADE CHANGES. NO EXTRA COMPENSATION SHALL BE PAID TO THE CONTRACTOR FOR ANY WORK DONE DUE TO DIMENSIONS OR GRADES SHOWN INCORRECTLY ON THESE PLANS IF SUCH NOTIFICATION HAS NOT BEEN GIVEN.
2. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS FOR EXCAVATIONS; FINAL RULE 29CFR PART 1926, SUBPART "P" APPLIES TO ALL EXCAVATIONS EXCEEDING FIVE (5) FEET IN DEPTH. EXCAVATION EXCEEDING TWENTY (20) FEET IN DEPTH REQUIRES THE DESIGN OF A TRENCH SAFETY SYSTEM BY A REGISTERED PROFESSIONAL ENGINEER, PROVIDED BY CONTRACTOR RESPONSIBLE FOR EXCAVATION.
3. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST TOWN OF KNIGHTDALE, CITY OF RALEIGH AND NCDOT (WHERE APPLICABLE) STANDARDS AND SPECIFICATIONS.
4. SURROUNDING AND ADJACENT PARCEL INFORMATION IS BASED ON WAKE COUNTY GIS DATA
5. EXISTING TOPOGRAPHY SHOWN ON THIS PLAN IS BASED ON SURVEY DATA AMD GIS LIDAR DATA
6. LIMITS OF NEUSE RIPARIAN BUFFERS
7. LIMITS OF JURISDICTIONAL STREAM AND WETLANDS ARE BASED ON FIELD DETERMINATION BY CAROLINA ECOSYSTEM
8. RECEIVING WATERCOURSE: NEUSE RIVER BASIN
9. CONTRACTOR SHALL NOTIFY "NC811" (811) OR (1-800-632-4949) AT LEAST 3 FULL BUSINESS DAYS PRIOR TO BEGINNING CONSTRUCTION OR EXCAVATION TO HAVE EXISTING UTILITIES LOCATED. CONTRACTOR SHALL CONTACT ANY LOCAL UTILITIES THAT PROVIDE THEIR OWN LOCATOR SERVICES INDEPENDENT OF "NC811". REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
10. PRIOR TO BEGINNING CONSTRUCTION, THE GENERAL CONTRACTOR SHALL SCHEDULE AND ATTEND A PRECONSTRUCTION CONFERENCE WITH THE TOWN OF KNIGHTDALE, A REPRESENTATIVE OF THE OWNER, THE GRADING COMPANY, THE EROSION CONTROL INSTALLER, UTILITY CONTRACTOR, AND A REPRESENTATIVE FOR THE ENGINEER OF RECORD.
11. CONSTRUCTION, MAINTENANCE AND REMOVAL OF ALL EROSION CONTROL DEVICES ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. TIMING OF REMOVAL SHALL BE COORDINATED WITH THE EROSION CONTROL INSPECTOR.
12. EXISTING UTILITIES AND STRUCTURES SHOWN, BOTH UNDERGROUND AND ABOVE GROUND, ARE BASED ON A FIELD SURVEY AND THE BEST AVAILABLE RECORD DRAWINGS. THE CONTRACTOR SHALL VERIFY FIELD CONDITIONS PRIOR TO BEGINNING RELATED CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
13. SOIL UNDER BUILDINGS, PAVED AREAS AND WITHIN SLOPES GREATER THAN 3:1 (H:V) SHALL BE APPROVED, PLACED AND COMPACTED AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
14. GRADING CONTRACTOR SHALL BE RESPONSIBLE TO GRADE EACH LOT SUCH THAT POSITIVE DRAINAGE FROM THE HOUSE FOUNDATION IS PROVIDED AND WATER FROM A HIGHER ELEVATION ON ADJOINING LOTS IS DIVERTED THROUGH THE USE OF SWALES ALONG LOT LINES. THE GRADING CONTRACTOR SHALL ALSO ENSURE THAT PONDING ON INDIVIDUAL LOTS WILL NOT BE CREATED.
15. EXISTING VEGETATION AND NATURAL AREAS SHALL BE PROTECTED TO THE GREATEST EXTENT POSSIBLE.
16. 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.
17. ALL STORM DRAINAGE PIPE SHALL HAVE A MINIMUM COVER OF 1 FOOT TO THE PIPE CROWN IN NON-TRAFFIC AREAS.
18. STORM SEWER PIPE ENDS SHALL BE FURNISHED WITH REINFORCED CONCRETE PIPE FLARED END SECTION UNLESS OTHERWISE SPECIFIED ON PLANS
19. EACH DRAINAGE STRUCTURE SHALL HAVE A SHAPED INVERT CONSTRUCTED FROM CONCRETE PER TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS
20. ENERGY DISSIPATER 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.
21. STORM PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARD SPECIFICATIONS AND DETAILS. PLEASE CONTACT THE TOWN OF KNIGHTDALE DEVELOPMENT SERVICES ENGINEER PRIOR TO THE INSTALLATION OF ALL STORM DRAIN PIPE. STORMWATER CALCULATIONS ARE BASED ON A MAXIMUM 3,500 SF OF IMPERVIOUS AREA PER LOT.
22. ALL STORM DRAINAGE PIPE SHALL BE CLASS III REINFORCED CONCRETE PIPE (RCP) UNLESS NOTES OTHERWISE.
23. DISCHARGE BASED ON 10-YR STORM EVENT UNLESS NOTED OTHERWISE.
24. CB=CATCH BASIN: FES=FLARED END SECTION: JB=JUNCTION BOX; YI=YARD INLET; (TOK#5.03); DI=DROP INLET (TOK #5.04)
25. RIM ELEVATION GIVEN FOR CB IS TOP OF CURB, YI OPENING INVERT FOR SLAB TOP, DI IS TOP OF GRATE FOR GRATED INLET, JB IS TOP OF RIM.
26. 'TOWN OF KNIGHTDALE DRAINAGE EASEMENT'=PUBLIC EASEMENT
27. ALL PUBLIC STORM DRAINAGE FRAMES, GRATES, & HOODS SHALL BE STAMPED W/ "DRAINS TO RIVER" IN ACCORDANCE WITH TOWN OF KNIGHTDALE STANDARDS.
28. THE USE OF WAFFLE BOXES IS NOT PERMITTED WITHIN PUBLIC RIGHT OF WAY AND PUBLIC DRAINAGE EASEMENTS.
29. THE CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING STEPS IN THE STORM DRAINAGE BLOSES GREATER THAN OR EQUAL TO 3'-6" DEPTH. THE STEPS SHALL BE INSTALLED ON 12 INCH CENTERS AND SECURED PER TOWN OF KNIGHTDALE SPECIFICATIONS.

STANDARD UTILITY NOTES (AS APPLICABLE)

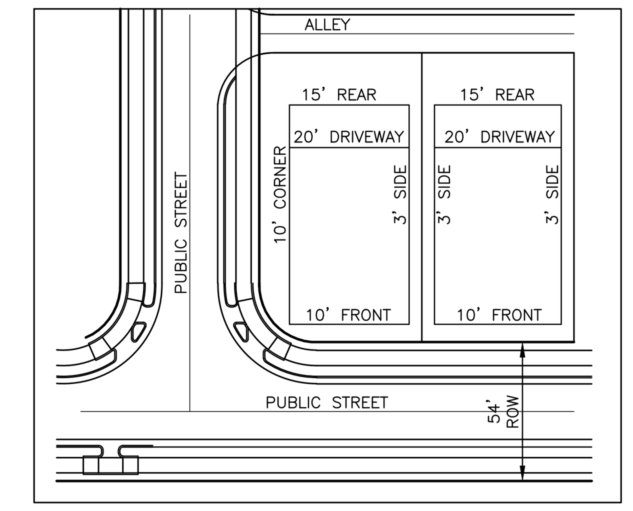
1. ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS (REFERENCE: CORPUD HANDBOOK, CURRENT EDITION).
2. UTILITY SEPARATION REQUIREMENTS:
   - A. A DISTANCE OF 100' SHALL BE MAINTAINED BETWEEN SANITARY SEWER & ANY PRIVATE OR PUBLIC WATER SUPPLY SOURCE SUCH AS AN IMPOUNDED RESERVOIR USED AS A SOURCE OF DRINKING WATER. IF ADEQUATE LATERAL SEPARATION CANNOT BE ACHIEVED, FERROUS SANITARY SEWER PIPE SHALL BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS. HOWEVER, THE MINIMUM SEPARATION SHALL NOT BE LESS THAN 25' FROM A PRIVATE WELL OR 50' FROM A PUBLIC WELL.
   - B. WHEN INSTALLING WATER &/OR SEWER MAINS, THE HORIZONTAL SEPARATION BETWEEN UTILITIES SHALL BE 10'. IF THIS SEPARATION CANNOT BE MAINTAINED DUE TO EXISTING CONDITIONS, THE VARIATION ALLOWED IS THE WATER MAIN IN A SEPARATE TRENCH WITH THE ELEVATION OF THE WATER MAIN AT LEAST 18" ABOVE THE TOP OF THE SEWER & MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR. ALL DISTANCES ARE MEASURED FROM OUTSIDE DIAMETER TO OUTSIDE DIAMETER.
   - C. WHERE IT IS IMPOSSIBLE TO OBTAIN PROPER SEPARATION, OR ANYTIME A SANITARY SEWER PASSES OVER A WATERMAIN, DIP MATERIALS OR STEEL ENCASEMENT EXTENDED 10' ON EACH SIDE OF CROSSING MUST BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS.
   - D. 5.0' MINIMUM HORIZONTAL SEPARATION IS REQUIRED BETWEEN ALL SANITARY SEWER & STORM SEWER FACILITIES, UNLESS DIP MATERIAL IS SPECIFIED FOR SANITARY SEWER.
   - E. MAINTAIN 18" 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 CORPUD 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 FORCEMAINS. 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 CORPUD HANDBOOK PROCEDURE.
7. INSTALL 3/4" COPPER* WATER SERVICES WITH METERS LOCATED AT ROW OR WITHIN A 2'X2' 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 @ 1.0% 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; BACKWATER VALVES ARE REQUIRED ON ALL SANITARY SEWER SERVICES HAVING BUILDING DRAINS LOWER THAN 1.0' ABOVE THE NEXT UPSTREAM MANHOLE.
10. ALL ENVIRONMENTAL PERMITS APPLICABLE TO THE PROJECT MUST BE OBTAINED FROM NCDWQ, USACE &/OR FEMA FOR ANY RIPARIAN BUFFER, WETLAND &/OR FLOODPLAIN IMPACTS (RESPECTIVELY) PRIOR TO CONSTRUCTION.
11. NCDOT / RAILROAD ENCROACHMENT AGREEMENTS ARE REQUIRED FOR ANY UTILITY WORK (INCLUDING MAIN EXTENSIONS & SERVICE TAPS) WITHIN STATE OR RAILROAD ROW PRIOR TO CONSTRUCTION.
12. GREASE INTERCEPTOR / OIL WATER SEPARATOR SIZING CALCULATIONS & INSTALLATION SPECIFICATIONS SHALL BE APPROVED BY THE CORPUD FOG PROGRAM COORDINATOR PRIOR TO ISSUANCE OF A BUILDING PERMIT. CONTACT TIM BEASLEY AT (919) 996-2334 OR TIMOTHY.BEASLEY@RALEIGHNC.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 JOANIE HARTLEY AT (919) 996-5923 OR JOANIE.HARTLEY@RALEIGHNC.GOV FOR MORE INFORMATION.

ADDITIONAL UTILITY NOTES

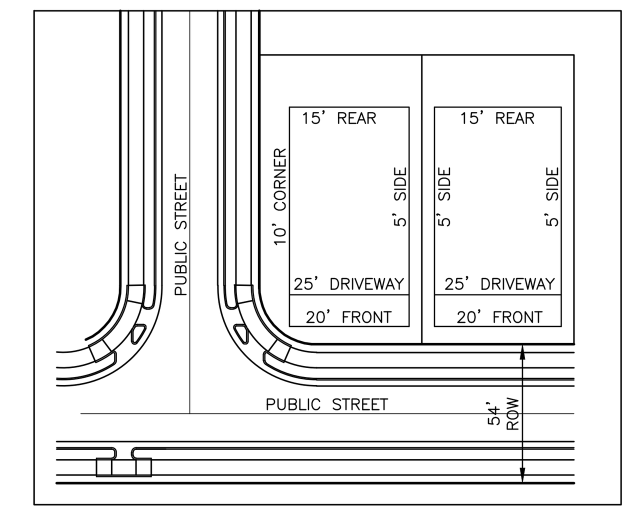
1. ALL WATER SERVICE LINES WHERE 1 TO 2 UNITS CONNECT SHALL BE 1" HDPE SDR9 LINE. ALL WATER SERVICE LINES WHERE 3 OR MORE UNITS CONNECT SHALL BE 2" HDPE SDR9 LINE.
2. ALL SEWER MAINS SHALL BE EITHER PVC OR DUCTILE IRON PIPE AS SHOWN ON THE PLANS. ALL PIPE MATERIAL SHALL MEET CITY OF RALEIGH STANDARDS AND SPECIFICATIONS AS DEFINED IN THE LATEST ISSUE OF THE PUBLIC UTILITIES HANDBOOK AND/OR UNIFIED DEVELOPMENT ORDINANCE (UDO).
3. ALL FIRE HYDRANTS ALONG PUBLIC R/W LINES SHALL HAVE A 3'Wx3'L CITY OF RALEIGH WATERLINE EASEMENT ONTO ADJACENT PROPERTY.
4. ALL SANITARY SEWER INTERCEPTOR LINES (12" AND LARGER), AS WELL AS MANHOLES AND FITTINGS ASSOCIATED WITH THE INTERCEPTOR LINE, SHALL BE INTERNALLY LINED WITH PROTECTO 401 OR APPROVED EQUAL TO PREVENT HYDROGEN SULFIDE CORROSION. SEE THE CURRENT CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT HANDBOOK FOR APPROVED COATINGS AND APPLICATION METHODS.
5. IN ACCORDANCE WITH GENERAL STATUTE 87-121(G), ALL UNDERGROUND UTILITIES INSTALLED AFTER OCTOBER 1, 2014 SHALL BE ELECTRONICALLY LOCATABLE. CONTRACTOR SHALL COORDINATE DIRECTLY WITH THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT FOR DETAILS AND SPECIFICATIONS FOR MEETING THESE REQUIREMENTS.
6. EXISTING UTILITIES SHOWN ARE BASED ON FIELD SURVEYS AND THE BEST AVAILABLE RECORD DRAWINGS. THE CONTRACTOR SHALL VERIFY CONDITIONS PRIOR TO BEGINNING CONSTRUCTION. ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE PLANS SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
7. ALL WATER AND SEWER MAINS WITHIN PUBLIC EASEMENTS OR RIGHTS-OF-WAY TO BE OWNED, OPERATED, AND MAINTAINED BY THE CITY OF RALEIGH.
8. ALL WATER AND SEWER MAINS NOT WITHIN PUBLIC EASEMENTS OR RIGHTS-OF-WAY TO BE PRIVATELY OWNED, OPERATED, AND MAINTAINED BY THE PROPERTY OWNER.
9. CONTRACTOR SHALL NOTIFY "NC811" (811) OR (1-800-632-4949) AT LEAST 3 FULL BUSINESS DAYS PRIOR TO BEGINNING CONSTRUCTION OR EXCAVATION TO HAVE EXISTING UTILITIES LOCATED. CONTRACTOR SHALL CONTACT ANY LOCAL UTILITIES THAT PROVIDE THEIR OWN LOCATOR SERVICES INDEPENDENT OF "NC811". REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
10. ALL UTILITY SLEEVES SHALL BE SCHEDULE 40 PVC AND INSTALLED WITH 2' MINIMUM COVER. BOTH ENDS SHALL BE CAPPED AND MARKED.

RETAINING WALL NOTES

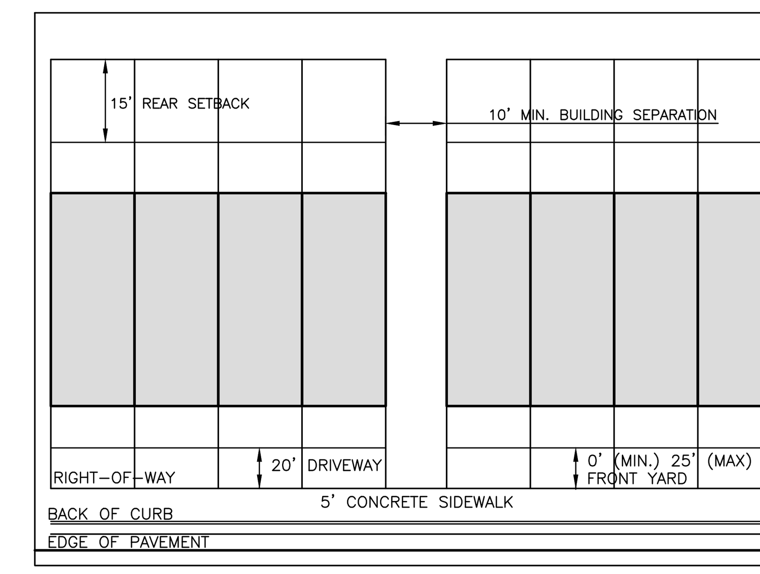
1. THE RETAINING WALL ALIGNMENT SHOWN ON THESE PLANS DEPICTS THE LOCATION OF THE FRONT/BOTTOM FACE OF THE RETAINING WALL.
2. RETAINING WALLS SHALL BE DESIGNED BY A REGISTERED NORTH CAROLINA PROFESSIONAL ENGINEER AND PROVIDED AS A STANDALONE CONSTRUCTION DRAWING SET TO THE TOWN OF KNIGHTDALE FOR APPROVAL PRIOR TO THE ISSUANCE OF BUILDING PERMITS.
3. RETAINING WALLS SHALL BE ASSUMED TO BE BACKFILLED WITH OFF-SITE BORROW MATERIAL OR PROCESSED FILL UNLESS DESIGN ENGINEER CAN PROVIDE OWNER WITH CONFIRMATION FROM THE GEOTECHNICAL ENGINEER THAT READILY AVAILABLE ON-SITE SOILS CAN BE USED.
4. THE TOP AND BOTTOM OF WALL ELEVATIONS SHOWN ON THESE PLANS IDENTIFY FINISHED GRADE ELEVATIONS ONLY. THE EXTENT THAT THE RETAINING WALL WILL EXTEND BELOW GRADE TO THE FOOTING SHALL BE IDENTIFIED ON THE RETAINING WALL CONSTRUCTION DRAWINGS.
5. RETAINING WALLS GREATER THAN 30" IN HEIGHT SHALL HAVE A RAILING OR FENCE INSTALLED AT THE TOP OF WALL. RAILING DESIGN SHALL BE INCLUDED IN THE RETAINING WALL CONSTRUCTION DRAWINGS.
6. RETAINING WALL DESIGNER SHALL BE RESPONSIBLE FOR IDENTIFYING AND REPORTING TO THE ENGINEER THE REQUIRED SPACING, CLEARANCE, OR CONFLICTS BETWEEN THE FOOTPRINT OF THE WALL AND ANY ADJACENT SURFACE/SUB-SURFACE UTILITIES. WALL DESIGNER SHALL ALSO BE RESPONSIBLE FOR REVIEW AND APPROVAL OF ALL WALL RELATED SHOP DRAWINGS/SUBMITTALS.
7. CONTRACTOR SHALL ENSURE THAT WALL BATTER DOES NOT ENCROACH INTO BUFFERS, ADJACENT PROPERTIES, SIDEWALKS, ETC.



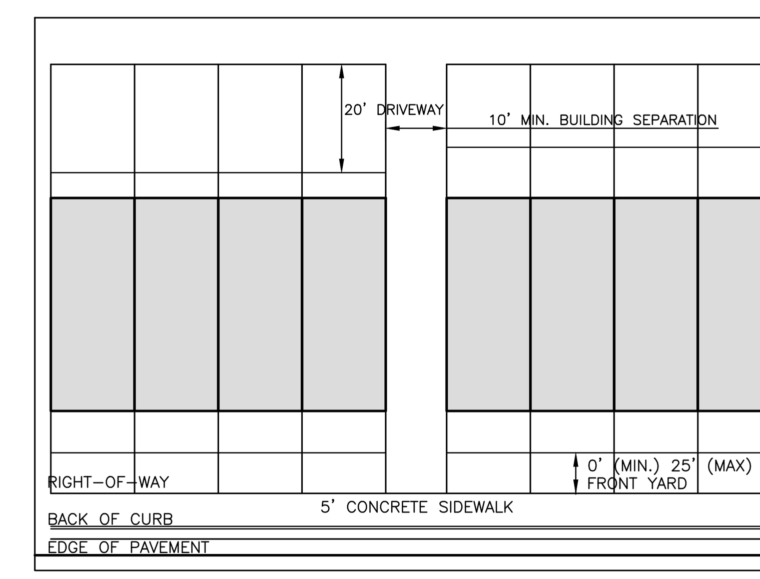
TYPICAL REAR LOADED LOT DETAIL
NTS



TYPICAL FRONT LOADED LOT DETAIL
NTS



TYPICAL FRONT LOADED TOWNHOME DETAIL
SCALE: NTS



TYPICAL REAR LOADED TOWNHOME DETAIL
SCALE: NTS

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ____________________ Date: ____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ____________________ Date: ____________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

MCADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
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PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

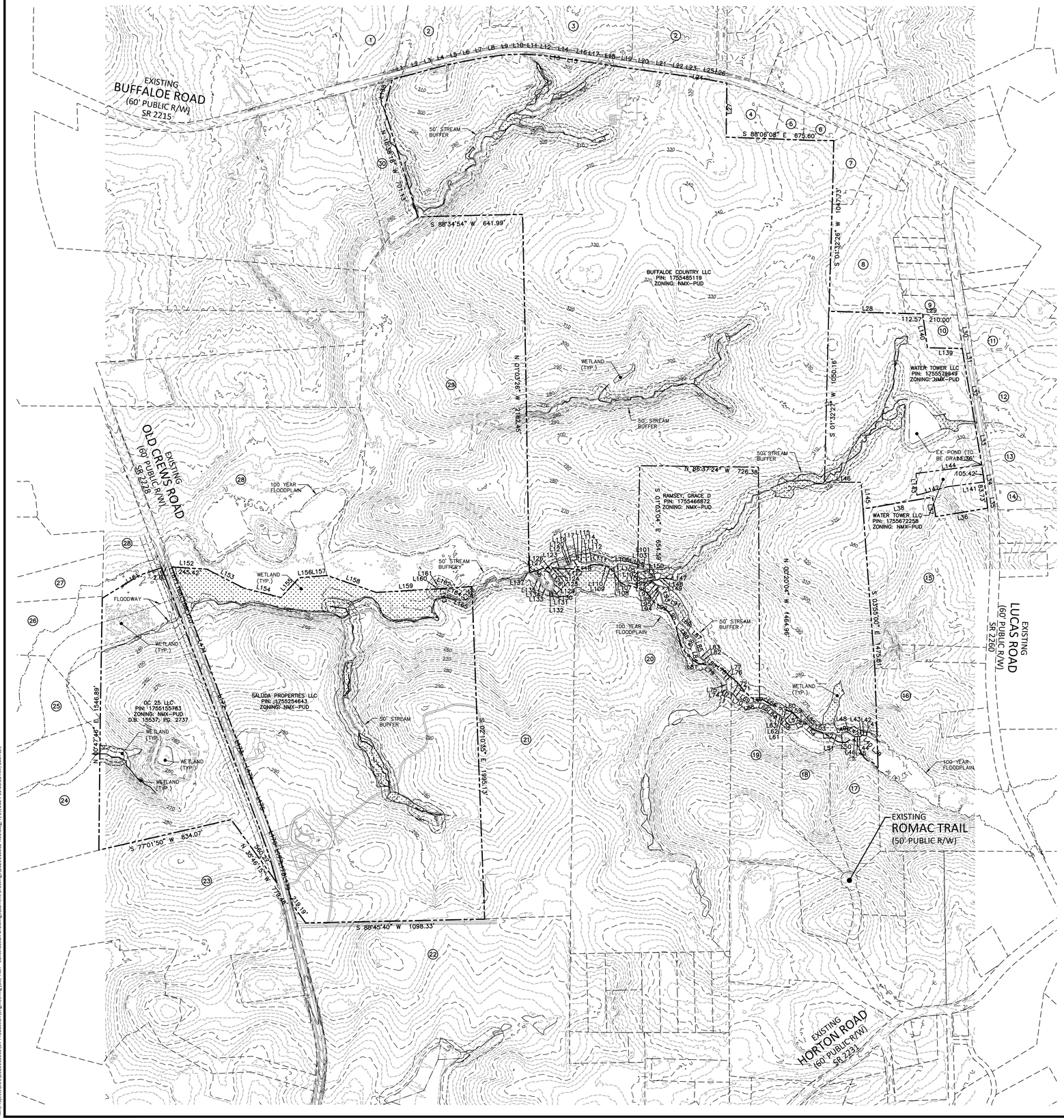
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-CD-N1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	N.T.S.
DATE	12. 22. 2022

SHEET

PROJECT NOTES
C0.00

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-CD-N1.dwg, 7/30/2024 7:05:05 PM, Katie Anderson



LINE TABLE		
LINE	BEARING	DISTANCE
L1	N 74°29'16" E	116.32'
L2	N 75°00'16" E	79.07'
L3	N 75°24'53" E	82.27'
L4	N 77°07'00" E	82.71'
L5	N 78°19'48" E	78.20'
L6	N 79°15'56" E	76.43'
L7	N 79°23'56" E	80.24'
L8	N 81°26'02" E	76.63'
L9	N 84°17'00" E	84.76'
L10	N 88°40'48" E	77.19'
L11	S 86°42'34" E	85.90'
L12	S 83°31'14" E	81.38'
L13	S 81°57'18" E	47.58'
L14	S 81°29'18" E	53.72'
L15	S 81°15'59" E	54.28'
L16	S 81°18'37" E	52.95'
L17	S 81°31'22" E	99.26'
L18	S 81°51'59" E	100.41'
L19	S 81°35'02" E	103.92'
L20	S 81°53'31" E	106.32'
L21	S 81°57'43" E	107.53'
L22	S 81°48'57" E	106.60'
L23	S 81°17'27" E	56.79'
L24	S 80°25'23" E	56.57'
L25	S 79°47'08" E	57.62'
L26	S 78°36'08" E	74.47'
L27	S 00°52'27" W	363.81'
L28	S 88°16'20" E	462.82'
L29	S 88°18'01" E	322.57'
L30	S 09°05'09" E	209.93'
L31	S 09°05'20" E	102.15'
L32	S 09°39'59" E	319.91'
L33	S 09°23'40" E	291.81'
L34	S 08°30'16" E	200.51'
L35	S 06°05'04" E	78.54'
L36	S 80°33'38" W	323.62'
L37	N 09°05'59" W	120.00'
L38	S 80°54'02" W	432.96'
L39	N 49°02'04" W	41.55'
L40	N 40°27'24" W	77.35'
L41	N 84°54'10" W	10.23'
L42	N 79°21'51" W	20.17'
L43	S 42°38'52" W	15.51'
L44	N 59°42'56" W	9.90'
L45	S 76°13'33" W	16.37'
L46	N 71°00'56" W	20.80'
L47	N 52°32'57" W	23.70'
L48	N 63°35'27" W	25.07'
L49	S 68°53'51" W	21.99'
L50	S 36°21'28" W	30.51'
L51	N 61°11'49" W	47.99'
L52	S 89°03'48" W	65.76'
L53	N 75°51'55" W	38.74'
L54	N 47°53'25" W	56.94'
L55	S 37°41'31" W	43.56'
L56	S 66°49'33" W	73.57'
L57	S 85°20'01" W	28.48'
L58	N 47°15'37" W	14.29'
L59	N 05°27'17" W	16.99'
L60	N 68°07'05" W	19.14'
L61	N 68°07'05" W	4.03'
L62	N 48°01'33" W	21.83'
L63	N 63°51'21" W	24.74'
L64	N 45°13'55" W	40.52'
L65	N 52°07'08" W	26.06'
L66	N 61°54'31" W	32.47'
L67	N 88°08'48" W	55.01'
L68	S 78°27'48" W	38.59'
L69	N 55°43'52" W	37.95'
L70	N 71°31'12" W	33.10'
L71	N 40°45'22" W	32.09'
L72	N 46°11'46" W	15.86'
L73	N 68°31'45" W	33.06'
L74	N 06°17'32" W	20.77'
L75	N 03°41'20" W	40.72'
L76	N 62°26'21" W	6.52'
L77	N 39°06'19" W	31.28'
L78	N 49°59'11" W	54.13'
L79	N 53°44'08" W	45.67'
L80	N 51°12'15" W	24.31'
L81	N 19°45'07" W	19.71'
L82	N 56°59'02" W	21.33'
L83	N 51°10'24" W	26.09'
L84	N 05°38'20" W	19.19'
L85	N 21°39'31" W	66.23'
L86	N 22°51'53" E	22.33'
L87	N 49°28'10" W	41.25'
L88	N 33°22'51" W	53.12'
L89	N 48°25'24" W	49.77'

LINE TABLE		
LINE	BEARING	DISTANCE
L90	N 24°14'33" W	108.16'
L91	N 63°52'09" W	31.31'
L92	N 72°32'23" W	34.03'
L93	N 14°00'19" W	64.16'
L94	N 61°28'54" W	16.57'
L95	N 09°40'19" W	19.03'
L96	N 22°16'19" E	15.53'
L97	N 54°29'48" W	45.11'
L98	N 15°17'29" E	11.38'
L99	N 15°17'29" E	10.28'
L100	N 22°39'56" W	18.60'
L101	N 50°54'45" W	39.85'
L102	N 10°21'44" W	11.52'
L103	N 76°46'00" W	48.37'
L104	N 72°35'10" W	49.26'
L105	N 77°51'01" W	34.26'
L106	N 86°24'13" W	49.21'
L107	S 31°44'35" W	14.76'
L108	S 62°27'35" W	43.47'
L109	N 34°35'00" W	15.59'
L110	N 60°04'38" W	45.91'
L111	N 72°47'55" W	58.44'
L112	S 66°58'25" W	26.79'
L113	S 81°48'08" W	38.21'
L114	N 66°37'55" W	32.29'
L115	N 29°02'14" W	12.37'
L117	S 84°57'34" W	9.34'
L118	S 71°01'47" W	29.85'
L119	S 17°11'08" W	18.76'
L120	S 62°49'16" W	15.34'
L121	N 79°18'23" W	4.66'
L122	S 67°39'25" W	48.25'
L123	N 80°09'16" W	12.96'
L124	S 85°06'50" W	29.63'
L125	S 57°01'37" W	10.11'
L126	S 31°28'05" W	22.75'
L127	S 07°25'20" W	21.93'
L128	S 38°27'56" E	44.11'
L129	S 06°22'17" W	35.57'
L130	S 15°05'02" W	25.17'
L131	S 75°22'27" W	10.28'
L132	N 73°01'39" W	17.65'
L133	N 54°20'37" W	44.08'
L134	N 24°00'50" W	45.69'
L135	N 67°23'29" W	21.04'
L136	N 53°36'23" W	54.08'
L137	N 70°53'24" W	16.65'
L138	N 14°37'42" E	218.66'
L139	S 88°19'55" E	210.04'
L140	S 09°04'12" E	210.03'
L141	S 82°19'40" W	223.78'
L142	S 74°19'39" W	199.25'
L143	N 02°37'34" W	133.66'
L144	N 82°19'40" E	407.80'
L145	N 03°43'50" E	164.13'
L146	S 89°47'08" E	225.47'
L147	S 61°32'33" W	1.85'
L148	N 87°58'16" W	29.85'
L149	S 42°15'45" W	15.17'
L150	S 87°17'28" W	29.65'
L151	S 63°19'26" W	437.20'
L152	N 86°29'56" W	248.05'
L153	N 62°55'14" W	258.50'
L154	N 76°55'14" W	233.25'
L155	S 42°33'30" W	164.29'
L156	S 85°19'37" W	76.57'
L157	N 85°19'37" E	95.22'
L158	S 71°01'33" E	320.75'
L159	N 86°39'30" E	366.69'
L160	S 19°42'39" W	17.20'
L161	S 42°15'49" W	14.12'
L162	N 66°18'16" W	47.22'
L163	N 10°41'51" W	32.54'
L164	N 63°14'47" W	84.83'
L165	N 67°52'24" W	43.71'
L166	S 42°39'12" W	62.03'
L167	S 20°20'19" E	101.96'
L168	S 20°42'42" E	107.10'
L169	S 20°37'24" E	71.95'
L170	S 20°41'42" E	87.18'
L171	S 20°32'04" E	330.89'
L172	S 20°23'52" E	387.42'
L173	S 20°37'34" E	210.45'
L174	S 20°42'41" E	137.27'
L175	S 20°17'49" E	257.79'
L176	S 19°27'42" E	190.81'
L177	S 17°38'59" E	62.77'
L178	S 15°43'22" E	64.44'
L179	S 14°50'41" E	127.96'

SURVEY LEGEND

- EXISTING IRON PIPE
- IRON PIPE SET
- CALCULATED POINT
- BORE HOLE
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEANOUT
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- ELECTRIC BOX
- LIGHT POLE
- POWER POLE
- GUY WIRE
- CURB INLET
- STORM DRAINAGE MANHOLE
- YARD INLET
- FIBER OPTIC MARKER
- FIBER OPTIC VAULT
- SIGN
- BOLLARD
- SD — STORM DRAIN PIPE
- OU — OVERHEAD UTILITY LINES
- W — WATER LINE
- SS — SANITARY SEWER LINE
- T — TELEPHONE LINE
- G — GAS LINE
- UE — UNDERGROUND ELECTRIC
- UT — UNDERGROUND TELEPHONE
- X — X — FENCE LINE
- TREE LINE
- GUARDRAIL
- WETLANDS

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

ADJACENT PROPERTY OWNER INFORMATION

1. TRAM, VINNY KIM
PIN: 1756207225
ZONING: R-30

2. RWC BUFFALOE, LLC
PIN: 1756421236
ZONING: R-4-CU

3. RWC BUFFALOE, LLC
PIN: 1756309588
ZONING: R-4-CU

4. CATES, C M
PIN: 1755591500
ZONING: RT, RURAL TRANSITION

5. OLGUIN, ESTANISLAO OTERO CAPISTRAN, MARIA DE LA LUZ
PIN: 1755592485
ZONING: RT, RURAL TRANSITION

6. FINDLEY, CYNTHIA LORELEI
PIN: 1755594472
ZONING: RT, RURAL TRANSITION

7. SHEPARD, PAUL P III
SHEPARD, CINDY A
PIN: 1755596281
ZONING: RT, RURAL TRANSITION

8. GANDHI, KAUSHIK
GANDHI, KAILAS
PIN: 1755588689
ZONING: RT, RURAL TRANSITION

9. MARTINEZ, JOSE ANGEL VENEG
PIN: 1755681345
ZONING: GR8, GENERAL RESIDENTIAL

10. LUCAS, CRAIG
PIN: 1755682129
ZONING: GR8, GENERAL RESIDENTIAL

11. LUCAS, ZELL EDWARD
LUCAS, MALANEY
PIN: 1755686157
ZONING: RT, RURAL TRANSITION

12. LUCAS, TED EDWARD SR
LUCAS, TED EDWARD JR
PIN: 1755677833
ZONING: RT, RURAL TRANSITION

13. LUCAS, ODIS FITZGERALD
PIN: 1755677424
ZONING: RT, RURAL TRANSITION

14. CONTRERAS, OCTAVIO N
PIN: 1755677147
ZONING: RT, RURAL TRANSITION

15. COLLIER, GERALDINE L
PIN: 1755661638
ZONING: RT, RURAL TRANSITION

16. LARYEA, ROBERT O II
PIN: 1755651583
ZONING: RT, RURAL TRANSITION

17. VANDOOSER, ROSS G
PIN: 1755556296
ZONING: RR1, RURAL RESIDENTIAL

18. HOFSHEIER, RICHARD
HOFSHEIER, TONI
PIN: 1755554305
ZONING: RR1, RURAL RESIDENTIAL

19. PARNELL, WILLIAM GARY
PIN: 1755551308
ZONING: RR1, RURAL RESIDENTIAL

20. RAMSEY, GRACE D
PIN: 1755453795
ZONING: RT, RURAL TRANSITION

21. RAMSEY, GRACE D
PIN: 1755356880
ZONING: RT, RURAL TRANSITION
D.B. 12885, PG. 214

22. RAMSEY, GRACE D
PIN: 1755331861
ZONING: RT, RURAL TRANSITION
D.B. 12885, PG. 2144

23. OLD CREWS WOODS, LLC
PIN: 1755142051
ZONING: RT, RURAL TRANSITION
D.B. 16563, PG. 430
B.B. 2004, PG. 1841

24. HINTON LAND LLC
SILVER, CHARLES H JR
PIN: 1745948245
ZONING: RR1, RURAL RESIDENTIAL

25. NGO, CAI NGO, LYNN
PIN: 1755055916
ZONING: RR1, RURAL RESIDENTIAL

26. PAIR, H STEPHEN
PIN: 1755066398
ZONING: RR1, RURAL RESIDENTIAL

27. MAYNARD, WILLIAM D
MAYNARD, CATHERINE H
PIN:1755067644
ZONING: RR1, RURAL RESIDENTIAL

28. WT CARY LLC WG PARTNERS
PIN: 1755179228
ZONING: GR3 PUD, GENERAL RESIDENTIAL
D.B. 12419, PG.184

29. PURYEAR, FRED L
PIN: 1755371757
ZONING: RT, RURAL TRANSITION
D.B. 10853, PG. 2727

30. PURYEAR, LINDA
PIN: 1755297266
ZONING: RT, RURAL TRANSITION

GRAPHIC SCALE
0 150 300 600
1 inch = 300 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

MCADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO
MASTER PLAN
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

REVISIONS

NO.	DATE	
1	04. 29. 2022	PER TOWN COMMENTS
2	07. 01. 2022	PER TOWN COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-XC1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=300'
DATE	03. 28. 2022

SHEET

EXISTING CONDITIONS

C1.00

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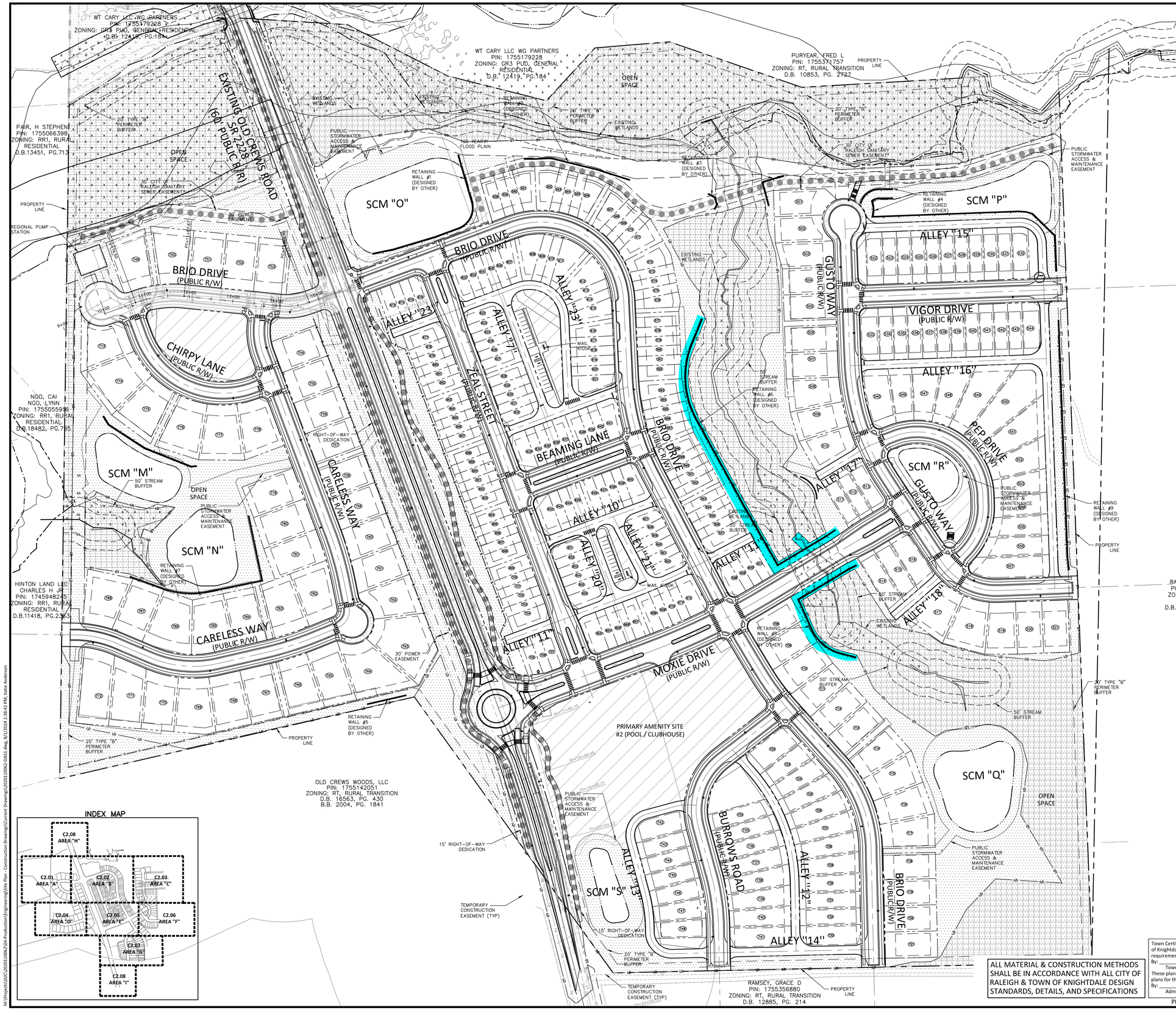

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACCESSIBLE PARKING STALL (ACC)
- VAN ACCESSIBLE PARKING STALL (VAN)
- PARKING SPACE COUNT (XX)
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- TRAIL
- WETLANDS
- OPEN SPACE - PASSIVE
- OPEN SPACE - ACTIVE
- TREE SAVE AREA (6)
- PRIVATE ACCESS AND MAINTENANCE EASEMENT

SITE SIGN KEY

R2-1 30"x30" SPEED LIMIT 25 | R1-1 30"x30" STOP | R6-5P 30"x30" | W11-2 W16-7P 30"x30" | R6-4 30"x30" | R1-2 30"x30" YIELD

SPEED LIMIT TABLE	
54' LOCAL STREET	25 MPH
74' AVENUE	35 MPH

GRAPHIC SCALE
0 50 100 200
1 inch = 100 ft.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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license number: C-0293, C-187

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CLIENT

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2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

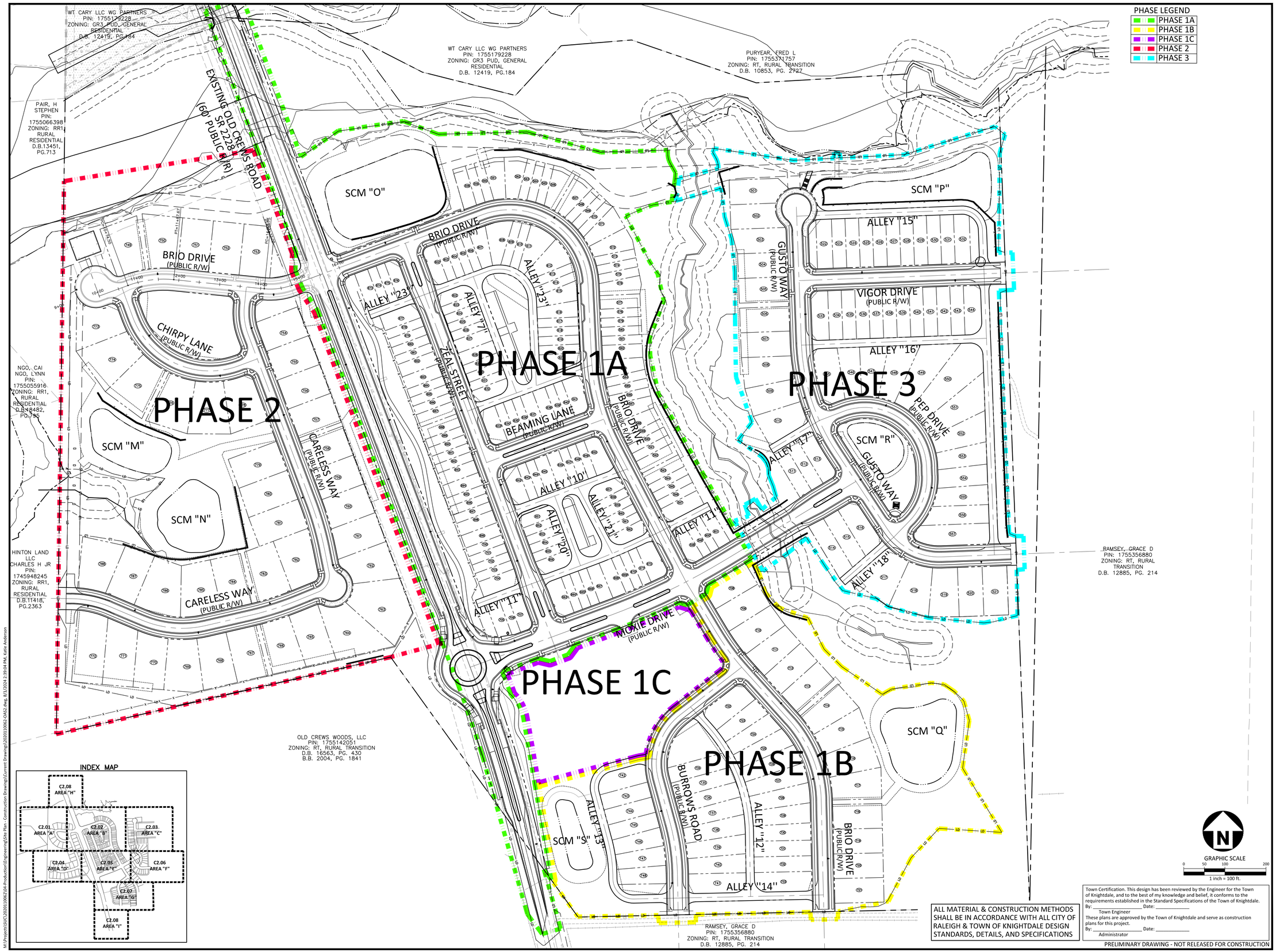
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=100'
DATE	12. 22. 2022

SHEET

OVER ALL SITE PLAN

C2.00

M:\Projects\SA\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-OAS1.dwg, 8/7/2024 2:38:42 PM, Katie Anderson



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SUNCREST Real Estate & Land

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CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=100'
DATE	12. 22. 2022

SHEET

OVER ALL PHASING PLAN

C2.00A

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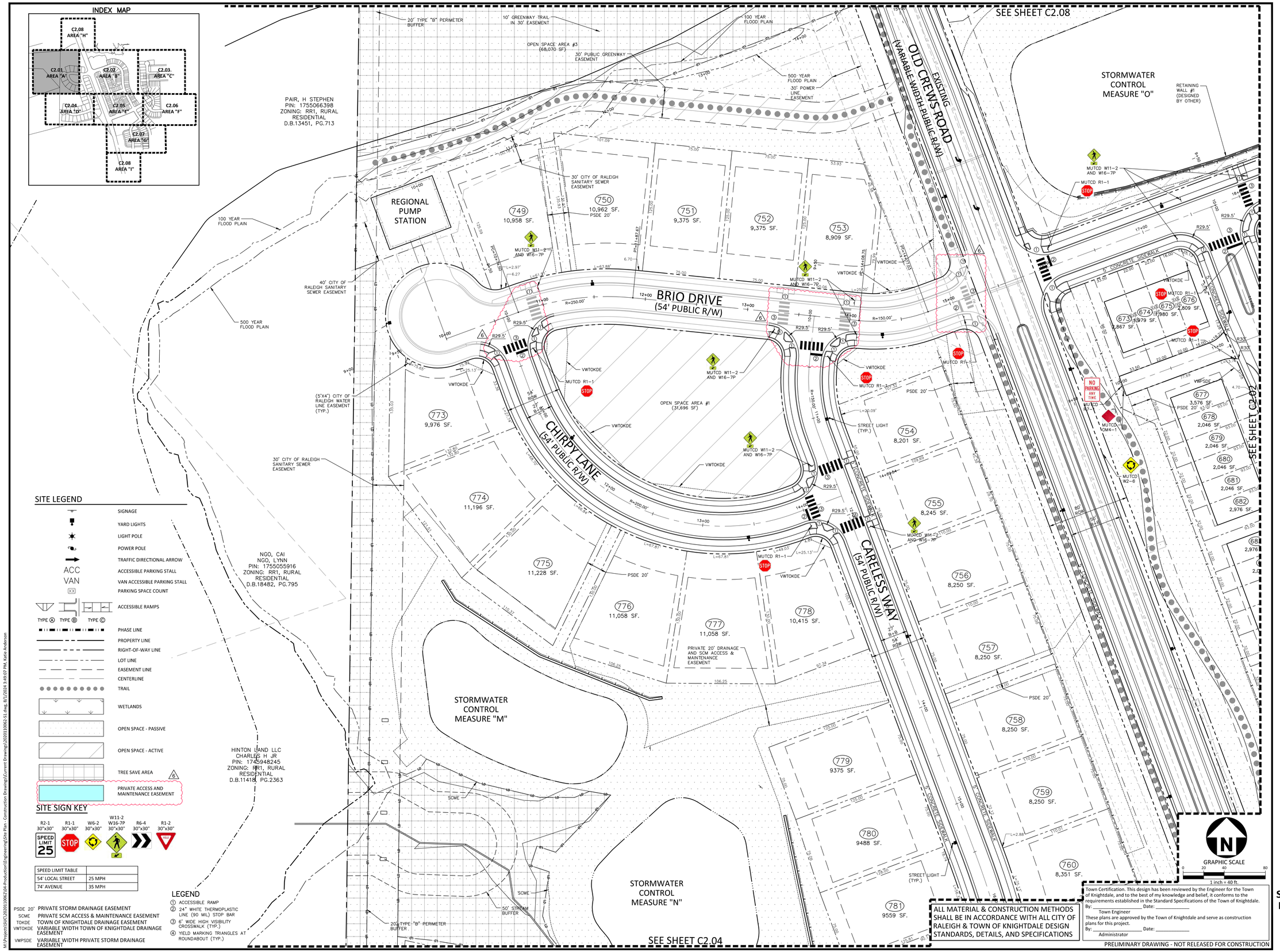

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1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION
PRELIMINARY

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

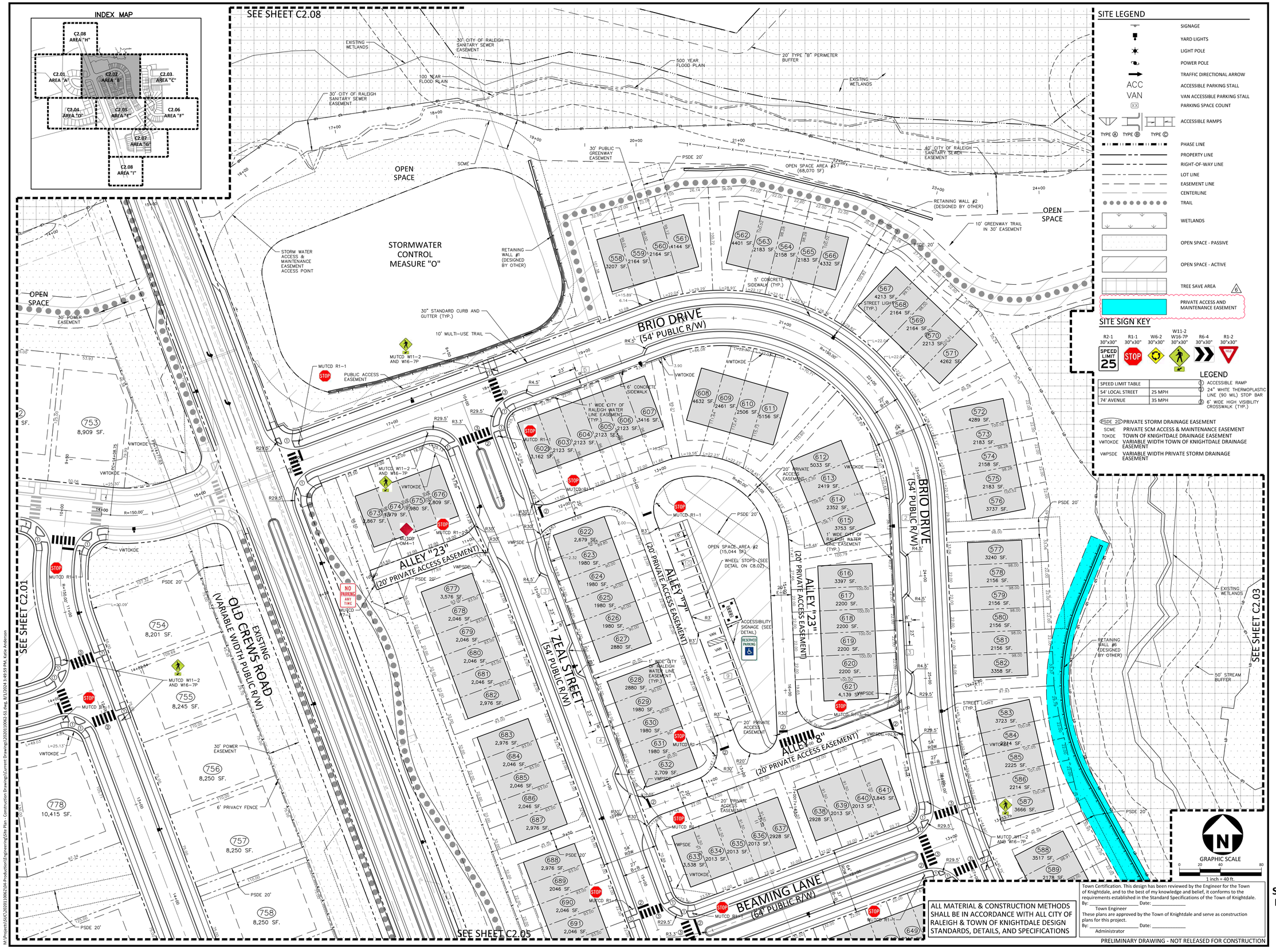
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "A"

C2.01

M:\Projects\SG\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-S1.dwg, 8/1/2024 3:49:07 PM, Katie Anderson



SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACCESSIBLE PARKING STALL (ACC)
- VAN ACCESSIBLE PARKING STALL (VAN)
- PARKING SPACE COUNT (XX)
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- TRAIL
- WETLANDS
- OPEN SPACE - PASSIVE
- OPEN SPACE - ACTIVE
- TREE SAVE AREA (6)
- PRIVATE ACCESS AND MAINTENANCE EASEMENT

SITE SIGN KEY

R2-1	R1-1	W6-2	W11-2 W16-7P	R6-4	R1-2
30"x30"	30"x30"	30"x30"	30"x30"	30"x30"	30"x30"
SPEED LIMIT 25	STOP				

LEGEND

SPEED LIMIT TABLE	
54' LOCAL STREET	25 MPH
74' AVENUE	35 MPH

1. ACCESSIBLE RAMP
2. 24" WHITE THERMOPLASTIC LINE (90 MIL) STOP BAR
3. 6" WIDE HIGH VISIBILITY CROSSWALK (TYP.)

PSDE 20' PRIVATE STORM DRAINAGE EASEMENT
SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

GRAPHIC SCALE 0 20 40 80
1 inch = 40 ft.

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PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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#180 BILTMORE PARK
PHOENIX, AZ 85016
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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RAIN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "B"

C2.02

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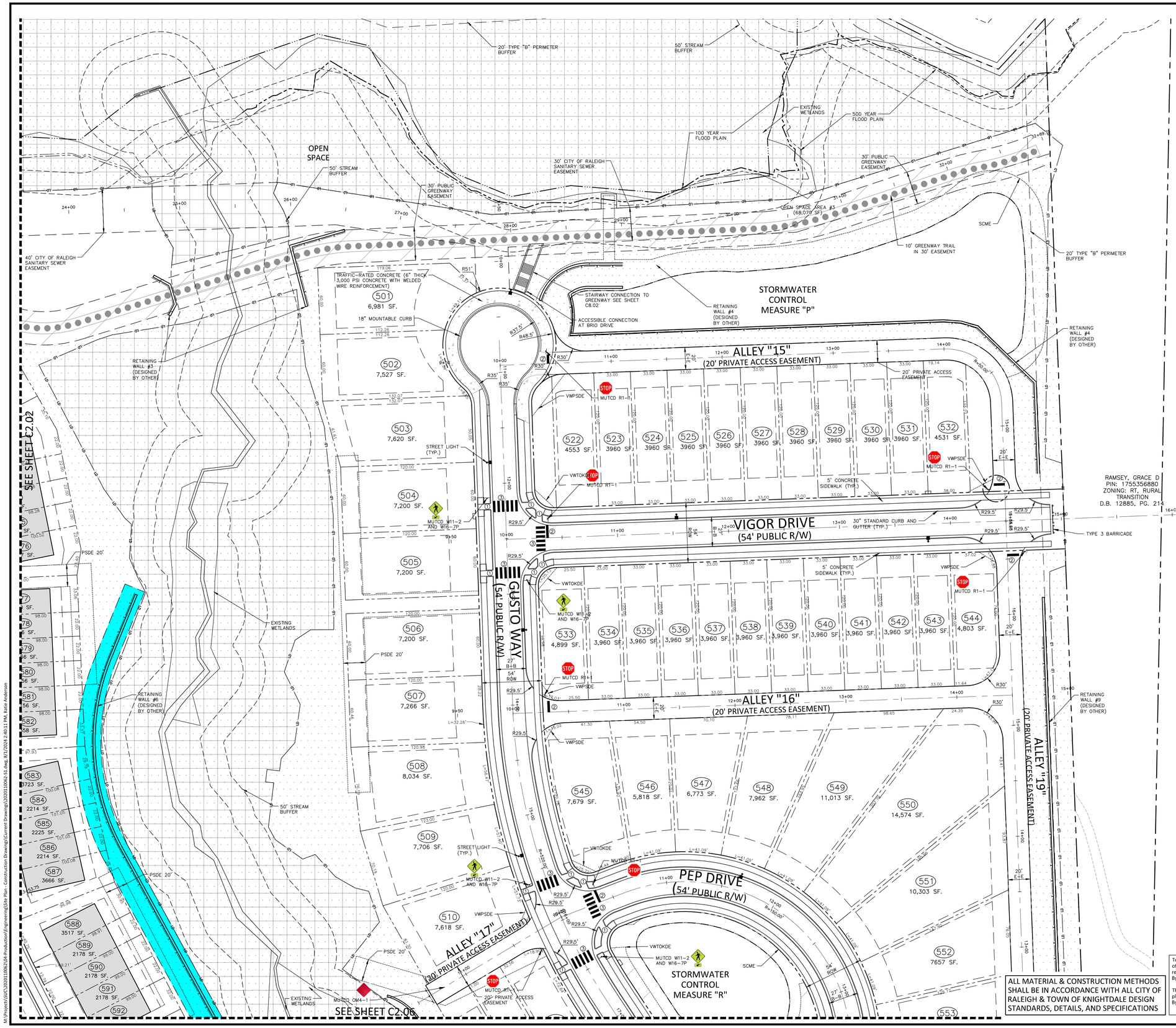


SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACCESSIBLE PARKING STALL (ACC)
- VAN ACCESSIBLE PARKING STALL (VAN)
- PARKING SPACE COUNT (XX)
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- TRAIL
- WETLANDS
- OPEN SPACE - PASSIVE
- OPEN SPACE - ACTIVE
- TREE SAVE AREA
- PRIVATE ACCESS AND MAINTENANCE EASEMENT

SITE SIGN KEY

R2-1 30"x30" SPEED LIMIT 25 | R1-1 30"x30" STOP | W6-2 30"x30" | W11-2 W16-7P 30"x30" | R6-4 30"x30" | R1-2 30"x30" YIELD

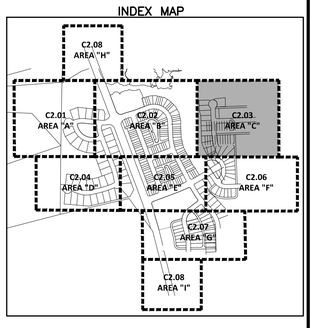
LEGEND

SPEED LIMIT TABLE	
54' LOCAL STREET	25 MPH
74' AVENUE	35 MPH

1. ACCESSIBLE RAMP
2. 24" WHITE THERMOPLASTIC LINE (90 MIL) STOP BAR
3. 5' WIDE HIGH VISIBILITY CROSSWALK (TYP.)

PSDE	20' PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE	VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

INDEX MAP



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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

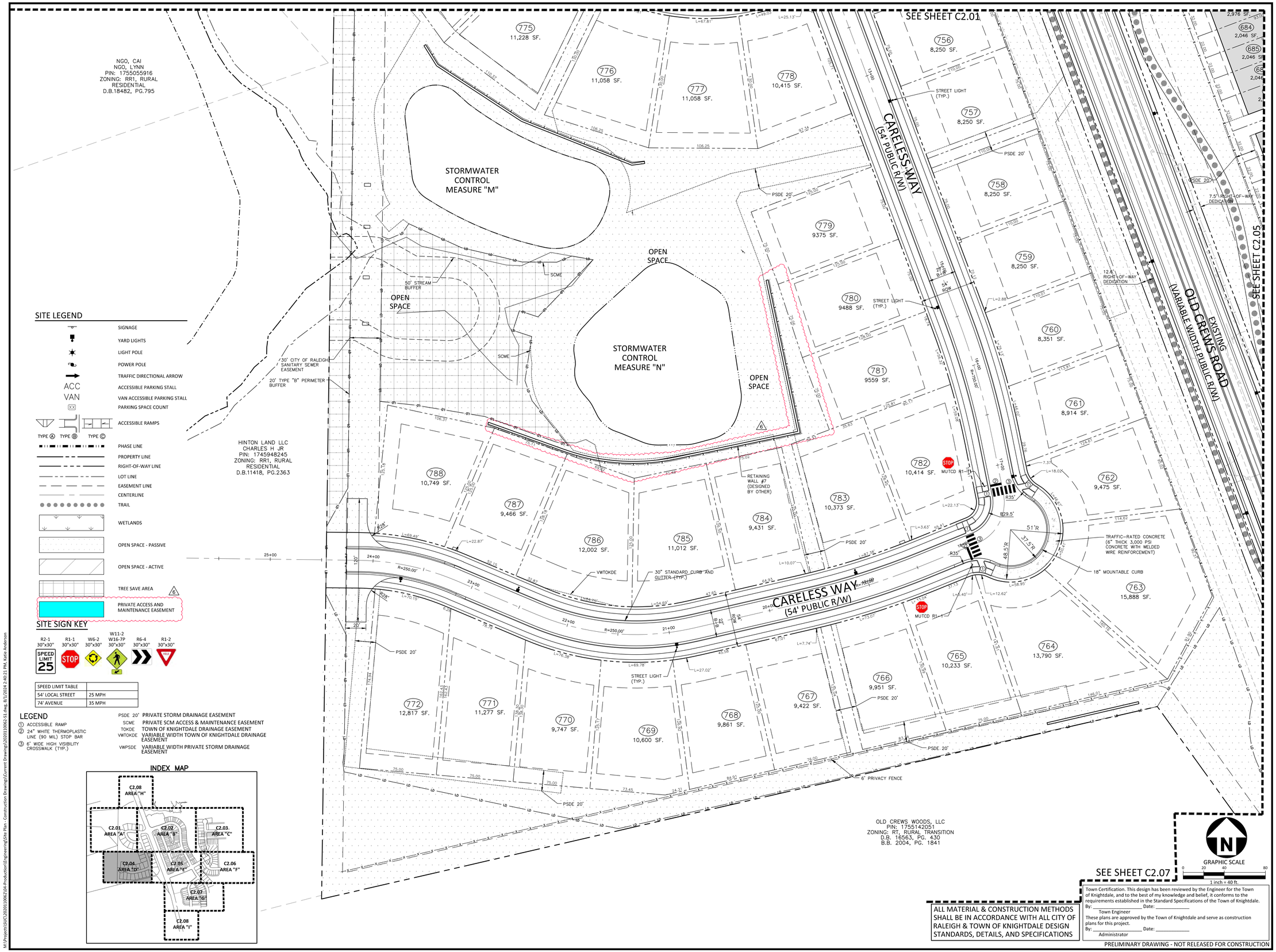
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "C"

C2.03

M:\Projects\SH\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-S1.dwg, 8/7/2024 2:40:11 PM, Katie Anderson



SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- XX — PARKING SPACE COUNT
- TYPE A, TYPE B, TYPE C — ACCESSIBLE RAMPS
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- TRAIL
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74' AVENUE	35 MPH

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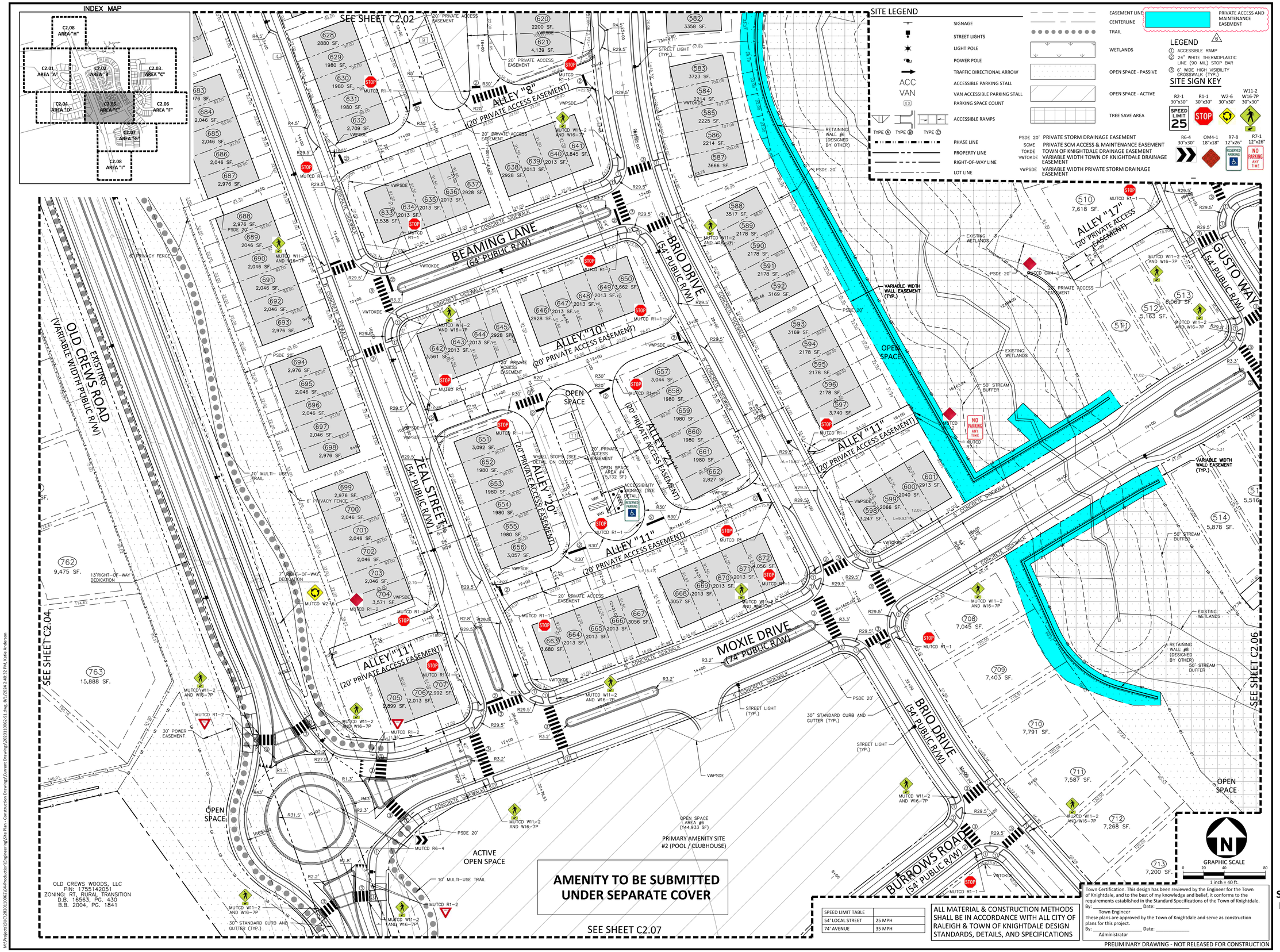
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "D"

C2.04



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PLAN INFORMATION

PROJECT NO.	2020110062
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DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "E"

C2.05

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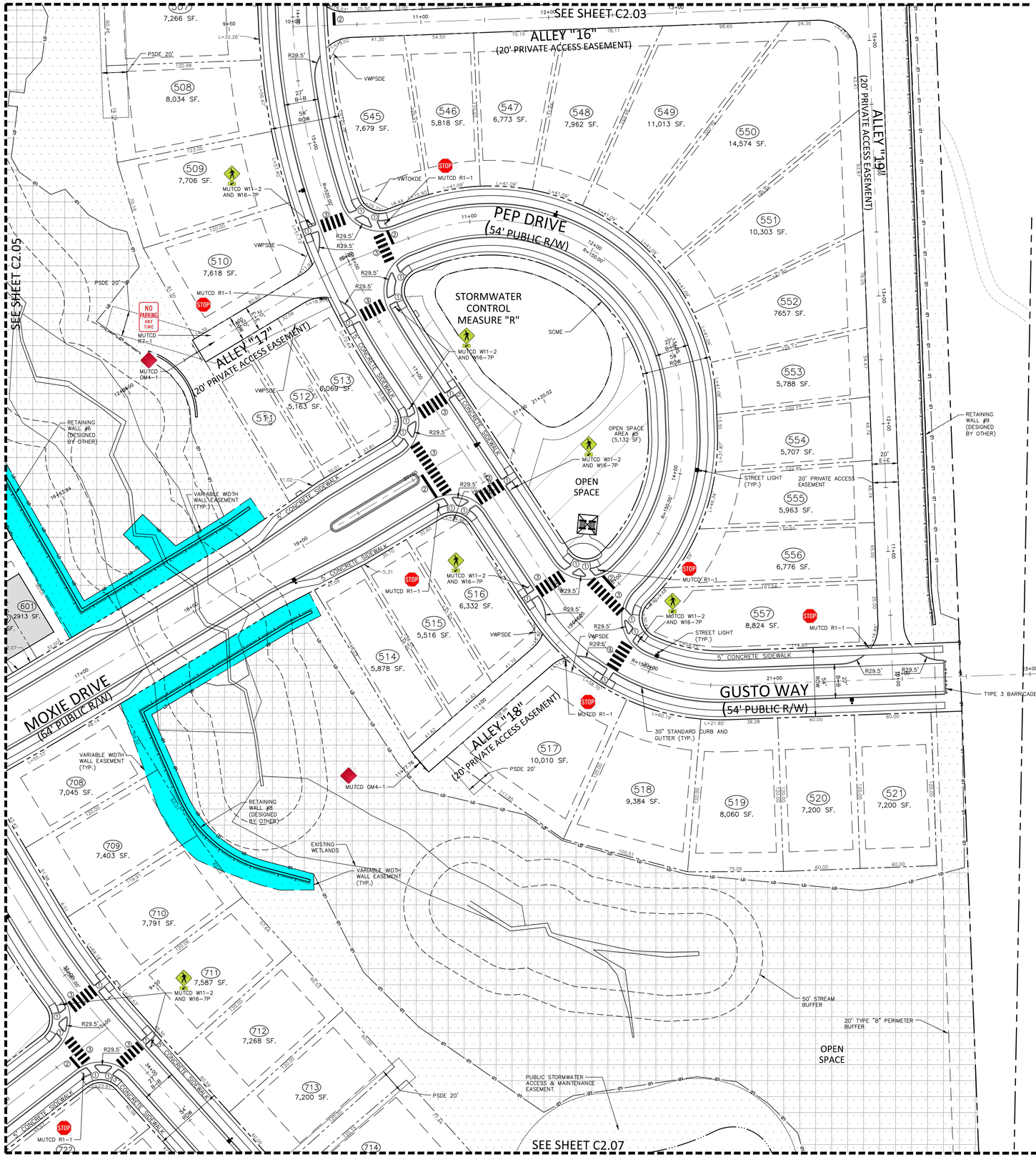

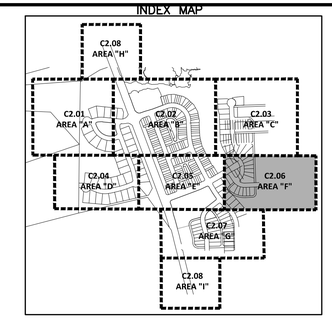

SITE LEGEND

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- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "F"

C2.06

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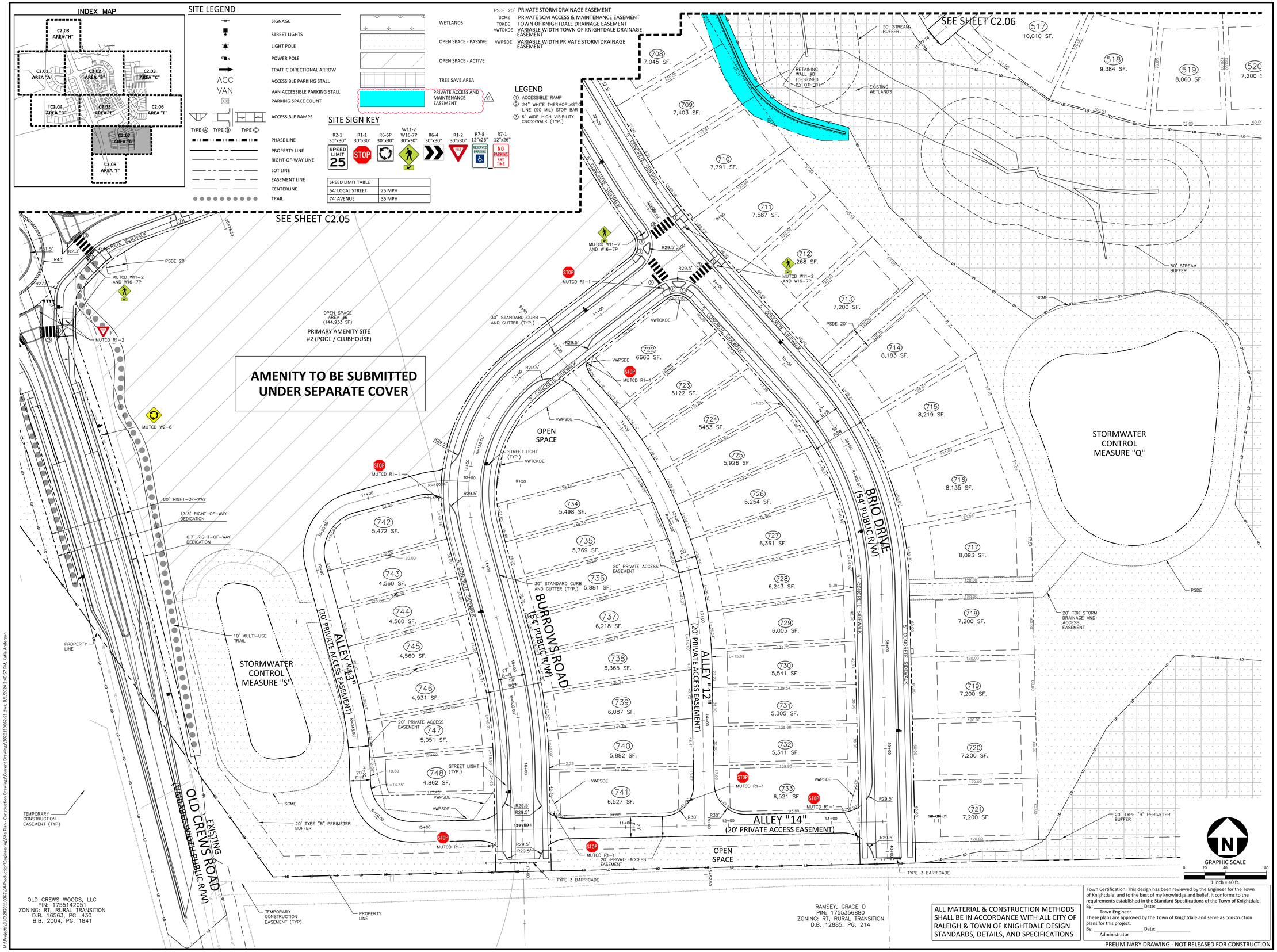

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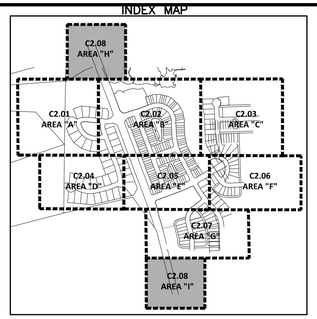
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "G"

C2.07

INDEX MAP



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- OPEN SPACE - PASSIVE
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LEGEND

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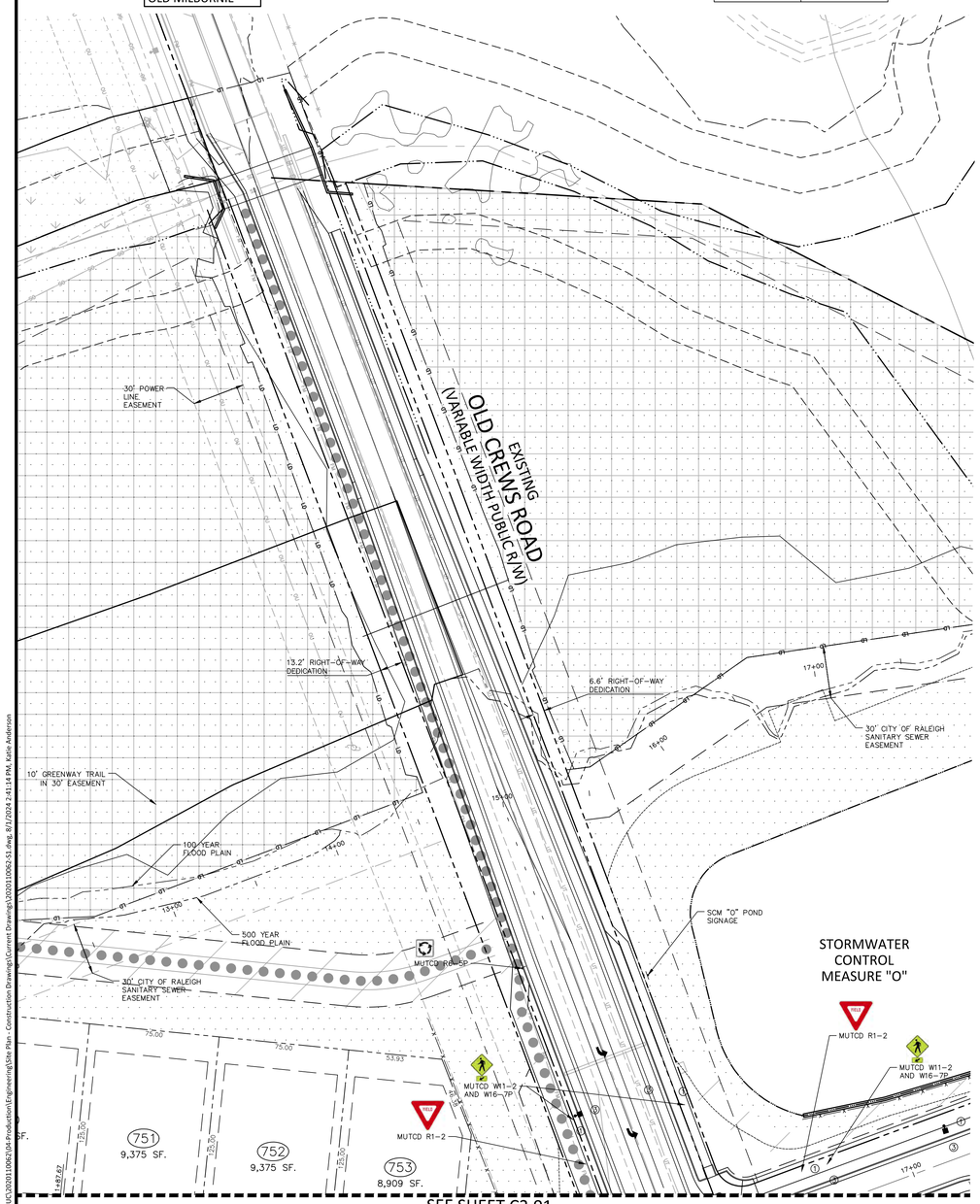
SITE SIGN KEY

R2-1	R1-1	R6-5P	W11-2 W16-7P	R6-4	R1-2	R7-8	R7-1
30"x30"	30"x30"	30"x30"	30"x30"	30"x30"	30"x30"	12"x26"	12"x26"
SPEED LIMIT 25	STOP				YIELD	RESERVED PARKING	NO PARKING ANY TIME

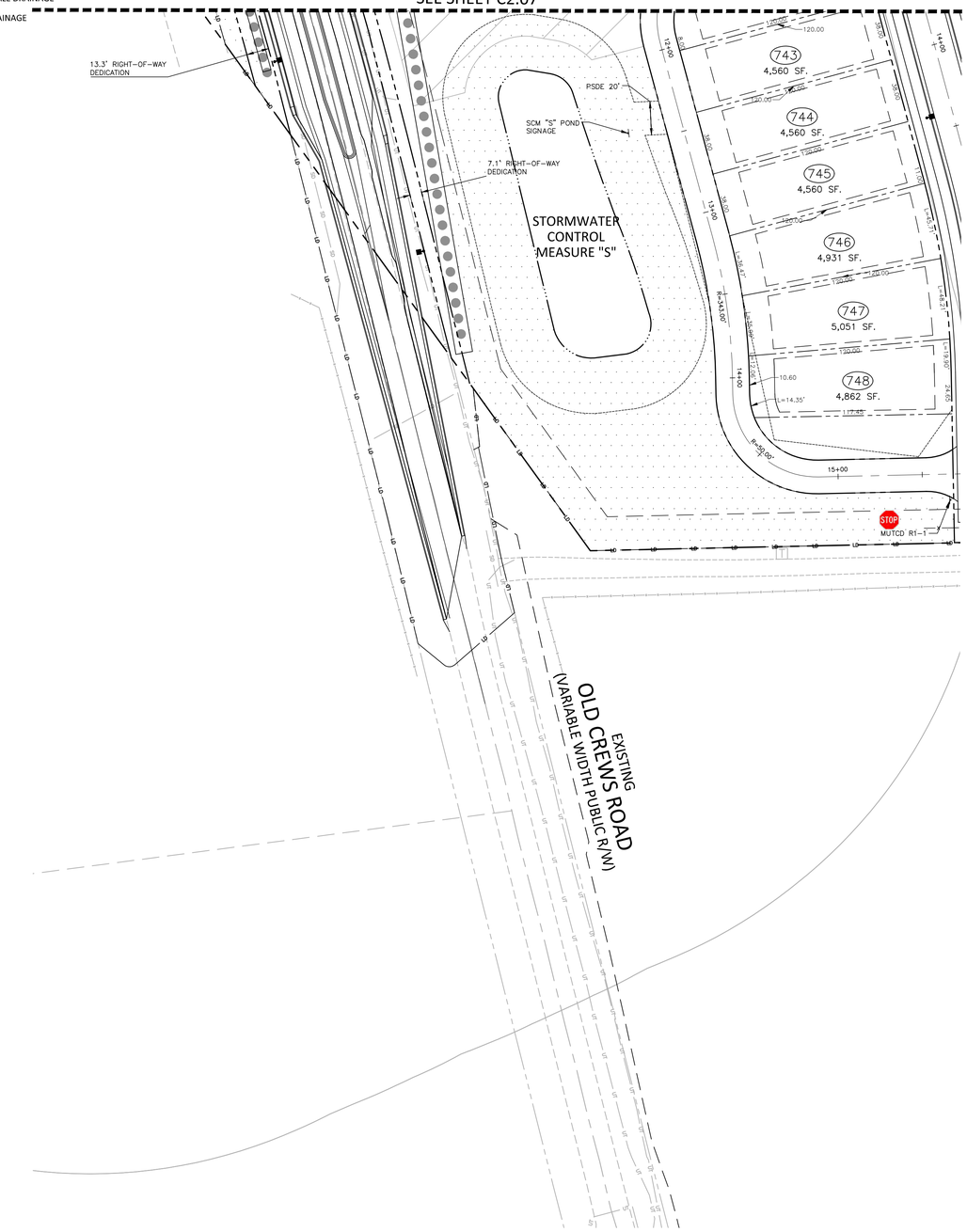
SPEED LIMIT TABLE	
54' LOCAL STREET	25 MPH
74' AVENUE	35 MPH

ROAD WIDENING BY OLD MILBURNIE



SEE SHEET C2.01

SEE SHEET C2.07



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2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

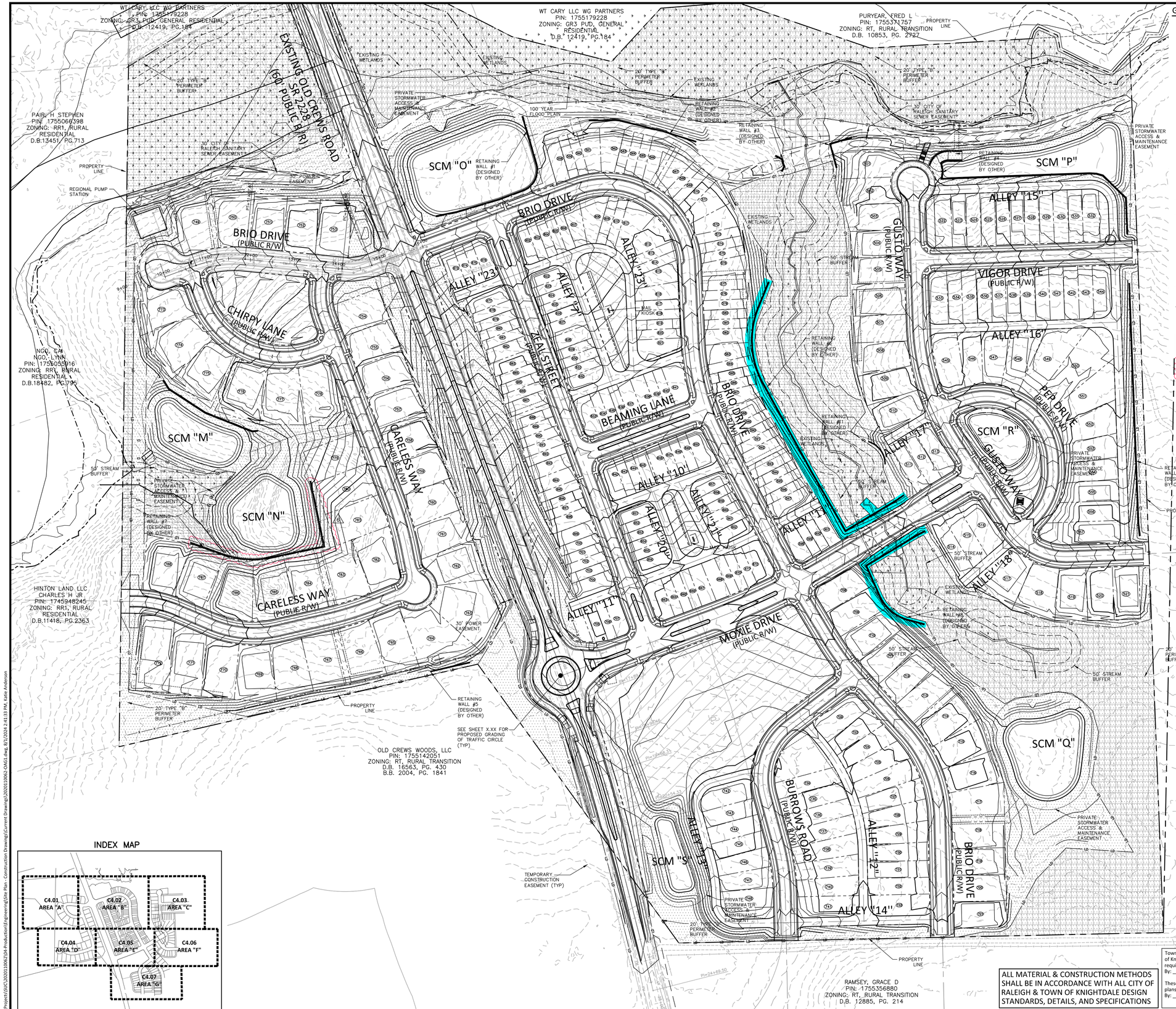
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

SITE, SIGNAGE, PAVEMENT MARKING PLAN-AREA "H"

C2.08

M:\Projects\SJC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-S1.dwg, 8/1/2024 2:41:18 PM, Katie Anderson



GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
- CATCH BASIN
- DROP INLET
- STORM SERVICE INLET
- STORM SERVICE ROOF-DRAIN
- JUNCTION BOX
- DRAINAGE FLOW ARROW
- LINE BREAK SYMBOL
- 250.50 / 250.00 — TOP & BOTTOM CURB ELEVATIONS
- TW=223.00 / BW=213.00 — TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION (NOTE: BOTTOM OF WALL IS GROUND ELEVATION NOT WALL FOUNDATION)
- + 250.60 — SPOT ELEVATION
- STORM DRAINAGE
- STORM SERVICE LINE
- RD — RD — RD — ROOF DRAIN, 8" ADS NON-PERFORATED TUBING OR EQUAL 1.0% MIN. SLOPE 3' MIN. COVER PVC SCHEDULE 40 IN TRAFFIC AREAS
- TP — TP — TP — TREE PROTECTION FENCE
- LD — LD — LIMITS OF DISTURBANCE
- WOODED AREA
- 250 — MAJOR CONTOUR
- 252 — MINOR CONTOUR
- 250 — EXISTING MAJOR CONTOUR
- 252 — EXISTING MINOR CONTOUR
- EASEMENT LINE
- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- TOWN OF KNIGHTDALE ACCESS AND MAINTENANCE EASEMENT (6)

INDEX MAP

GRAPHIC SCALE
0 50 100 200
1 inch = 100 ft.

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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=100'
DATE	12. 22. 2022

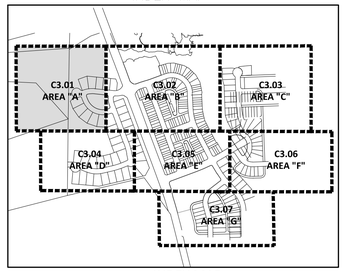
SHEET

OVERALL GRADING AND STORM DRAINAGE PLAN

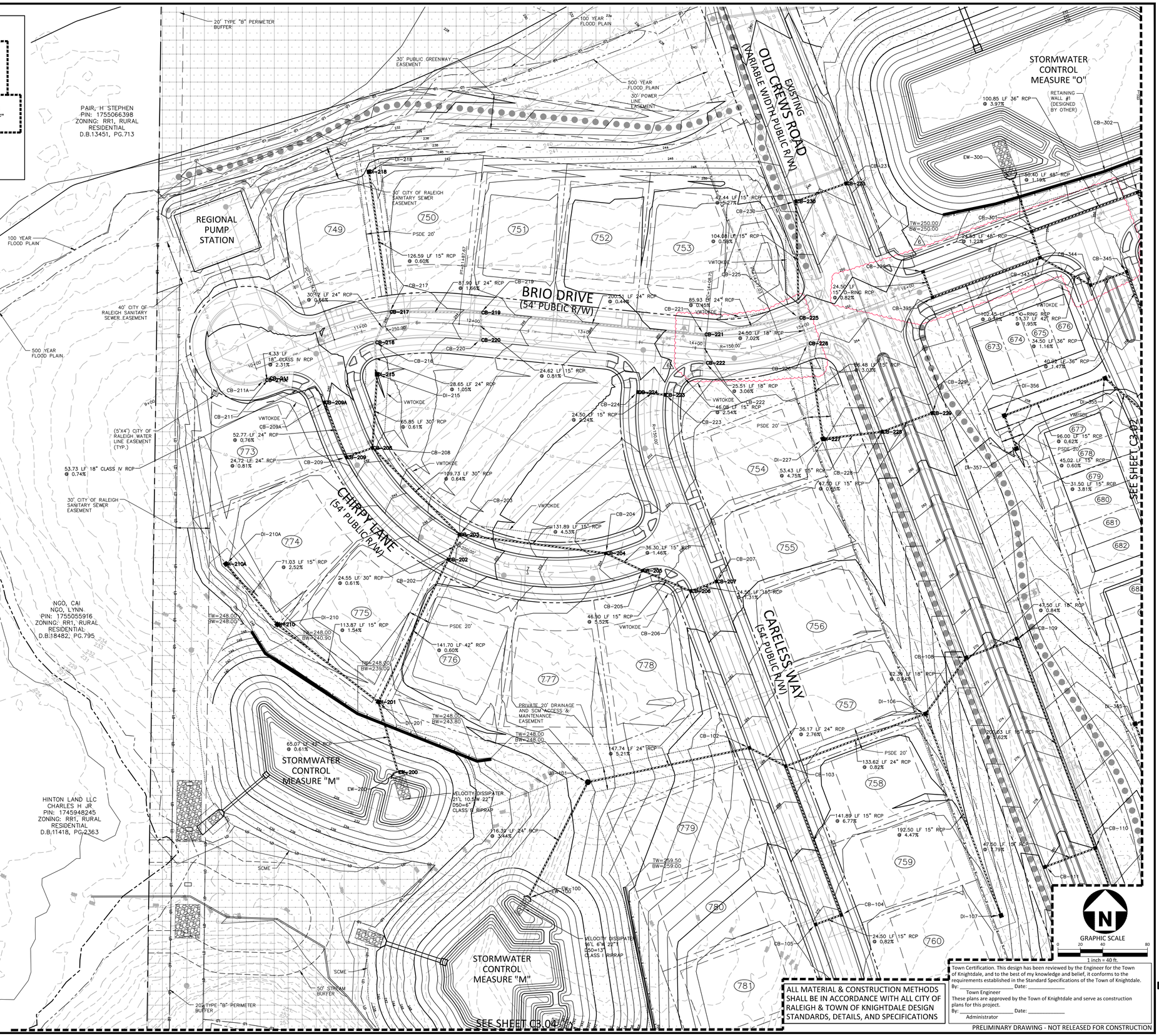
C3.00

M:\Projects\SA\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-OAG1.dwg, 8/1/2024 2:41:33 PM, Katie Anderson

INDEX MAP



INDEX MAP



GRADING LEGEND

	FLARED END SECTION
	ENDWALL SECTION
	CATCH BASIN
	DROP INLET
	STORM SERVICE INLET
	STORM SERVICE ROOF-DRAIN
	JUNCTION BOX
	DRAINAGE FLOW ARROW
	LINE BREAK SYMBOL
250.50 / 250.00	TOP & BOTTOM CURB ELEVATIONS
TW=223.00 / BW=213.00	TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION (NOTE: BOTTOM OF WALL IS GROUND ELEVATION NOT WALL FOUNDATION)
+ 250.60	SPOT ELEVATION
	STORM DRAINAGE
	STORM SERVICE LINE
RD RD RD	ROOF DRAIN, 8" ADS NON-PERFORATED TUBING OR EQUAL 1.0% MIN. SLOPE 3' MIN. COVER PVC SCHEDULE 40 IN TRAFFIC AREAS
TP TP TP	TREE PROTECTION FENCE
LD LD	LIMITS OF DISTURBANCE
	WOODED AREA
250	MAJOR CONTOUR
252	MINOR CONTOUR
250	EXISTING MAJOR CONTOUR
252	EXISTING MINOR CONTOUR
	EASEMENT LINE
	ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
	TRAIL

PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE	VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

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1 inch = 40 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

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5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

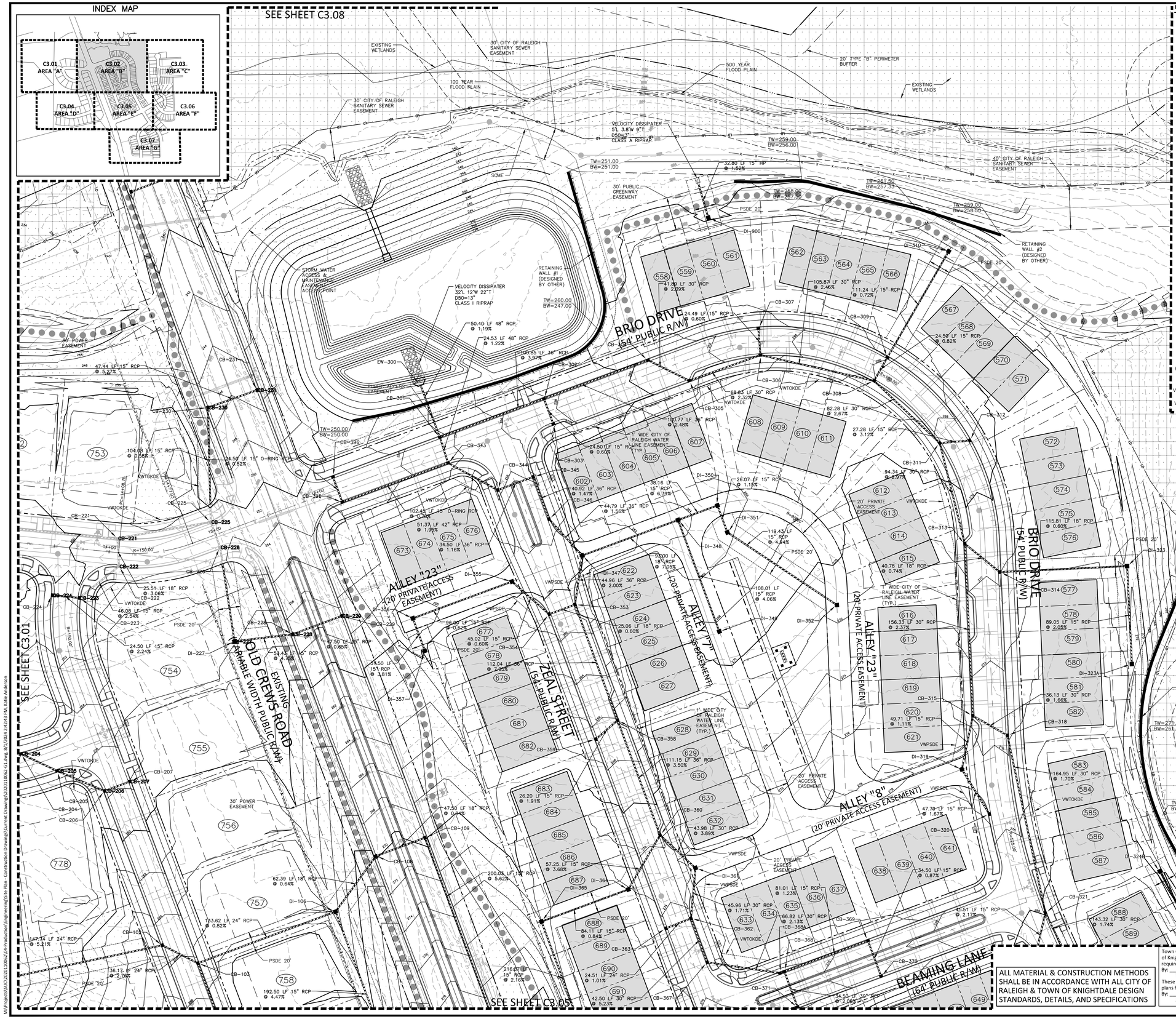
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "A"

C3.01

M:\Projects\US\CA\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-G1.dwg, 8/1/2024 2:42:31 PM, Katie Anderson



GRADING LEGEND

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- ENDWALL SECTION
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- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- TRAIL

PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL SEAL ENGINEER 049483 RYAN K. BARKER
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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "B"

C3.02

M:\Projects\SA\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-G1.dwg, 8/1/2024 2:42:43 PM, Katie Anderson

GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
- CATCH BASIN
- DROP INLET
- STORM SERVICE INLET
- STORM SERVICE ROOF-DRAIN
- JUNCTION BOX
- DRAINAGE FLOW ARROW
- LINE BREAK SYMBOL
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- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- TRAIL

PSDE 20' PRIVATE STORM DRAINAGE EASEMENT
SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

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5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "C"

C3.03

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-G1.dwg, 8/1/2024 2:42:58 PM, Katie Anderson

GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
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- DROP INLET
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INDEX MAP

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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "D"

C3.04

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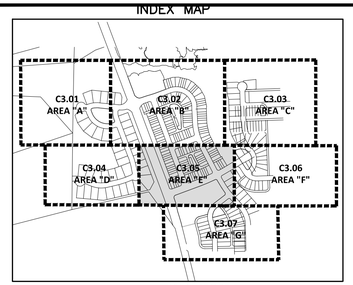
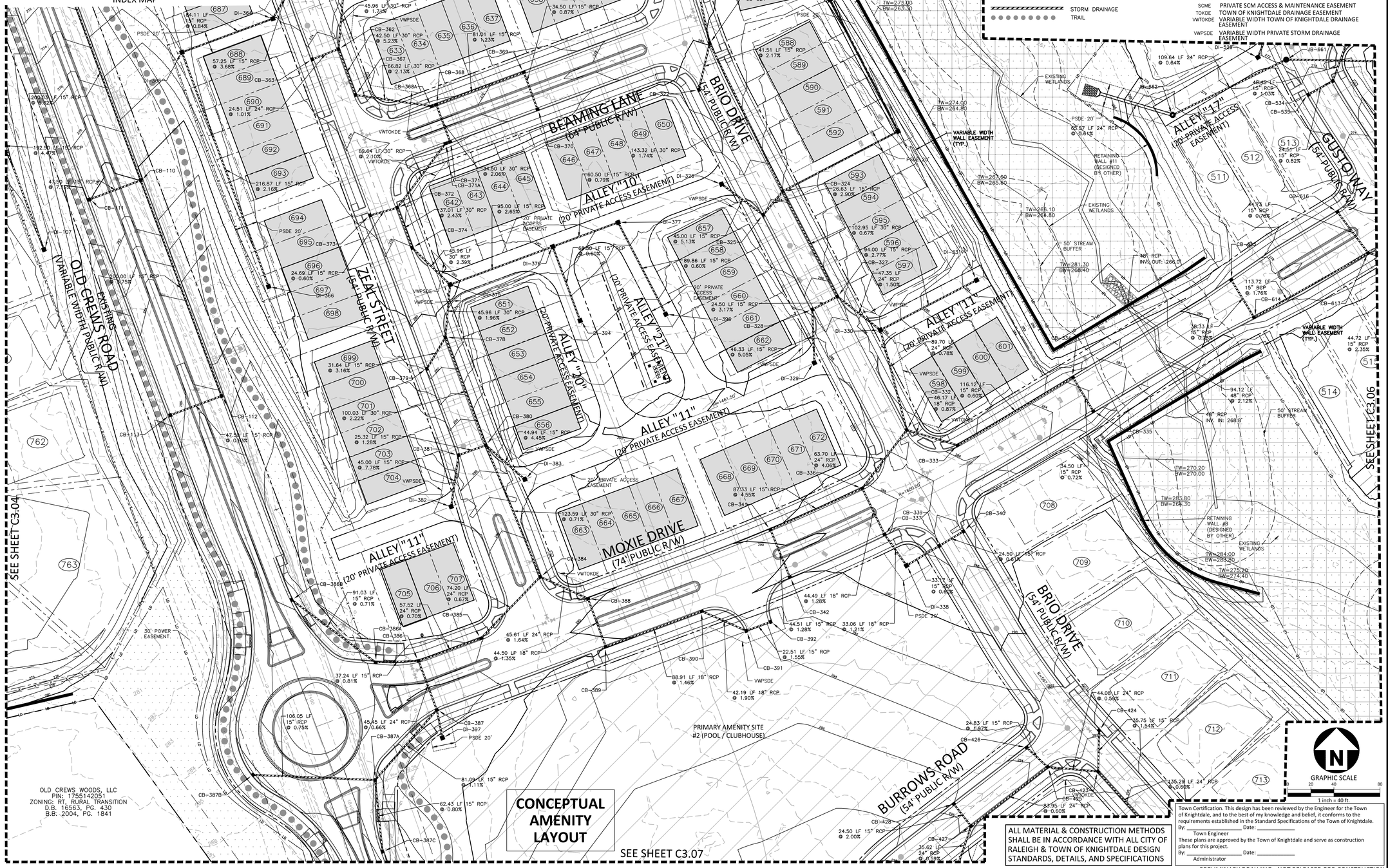
INDEX MAP



INDEX MAP



GRADING LEGEND

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- STORM SERVICE INLET
- STORM SERVICE ROOF-DRAIN
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GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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PLAN INFORMATION

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FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "E"

C3.05

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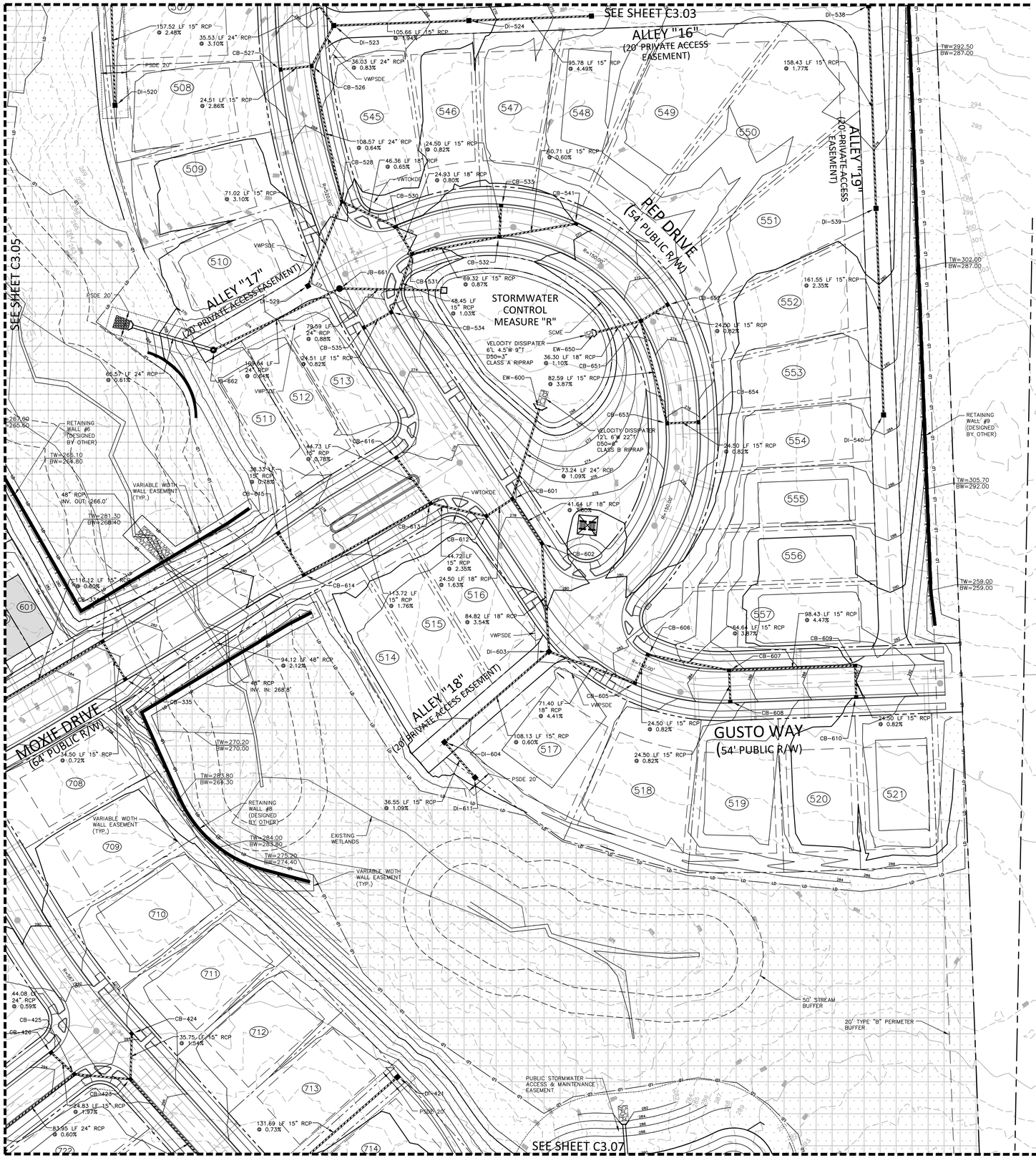
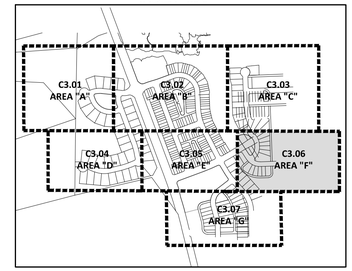


INDEX MAP



GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
- CATCH BASIN
- DROP INLET
- STORM SERVICE INLET
- STORM SERVICE ROOF-DRAIN
- JUNCTION BOX
- DRAINAGE FLOW ARROW
- LINE BREAK SYMBOL
- 250.50 / 250.00 — TOP & BOTTOM CURB ELEVATIONS
- TW=223.00 / BW=213.00 — TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION (NOTE: BOTTOM OF WALL IS GROUND ELEVATION NOT WALL FOUNDATION)
- + 250.60 — SPOT ELEVATION
- STORM DRAINAGE
- STORM SERVICE LINE
- RD — RD — RD — ROOF DRAIN, 8" ADS NON-PERFORATED TUBING OR EQUAL 1.0% MIN. SLOPE 3' MIN. COVER PVC SCHEDULE 40 IN TRAFFIC AREAS
- TP — TP — TP — TREE PROTECTION FENCE
- LD — LD — LIMITS OF DISTURBANCE
- WOODED AREA
- 250 — MAJOR CONTOUR
- 252 — MINOR CONTOUR
- 250 — EXISTING MAJOR CONTOUR
- 252 — EXISTING MINOR CONTOUR
- EASEMENT LINE
- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- TRAIL

PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE	VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

MCADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "F"

C3.06

M:\Projects\SK\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-G1.dwg, 8/7/2024 2:43:43 PM, Katie Anderson

INDEX MAP

GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
- CATCH BASIN
- DROP INLET
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VWTOKDE VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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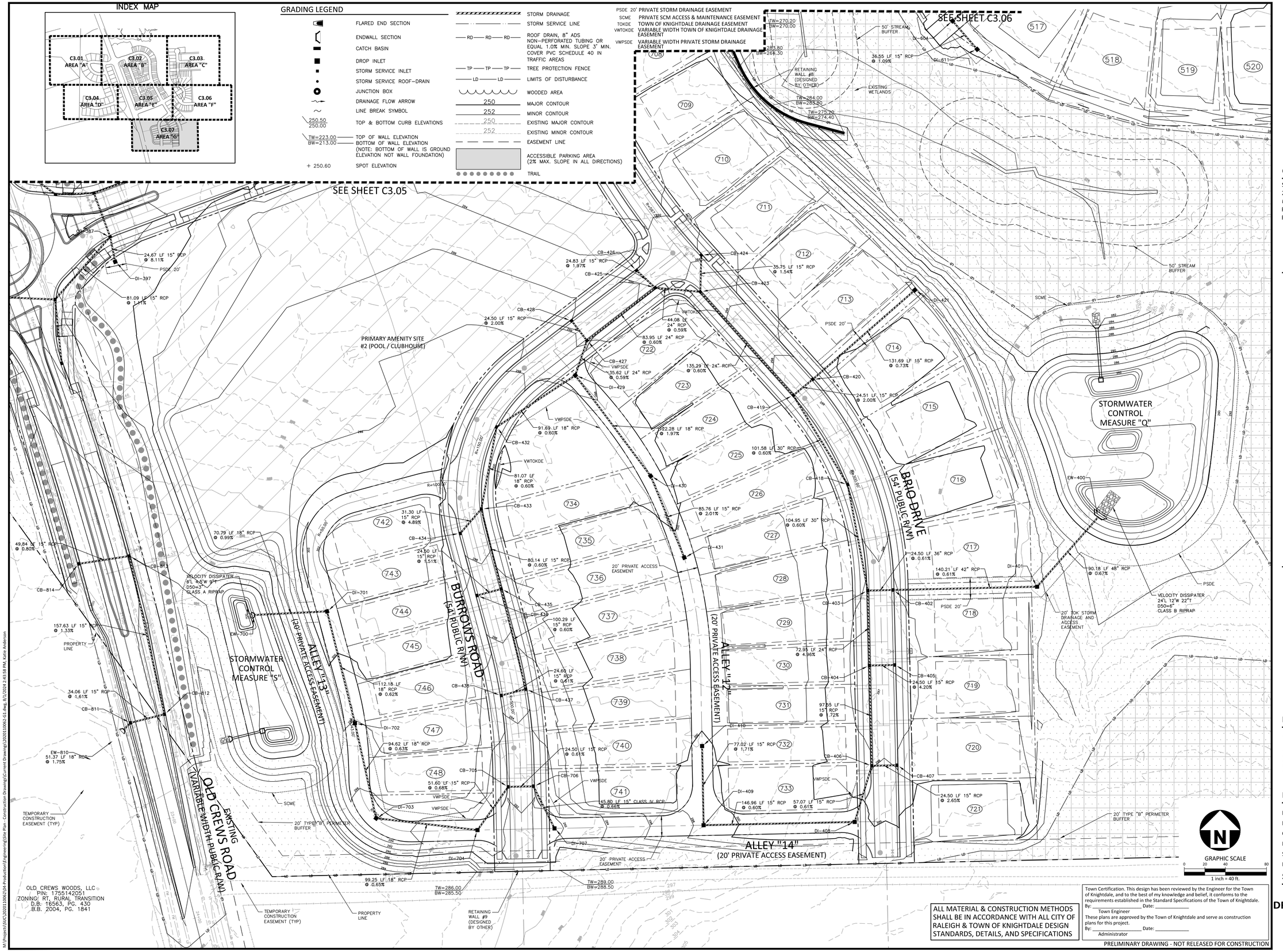

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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

GRADING AND STORM DRAINAGE PLAN - AREA "G"

C3.07

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-G1.dwg, 8/1/2024 2:43:58 PM, Katie Anderson

CB-102
T/C=265.44
INV IN=256.30 (CB-103)
INV OUT=256.20

CB-103
T/C=266.75
INV IN=257.40 (DI-106)
INV IN=258.10 (CB-104)
INV OUT=257.30

CB-104
T/C=272.58
INV IN=267.80 (CB-105)
INV OUT=267.70

CB-105
T/C=272.58
INV OUT=268.00

CB-108
T/C=270.01
INV IN=259.50 (CB-109)
INV OUT=259.40

CB-109
T/C=270.01
INV IN=260.15 (CB-110)
INV OUT=259.90

CB-110
T/C=280.62
INV IN=271.50 (CB-112)
INV IN=271.50 (CB-111)
INV OUT=271.40

CB-111
T/C=279.97
INV OUT=275.20

CB-112
T/C=286.11
INV IN=279.10 (CB-113)
INV OUT=279.00

CB-113
T/C=285.43
INV OUT=279.40

CB-152
T/C=272.61
INV IN=268.10 (CB-153)
INV IN=268.90 (CB-155)
INV IN=249.10 (CB-159)
INV OUT=249.00

CB-153
T/C=274.55
INV IN=269.60 (CB-154)
INV OUT=269.50

CB-154
T/C=274.71
INV OUT=270.20

CB-155
T/C=272.61
INV IN=269.15 (DI-156)
INV OUT=269.05

CB-159
T/C=272.89
INV IN=250.00 (CB-160)
INV OUT=249.90

CB-160
T/C=270.78
INV IN=262.60 (CB-166)
INV IN=250.90 (CB-161)
INV OUT=250.40

CB-161
T/C=264.41
INV IN=251.90 (CB-162)
INV IN=258.93 (CB-167)
INV OUT=251.70

CB-162
T/C=258.11
INV IN=253.20 (CB-163)
INV OUT=253.10

CB-163
T/C=257.70
INV IN=253.50 (DI-164)
INV OUT=253.40

CB-166
T/C=270.47
INV OUT=262.80

CB-167
T/C=263.45
INV OUT=259.12

CB-202
T/C=248.07
INV IN=233.65 (CB-203)
INV OUT=233.65

CB-203
T/C=247.99
INV IN=243.66 (CB-204)
INV IN=233.90 (CB-208)
INV OUT=233.80

CB-204
T/C=254.43
INV IN=249.74 (CB-205)
INV OUT=249.64

CB-205
T/C=255.09
INV IN=250.37 (CB-206)
INV OUT=250.27

CB-206
T/C=258.09
INV IN=253.06 (CB-207)
INV OUT=252.96

CB-207
T/C=258.09
INV OUT=253.38

CB-208
T/C=241.85
INV IN=234.70 (DI-215)
INV IN=235.00 (CB-209)
INV OUT=234.60

CB-209
T/C=241.72
INV IN=235.20 (CB-209A)
INV OUT=235.20

CB-209A
T/C=240.38
INV IN=235.70 (CB-211)
INV OUT=235.60

CB-211A
T/C=239.20
INV OUT=236.30

CB-216
T/C=241.80
INV IN=235.80 (CB-217)
INV OUT=235.70

CB-217
T/C=242.37
INV IN=236.10 (CB-219)
INV IN=236.75 (DI-218)
INV OUT=236.00

CB-219
T/C=245.00
INV IN=237.40 (CB-221)
INV IN=237.90 (CB-220)
INV OUT=237.46

CB-220
T/C=245.07
INV OUT=238.10

CB-221
T/C=251.37
INV IN=238.45 (CB-225)
INV IN=242.59 (CB-222)
INV OUT=238.35

CB-222
T/C=251.44
INV IN=243.62 (CB-223)
INV OUT=243.37

CB-223
T/C=250.62
INV IN=244.89 (CB-224)
INV OUT=244.79

CB-224
T/C=250.62
INV OUT=245.44

6 CB-225
T/C=251.28
INV IN=242.88 (CB-226)
INV IN=239.60 (CB-230)
INV OUT=238.84

CB-226
T/C=251.28
INV IN=244.85 (DI-227)
INV OUT=244.60

CB-228
T/C=257.24
INV IN=250.21 (CB-229)
INV OUT=250.11

CB-229
T/C=257.24
INV OUT=250.52

CB-230
T/C=250.11
INV IN=240.30 (CB-231)
INV OUT=240.20

CB-231
T/C=249.42
INV OUT=242.80

CB-301
T/C=253.72
INV IN=245.20 (CB-343)
INV IN=246.30 (CB-302)
INV OUT=245.10

CB-302
T/C=257.96
INV IN=250.40 (CB-304)
INV IN=253.05 (CB-303)
INV OUT=250.30

CB-303
T/C=257.95
INV OUT=253.20

CB-304
T/C=260.77
INV IN=252.90 (CB-305)
INV OUT=252.90

CB-305
T/C=261.40
INV IN=254.00 (CB-306)
INV OUT=253.90

CB-306
T/C=263.42
INV IN=255.70 (CB-308)
INV IN=258.52 (CB-307)
INV OUT=255.60

CB-307
T/C=263.42
INV OUT=258.67

CB-308
T/C=266.41
INV IN=258.40 (CB-311)
INV IN=260.20 (CB-309)
INV OUT=258.30

CB-309
T/C=266.40
INV IN=260.50 (DI-310)
INV OUT=260.40

CB-311
T/C=268.71
INV IN=260.70 (CB-313)
INV IN=263.71 (CB-312)
INV OUT=260.60

CB-312
T/C=269.03
INV OUT=264.56

CB-313
T/C=271.28
INV IN=263.60 (CB-315)
INV IN=264.50 (CB-314)
INV OUT=263.50

CB-314
T/C=272.11
INV IN=264.90 (DI-323)
INV OUT=264.80

CB-315
T/C=275.35
INV IN=267.40 (CB-318)
INV IN=270.55 (DI-319)
INV OUT=267.30

CB-318
T/C=275.97
INV IN=268.10 (CB-321)
INV OUT=268.00

CB-320
T/C=277.77
INV OUT=272.00

CB-321
T/C=280.39
INV IN=271.00 (CB-324)
INV IN=275.60 (CB-322)
INV OUT=270.90

CB-322
T/C=281.26
INV OUT=276.50

CB-324
T/C=284.14
INV IN=273.60 (CB-327)
INV IN=274.40 (DI-324A)
INV IN=274.65 (CB-325)
INV OUT=273.50

CB-325
T/C=284.42
INV IN=275.52 (DI-326)
INV OUT=275.42

CB-327
T/C=286.83
INV IN=274.29 (DI-330)
INV IN=275.44 (CB-328)
INV OUT=274.29

CB-328
T/C=286.83
INV IN=276.32 (DI-329)
INV OUT=276.22

CB-332
T/C=287.53
INV IN=275.90 (CB-336)
INV IN=276.30 (CB-333)
INV OUT=275.80

CB-333
T/C=286.13
INV IN=277.00 (CB-334)
INV OUT=276.70

CB-334
T/C=283.24
INV IN=277.80 (CB-335)
INV OUT=277.70

CB-335
T/C=283.24
INV OUT=278.05

CB-336
T/C=288.60
INV IN=279.24 (CB-341)
INV IN=279.09 (CB-337)
INV OUT=278.49

CB-337
T/C=288.60
INV IN=279.76 (DI-338)
INV OUT=279.66

CB-339
T/C=287.62
INV IN=280.70 (CB-340)
INV OUT=280.60

CB-340
T/C=287.62
INV OUT=280.85

CB-341
T/C=290.17
INV IN=283.31 (CB-342)
INV OUT=283.21

CB-342
T/C=290.17
INV OUT=283.88

6 CB-343
T/C=253.75
INV IN=246.10 (CB-344)
INV IN=245.60 (CB-395)
INV OUT=245.50

6 CB-344
T/C=256.34
INV IN=247.10 (CB-345)
INV OUT=247.10

CB-345
T/C=256.34
INV IN=247.60 (CB-346)
INV OUT=247.50

CB-346
T/C=257.45
INV IN=248.30 (DI-347)
INV OUT=248.20

CB-353
T/C=261.12
INV IN=250.10 (CB-358)
INV IN=251.73 (CB-354)
INV OUT=250.00

CB-354
T/C=261.12
INV IN=252.13 (DI-355)
INV OUT=251.88

CB-358
T/C=266.54
INV IN=258.10 (CB-360)
INV IN=261.70 (CB-359)
INV OUT=258.00

CB-359
T/C=266.99
INV OUT=262.20

CB-360
T/C=271.90
INV IN=262.49 (DI-361)
INV IN=264.61 (DI-364)
INV OUT=261.99

CB-362
T/C=274.72
INV IN=265.19 (CB-367)
INV IN=265.59 (CB-363)
INV OUT=265.09

CB-363
T/C=274.73
INV OUT=265.83

CB-367
T/C=275.59
INV IN=267.51 (CB-368A)
INV OUT=267.41

CB-368
T/C=275.89
INV IN=269.23 (CB-371)
INV IN=270.80 (CB-369)
INV OUT=269.13

CB-368A
T/C=275.89
INV IN=269.03 (CB-368)
INV OUT=268.93

CB-369
T/C=277.04
INV IN=271.90 (CB-370)
INV OUT=271.80

CB-370
T/C=277.05
INV OUT=272.20

CB-371
T/C=275.89
INV IN=270.04 (CB-371A)
INV OUT=269.94

CB-371A
T/C=275.89
INV IN=270.24 (CB-372)
INV OUT=270.14

CB-372
T/C=277.69
INV IN=271.80 (CB-374)
INV IN=272.83 (CB-373)
INV OUT=271.70

CB-373
T/C=277.65
INV OUT=272.98

CB-374
T/C=278.47
INV IN=271.80 (DI-375)
INV OUT=272.70

CB-378
T/C=281.21
INV IN=275.40 (CB-380)
INV IN=276.30 (CB-379)
INV OUT=275.30

CB-379
T/C=282.05
INV OUT=277.30

CB-380
T/C=285.39
INV IN=277.73 (CB-384)
INV IN=281.30 (DI-383)
INV IN=278.58 (CB-381)
INV OUT=277.63

CB-381
T/C=285.39
INV IN=279.00 (DI-382)
INV OUT=278.90

CB-384
T/C=289.05
INV IN=279.10 (CB-385)
INV IN=279.10 (CB-388)
INV OUT=278.60

CB-385
T/C=288.39
INV IN=279.70 (CB-386)
INV OUT=279.60

CB-386
T/C=287.47
INV IN=280.20 (CB-387)
INV IN=281.10 (CB-386A)
INV OUT=280.10

CB-386A
T/C=288.32
INV IN=281.50 (CB-386B)
INV OUT=281.40

CB-386B
T/C=288.38
INV OUT=282.15

CB-387
T/C=287.47
INV IN=281.10 (CB-387A)
INV IN=281.60 (DI-397)
INV OUT=280.50

CB-387A
T/C=287.90
INV IN=282.10 (CB-387B)
INV IN=282.30 (CB-387C)
INV OUT=282.00

CB-387B
T/C=287.34
INV OUT=282.90

CB-387C
T/C=287.51
INV OUT=282.80

CB-388
T/C=290.26
INV IN=280.50 (CB-389)
INV OUT=279.85

CB-389
T/C=290.26
INV IN=281.20 (CB-390)
INV OUT=281.10

CB-390
T/C=290.69
INV IN=282.60 (CB-391)
INV OUT=282.50

CB-391
T/C=293.94
INV IN=283.65 (CB-392)
INV OUT=283.40

CB-392
T/C=293.60
INV OUT=284.00

6 CB-395
T/C=250.91
INV IN=246.50 (CB-396)
INV OUT=246.40

CB-396
T/C=250.91
INV OUT=246.70

CB-402
T/C=297.87
INV IN=285.35 (CB-403)
INV OUT=285.25

CB-403
T/C=297.87
INV IN=285.96 (CB-418)
INV IN=286.50 (CB-404)
INV OUT=285.50

CB-404
T/C=297.18
INV IN=290.87 (CB-406)
INV IN=290.87 (CB-405)
INV OUT=290.12

CB-405
T/C=297.17
INV OUT=291.90

CB-406
T/C=298.37
INV IN=292.65 (DI-408)
INV IN=292.65 (CB-407)
INV OUT=292.55

CB-407
T/C=298.37
INV OUT=293.30

CB-418
T/C=299.17
INV IN=286.69 (CB-419)
INV OUT=286.59

CB-419
T/C=298.97
INV IN=287.30 (CB-423)
INV IN=288.55 (CB-420)
INV OUT=287.30

CB-420
T/C=299.02
INV IN=289.14 (DI-421)
INV OUT=289.04

CB-423
T/C=295.15
INV IN=288.21 (CB-425)
INV IN=288.86 (CB-424)
INV OUT=288.11

CB-424
T/C=294.24
INV OUT=289.41

CB-425
T/C=294.00
INV IN=288.57 (CB-427)
INV IN=289.22 (CB-426)
INV OUT=288.47

CB-426
T/C=294.08
INV OUT=289.71

CB-427
T/C=296.06
INV IN=289.17 (DI-429)
INV IN=289.82 (CB-428)
INV OUT=289.07

CB-428
T/C=296.06
INV OUT=290.31

CB-432
T/C=299.40
INV IN=289.93 (CB-433)
INV OUT=289.83

CB-433
T/C=299.31
INV IN=290.67 (CB-435)
INV IN=290.67 (CB-434)
INV OUT=290.42

CB-434
T/C=298.98
INV OUT=292.20

CB-435
T/C=297.48
INV IN=291.25 (CB-437)
INV IN=291.89 (CB-436)
INV OUT=291.15

CB-436
T/C=297.48
INV OUT=292.26

CB-437
T/C=294.98
INV IN=291.95 (CB-438)
INV OUT=291.85

CB-438
T/C=294.93
INV OUT=292.10

CB-503
T/C=274.03
INV IN=267.60 (CB-536)
INV IN=248.60 (CB-506)
INV OUT=248.50

CB-506
T/C=270.26
INV IN=250.30 (CB-508)
INV IN=265.40 (CB-507)
INV OUT=250.20

CB-507
T/C=270.26
INV OUT=265.60

CB-508
T/C=266.56
INV IN=250.90 (CB-510)
INV IN=261.70 (CB-509)
INV OUT=250.90

CB-509
T/C=266.56
INV OUT=261.90

CB-510
T/C=263.63
INV IN=251.60 (CB-516)
INV IN=251.60 (CB-511)
INV OUT=251.50

CB-511
T/C=262.32
INV IN=252.00 (CB-512)
INV OUT=252.00

CB-512
T/C=261.06
INV IN=256.20 (CB-513)
INV IN=252.50 (DI-514)
INV OUT=252.40

CB-513
T/C=261.06
INV OUT=256.40

CB-515
T/C=258.50
INV IN=253.80 (CB-515A)
INV OUT=253.70

CB-515A
T/C=258.50
INV OUT=253.90

CB-516
T/C=263.63
INV IN=253.50 (CB-517)
INV OUT=253.40

CB-517
T/C=264.17
INV IN=255.00 (CB-522)
INV IN=255.80 (CB-518)
INV OUT=254.60

CB-518
T/C=264.33
INV IN=256.10 (DI-519)
INV OUT=256.00

CB-522
T/C=265.78
INV IN=260.30 (DI-523)
INV OUT=260.20

CB-526
T/C=267.10
INV IN=261.80 (CB-528)
INV IN=262.20 (CB-527)
INV OUT=261.70

CB-527
T/C=267.10
INV OUT=262.90

CB-528
T/C=269.95
INV IN=262.60 (CB-530)
INV IN=262.80 (DI-529)
INV OUT=262.50

CB-530
T/C=270.47
INV IN=263.00 (CB-531)
INV OUT=262.90

CB-531
T/C=270.39
INV IN=267.70 (CB-534)
INV IN=263.50 (CB-532)
INV OUT=263.20

CB-532
T/C=269.23
INV IN=264.76 (CB-541)
INV IN=264.50 (CB-533)
INV OUT=264.10

CB-533
T/C=269.22
INV OUT=264.70

CB-534
T/C=272.79
INV IN=268.30 (CB-535)
INV OUT=268.20

CB-535
T/C=272.79
INV OUT=268.50

CB-536
T/C=274.02
INV IN=267.90 (DI-537)
INV OUT=267.80

CB-541
T/C=270.07
INV OUT=265.12

CB-601
T/C=277.92
INV IN=269.80 (CB-602)
INV IN=269.90 (CB-612)
INV OUT=268.80

CB-602
T/C=279.15
INV IN=271.40 (DI-603)
INV OUT=271.30

CB-605
T/C=282.93
INV IN=277.90 (CB-606)
INV OUT=277.65

CB-606
T/C=282.92
INV IN=278.20 (CB-607)
INV OUT=278.10

CB-607
T/C=285.52
INV IN=280.80 (CB-609)
INV IN=280.80 (CB-608)
INV OUT=280.70

CB-608
T/C=285.52
INV OUT=281.00

CB-609
T/C=290.17
INV IN=285.30 (CB-610)
INV OUT=285.20

CB-610
T/C=290.17
INV OUT=285.50

CB-612
T/C=277.91
INV IN=270.55 (CB-613)
INV OUT=270.30

CB-613
T/C=276.53
INV IN=271.70 (CB-614)
INV IN=271.65 (CB-616)
INV OUT=271.60

CB-614
T/C=279.29
INV IN=273.80 (CB-615)
INV OUT=273.70

CB-615
T/C=279.29
INV OUT=274.10

CB-616
T/C=276.61
INV OUT=272.00

CB-651
T/C=273.34
INV IN=268.20 (CB-653)
INV IN=268.00 (CB-652)
INV OUT=267.90

CB-652
T/C=273.34
INV OUT=268.20

CB-653
T/C=276.64
INV IN=271.50 (CB-654)
INV OUT=271.40

CB-654
T/C=276.64
INV OUT=271.70

CB-705
T/C=292.73
INV IN=286.65 (CB-706)
INV OUT=286.55

CB-706
T/C=292.73
INV IN=286.90 (DI-707)
INV OUT=286.80

CB-801
T/C=236.49
INV IN=230.00 (CB-802)
INV OUT=229.90

CB-802
T/C=236.50
INV IN=230.40 (CB-803)
INV OUT=230.30

CB-803
T/C=236.11
INV IN=231.30 (CB-805)
INV IN=231.30 (CB-804)
INV OUT=231.20

CB-804
T/C=236.11
INV OUT=231.70

CB-805
T/C=238.78
INV IN=233.80 (CB-806)
INV OUT=233.70

CB-806
T/C=238.78
INV OUT=234.10

CB-811
T/C=284.51
INV IN=278.15 (CB-812)
INV OUT=277.90

CB-812
T/C=285.16
INV IN=278.80 (CB-813)
INV OUT=278.70

CB-813
T/C=285.92
INV IN=281.00 (CB-814)
INV OUT=280.90

CB-814
T/C=284.79
INV OUT=281.40

DI-106
T/G=265.05
INV IN=259.00 (CB-108)
INV IN=259.30 (DI-107)
INV OUT=258.50

DI-107
T/G=272.18
INV OUT=267.90

DI-156
T/G=273.08
INV IN=269.80 (DI-157)
INV OUT=269.55

DI-157
T/G=274.30
INV IN=270.60 (DI-158)
INV OUT=270.50

DI-158
T/G=273.50
INV OUT=271.82

DI-164
T/G=261.97
INV IN=256.80 (DI-165)
INV OUT=256.70

DI-165
T/G=269.58
INV OUT=264.50

DI-201
T/G=247.84
INV IN=232.80 (CB-202)
INV IN=234.88 (DI-210)
INV OUT=232.70

DI-210
T/G=242.92
INV IN=236.73 (DI-210A)
INV OUT=236.63

DI-210A
T/G=240.80
INV OUT=238.52

DI-215
T/G=239.86
INV IN=235.40 (CB-216)
INV OUT=235.10

DI-218
T/G=240.06
INV OUT=237.51

DI-227
T/G=255.83
INV IN=247.57 (CB-228)
INV OUT=247.47

DI-310
T/G=264.03
INV OUT=261.30

DI-319
T/G=277.08
INV IN=271.20 (CB-320)
INV OUT=271.10

DI-323
T/G=270.55
INV IN=265.70 (DI-323A)
INV OUT=265.60

DI-323A
T/G=272.82
INV OUT=267.53

DI-324A
T/G=277.26
INV IN=275.30 (DI-324B)
INV OUT=275.30

DI-324B
T/G=277.79
INV OUT=276.10

DI-326
T/G=283.24
INV OUT=277.83

DI-329
T/G=288.33
INV OUT=278.66

DI-330
T/G=288.00
INV IN=275.10 (CB-332)
INV IN=275.90 (DI-331)
INV OUT=275.00

DI-331
T/G=283.35
INV OUT=278.50

DI-338
T/G=288.93
INV IN=280.40 (CB-339)
INV OUT=280.15

DI-347
T/G=259.95
INV IN=249.10 (CB-353)
INV IN=251.35 (DI-348)
INV OUT=249.00

DI-348
T/G=263.48
INV IN=258.16 (DI-350)
INV IN=258.61 (DI-349)
INV OUT=257.91

DI-349
T/G=268.41
INV OUT=263.00

DI-350
T/G=264.93
INV IN=260.70 (DI-351)
INV OUT=260.60

DI-351
T/G=265.68
INV IN=261.10 (DI-352)
INV OUT=261.00

DI-352
T/G=271.37
INV OUT=267.00

DI-355
T/G=259.53
INV IN=252.60 (DI-356)
INV OUT=252.40

DI-356
T/G=257.42
INV IN=253.30 (DI-357)
INV OUT=253.20

DI-357
T/G=259.21
INV OUT=254.50

DI-361
T/G=274.12
INV IN=264.30 (CB-362)
INV OUT=264.20

DI-364
T/G=274.21
INV IN=266.81 (DI-365)
INV OUT=266.71

DI-365
T/G=272.00
INV IN=267.62 (DI-366)
INV OUT=267.52

DI-366
T/G=276.72
INV OUT=272.30

DI-375
T/G=279.77
INV IN=274.40 (CB-378)
INV IN=275.15 (DI-376)
INV OUT=273.90

DI-376
T/G=282.18
INV IN=277.77 (DI-377)
INV IN=277.77 (DI-394)
INV OUT=277.67

DI-377
T/G=283.28
INV IN=278.35 (DI-396)
INV OUT=278.25

DI-382
T/G=287.65
INV OUT=282.50

DI-383
T/G=287.69
INV OUT=283.30

DI-394
T/G=285.11
INV OUT=278.18

DI-396
T/G=286.54
INV OUT=278.89

DI-397
T/G=288.17
INV OUT=283.60

DI-401
T/G=296.57
INV IN=284.40 (CB-402)
INV OUT=284.40

DI-408
T/G=300.70
INV IN=293.10 (DI-409)
INV OUT=293.00

DI-409
T/G=298.47
INV IN=294.08 (DI-410)
INV OUT=293.98

DI-410
T/G=299.76
INV OUT=295.40

DI-421
T/G=297.35
INV OUT=290.10

DI-429
T/G=297.56
INV IN=290.12 (DI-430)
INV IN=289.28 (CB-432)
INV OUT=289.38

DI-430
T/G=299.21
INV IN=292.78 (DI-431)
INV OUT=292.53

DI-431
T/G=300.37
INV OUT=294.50

DI-501
T/G=273.79
INV IN=248.10 (CB-503)
INV OUT=247.60

DI-502
T/G=268.93
INV OUT=264.00

DI-514
T/G=261.48
INV IN=253.30 (CB-515)
INV IN=253.65 (DI-502)
INV OUT=252.90

DI-519
T/G=262.68
INV IN=257.00 (DI-521)
INV IN=257.00 (DI-520)
INV OUT=256.90

DI-520
T/G=265.67
INV OUT=260.90

DI-521
T/G=260.15
INV OUT=257.80

DI-523
T/G=266.32
INV IN=261.40 (CB-526)
INV IN=262.15 (DI-524)
INV OUT=261.40

DI-524
T/G=269.07
INV IN=264.30 (DI-525)
INV OUT=264.20

DI-525
T/G=273.33
INV OUT=268.60

DI-529
T/G=272.23
INV OUT=265.00

DI-537
T/G=273.84
INV IN=268.50 (DI-538)
INV OUT=268.20

DI-538
T/G=276.02
INV IN=270.90 (DI-539)
INV OUT=270.80

DI-539
T/G=278.79
INV IN=273.80 (DI-540)
INV OUT=273.70

DI-540
T/G=283.35
INV OUT=277.60

DI-550
T/G=243.55
INV IN=240.80 (XX-234)
INV OUT=240.70

DI-603
T/G=281.75
INV IN=274.50 (CB-605)
INV IN=274.65 (DI-604)
INV OUT=274.40

DI-604
T/G=281.45
INV IN=275.40 (DI-611)
INV OUT=275.30

DI-611
T/G=280.03
INV OUT=275.80

DI-701
T/G=301.22
INV IN=283.80 (DI-702)
INV OUT=283.70

DI-702
T/G=297.90
INV IN=284.60 (DI-703)
INV OUT=284.50

DI-703
T/G=294.99
INV IN=285.30 (DI-704)
INV OUT=285.20

DI-704
T/G=292.63
INV IN=286.20 (CB-705)
INV OUT=285.95

DI-707
T/G=291.68
INV OUT=287.20

DI-900
T/G=260.00
INV OUT=257.50

JB-101
RIM=251.78
INV IN=248.50 (CB-102)
INV OUT=248.50

JB-151
RIM=260.02
INV IN=246.60 (CB-152)
INV OUT=246.50

JB-661
RIM=271.59
INV IN=264.30 (SCM R - OCS)
INV OUT=264.20

JB-662
RIM=276.35
INV IN=263.50 (JB-661)
INV OUT=263.40

EW-100
INV=244.50

EW-150
INV=244.00

EW-200
INV=232.30

EW-300
INV=244.50

EW-400
INV=283.80

EW-500
INV=246.50

EW-600
INV=268.00

EW-650
INV=267.50

EW-700
INV=283.00

EW-810
INV=277.00

FES-800
INV=229.00

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

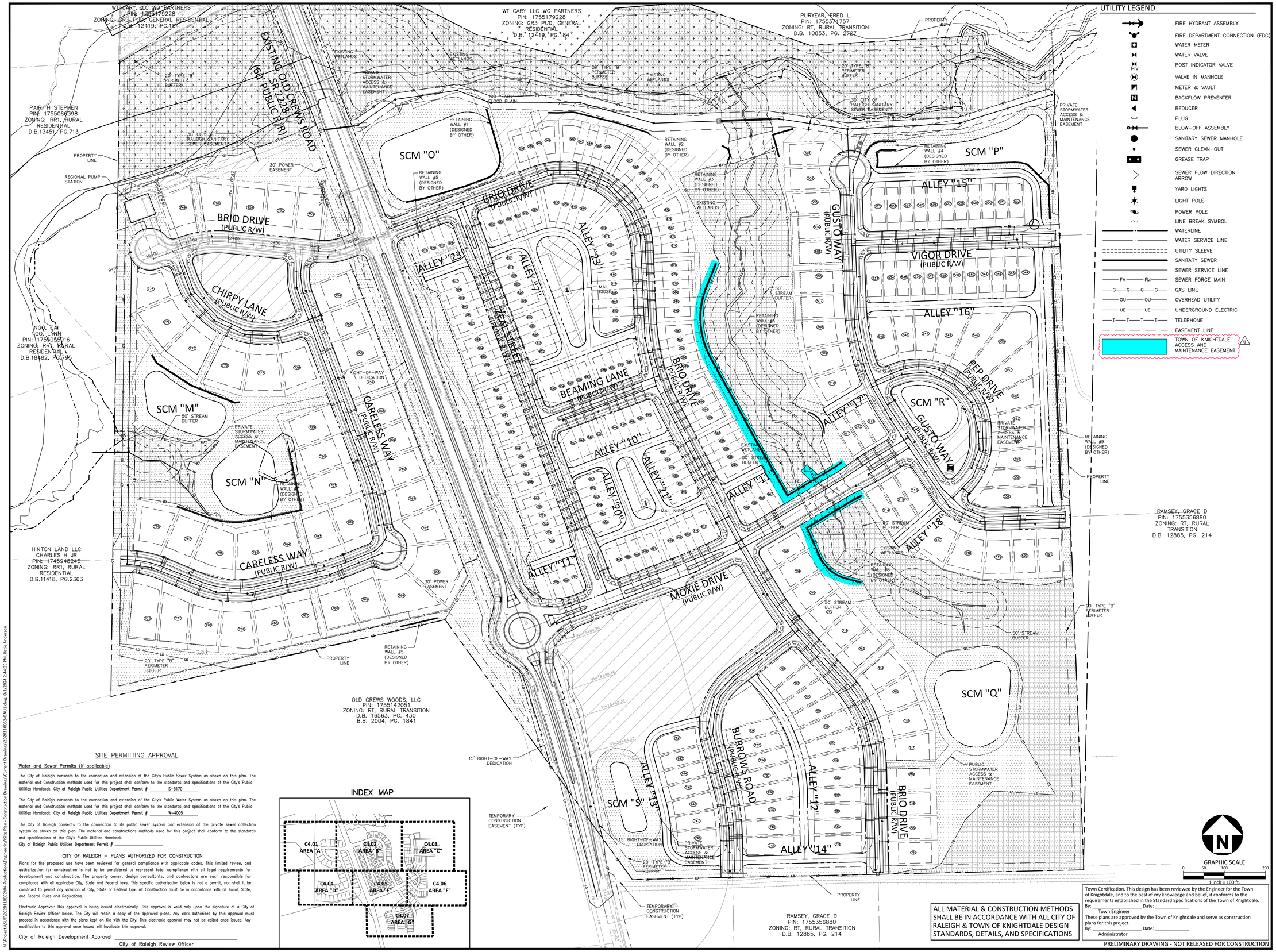
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

STORM DRAINAGE TABLES

C3.08

M:\Projects\04\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-C3.dwg, 8/1/2024 2:44:13 PM, Katie Anderson



SITE PERMITTING APPROVAL

Water and Sewer Permits (If applicable)

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. **City of Raleigh Public Utilities Department Permit #** S-5170

The City of Raleigh consents to the connection and extension of the City's Public Water System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. **City of Raleigh Public Utilities Department Permit #** W-4005

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 constructions 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 # _____

CITY OF RALEIGH – PLANS AUTHORIZED FOR CONSTRUCTION

Plans for the proposed use have been reviewed for general compliance with applicable codes. This limited review, and authorization for construction is not to be considered to represent total compliance with all legal requirements for development and construction. The property owner, design consultants, and contractors are each responsible for compliance with all applicable City, State and Federal laws. This specific authorization below is not a permit, nor shall it be construed to permit any violation of City, State or Federal Law. All Construction must be in accordance with all Local, State, and Federal Rules and Regulations.

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

City of Raleigh Development Approval _____
City of Raleigh Review Officer

INDEX MAP

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PLAN INFORMATION

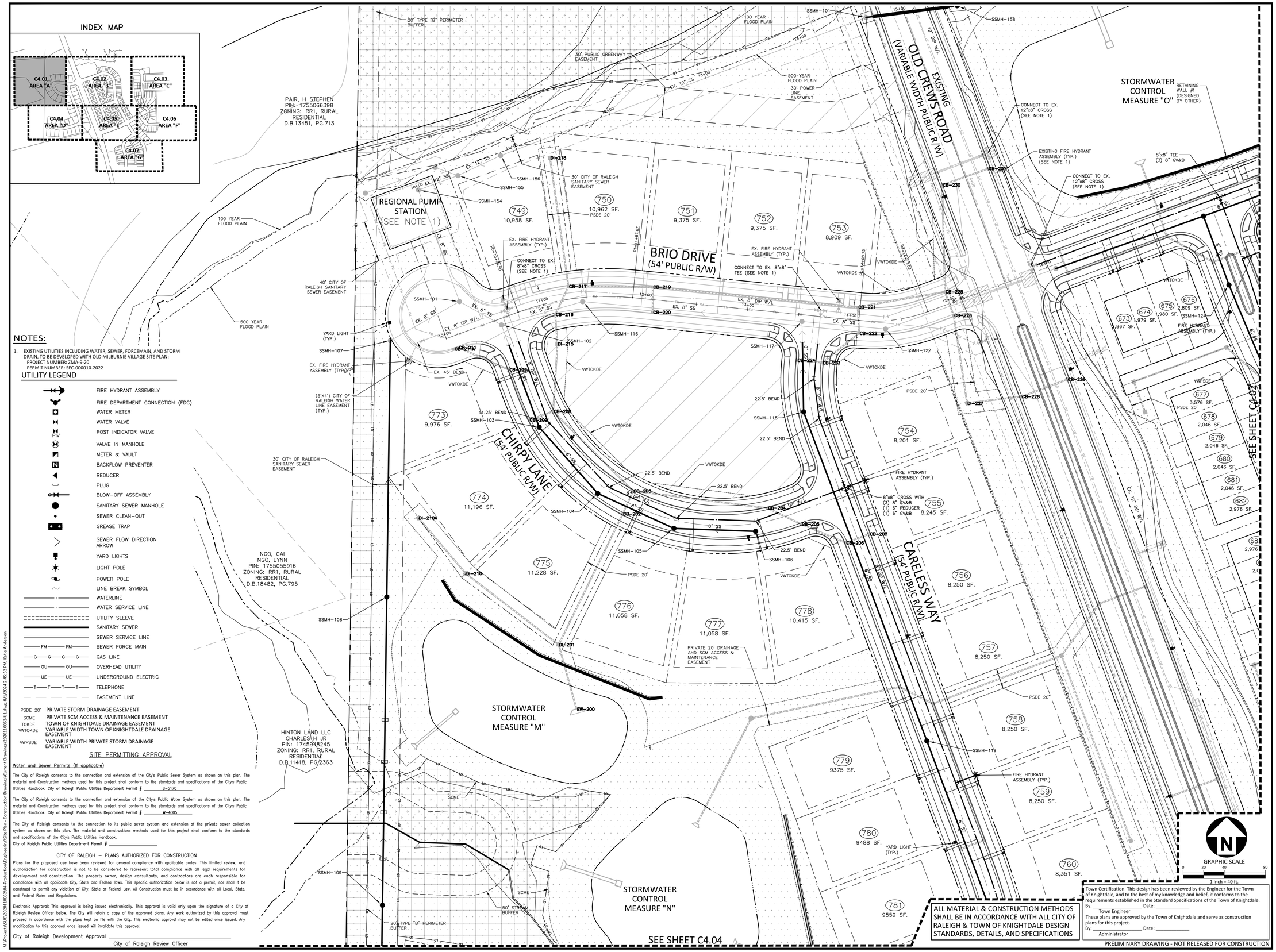
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=100'
DATE	12. 22. 2022

SHEET

OVERALL UTILITY PLAN

C4.00

M:\Projects\5\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-OAU1.dwg, 8/1/2024 2:44:35 PM, Katie Anderson



NOTES:

1. EXISTING UTILITIES INCLUDING WATER, SEWER, FORCEMAIN, AND STORM DRAIN, TO BE DEVELOPED WITH OLD MILBURNIE VILLAGE SITE PLAN:
   PROJECT NUMBER: ZMA-9-20
   PERMIT NUMBER: SEC-000010-2022

UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION (FDC)
- WATER METER
- WATER VALVE
- POST INDICATOR VALVE (PIV)
- VALVE IN MANHOLE
- METER & VAULT
- BACKFLOW PREVENTER
- REDUCER
- PLUG
- BLOW-OFF ASSEMBLY
- SANITARY SEWER MANHOLE
- SEWER CLEAN-OUT
- GREASE TRAP
- SEWER FLOW DIRECTION ARROW
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- LINE BREAK SYMBOL
- WATERLINE
- WATER SERVICE LINE
- UTILITY SLEEVE
- SANITARY SEWER
- SEWER SERVICE LINE
- FM — SEWER FORCE MAIN
- G — GAS LINE
- OU — OVERHEAD UTILITY
- UE — UNDERGROUND ELECTRIC
- T — TELEPHONE
- EASEMENT LINE

PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE	VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

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GRAPHIC SCALE 0 20 40 80
1 inch = 40 ft.

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-U1.dwg, 8/17/2024 2:45:52 PM, Katie Anderson

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KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

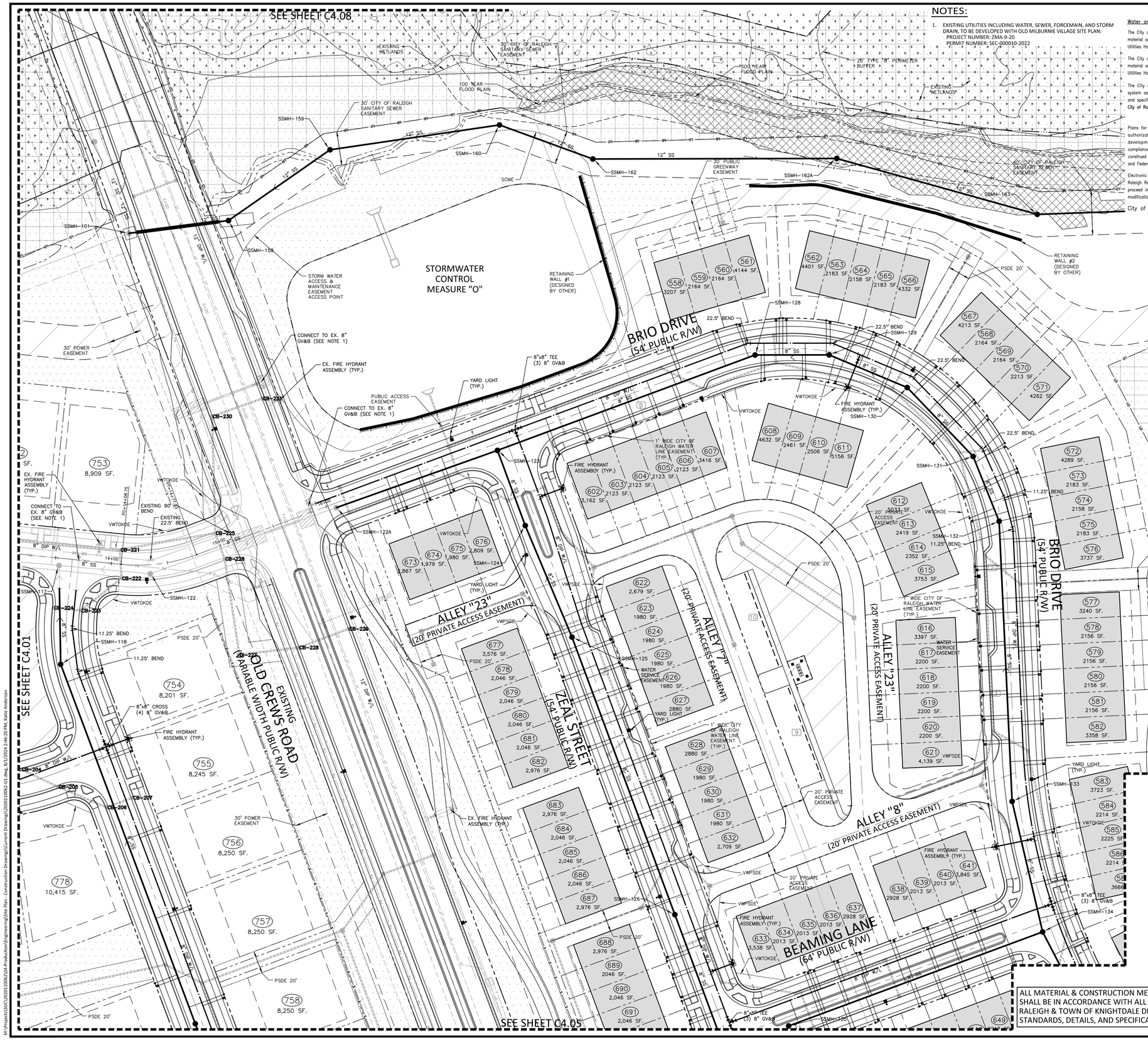
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

SHEET

UTILITY PLAN - AREA "A"

C4.01



NOTES:

1. EXISTING UTILITIES INCLUDING WATER, SEWER, FORCEMAIN, AND STORM DRAIN, TO BE DEVELOPED WITH OLD MILBURNIE VILLAGE SITE PLAN:
   PROJECT NUMBER: 2MA-9-20
   PERMIT NUMBER: SEC-000010-2022

SITE PERMITTING APPROVAL

Water and Sewer Permits (If applicable)

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-5170

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City of Raleigh Development Approval _____
City of Raleigh Review Officer

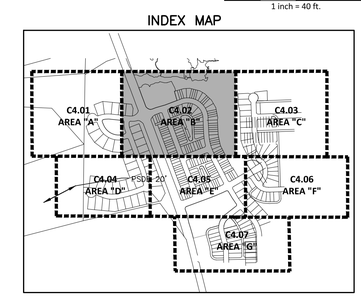
UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION (FDC)
- WATER METER
- WATER VALVE
- POST INDICATOR VALVE (PIV)
- VALVE IN MANHOLE
- METER & VAULT
- BACKFLOW PREVENTER
- REDUCER
- PLUG
- BLOW-OFF ASSEMBLY
- SANITARY SEWER MANHOLE
- SEWER CLEAN-OUT
- GREASE TRAP
- SEWER FLOW DIRECTION ARROW
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- LINE BREAK SYMBOL
- WATERLINE
- WATER SERVICE LINE
- UTILITY SLEEVE
- SANITARY SEWER
- SEWER SERVICE LINE
- FM — SEWER FORCE MAIN
- G — GAS LINE
- OU — OVERHEAD UTILITY
- UE — UNDERGROUND ELECTRIC
- T — TELEPHONE
- EASEMENT LINE

PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE	VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

INDEX MAP



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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
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Administrator

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SUNCREST Real Estate & Land

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

SHEET

UTILITY PLAN - AREA "B"

C4.02

M:\Projects\SSA\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-U1.dwg, 8/1/2024 2:46:20 PM, Katie Anderson

UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION (FDC)
- WATER METER
- WATER VALVE
- POST INDICATOR VALVE
- VALVE IN MANHOLE
- METER & VAULT
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- REDUCER
- PLUG
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- SEWER CLEAN-OUT
- GREASE TRAP
- SEWER FLOW DIRECTION ARROW
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- TELEPHONE
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GRAPHIC SCALE
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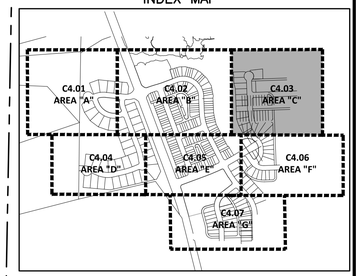
1 inch = 40 ft.

INDEX MAP



SITE PERMITTING APPROVAL

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5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

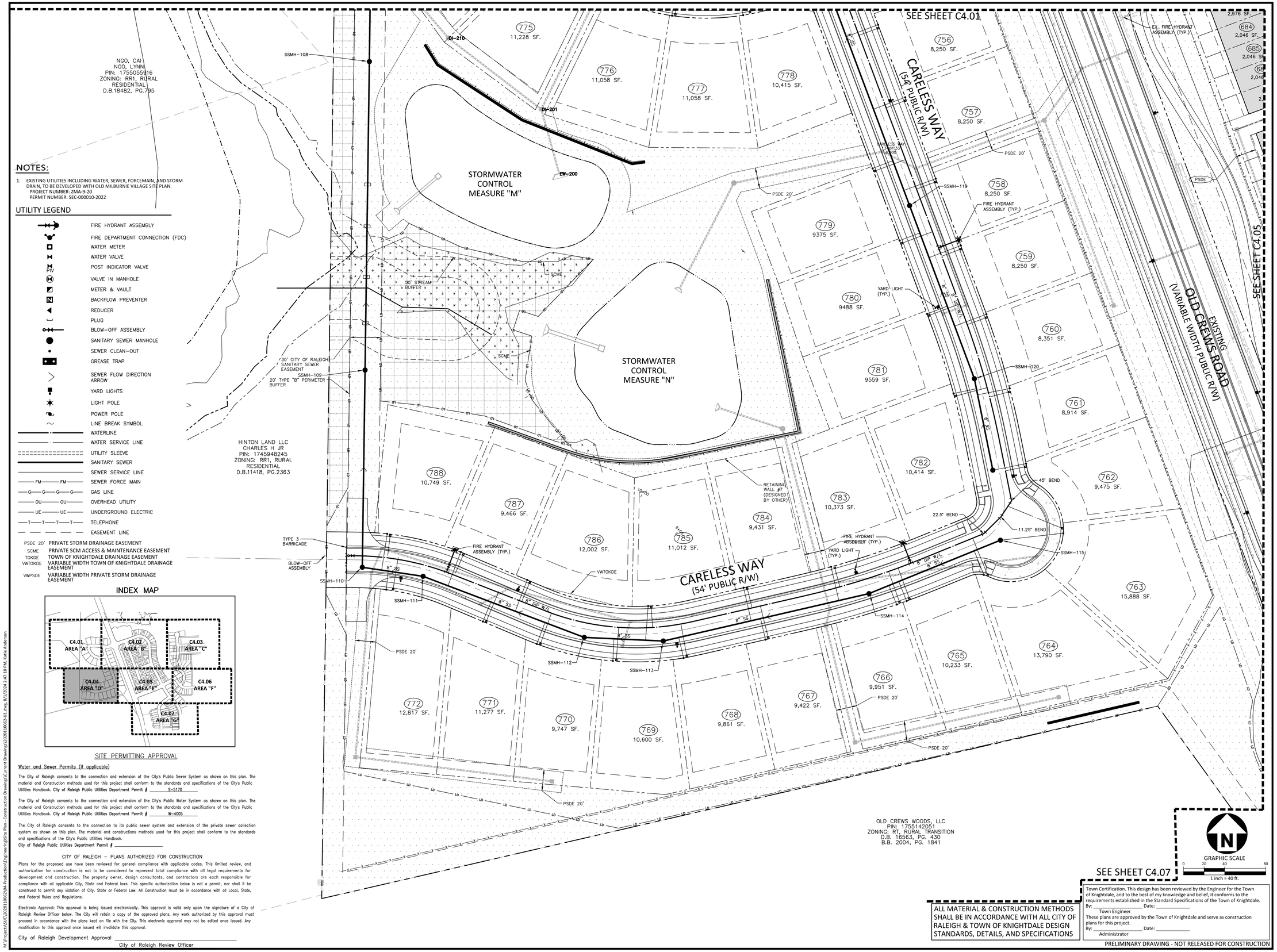
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

SHEET

UTILITY PLAN - AREA "C"

C4.03

M:\Projects\04\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-U1.dwg, 8/1/2024 2:46:46 PM, Katie Anderson



NOTES:

1. EXISTING UTILITIES INCLUDING WATER, SEWER, FORCEMAIN, AND STORM DRAIN, TO BE DEVELOPED WITH OLD MILBURNIE VILLAGE SITE PLAN:
   PROJECT NUMBER: ZMA-9-20
   PERMIT NUMBER: SEC-000010-2022

UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION (FDC)
- WATER METER
- WATER VALVE
- PIV — POST INDICATOR VALVE
- VALVE IN MANHOLE
- METER & VAULT
- BACKFLOW PREVENTER
- REDUCER
- PLUG
- BLOW-OFF ASSEMBLY
- SANITARY SEWER MANHOLE
- SEWER CLEAN-OUT
- GREASE TRAP
- SEWER FLOW DIRECTION ARROW
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- LIGHT POLE
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INDEX MAP

SITE PERMITTING APPROVAL

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SUNCREST Real Estate & Land

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

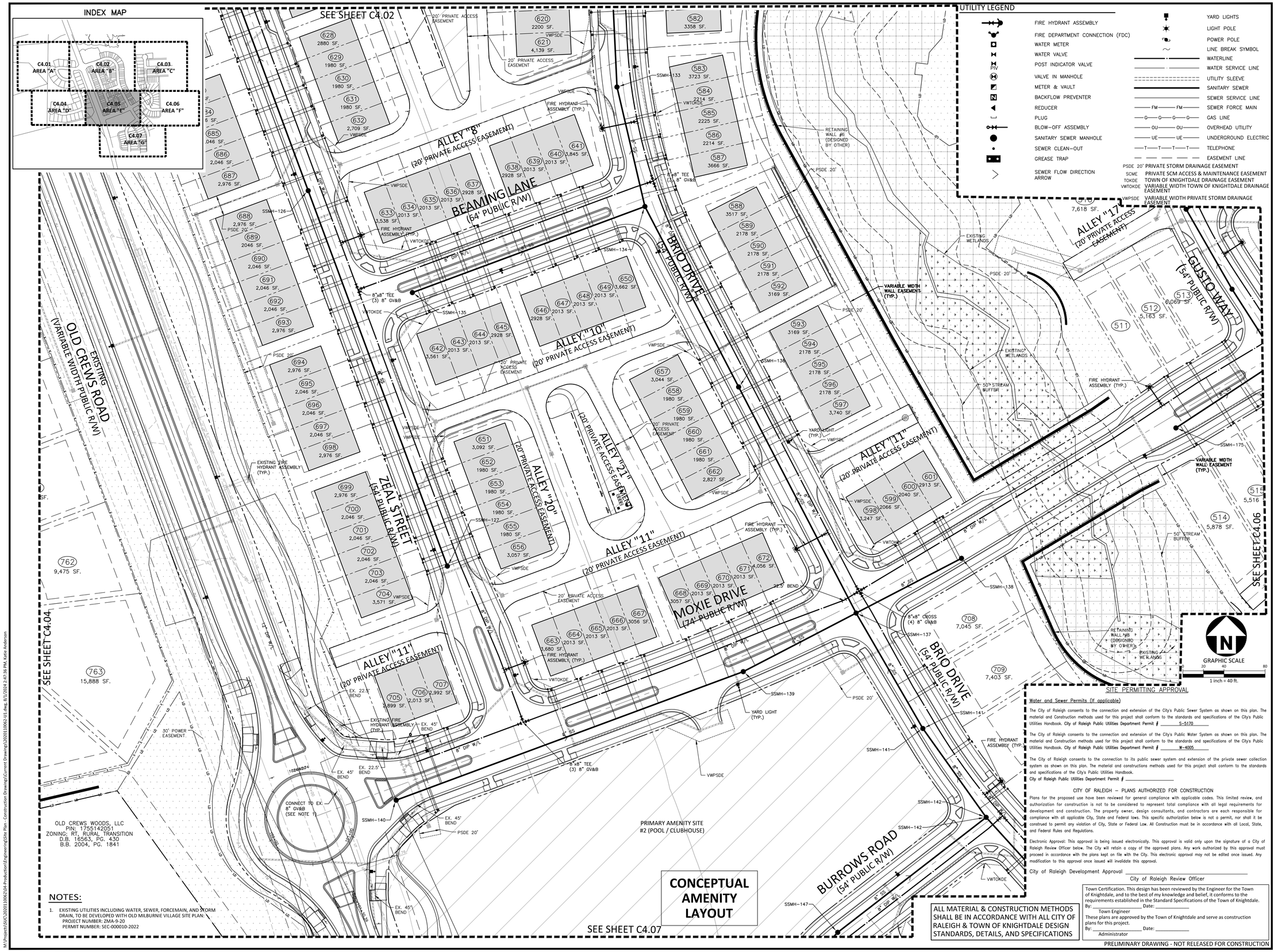
SHEET

UTILITY PLAN - AREA "D"

C4.04

M:\Projects\SVC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-J1.dwg, 8/7/2024 2:47:10 PM, Katie Andersen

NRDC



UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION (FDC)
- WATER METER
- WATER VALVE
- POST INDICATOR VALVE
- VALVE IN MANHOLE
- METER & VAULT
- BACKFLOW PREVENTER
- REDUCER
- PLUG
- BLOW-OFF ASSEMBLY
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- SEWER CLEAN-OUT
- GREASE TRAP
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PLAN INFORMATION

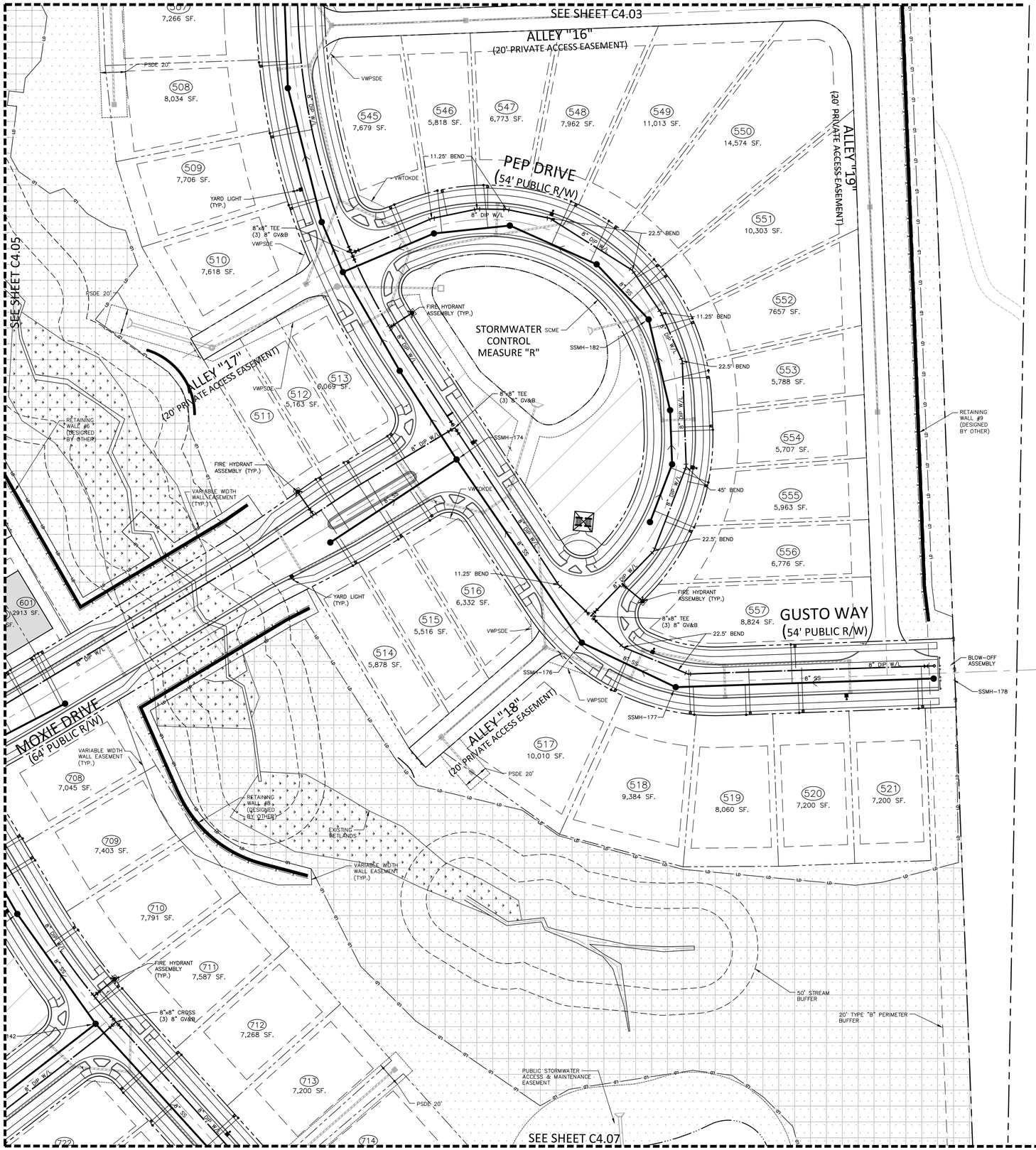
PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

SHEET

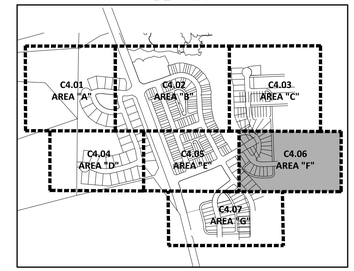
UTILITY PLAN - AREA "E"

C4.05

M:\Projects\SVC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-41.dwg, 8/1/2024 2:47:36 PM, Katie Anderson



INDEX MAP



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GRAPHIC SCALE
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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

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NO.	DATE	
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5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

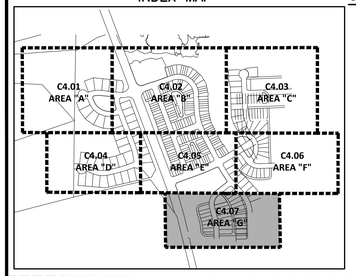
SHEET

UTILITY PLAN - AREA "F"

C4.06

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-U1.dwg, 8/1/2024 2:48:01 PM, Katie Anderson

INDEX MAP



UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- FIRE DEPARTMENT CONNECTION (FDC)
- WATER METER
- WATER VALVE
- POST INDICATOR VALVE
- VALVE IN MANHOLE
- METER & VAULT
- BACKFLOW PREVENTER
- REDUCER
- PLUG
- BLOW-OFF ASSEMBLY
- SANITARY SEWER MANHOLE
- SEWER CLEAN-OUT
- GREASE TRAP
- SEWER FLOW DIRECTION ARROW
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- LINE BREAK SYMBOL
- WATERLINE
- WATER SERVICE LINE
- UTILITY SLEEVE
- SANITARY SEWER
- SEWER SERVICE LINE
- SEWER FORCE MAIN
- GAS LINE
- OVERHEAD UTILITY
- UNDERGROUND ELECTRIC
- TELEPHONE
- EASEMENT LINE

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SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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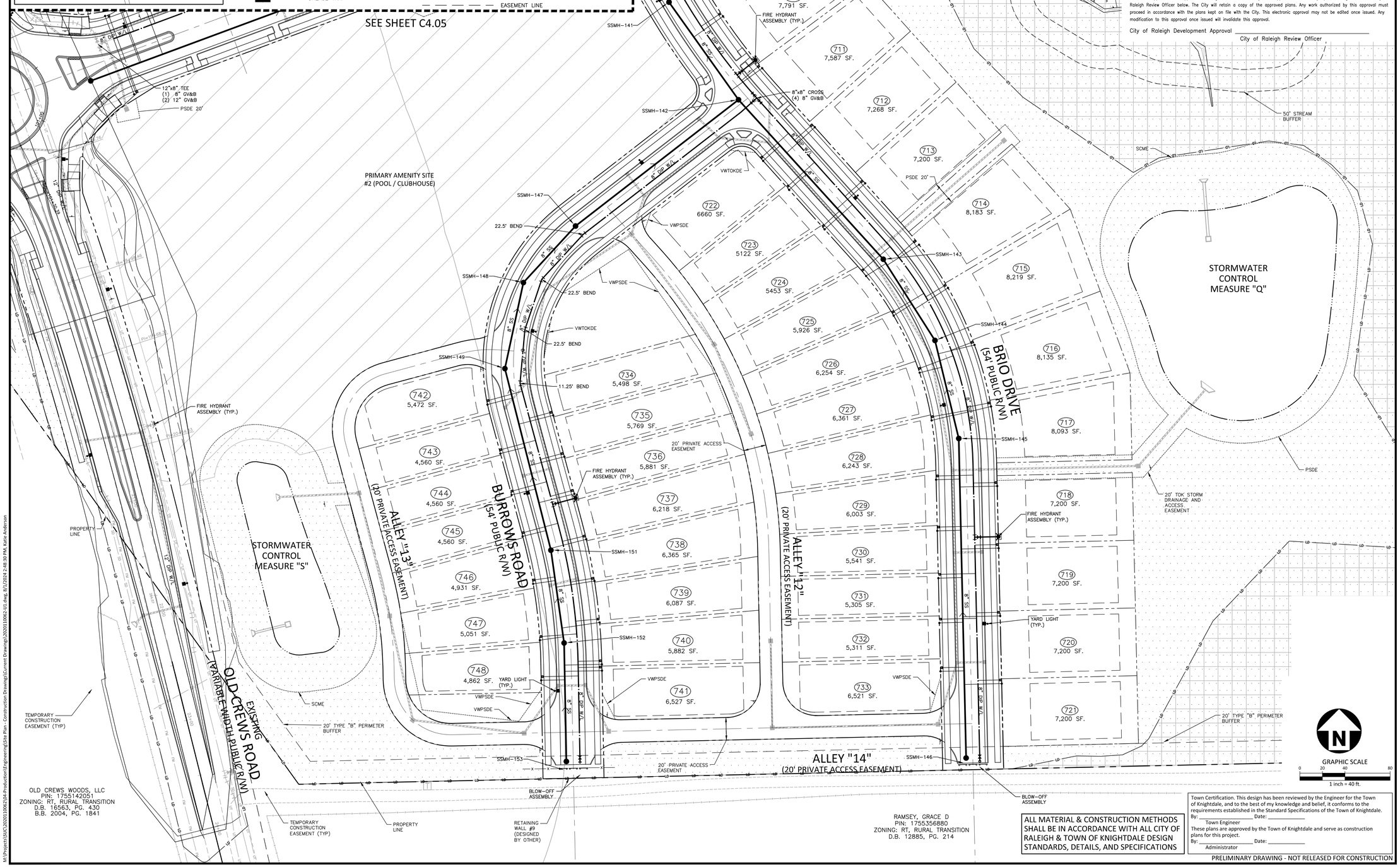

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PROJECT NO.	2020110062
FILENAME	
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	
DATE	12. 22. 2022

SHEET

UTILITY PLAN - AREA "G"

C4.07

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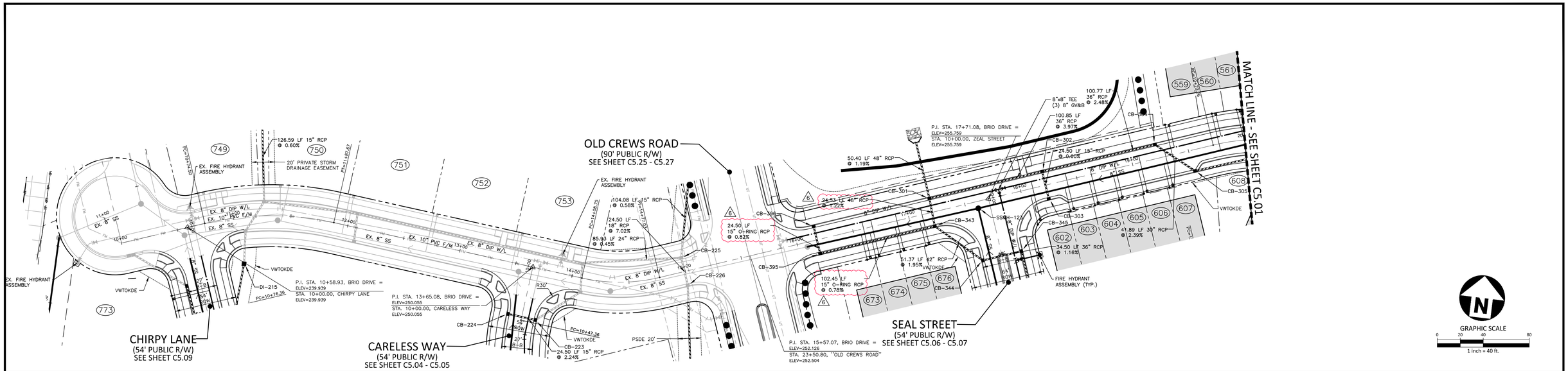
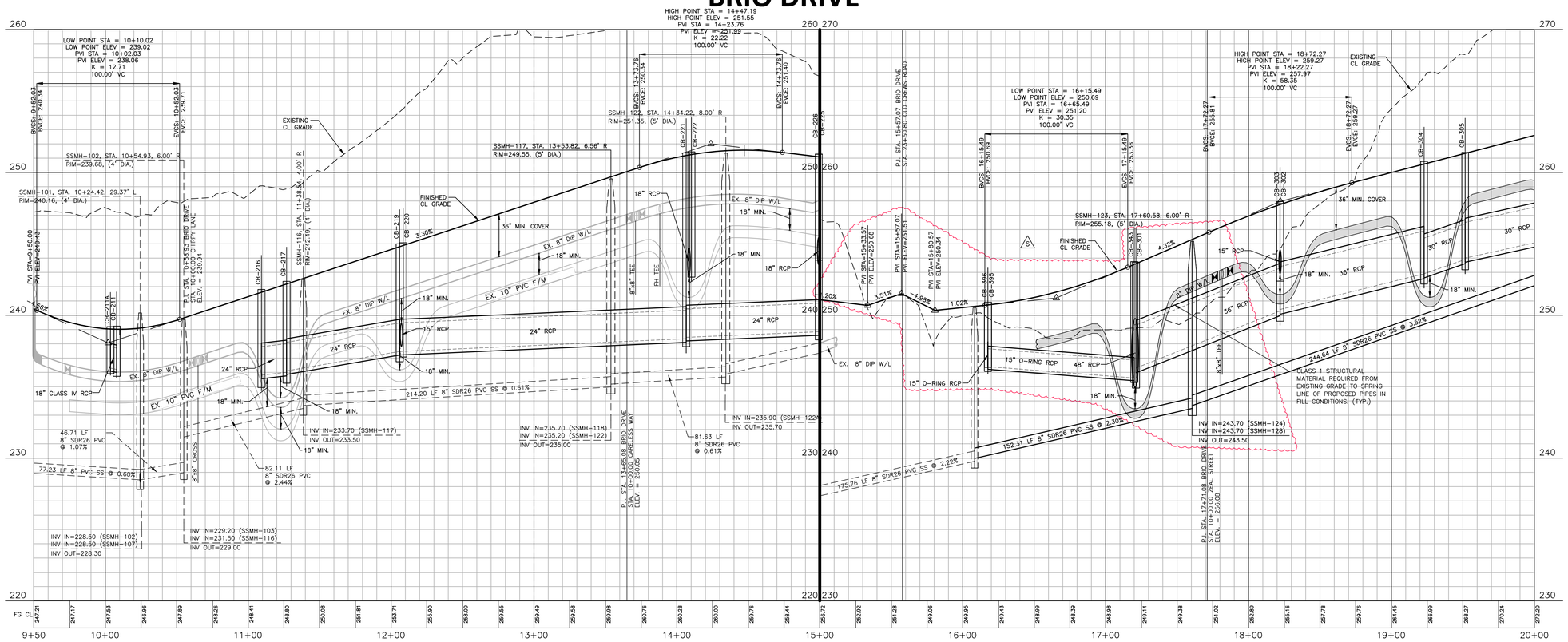


BRIO DRIVE



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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
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BRIO - PHASE 1

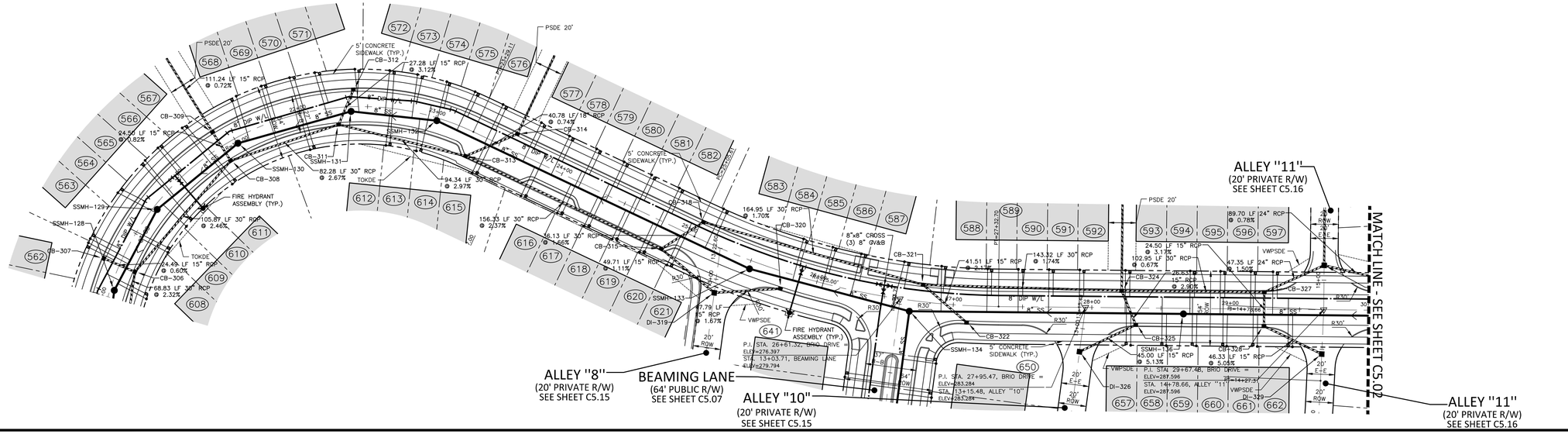
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P1
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
BRIO DRIVE, STA. 9+50 THRU STA. 20+00

C5.00



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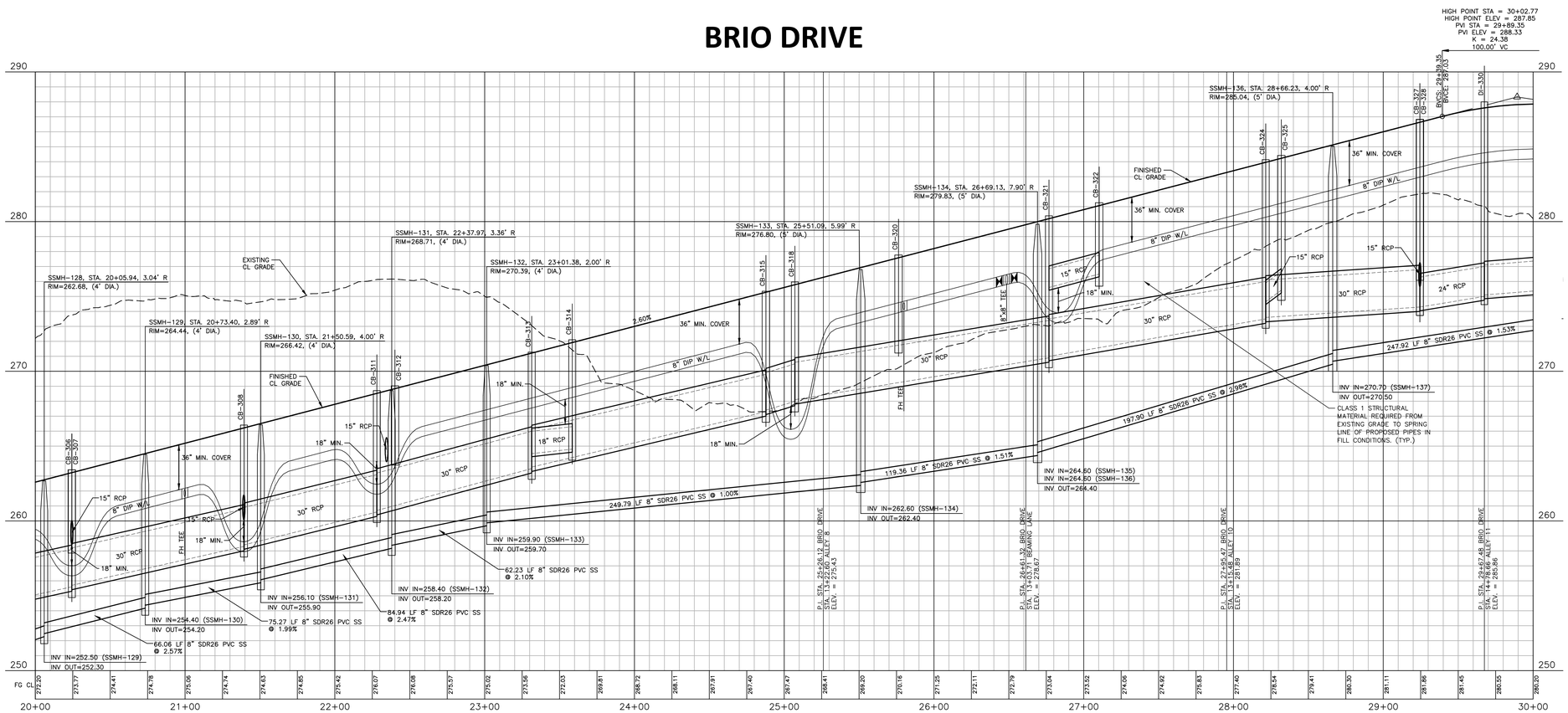

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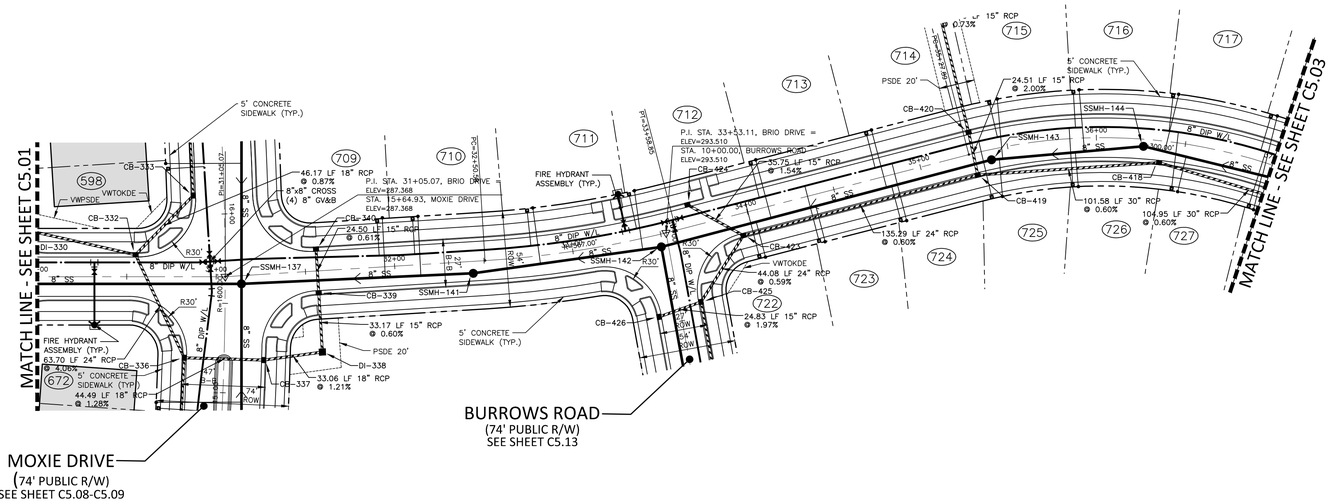
BRIO DRIVE, STA. 20+00THRU STA. 30+00

C5.01

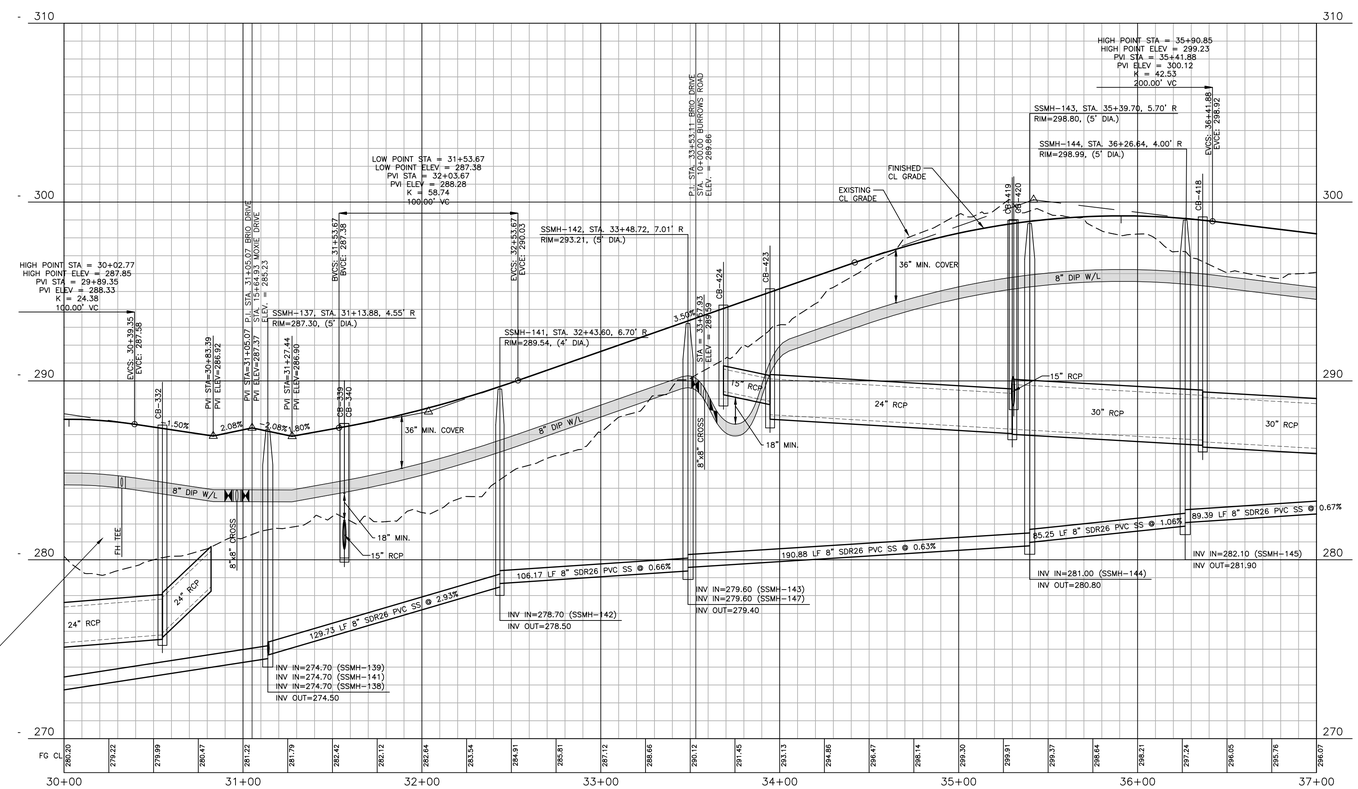


GRAPHIC SCALE

0 20 40 80

1 inch = 40 ft.

BRIO DRIVE



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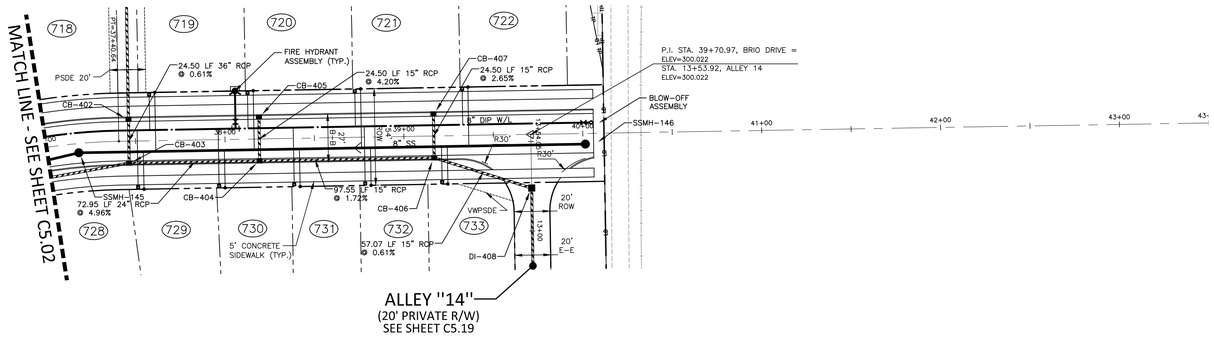
C5.02



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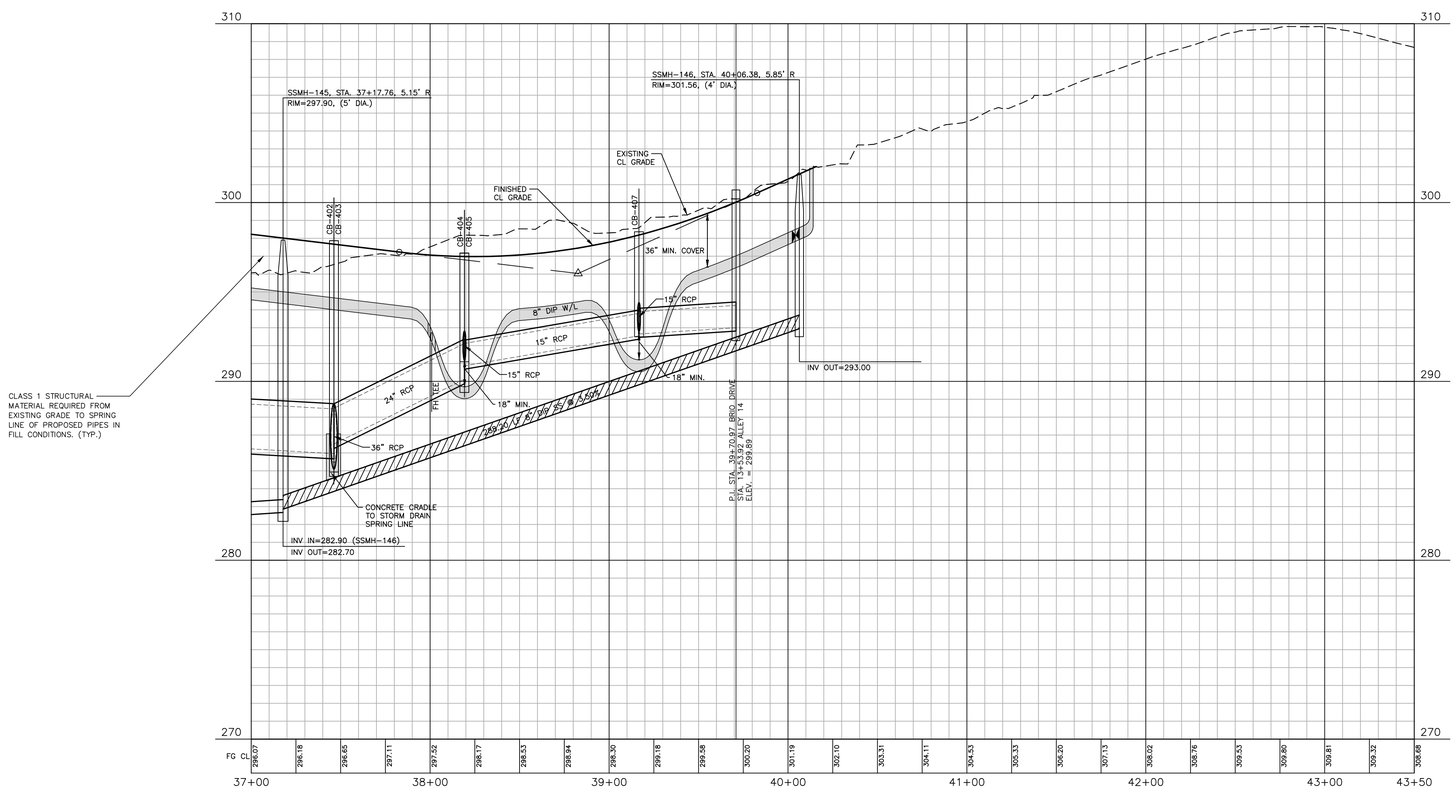

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City of Raleigh Development Approval _____
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PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-P1.dwg, 8/1/2024 2:53:05 PM, Katie Anderson

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER BRIAN K. BARKER
NOT FOR CONSTRUCTION

BRIO - PHASE 1

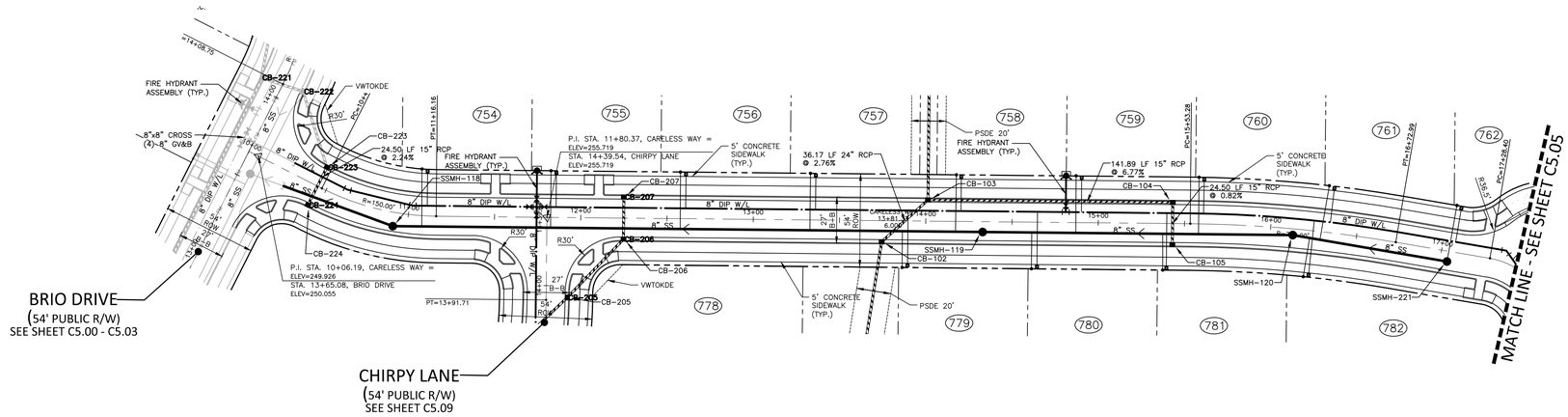
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

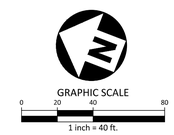
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P1
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

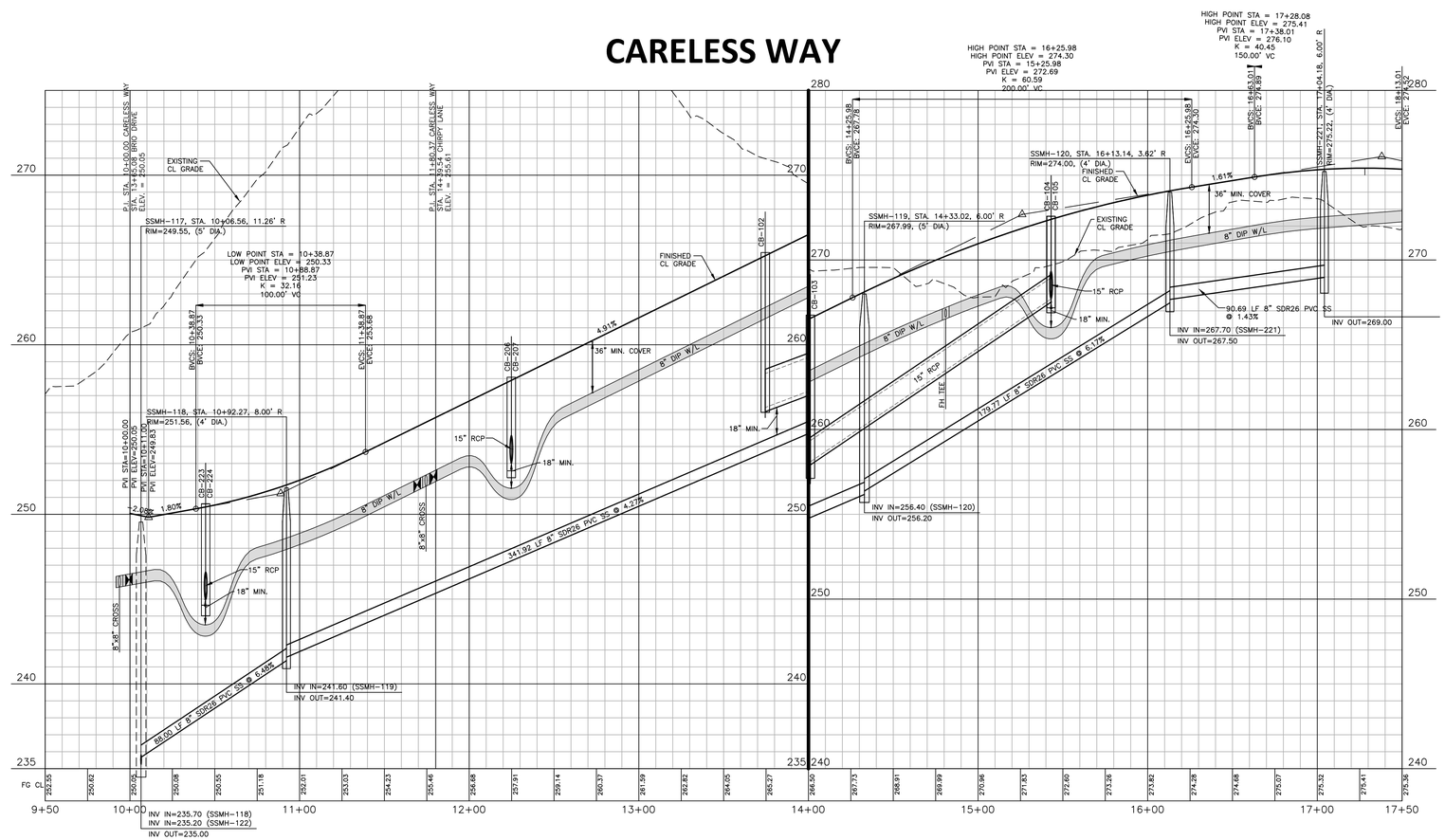
PLAN AND PROFILE
BRIO DRIVE, STA. 37+00THRU STA. 43+50

C5.03





CARELESS WAY



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TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049483 BRIAN K. BARKER
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KNIGHTDALE, NORTH CAROLINA

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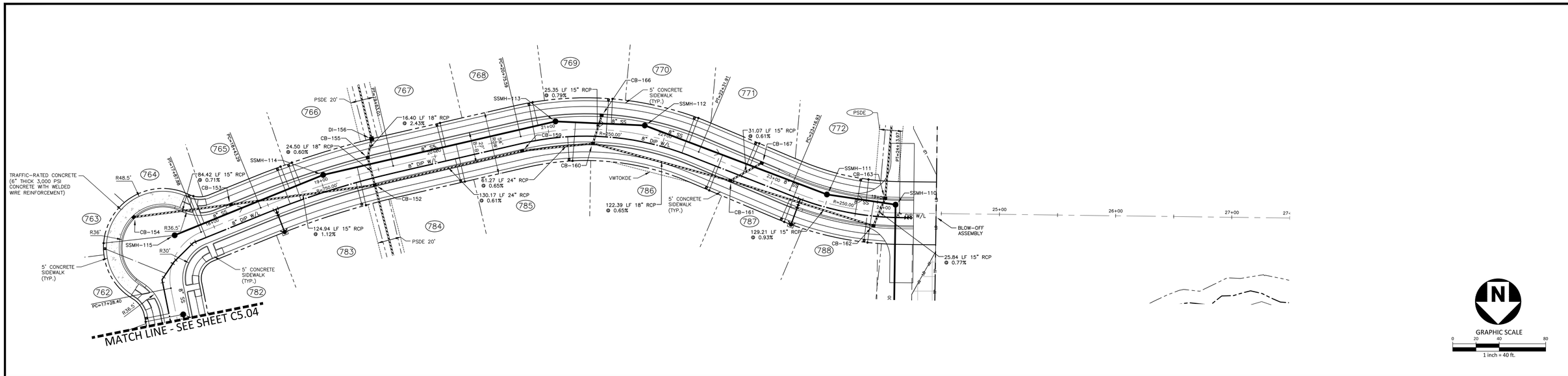
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
CARELESS WAY, STA. 9+50 THRU STA. 17+00

C5.04



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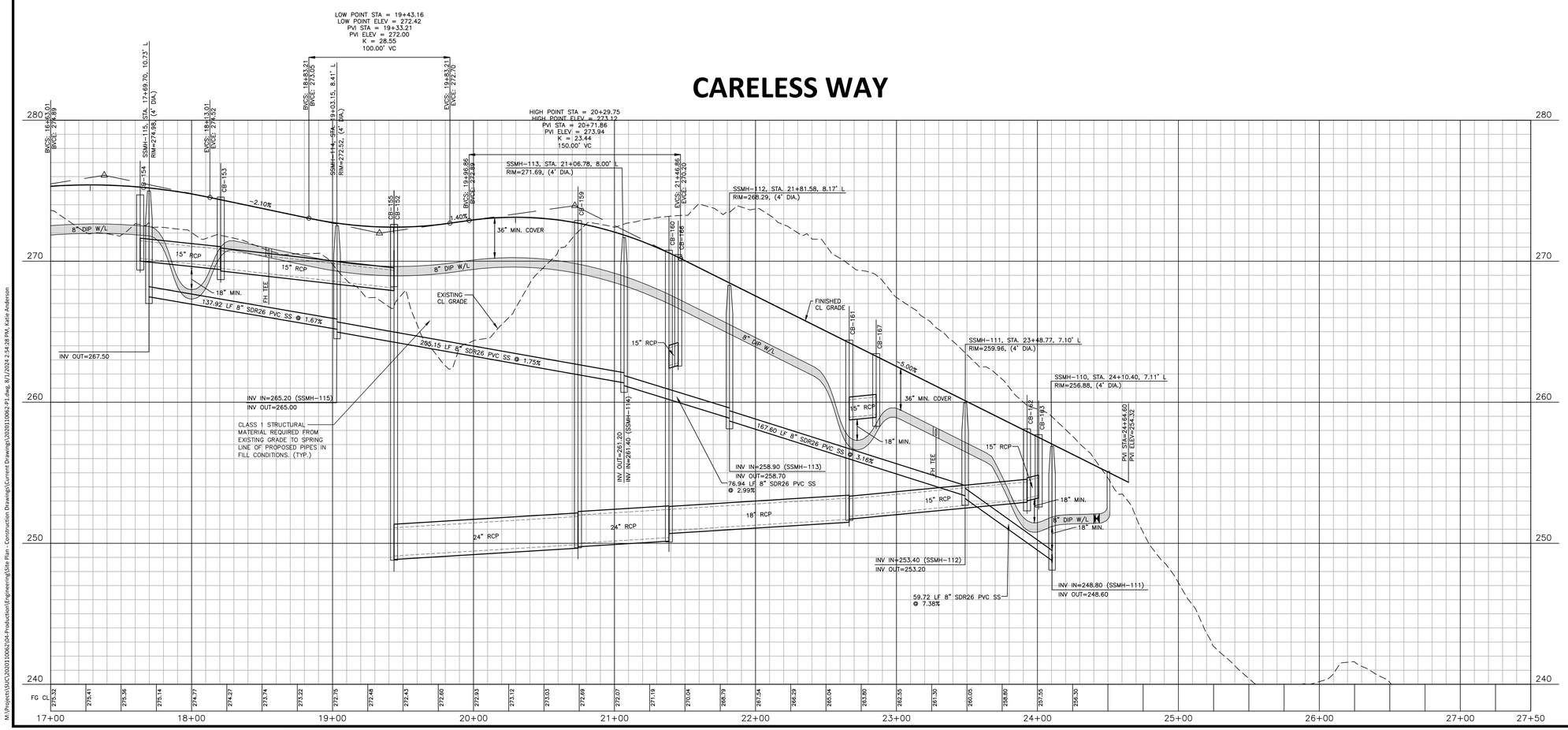

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

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KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

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CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

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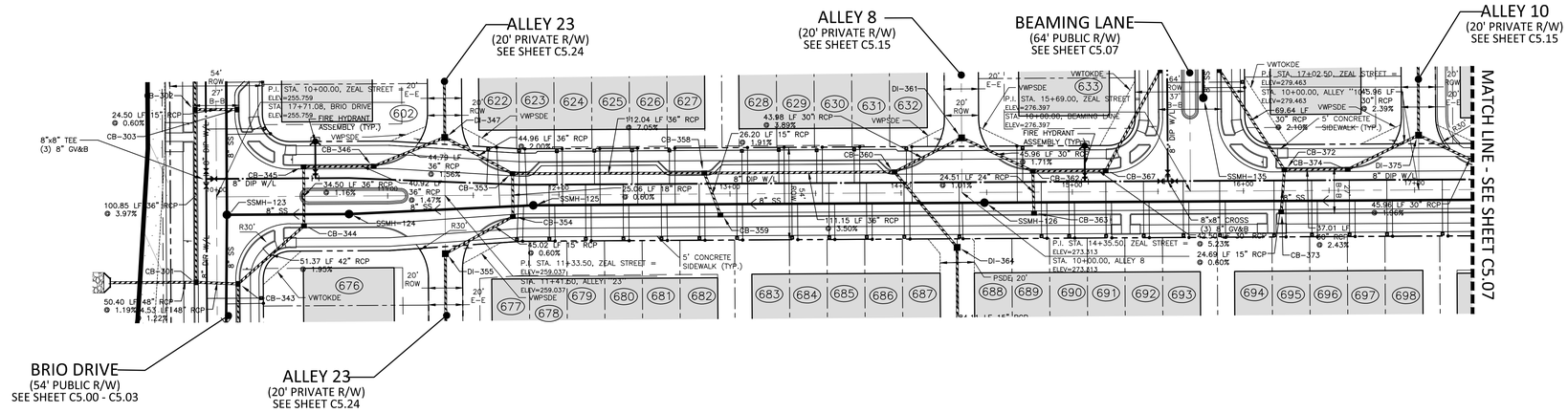
CARELESS WAY, STA. 17+00 THRU STA. 25+00

C5.05



GRAPHIC SCALE
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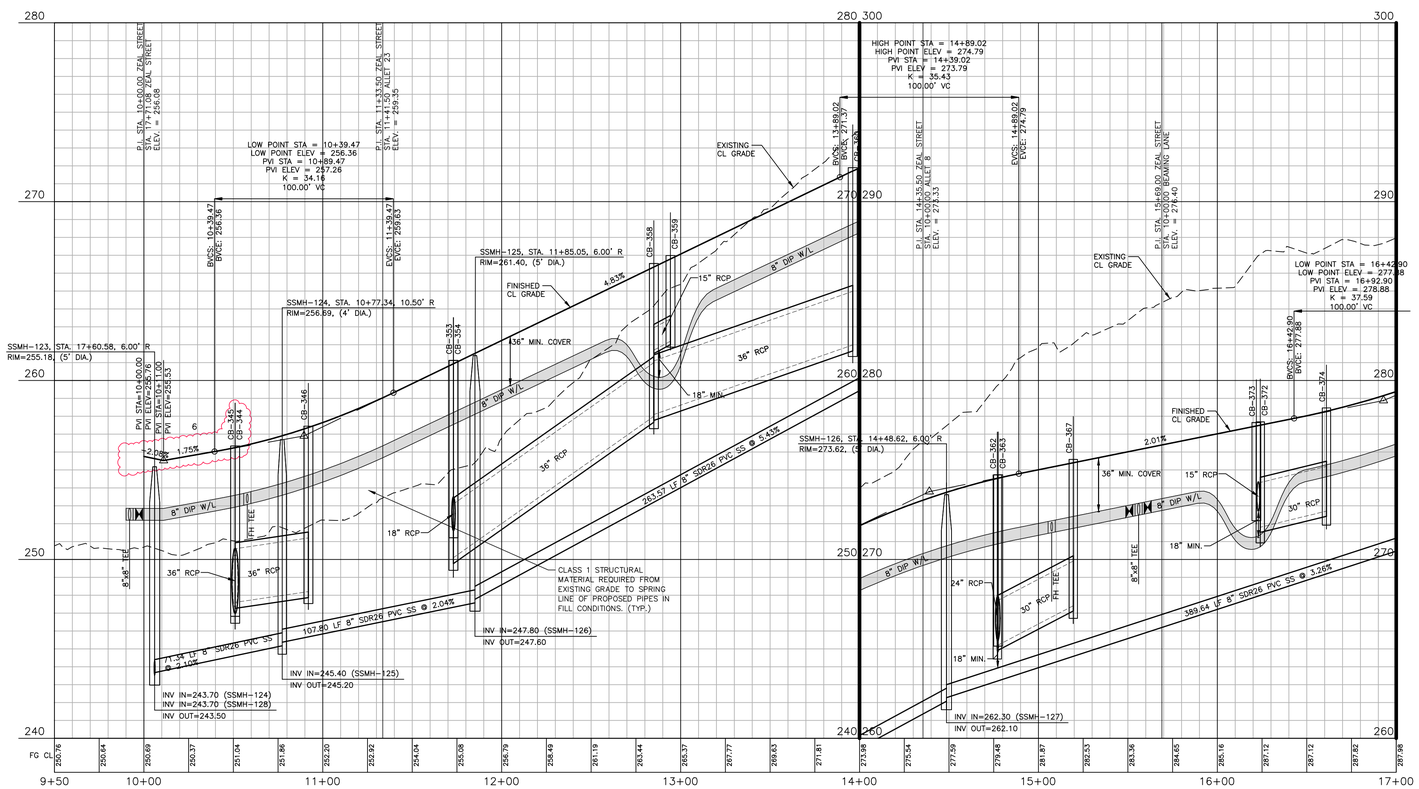
1 inch = 40 ft.

ZEAL STREET



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1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

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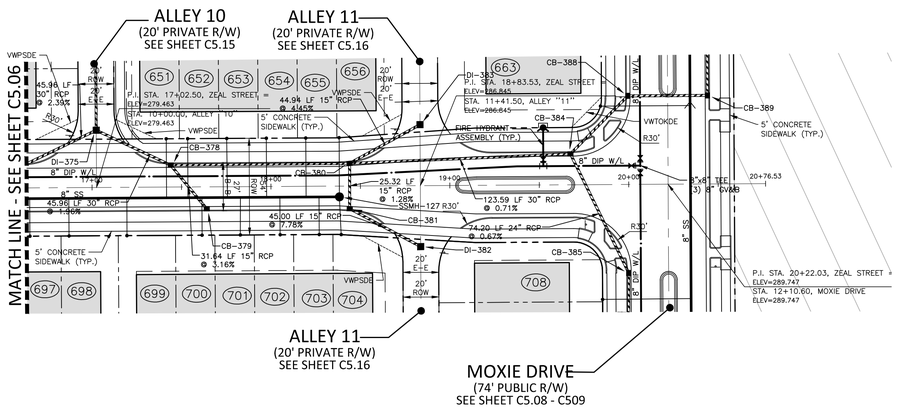
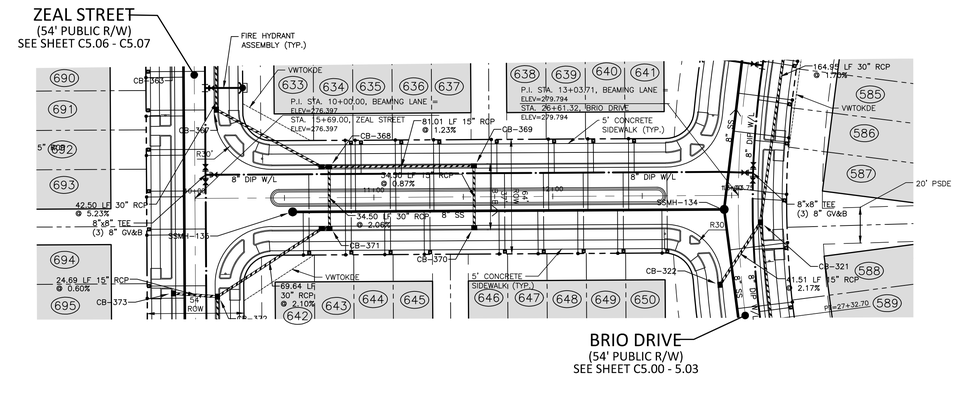
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
ZEAL STREET, STA. 9+50 THRU STA. 17+00

C5.06





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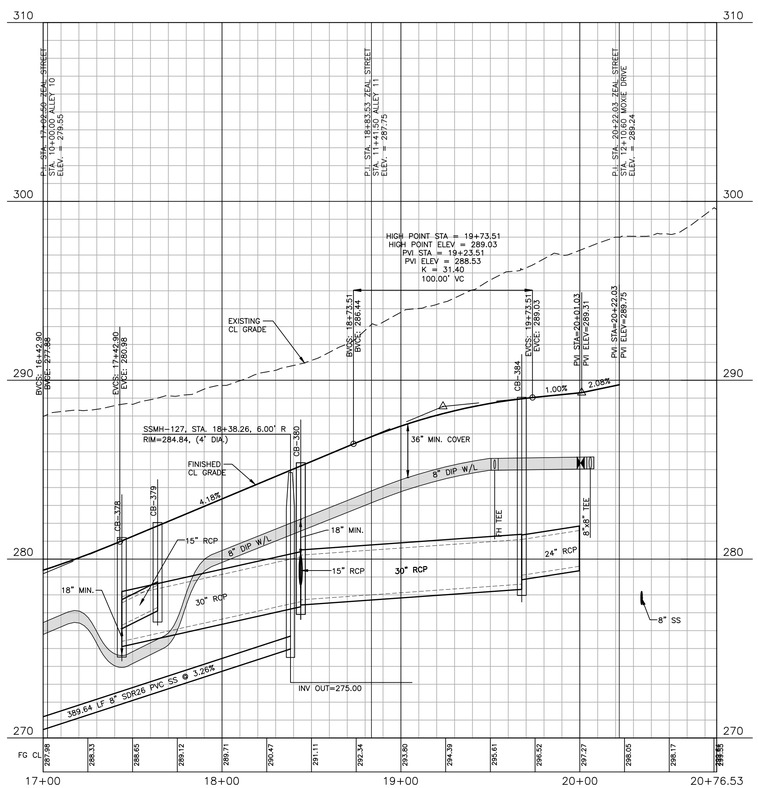
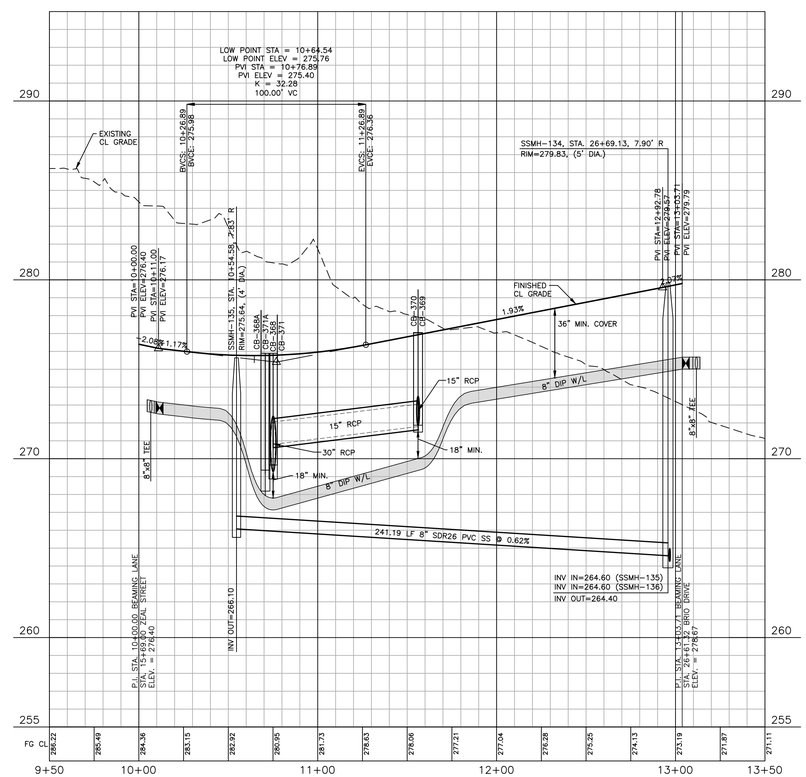


BEAMING LANE



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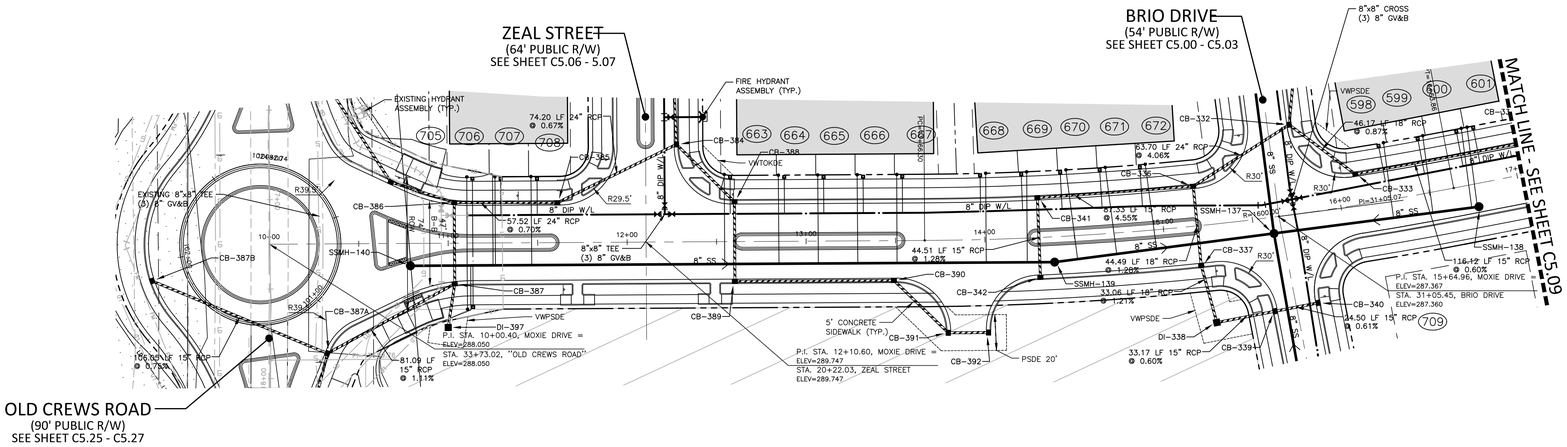

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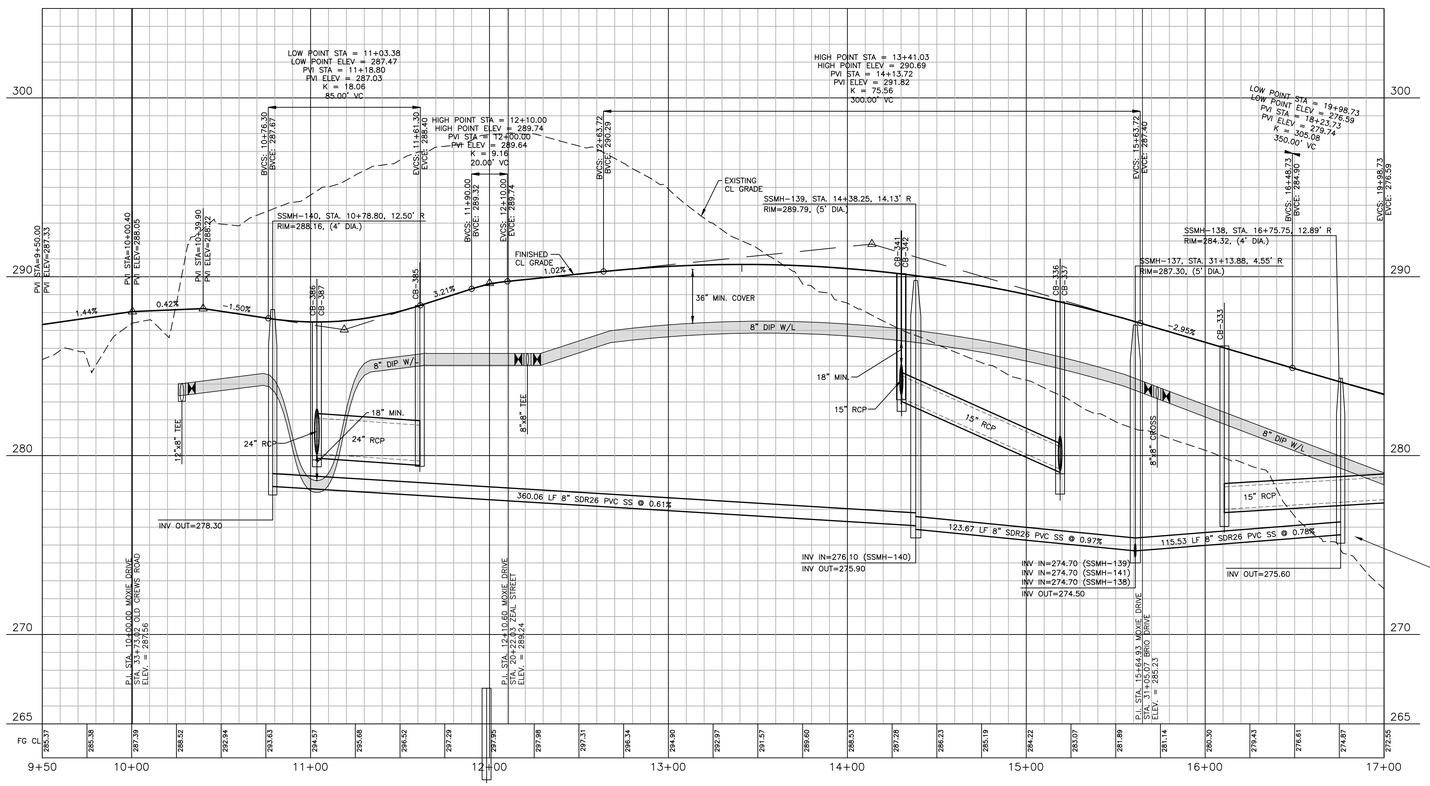

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City of Raleigh Development Approval _____
City of Raleigh Review Officer

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M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawing\2020110062-P2.dwg, 8/7/2024 2:58:44 PM, Katie Anderson

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

BRIO - PHASE 1

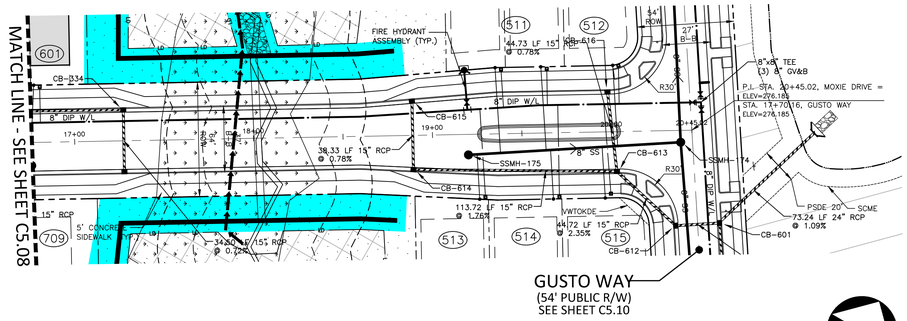
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

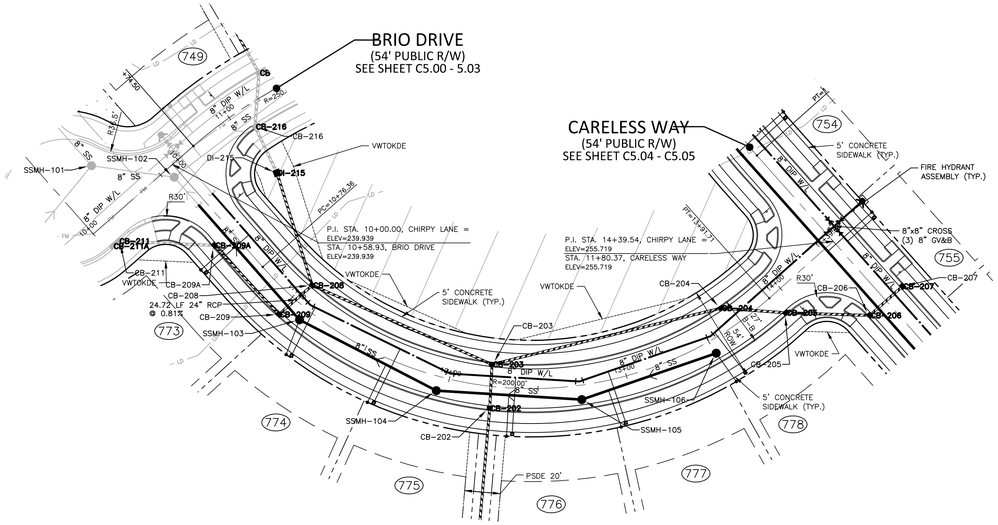
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P2
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
MOXIE DRIVE STA. 9+50 THRU STA. 17+00

C5.08



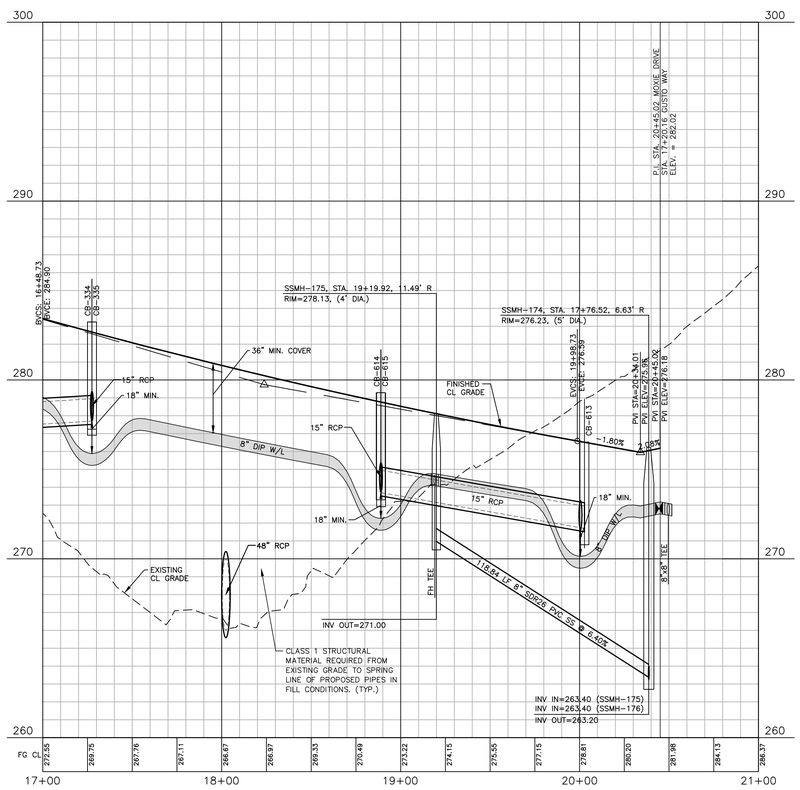


GRAPHIC SCALE

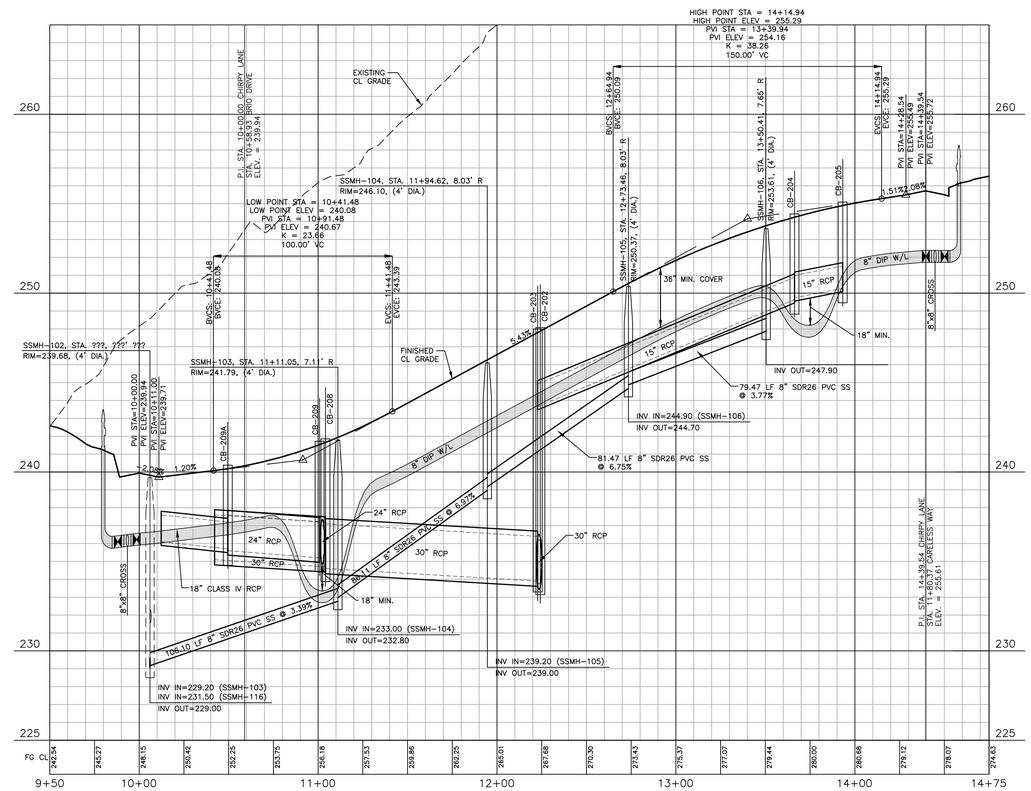
0 20 40 80

1 inch = 40 ft.

MOXIE DRIVE



CHIRPY LANE



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SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT VALID WITHOUT ORIGINAL SEAL

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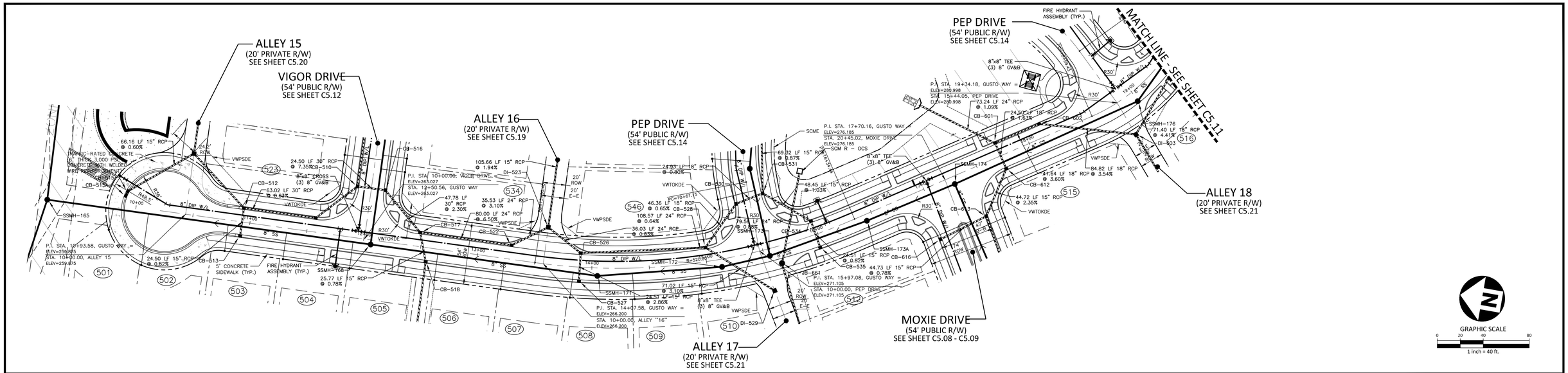
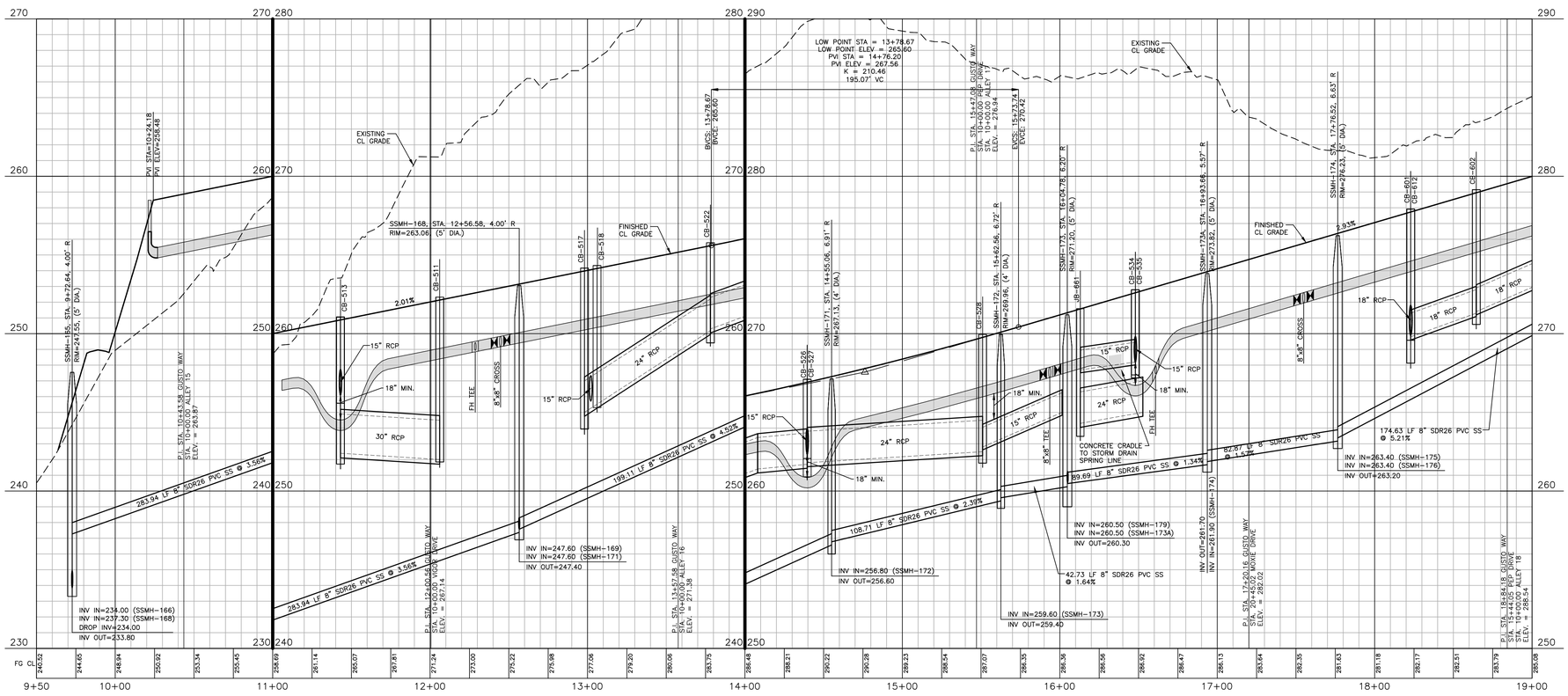


GUSTO WAY



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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER BRIAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

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KNIGHTDALE, NORTH CAROLINA

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DRAWN BY	MRF
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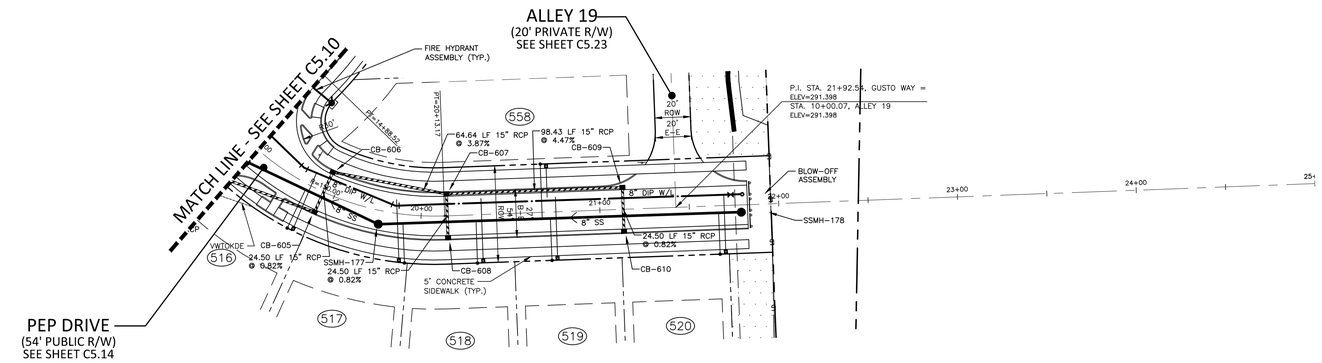
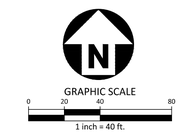
C5.10





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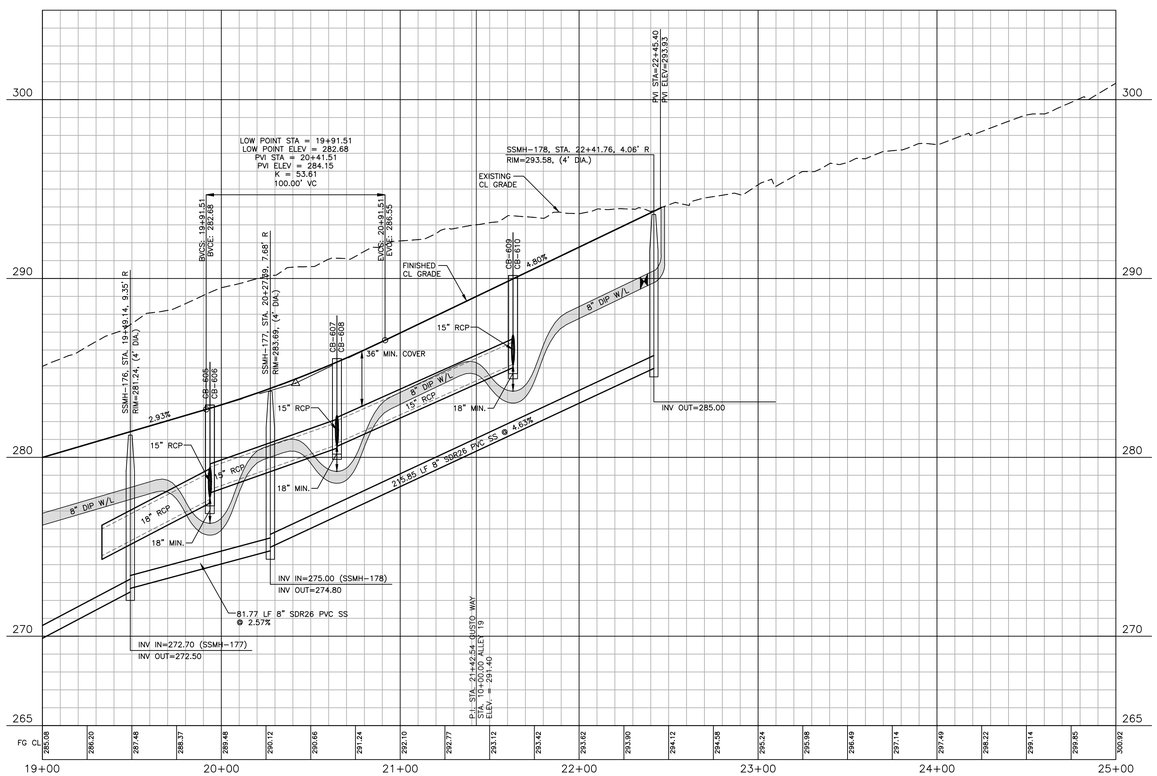

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
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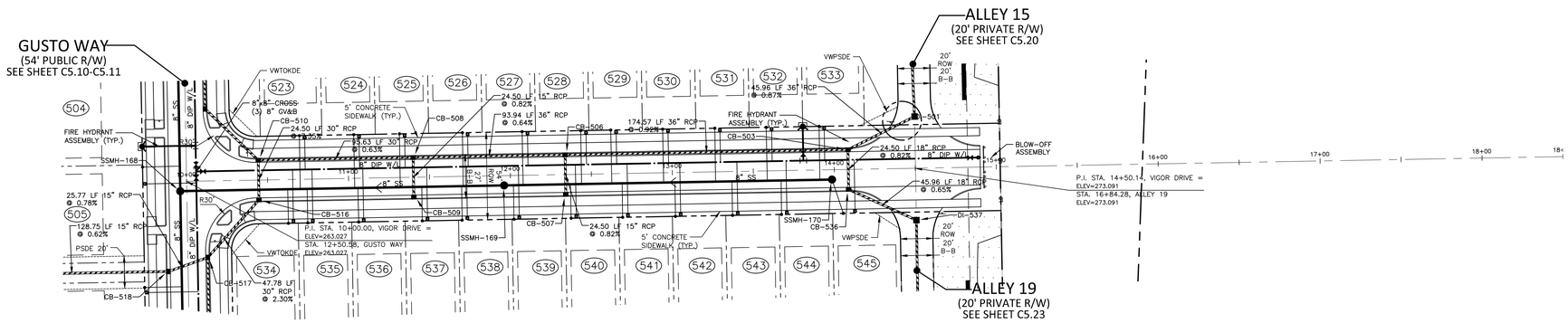
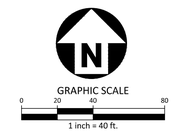
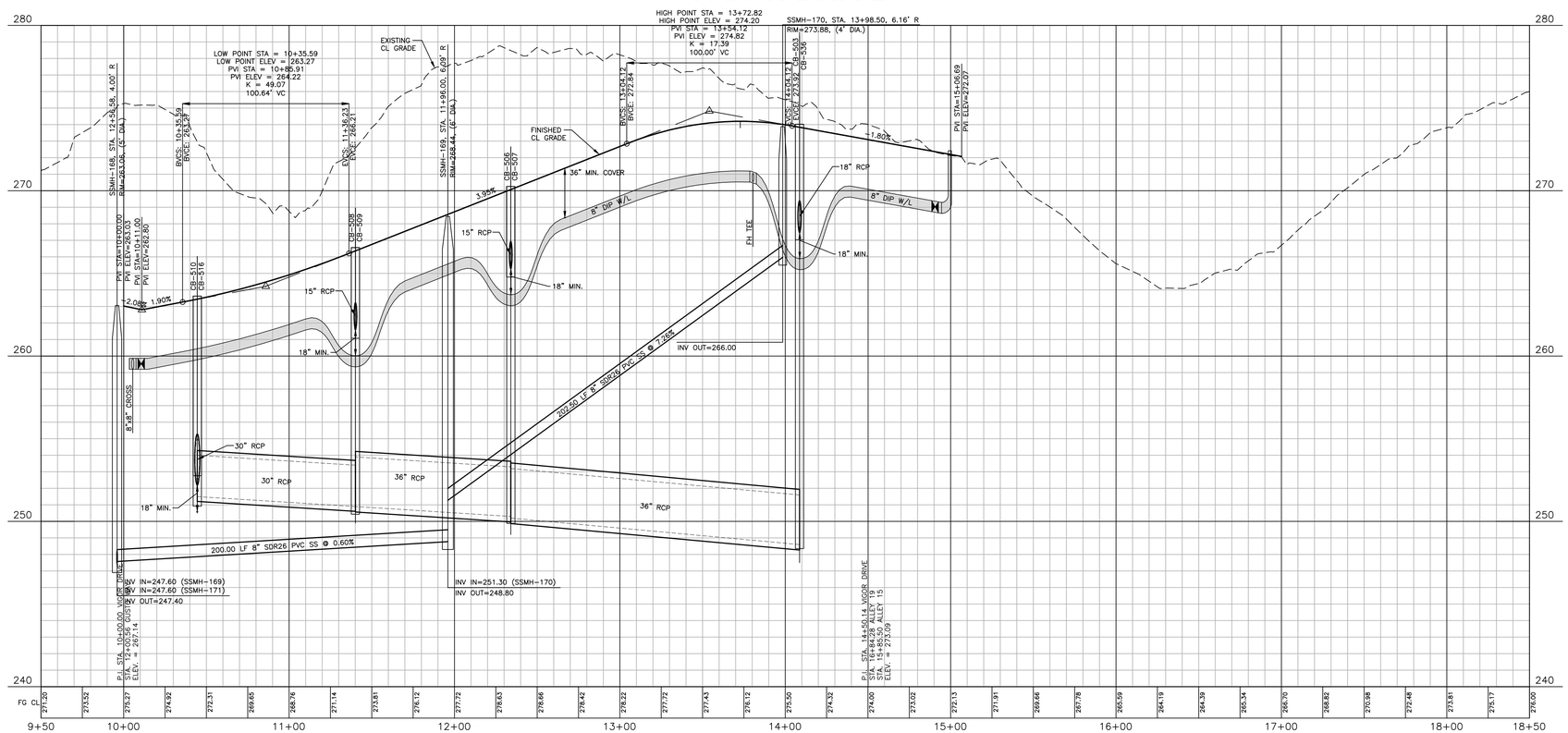
C5.11





VIGOR DRIVE



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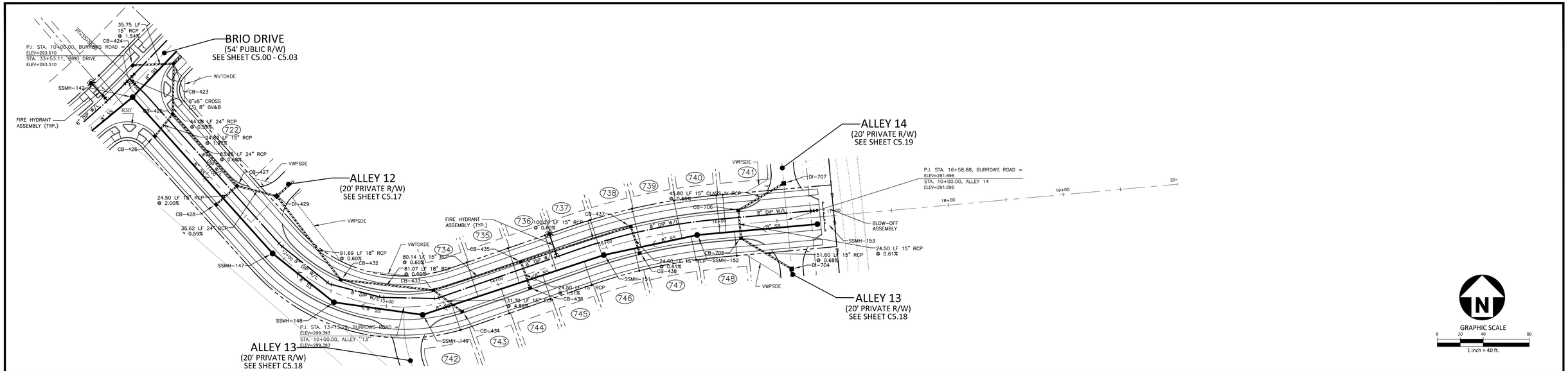
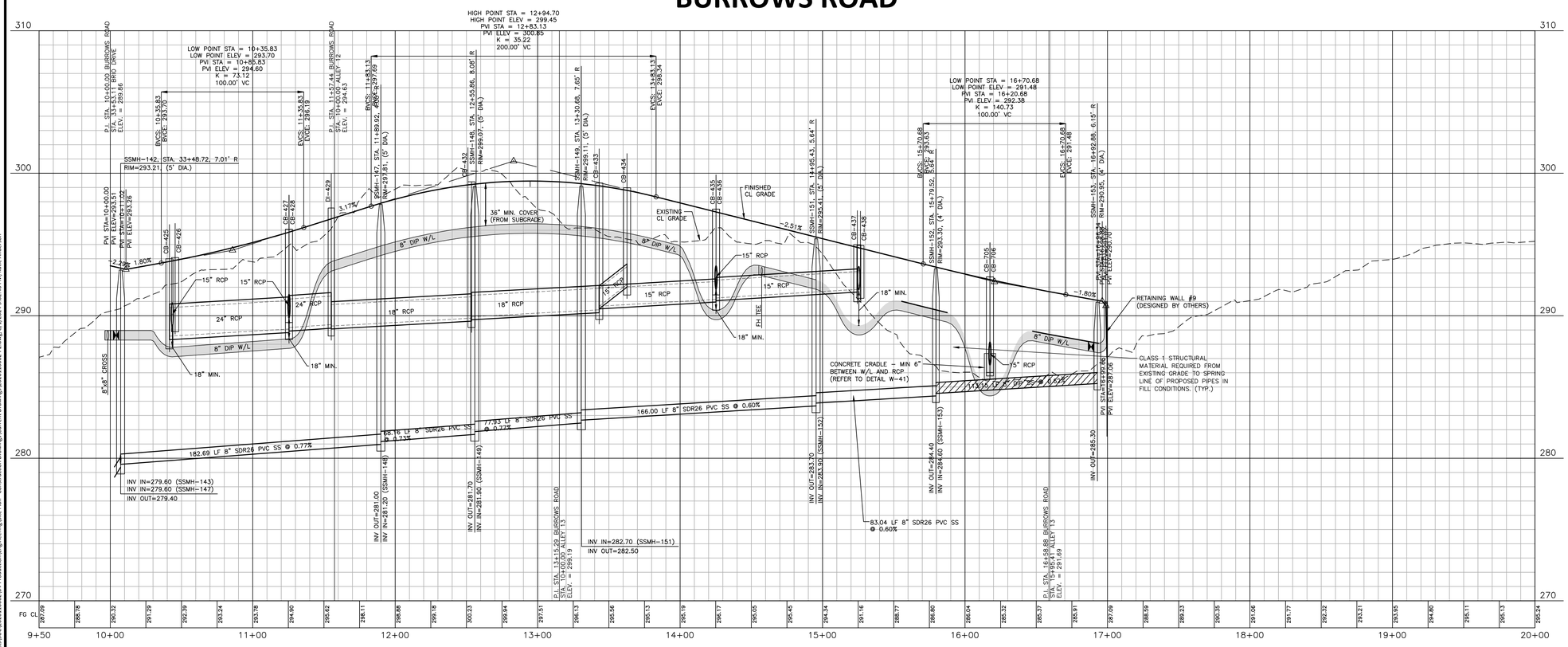


BURROWS ROAD



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City of Raleigh Review Officer

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PHONE: 602. 698. 8655

REVISIONS

NO.	DATE	
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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

BRIO - PHASE 1

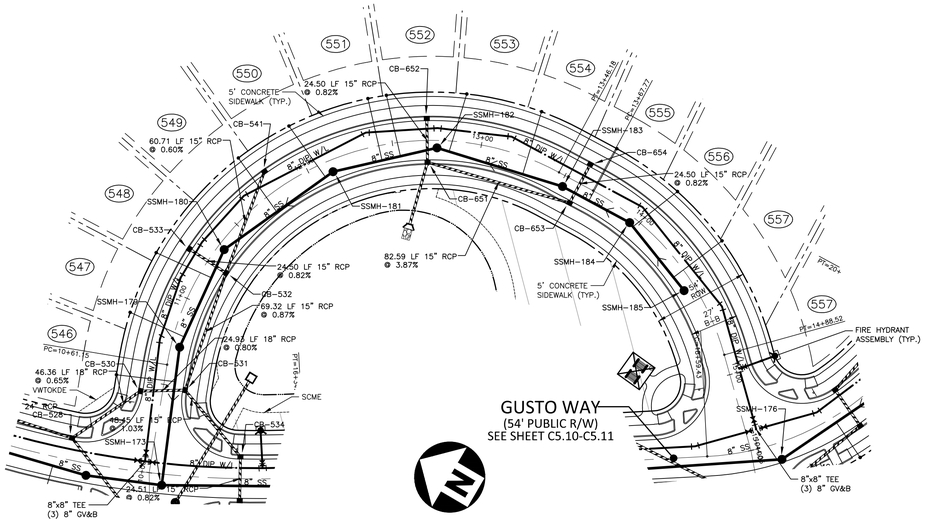
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

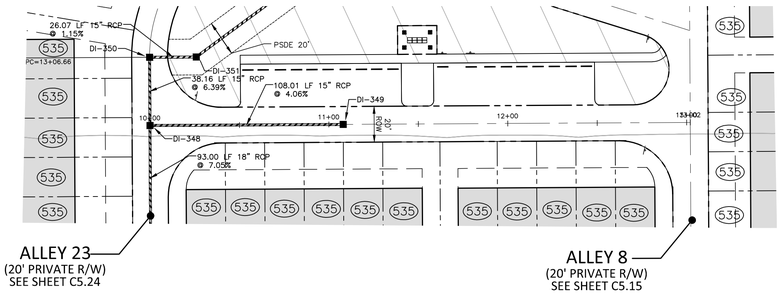
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P2
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
STREET FF, STA. 9+50 THRU STA. 20+00

C5.13





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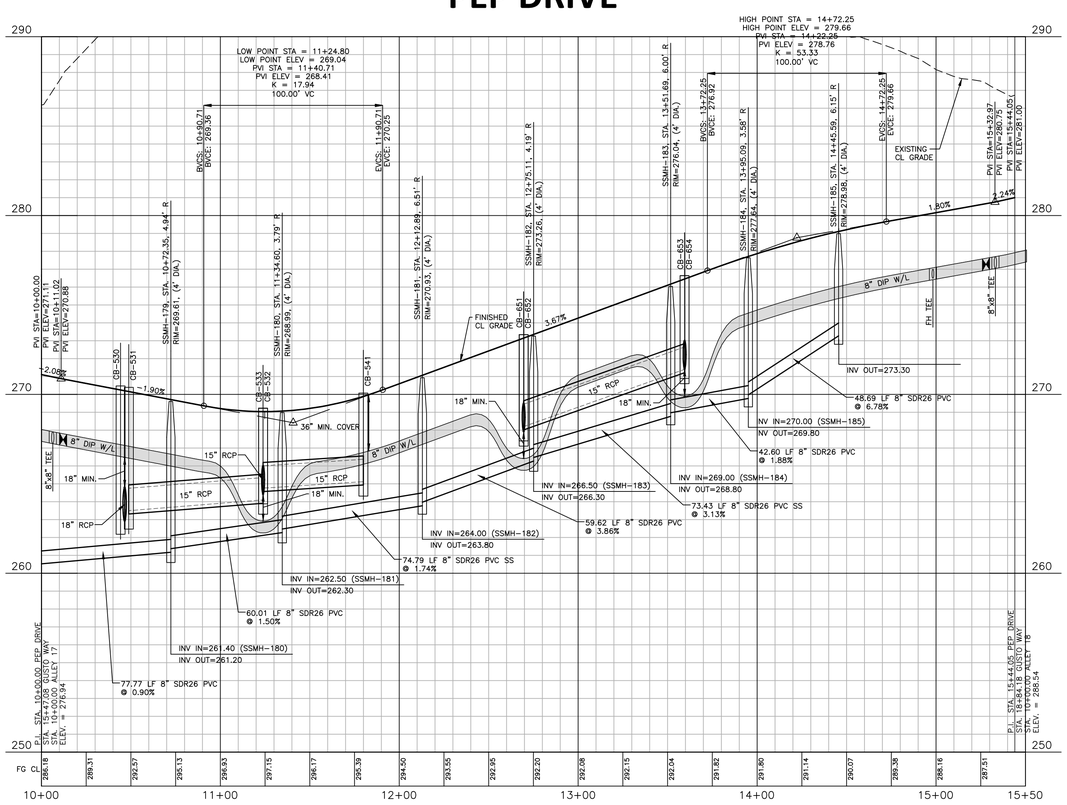
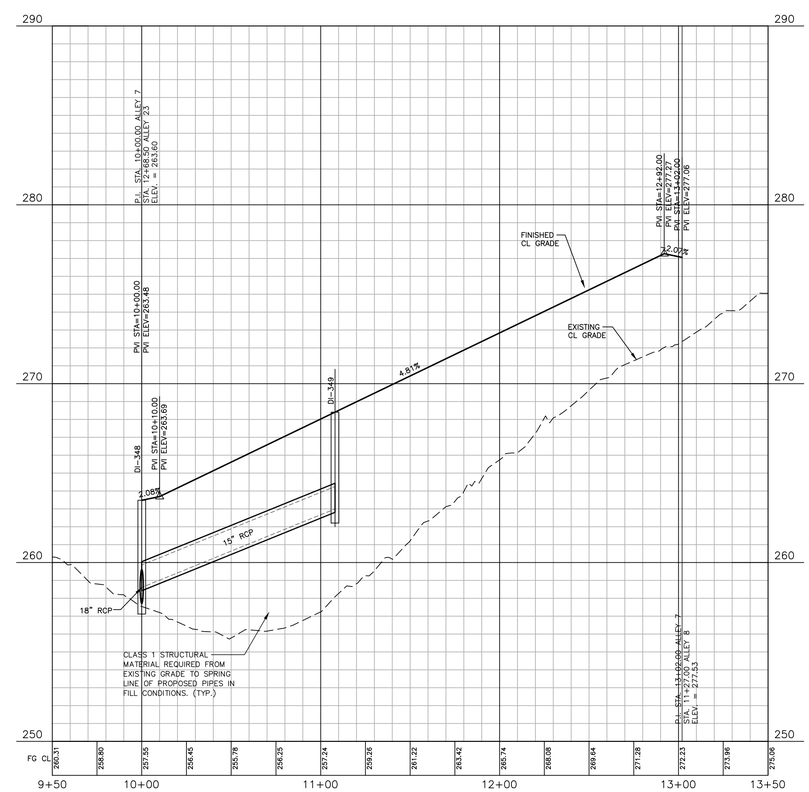
1 inch = 40 ft.

PEP DRIVE



ALLEY "7"



PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER BRIAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P3
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
STREET GG, STA. 9+50 THRU STA. 15+50
ALLY 7, STA. 9+50 THRU STA. 13+50

C5.14

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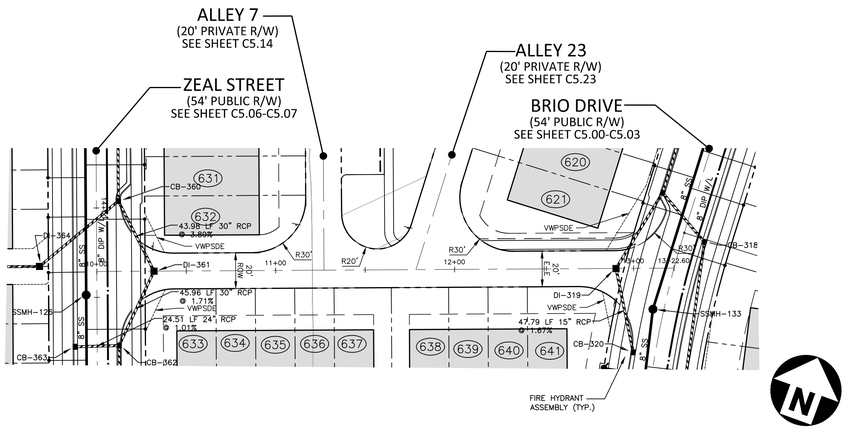

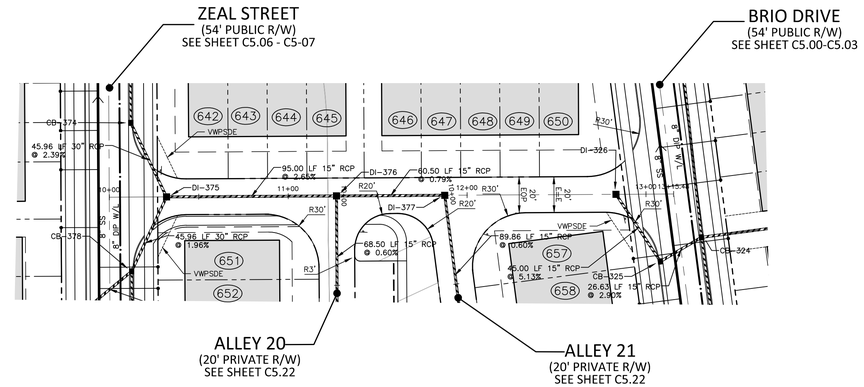

GRAPHIC SCALE
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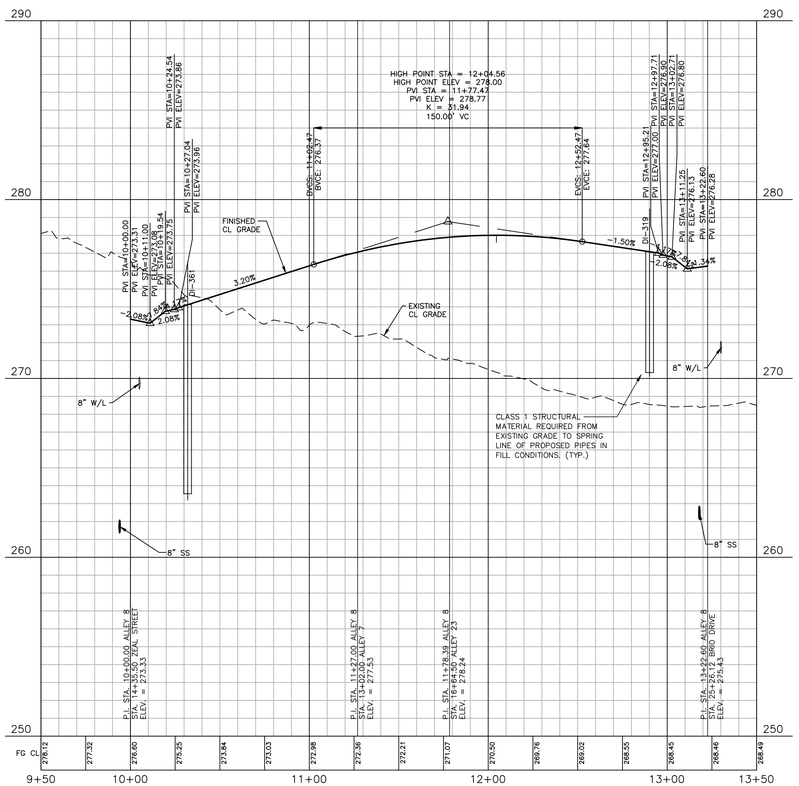
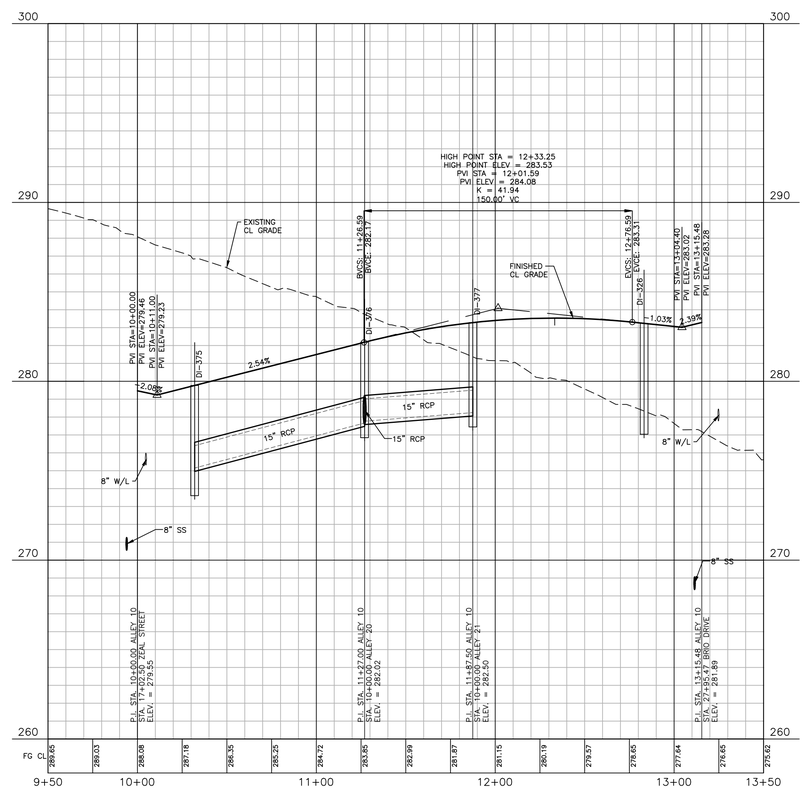
1 inch = 40 ft.

ALLEY "8"



ALLEY "10"



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SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
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M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-P3.dwg, 8/7/2024 3:06:45 PM, Katie Anderson

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

BRIO - PHASE 1

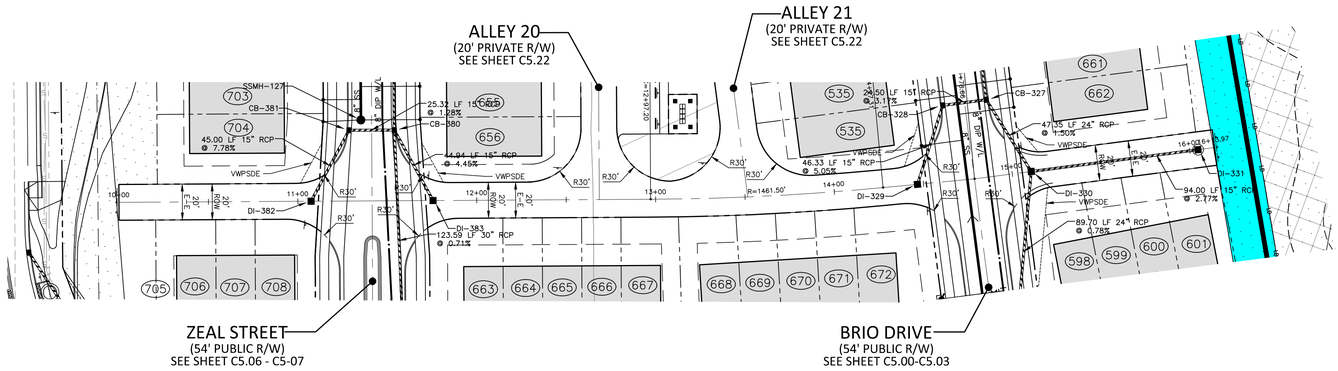
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P3
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

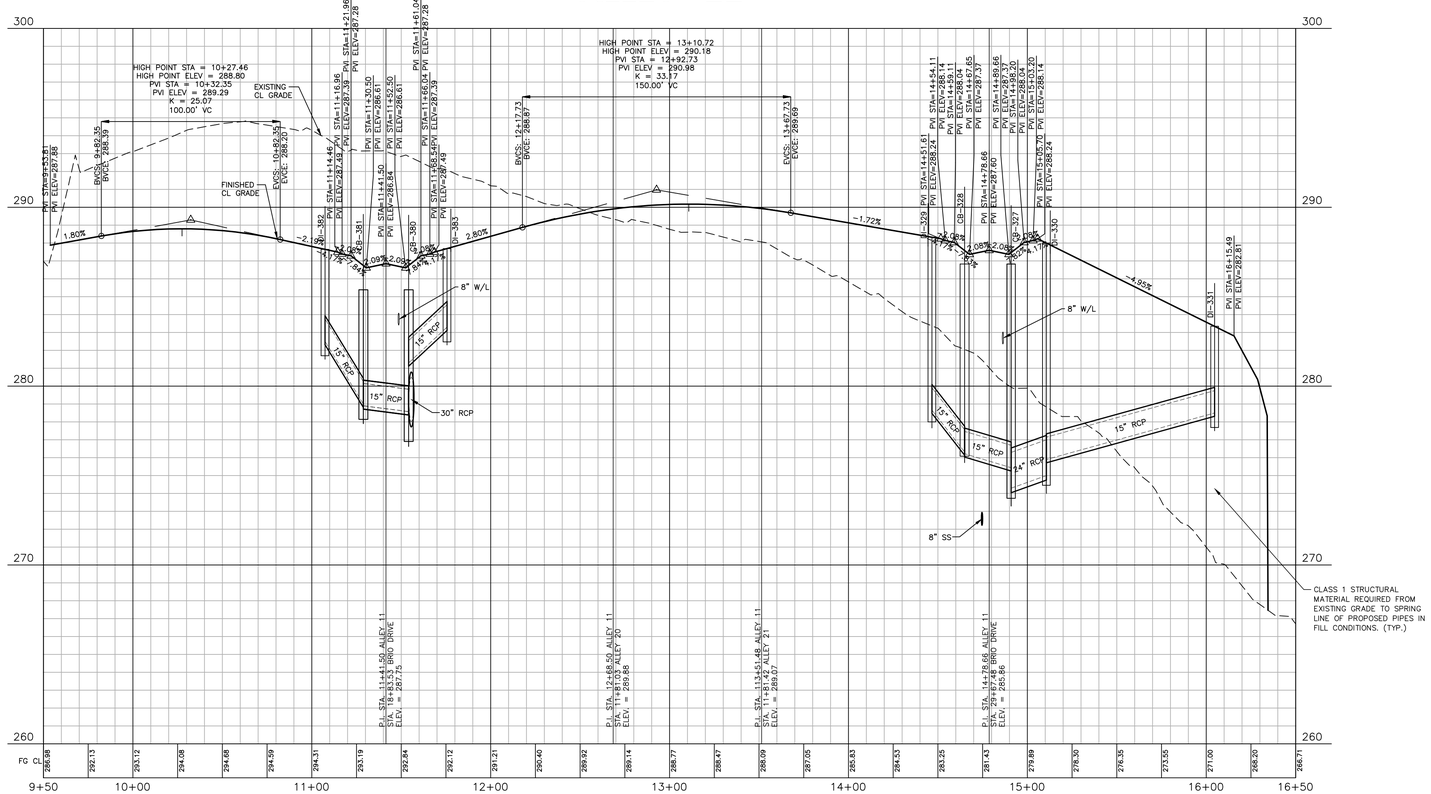
PLAN AND PROFILE
ALLEY 8, STA. 9+50 THRU STA. 13+50
ALLY 10, STA. 9+50 THRU STA. 13+50

C5.15



GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

ALLEY "11"



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SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

BRIO - PHASE 1

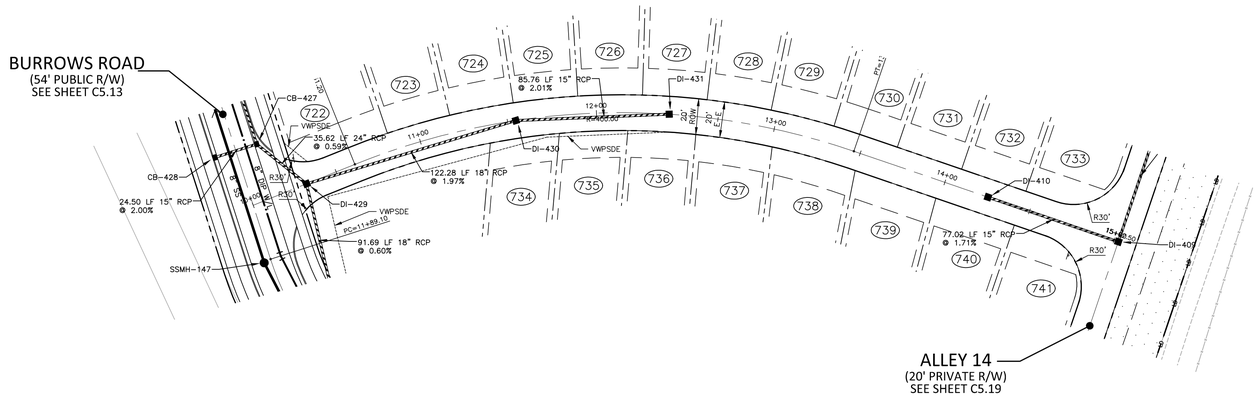
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

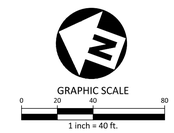
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P3
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

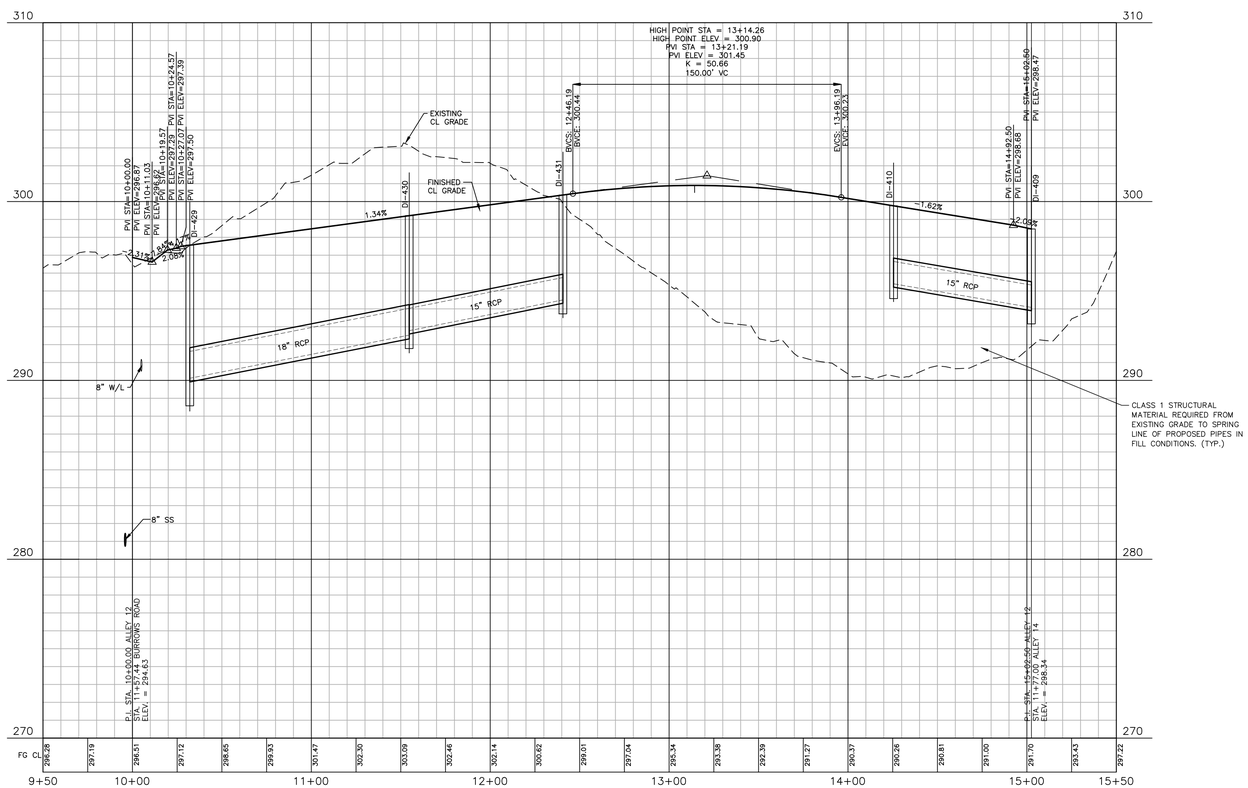
PLAN AND PROFILE
ALLEY 11, STA. 9+50 THRU STA. 16+50

C5.16





ALLEY "12"



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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

BRIO - PHASE 1
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PLAN INFORMATION

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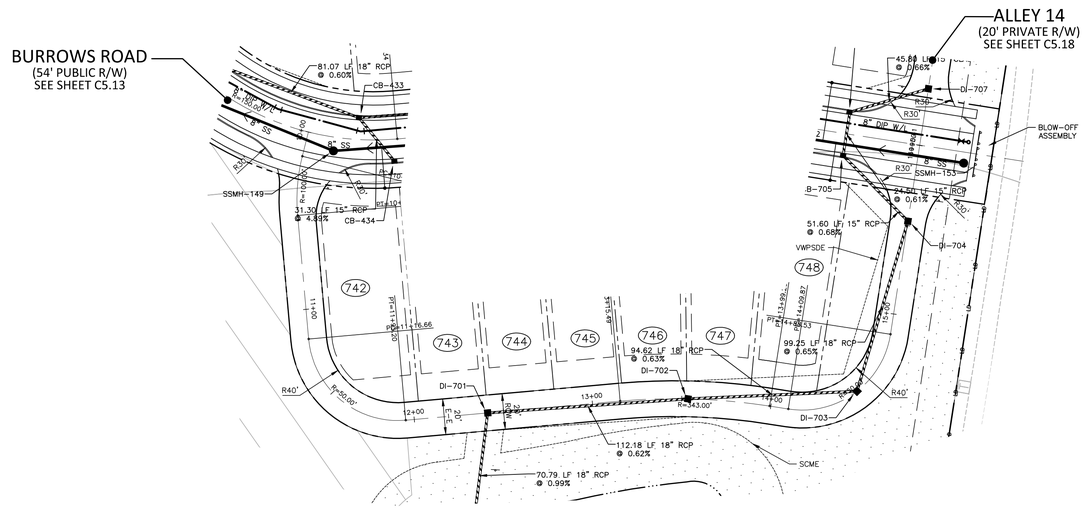
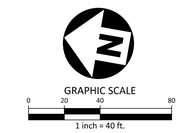
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

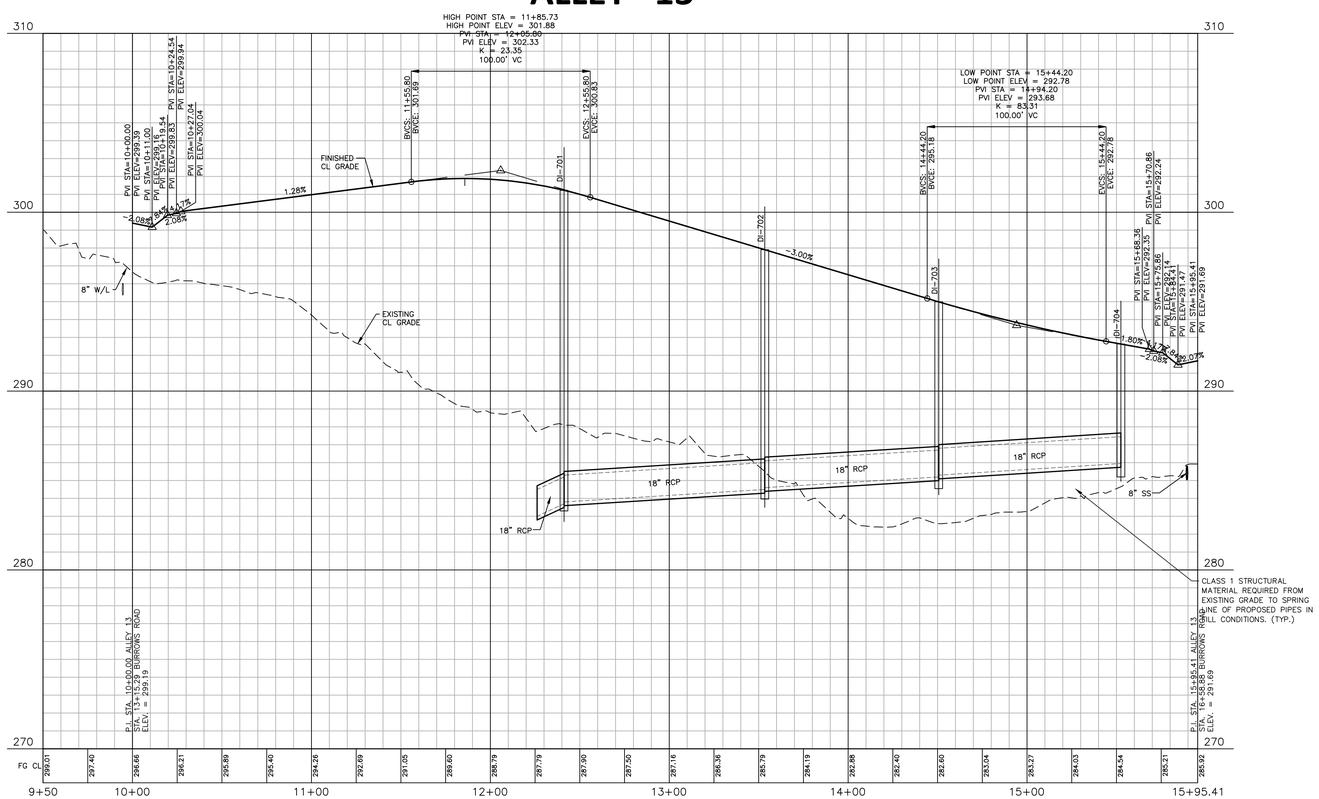
PLAN AND PROFILE
ALLEY 12, STA. 9+50 THRU STA. 15+50

C5.17





ALLEY "13"



PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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City of Raleigh Review Officer

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M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-P3.dwg, 8/1/2024 3:08:52 PM, Katie Anderson

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

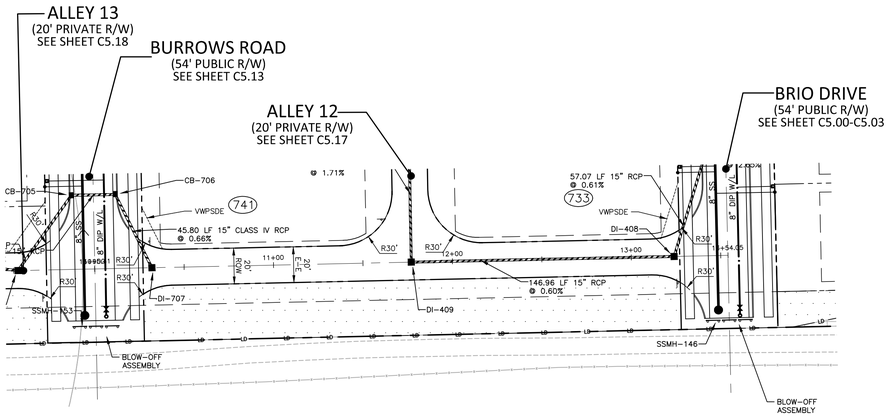
BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

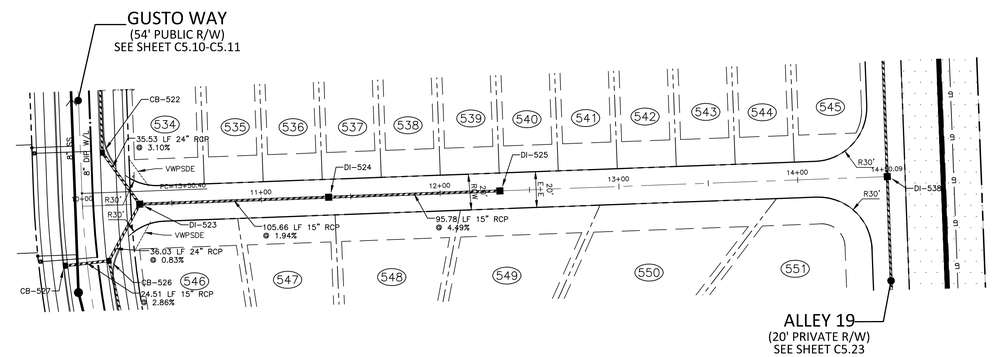
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P3
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
ALLEY 13, STA. 9+50 THRU STA. 15+95.41

C5.18





GRAPHIC SCALE
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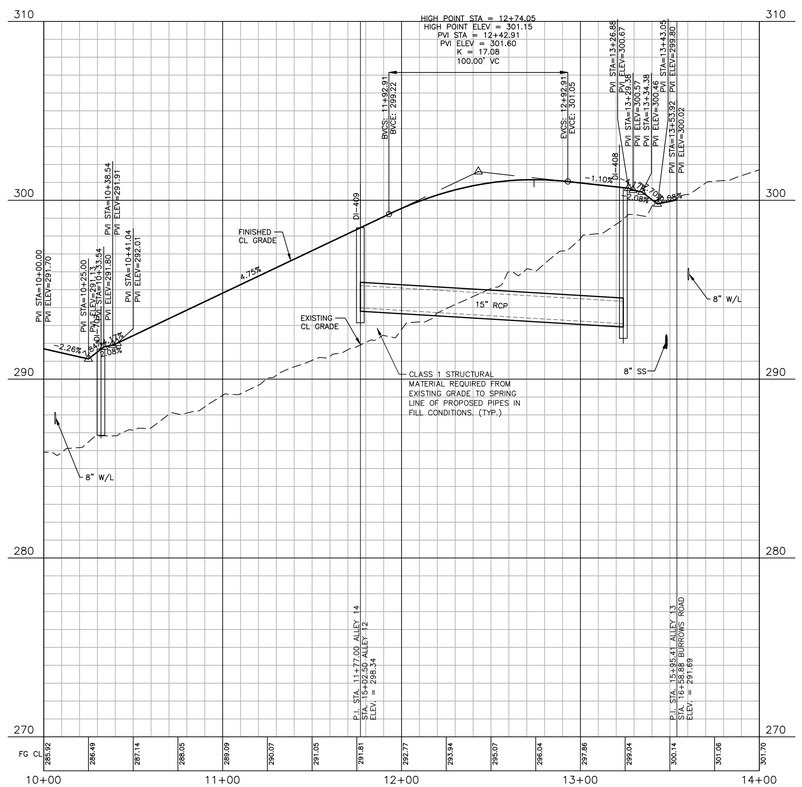
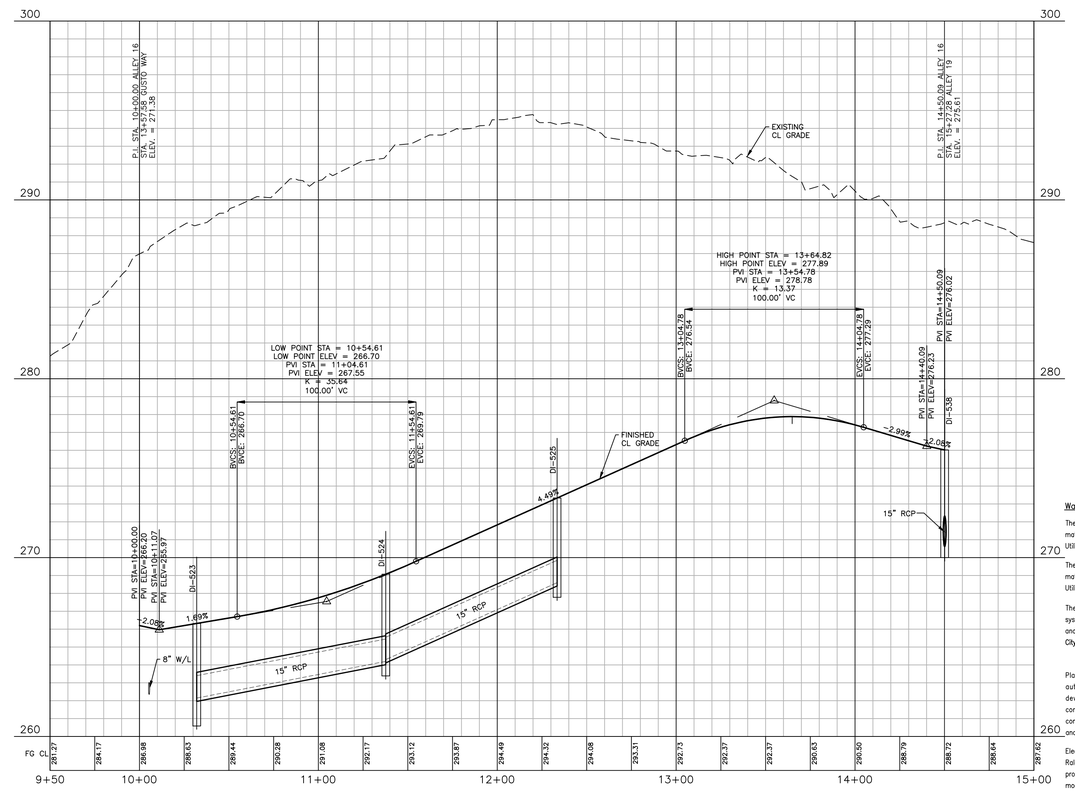
1 inch = 40 ft.

ALLEY "14"



ALLEY "16"



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SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

BRIO - PHASE 1

CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
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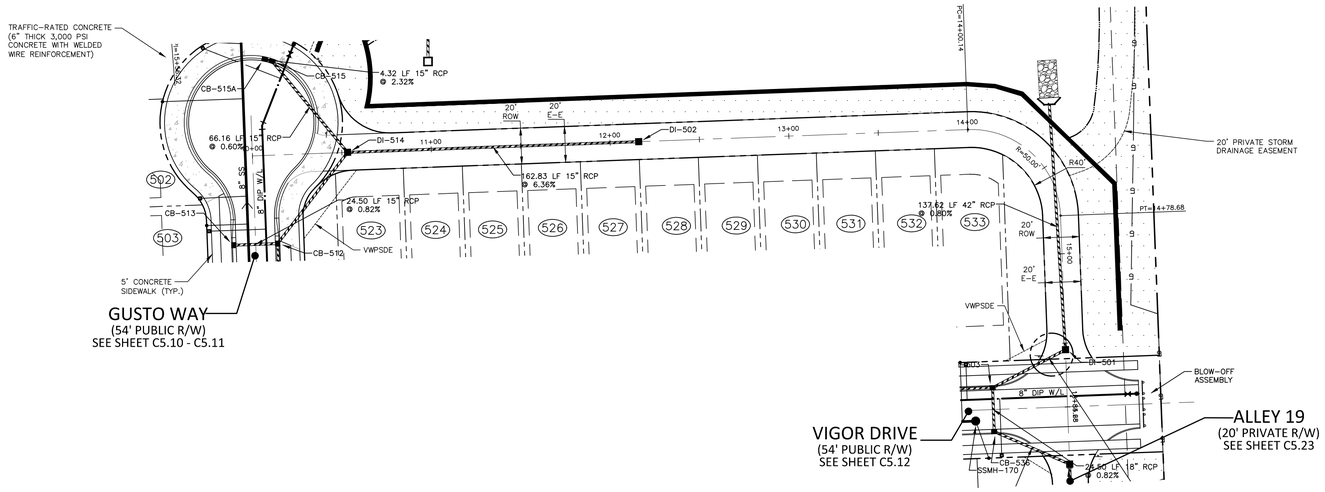
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

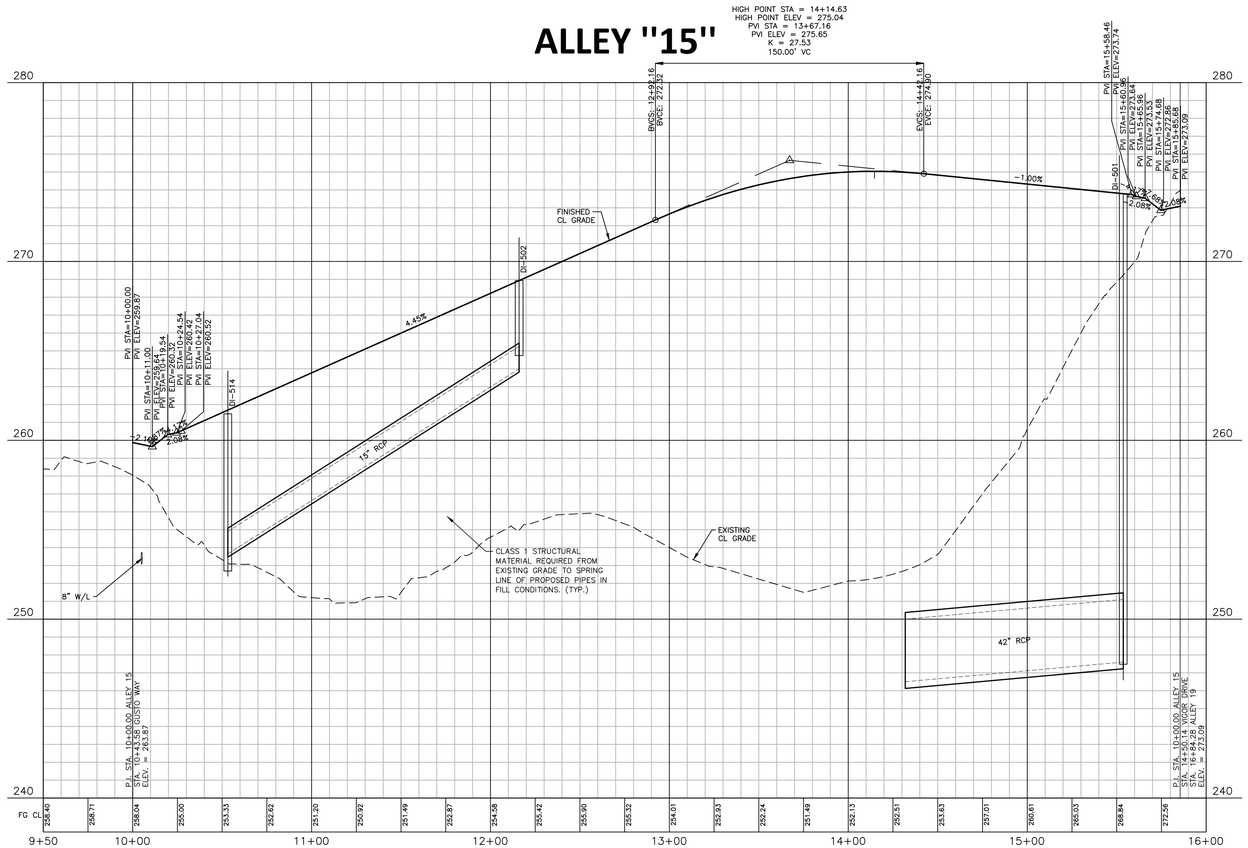
PLAN AND PROFILE
ALLEY 14, STA. 9+50 THRU STA. 14+00
ALLEY 16, STA. 9+50 THRU STA. 15+00

C5.19



GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

ALLEY "15"



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SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

BRIO - PHASE 1

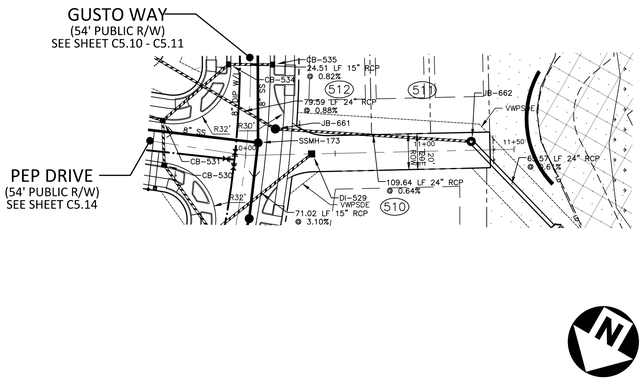
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

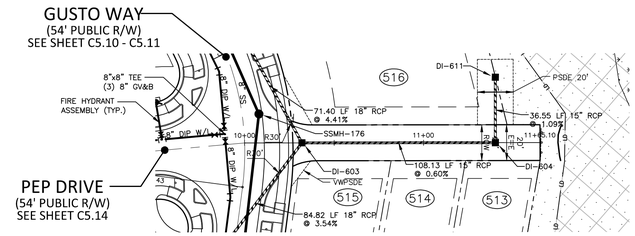
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P4
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
ALLEY 15, STA. 9+50 THRU STA. 15+85.68

C5.20





GRAPHIC SCALE
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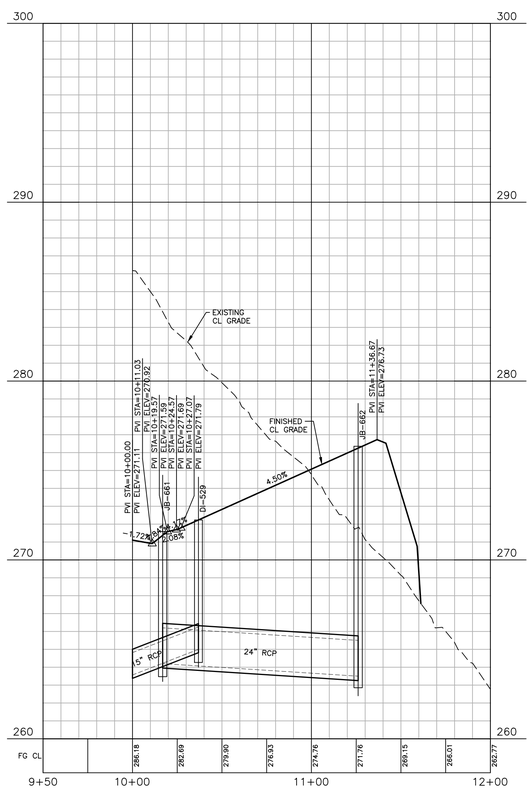
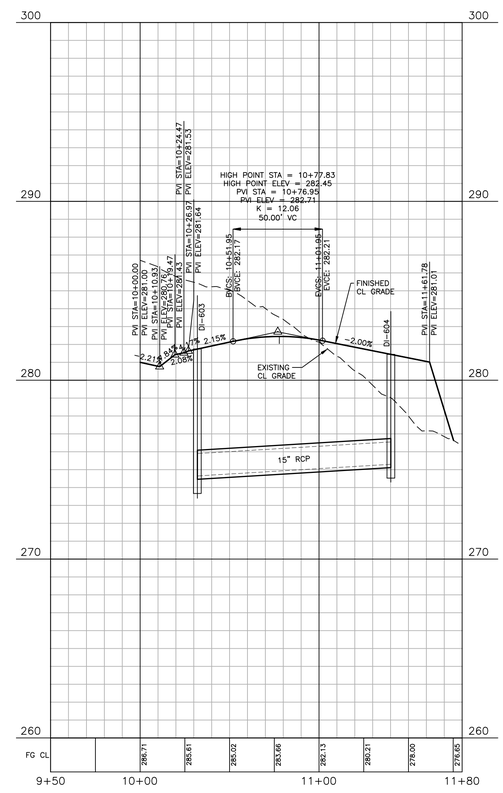
1 inch = 40 ft.

ALLEY "17"



ALLEY "18"



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PLAN INFORMATION

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DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

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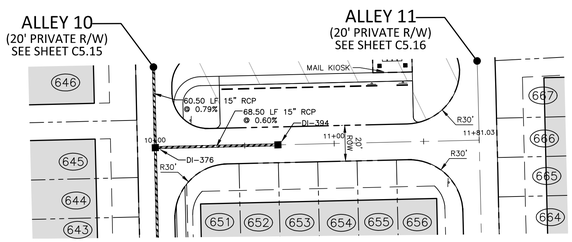
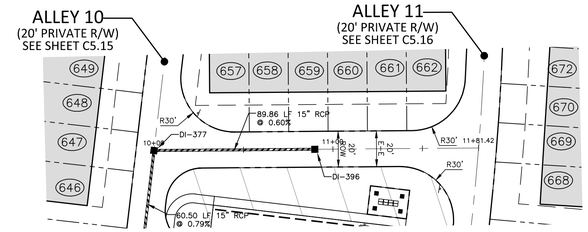
C5.21





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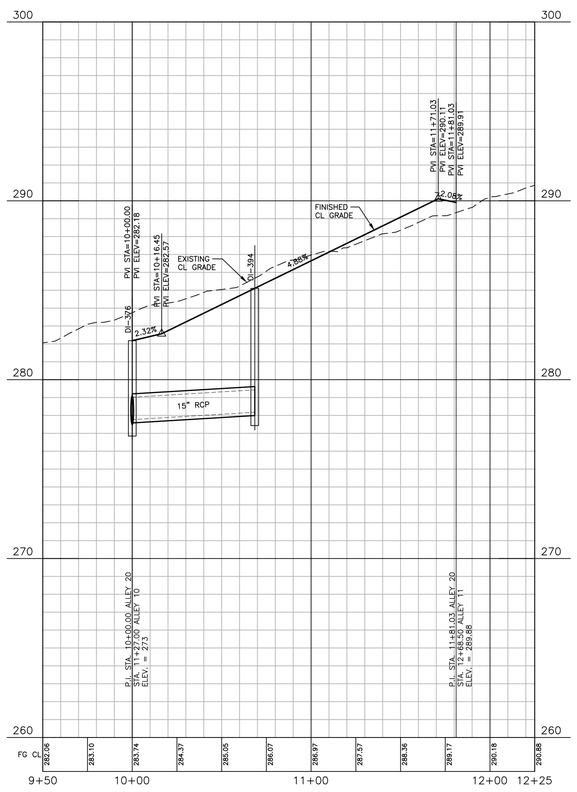

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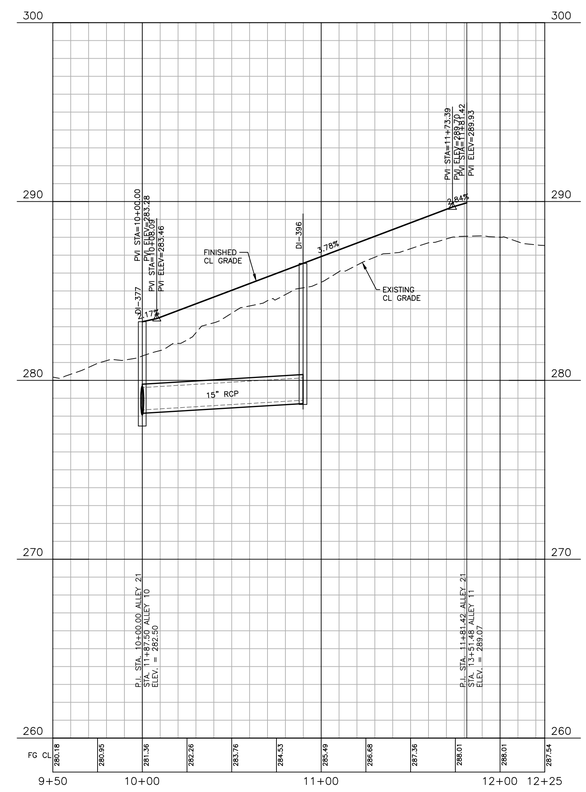

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M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-P4.DWG, 8/1/2024 3:13:13 PM, Katie Anderson

McADAMS

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PHONE: 602. 698. 8655
SUNCREST Real Estate & Land

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

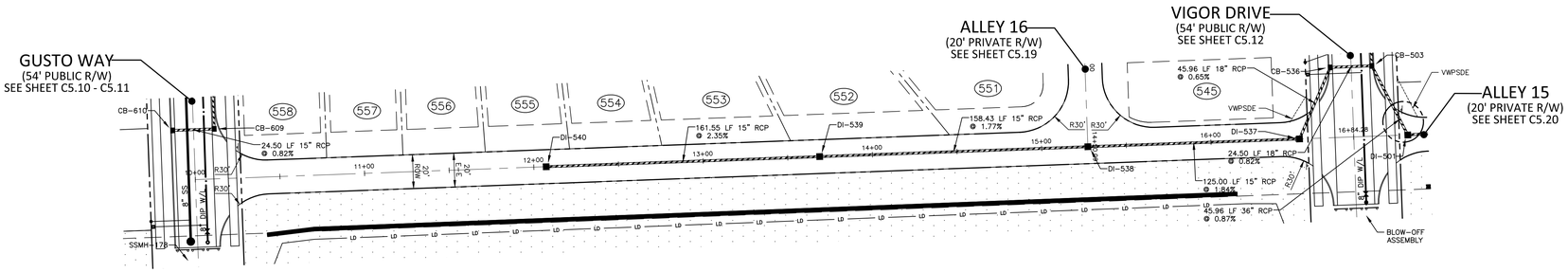
BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P4
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
ALLEY 20, STA. 9+50 THRU STA. 12+25
ALLEY 21, STA. 9+50 THRU STA. 12+25

C5.22

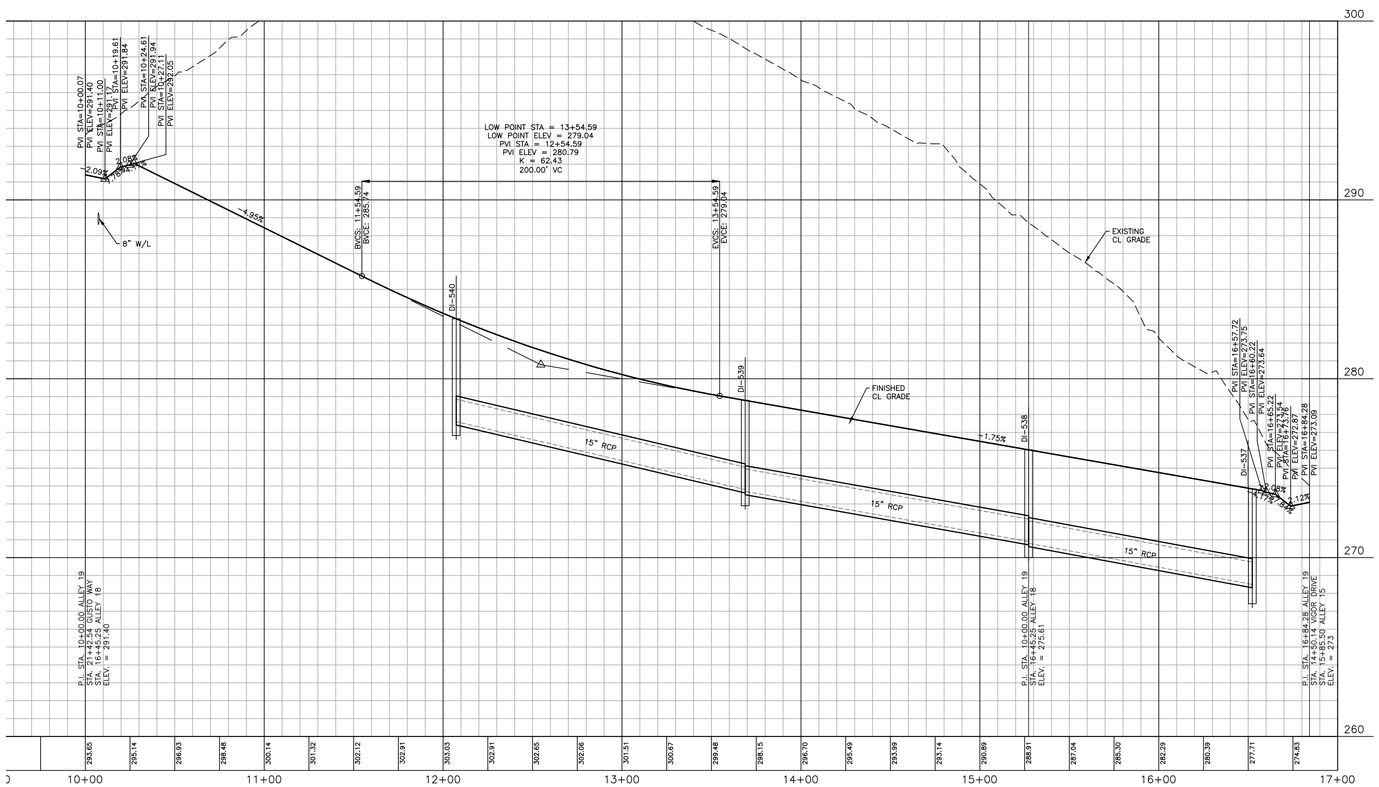


GRAPHIC SCALE

0 20 40 80

1 inch = 40 ft.

ALLEY "19"



PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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SITE PERMITTING APPROVAL

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City of Raleigh Development Approval _____
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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
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1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

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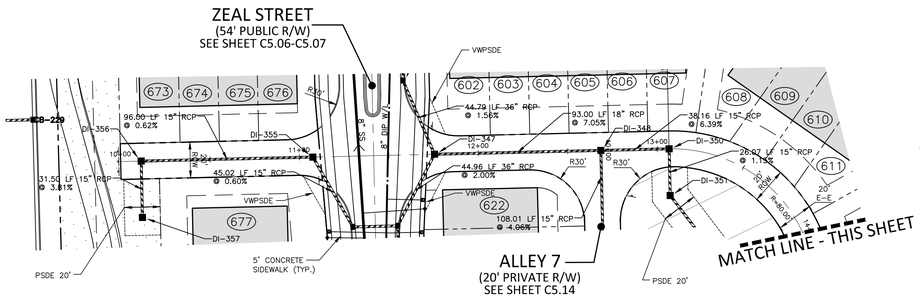
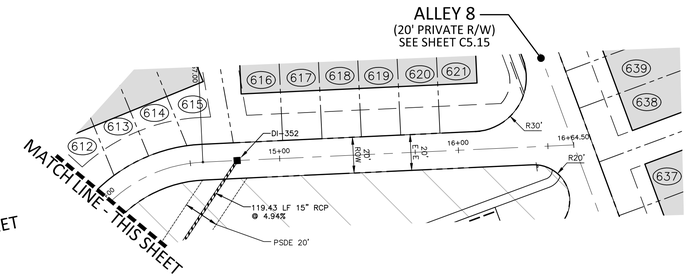
PLAN AND PROFILE
ALLEY 19, STA. 9+50 THRU STA. 16+84.28

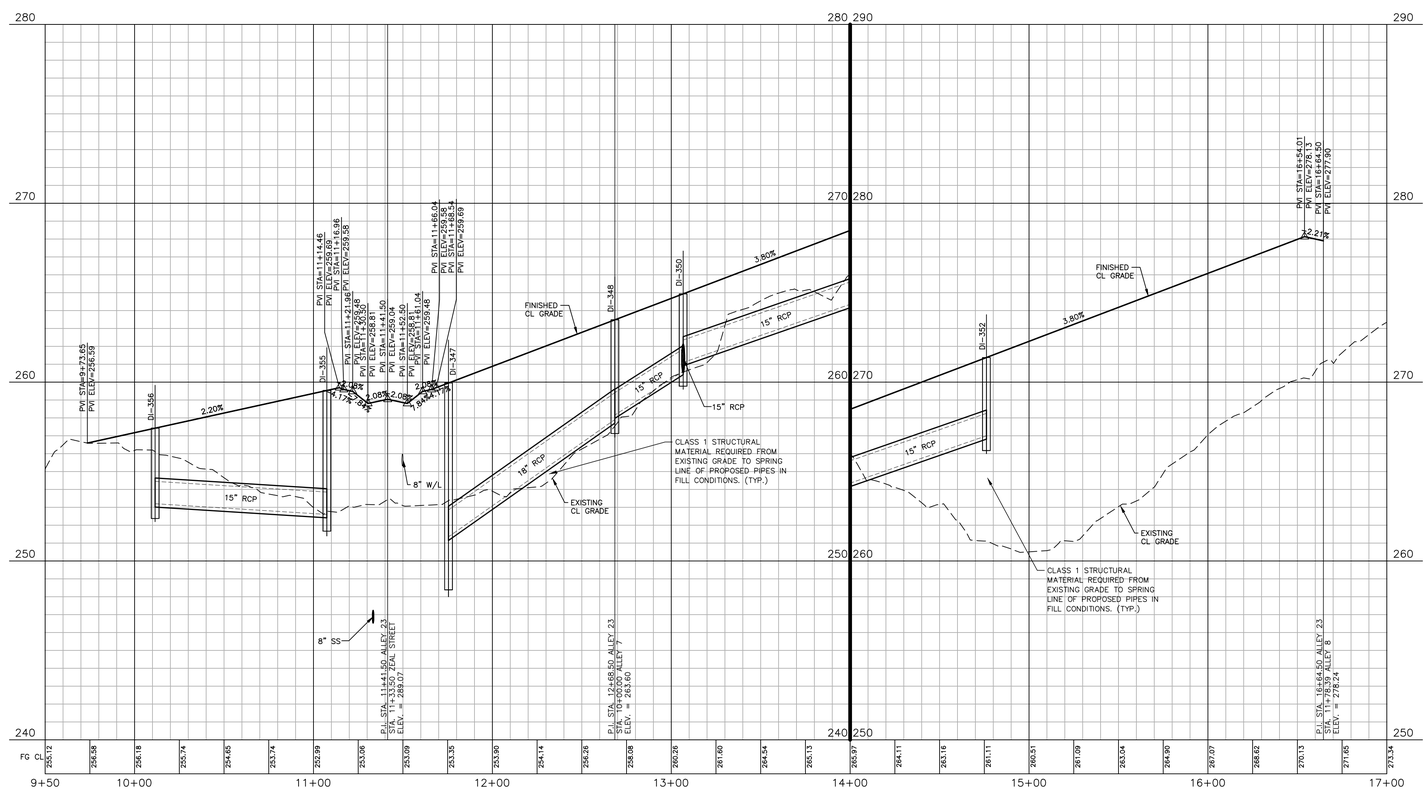
C5.23





GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

ALLEY "23"



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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
FOR REVIEW NOT FOR CONSTRUCTION

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DRAWN BY	MRF
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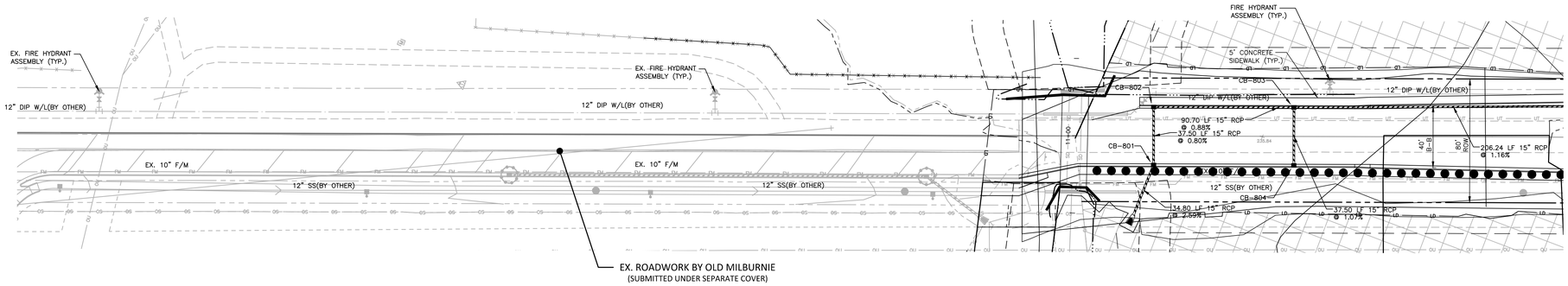
DATE	12. 22. 2022

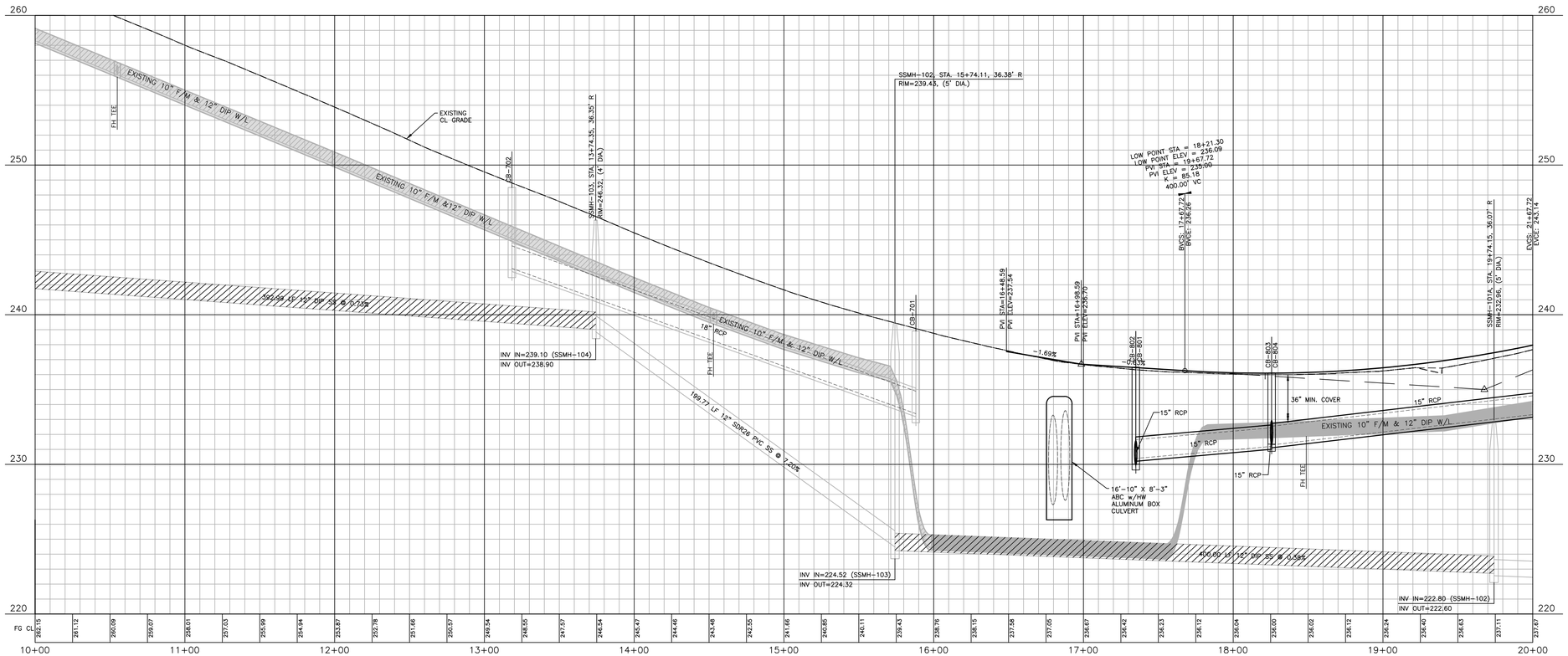
PLAN AND PROFILE
ALLEY 20, STA. 9+50 THRU STA. 17+00

C5.24



GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

"OLD CREWS ROAD"



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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
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PLAN INFORMATION

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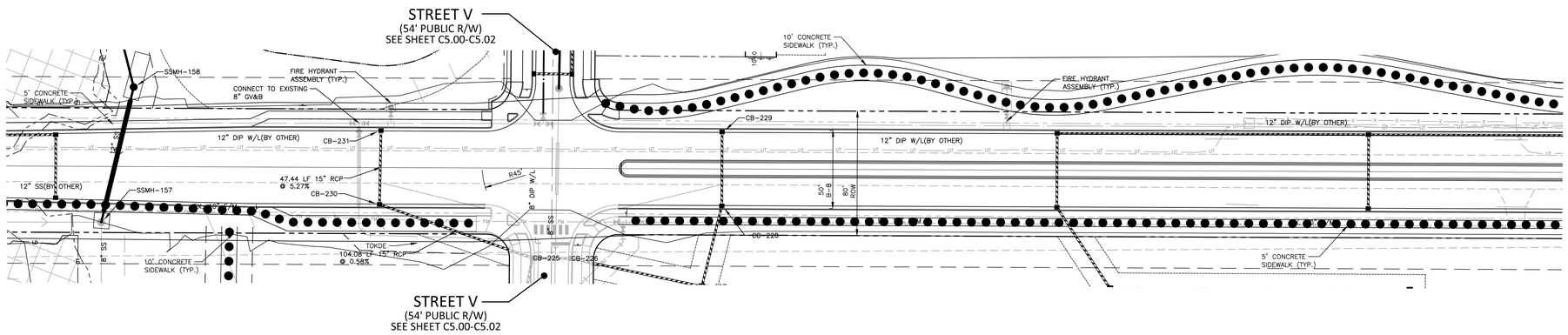
FILENAME	2020110062-P5
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
OLD CREWS ROAD, STA. 10+00 THRU STA. 20+00

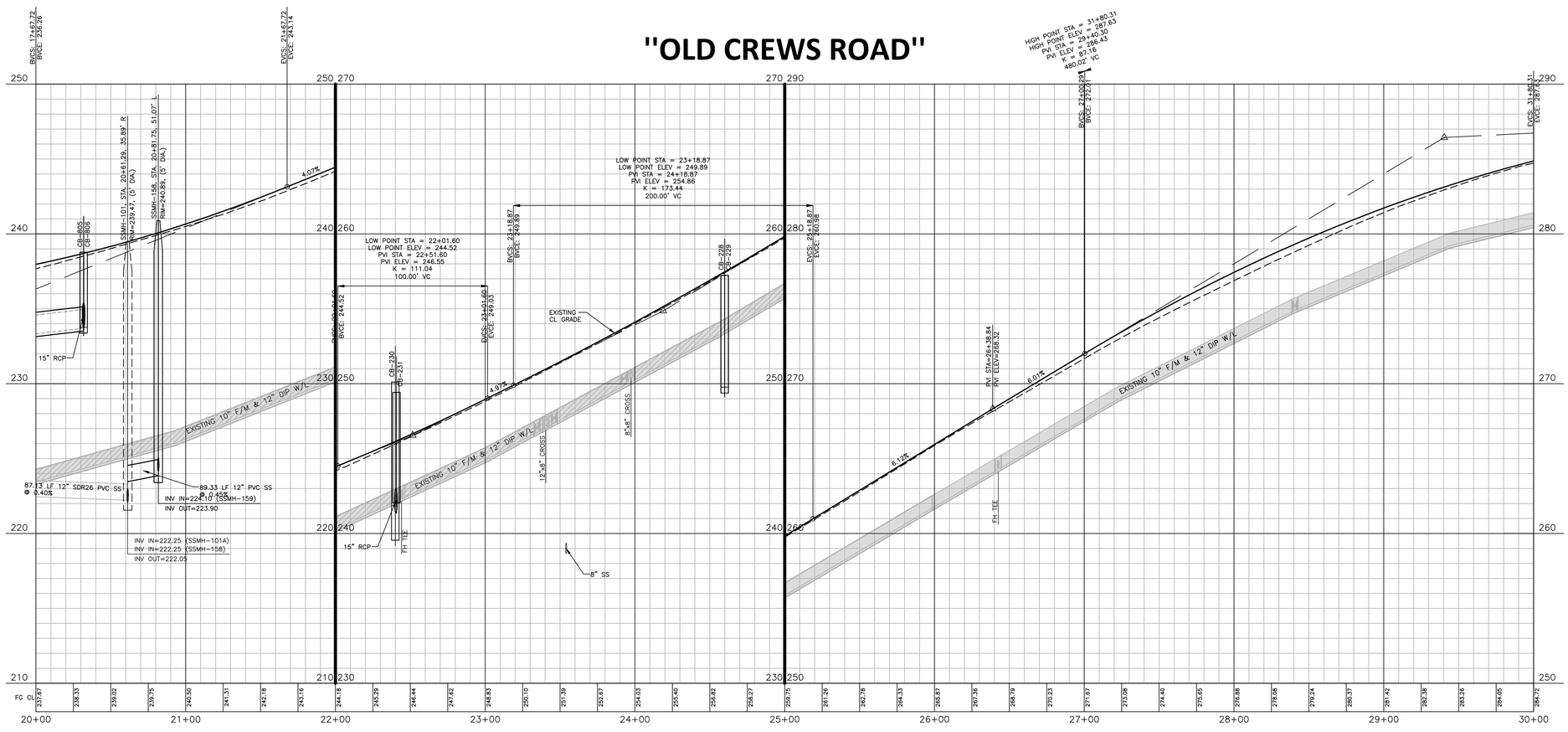
C5.25



PSDE PUBLIC STORM DRAINAGE EASEMENT
SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

"OLD CREWS ROAD"



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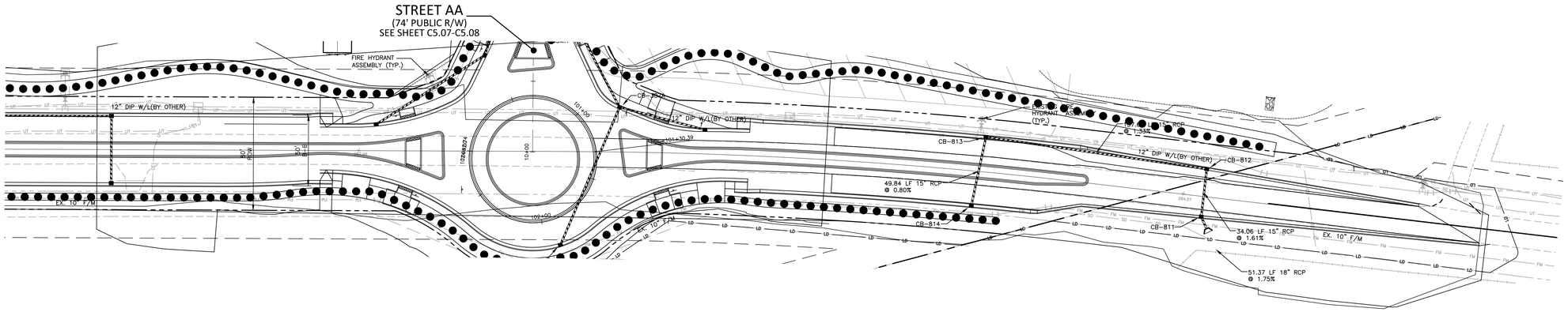
PLAN AND PROFILE
OLD CREWS ROAD, STA. 20+00 THRU STA. 30+00

C5.26



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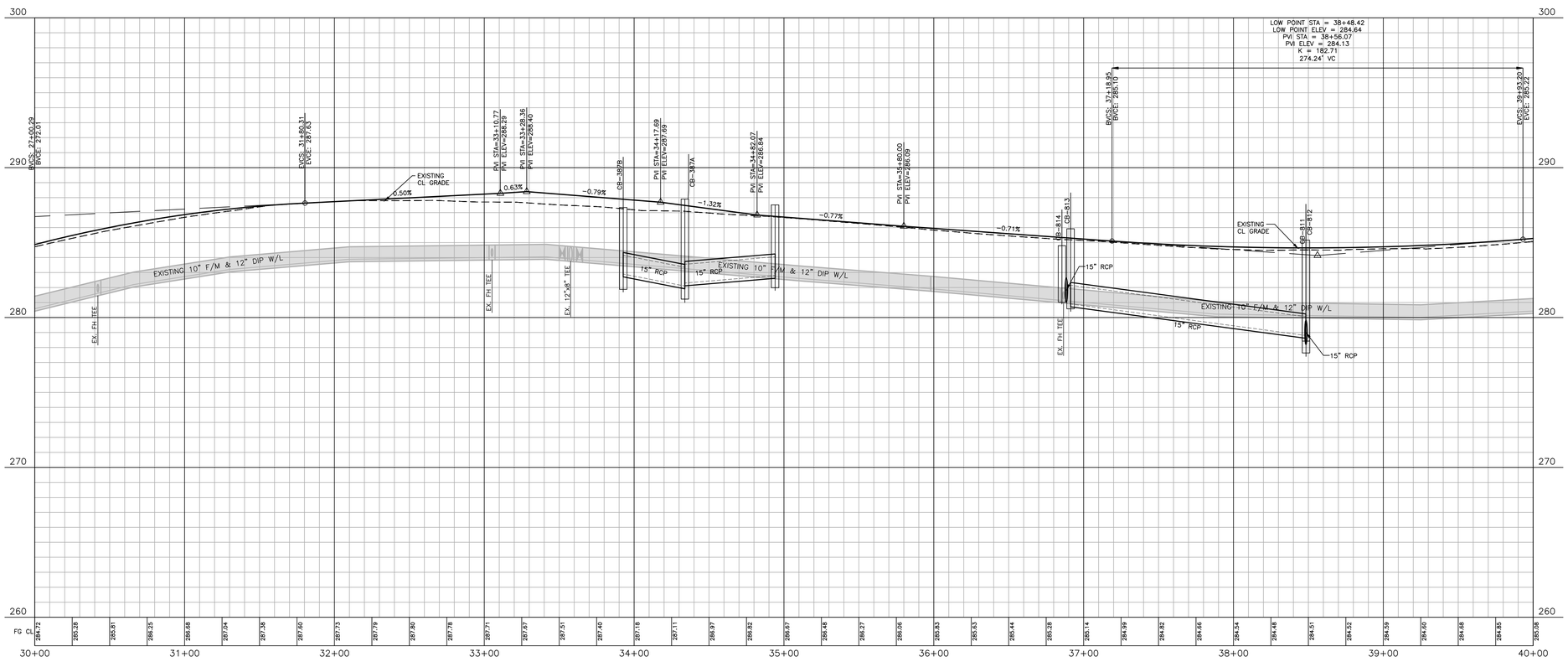

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#180 BILTMORE PARK
PHOENIX, ARIZONA, 85016
PHONE: 602. 698. 8655
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REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049483 BRIAN K. BARKER
NOT FOR CONSTRUCTION

BRIO - PHASE 1

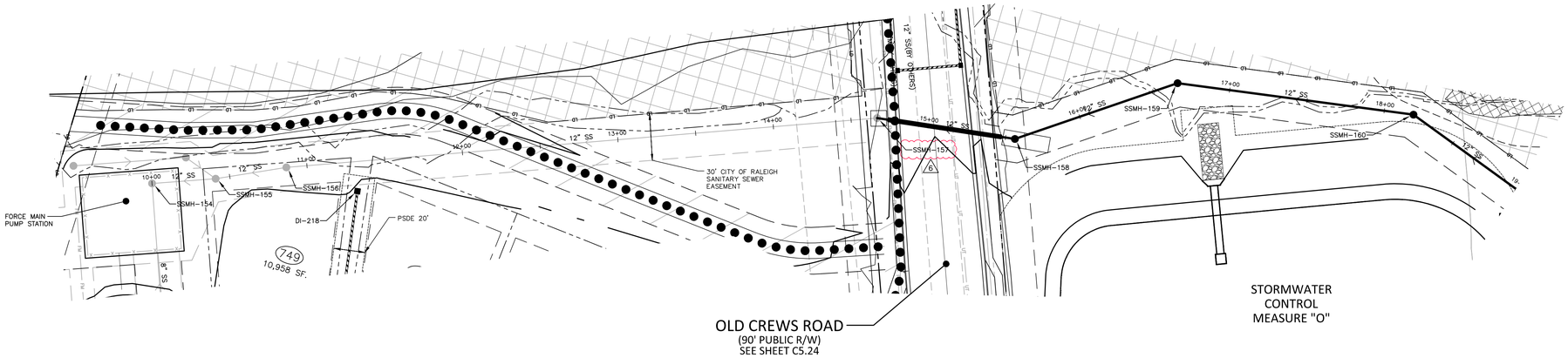
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-P5
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

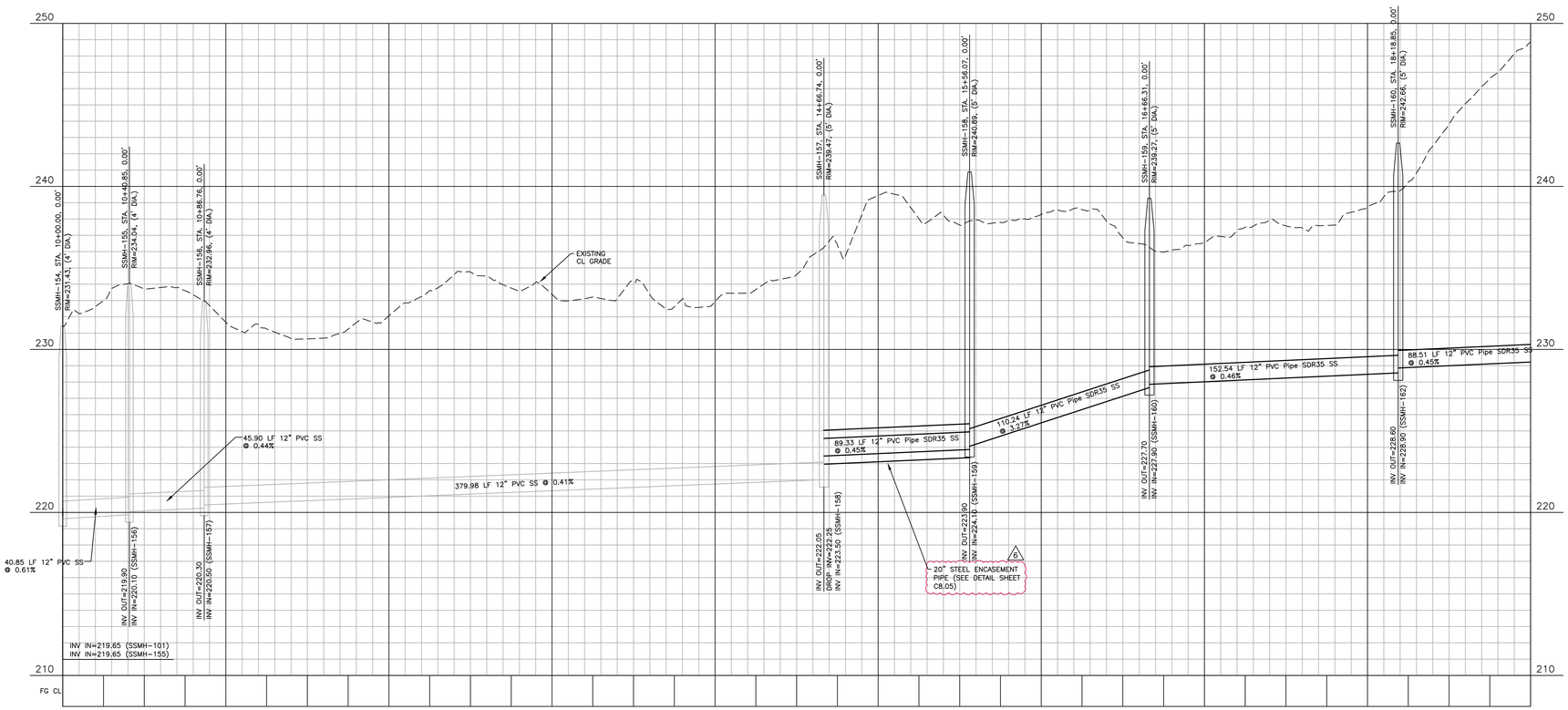
PLAN AND PROFILE
OLD CREWS ROAD, STA. 30+00 THRU STA. 40+00

C5.27



GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

OFFSITE SEWER 2



PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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SITE PERMITTING APPROVAL

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M:\Projects\SU\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-P5.DWG, 8/1/2024 4:43:56 PM, Katie Anderson

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
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KNIGHTDALE, NORTH CAROLINA

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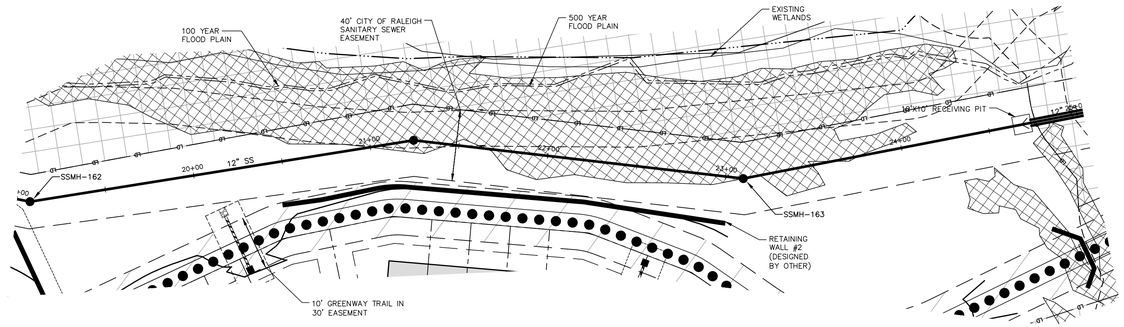
OFFSITE SEWER 2, STA. 10+00 THRU STA. 19+00

C5.28



GRAPHIC SCALE
0 20 40 80
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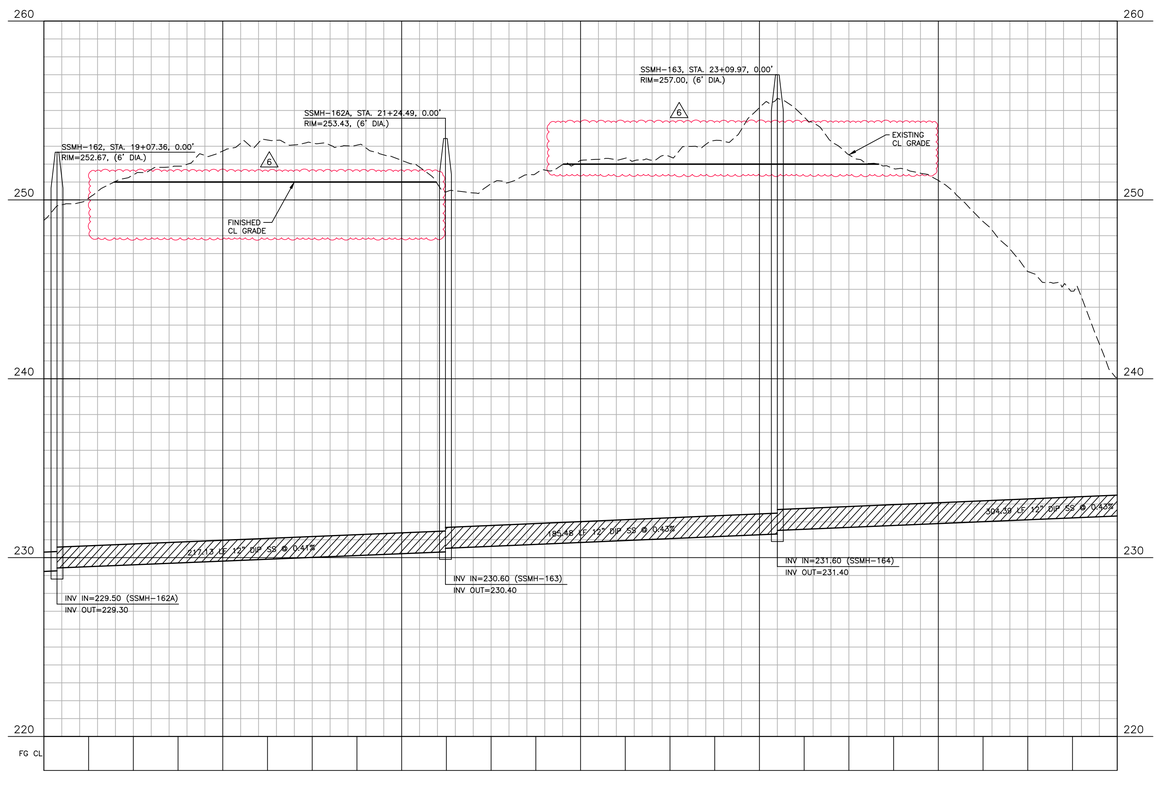

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
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BRIO - PHASE 1
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1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

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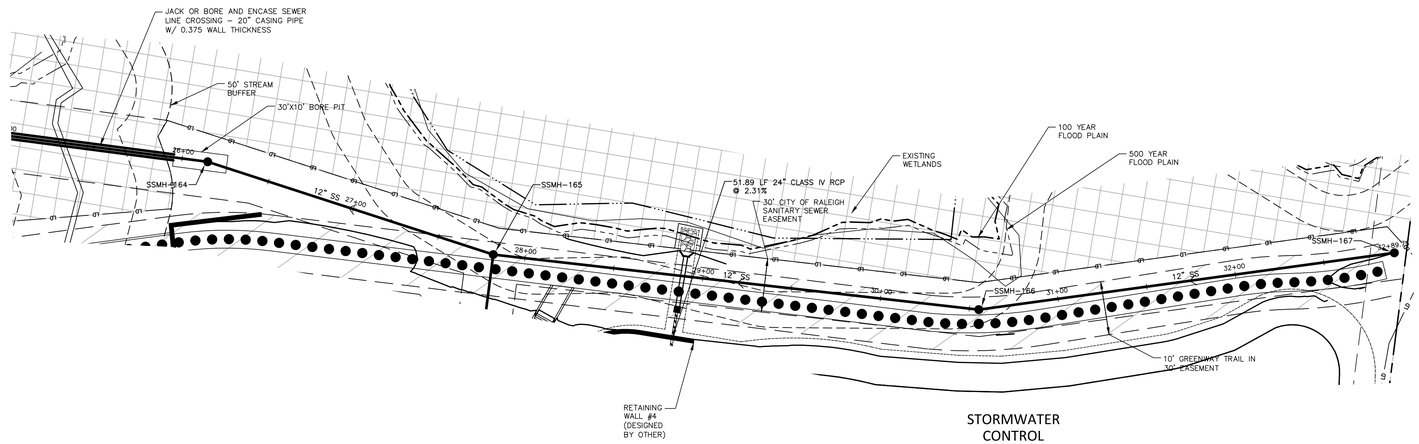
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
OFFSITE SEWER 2, STA. 19+00 THRU STA. 25+00

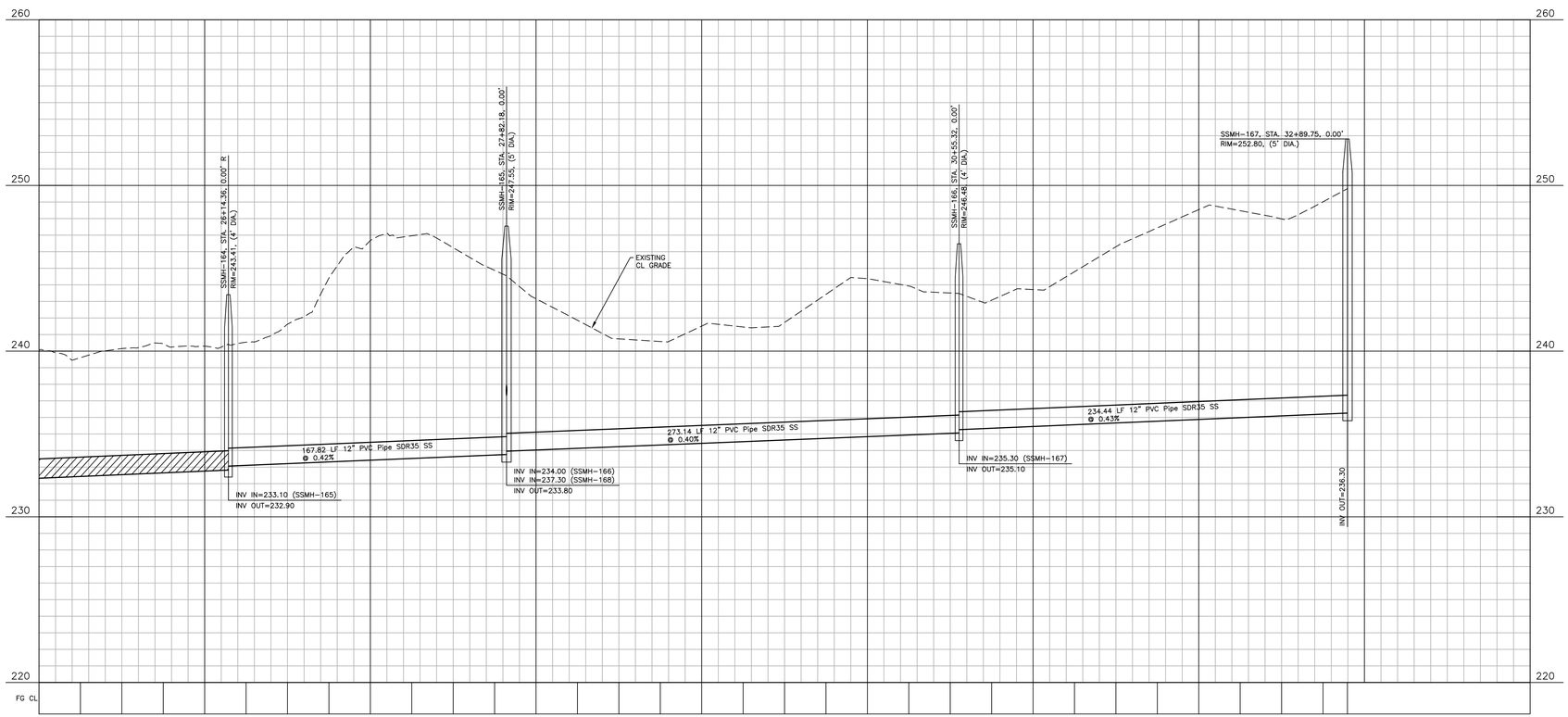
C5.29



STORMWATER CONTROL MEASURE "P"

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

OFFSITE SEWER 2



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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
FOR REVIEW PURPOSES ONLY
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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

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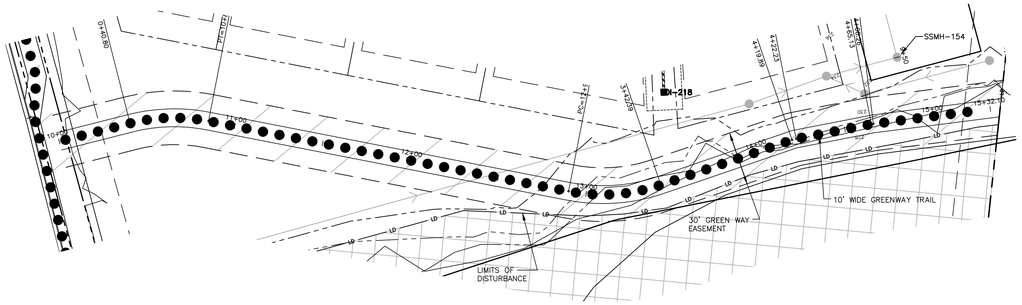
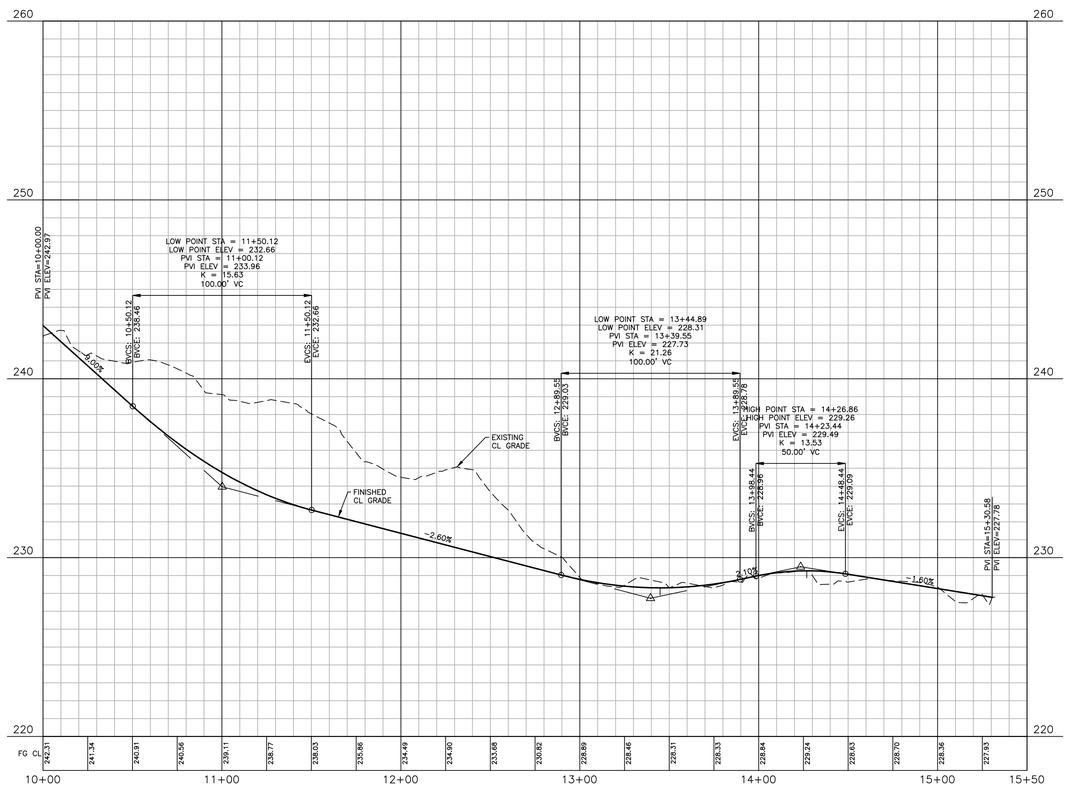
PLAN AND PROFILE
OFFSITE SEWER 2, STA. 25+00 THRU STA. 32+60

C5.30



GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

GREENWAY TRAIL 1



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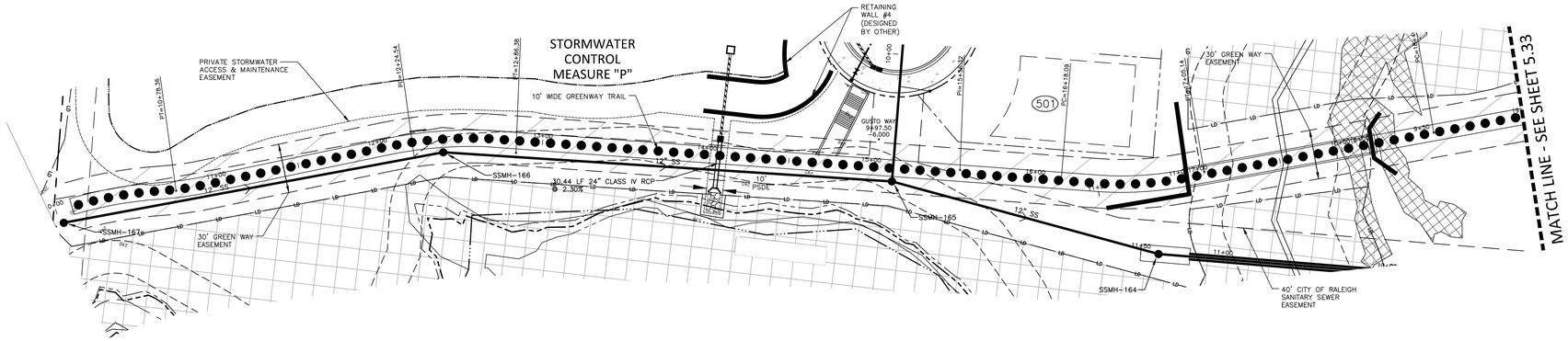
PLAN AND PROFILE
GREENWAY TRAIL WEST OF OLD CREWS ROAD
STA. 10+00 THRU STA. 15+57.88

C5.31



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0 20 40 80
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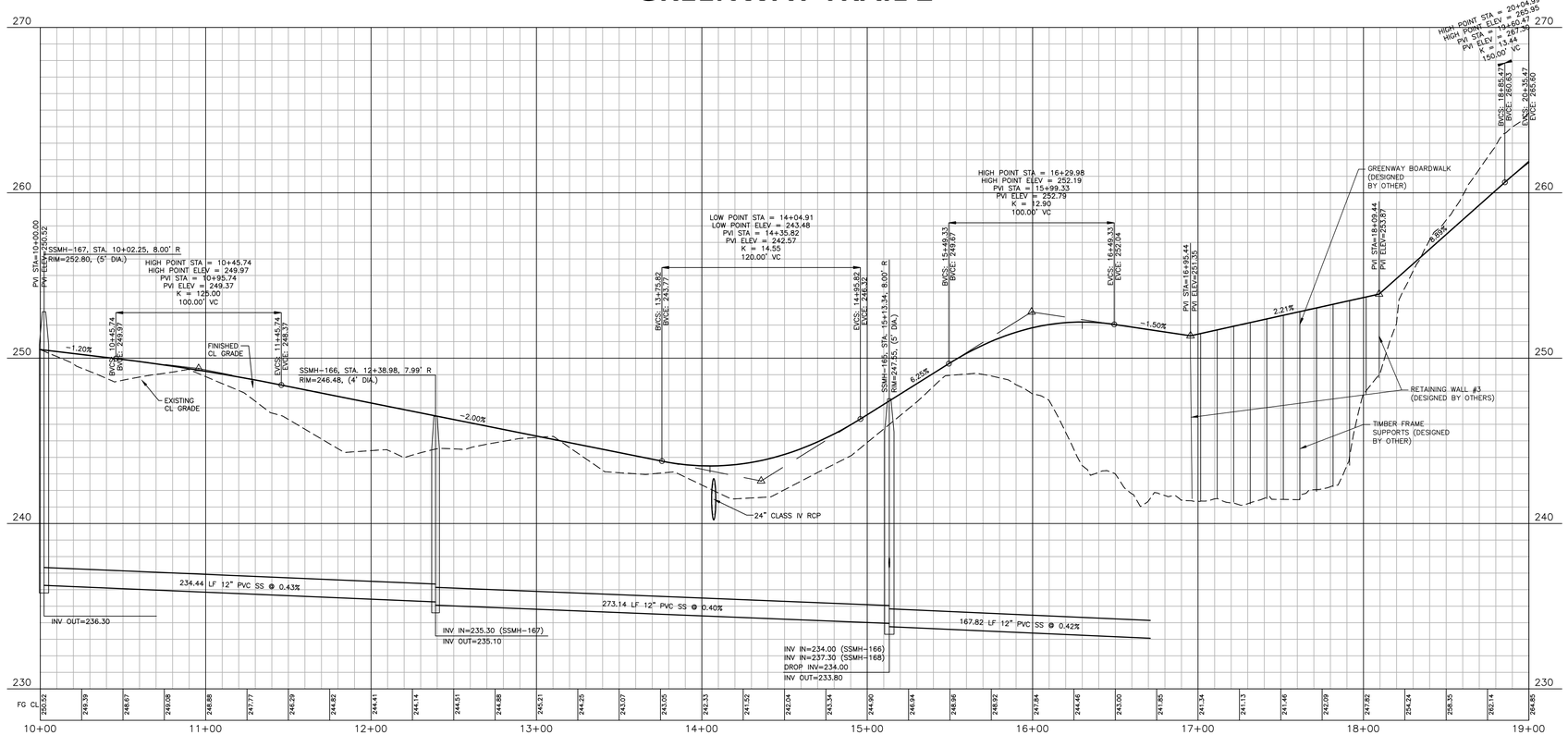
GREENWAY TRAIL 2



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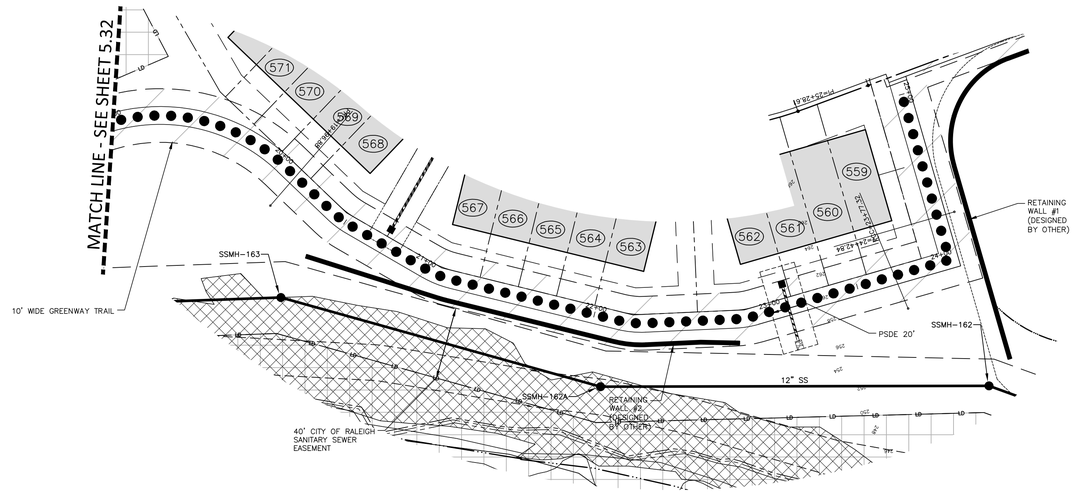
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

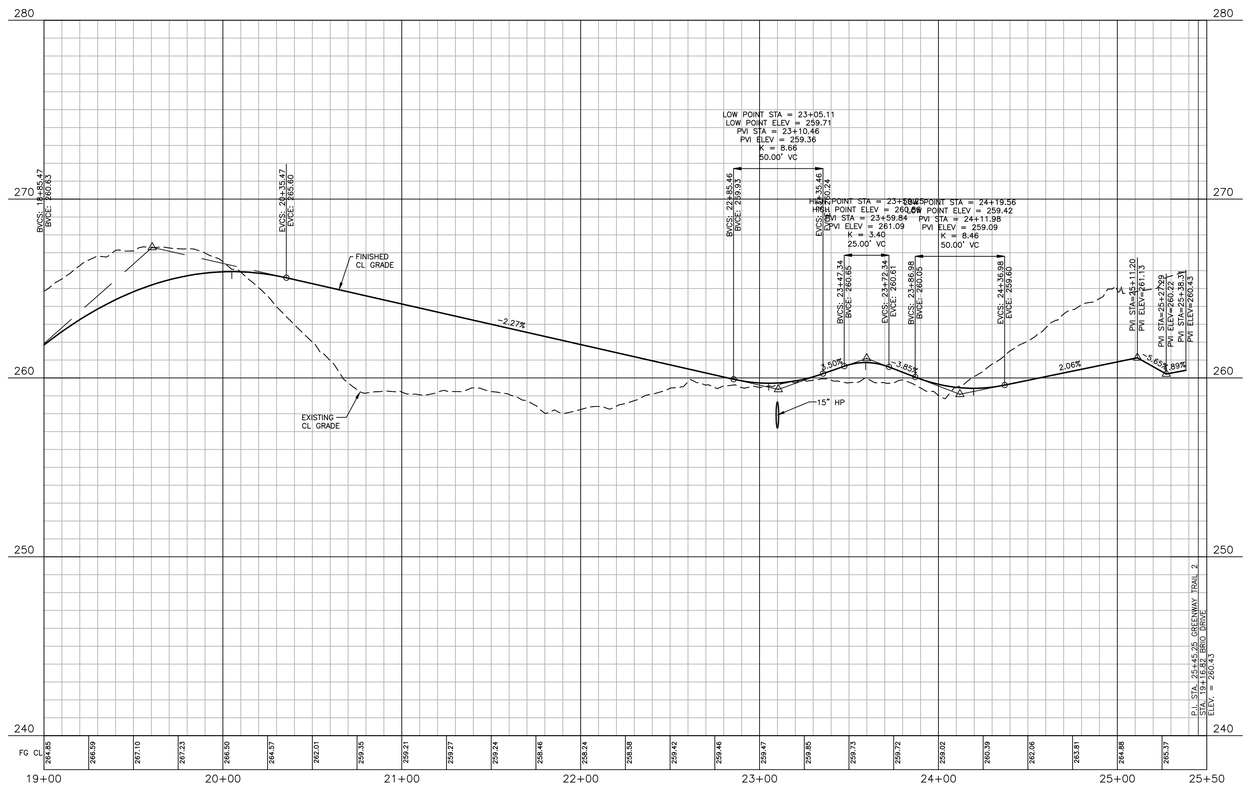
PLAN AND PROFILE
GREENWAY TRAIL EAST OF OLD CREWS ROAD
STA. 10+00 THRU STA. 18+00

C5.32



GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

GREENWAY TRAIL 2



PSDE 20'	PRIVATE STORM DRAINAGE EASEMENT
SCME	PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE	TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWTOKDE	VARIABLE WIDTH TOWN OF KNIGHTDALE DRAINAGE EASEMENT
VWPSDE	VARIABLE WIDTH PRIVATE STORM DRAINAGE EASEMENT

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
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By: _____ Date: _____
Administrator

SITE PERMITTING APPROVAL

Water and Sewer Permits (If applicable)

The City of Raleigh consents to the connection and extension of the City's Public Sewer System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # S-5170

The City of Raleigh consents to the connection and extension of the City's Public Water System as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook. City of Raleigh Public Utilities Department Permit # W-4005

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City of Raleigh Public Utilities Department Permit # _____

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City of Raleigh Development Approval _____
City of Raleigh Review Officer

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

M:\Projects\SU\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-P5.DWG, 8/1/2024 3:22:05 PM, Katie Anderson

McADAMS

The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

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#180 BILTMORE PARK
PHOENIX, ARIZONA, 85016
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SUNCREST Real Estate & Land

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
FOR REVIEW NOT FOR CONSTRUCTION

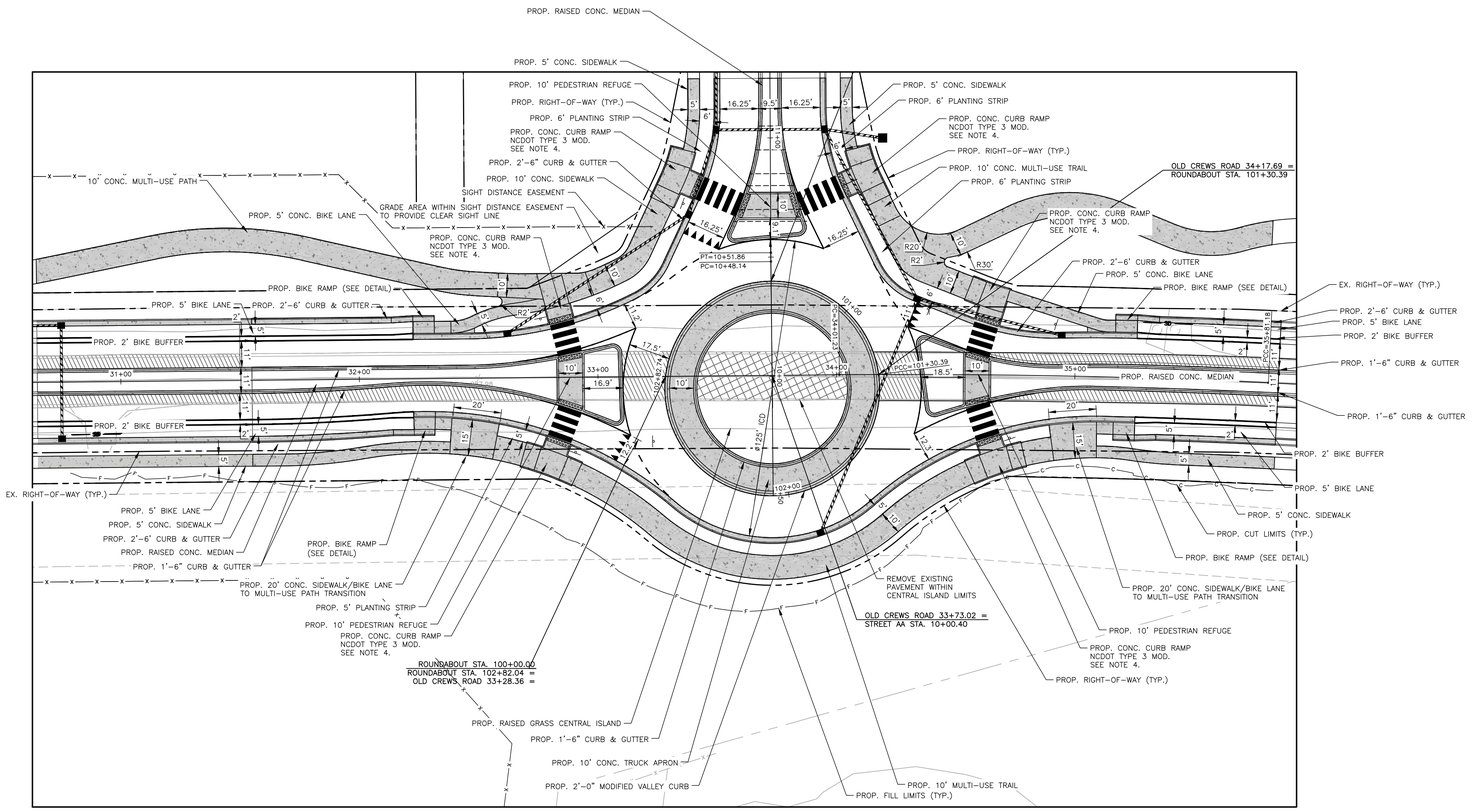
BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

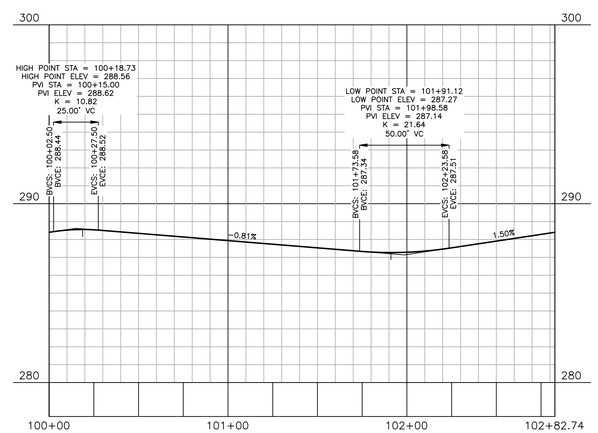
PROJECT NO.	2020110062
FILENAME	2020110062-P5
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
GREENWAY TRAIL EAST OF OLD CREWS ROAD
STA. 18+00 THRU STA. 25+50

C5.33



OLD CREWS ROAD + STREET AA ROUNDABOUT



LEGEND

- PROPOSED FULL-DEPTH ASPHALT
- PROPOSED MILLING/WEDGING OVER EXISTING PAVMENT
- PROPOSED CONCRETE
- PROPOSED PAVEMENT REMOVAL

GRAPHIC SCALE
0 15 30 60
1 inch = 30 ft.

NOTES:

1. SEE SHEET C5.35 FOR STATIONS, OFFSETS, AND ELEVATION INFORMATION.
2. SEE SHEET C7.05 FOR PAVEMENT MARKING AND SIGNING INFORMATION.
3. NO LANDSCAPING OVER 1' IS TO BE PLACED WITHIN THE MEDIAN FROM OLD CREWS STA. 31+00 TO 37+65. RESTRICT LANDSCAPING TO CENTER 9' RADIUS IN CENTRAL ISLAND.
4. MODIFY WIDTH DIMENSIONS AND TIE IN SLOPES TO CURB RAMPS AS REQUIRED TO PROVIDE ADA COMPLIANT LANDING AREA AND SLOPES. BIKE ONLY PATHS MAXIMUM LONGITUDINAL SLOPE IS 10%. MAXIMUM CROSS-SLOPE FOR ALL PATHS 2%.

M:\Projects\SJC\2020110062\04-Production\Transportation\Roadway\Current Drawings\2020110062_RDY-P1.dwg, 7/3/2024 2:51:32 PM, Zach Lee

FINAL DRAWING

The John R. McAdams Company, Inc.
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REVISIONS
NO. DATE

BRIO - PHASE 1

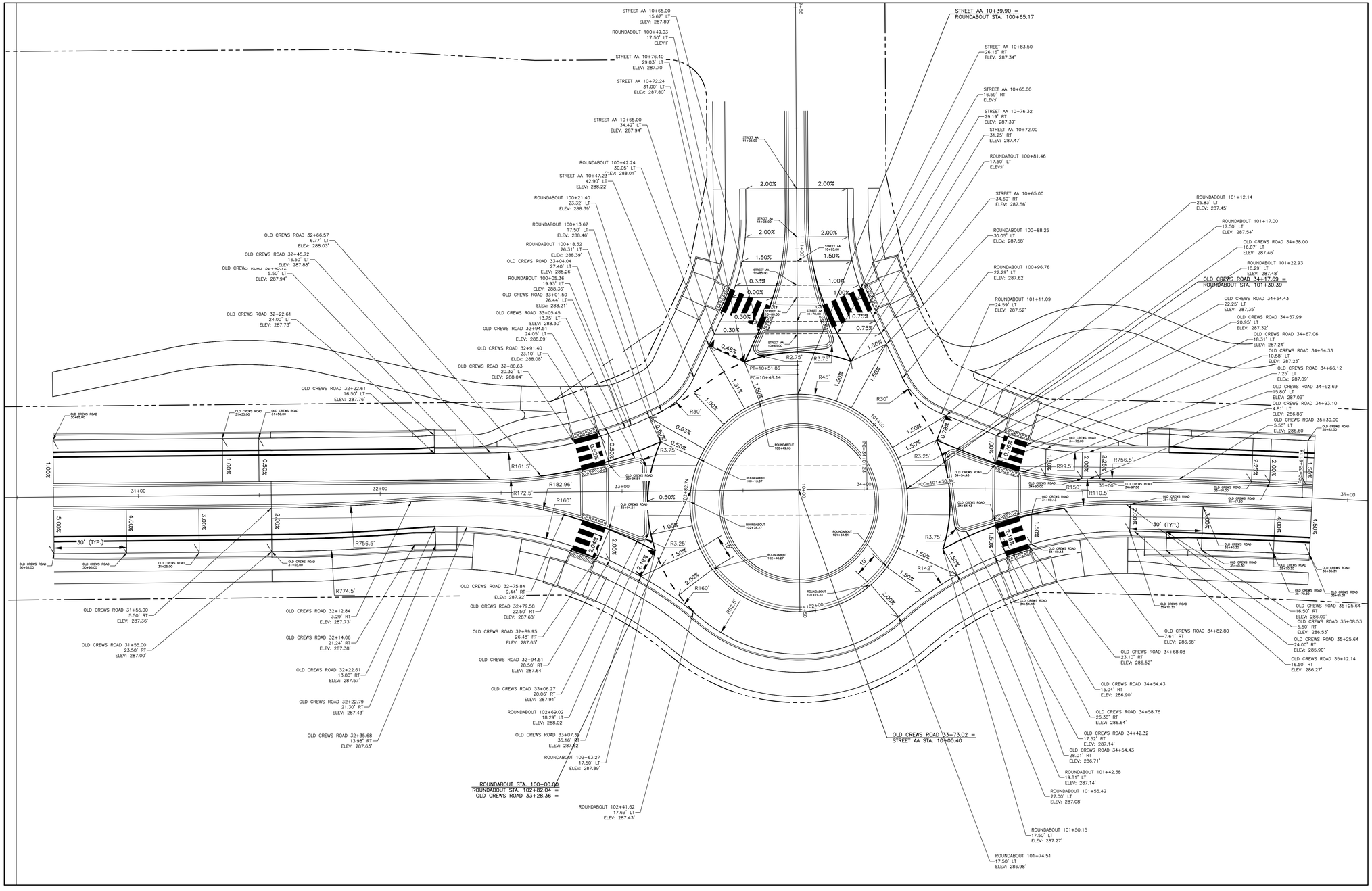
OFFSITE IMPROVEMENTS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062_RDY-P1
CHECKED BY	GSS
DRAWN BY	JAB
SCALE	1" = 30'
DATE	06.19.2024

ROUNDABOUT PLAN VIEW

C5.34



GRAPHIC SCALE

0 10 20 40

1 inch = 20 ft.

FINAL DRAWING

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BRIO - PHASE 1

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1700 OLD CREWS ROAD
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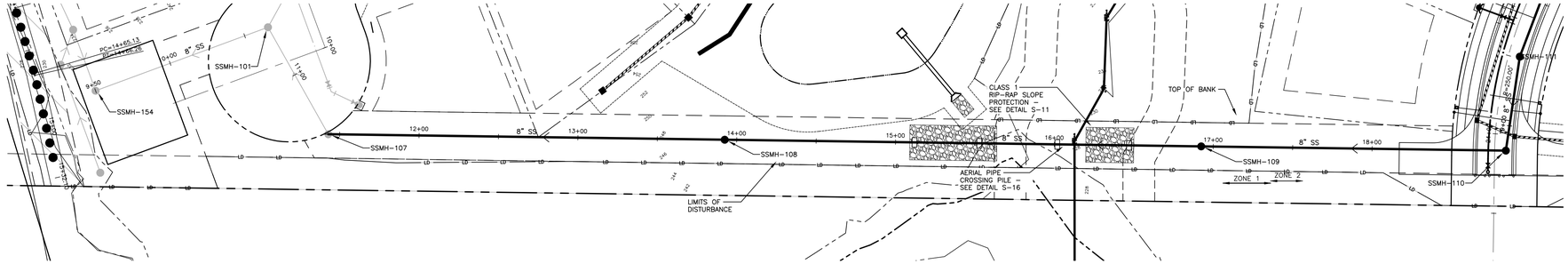
DATE	06.19.2024

ROUNDABOUT SPOT ELEVATIONS & SUPERELEVATION TRANSITIONS

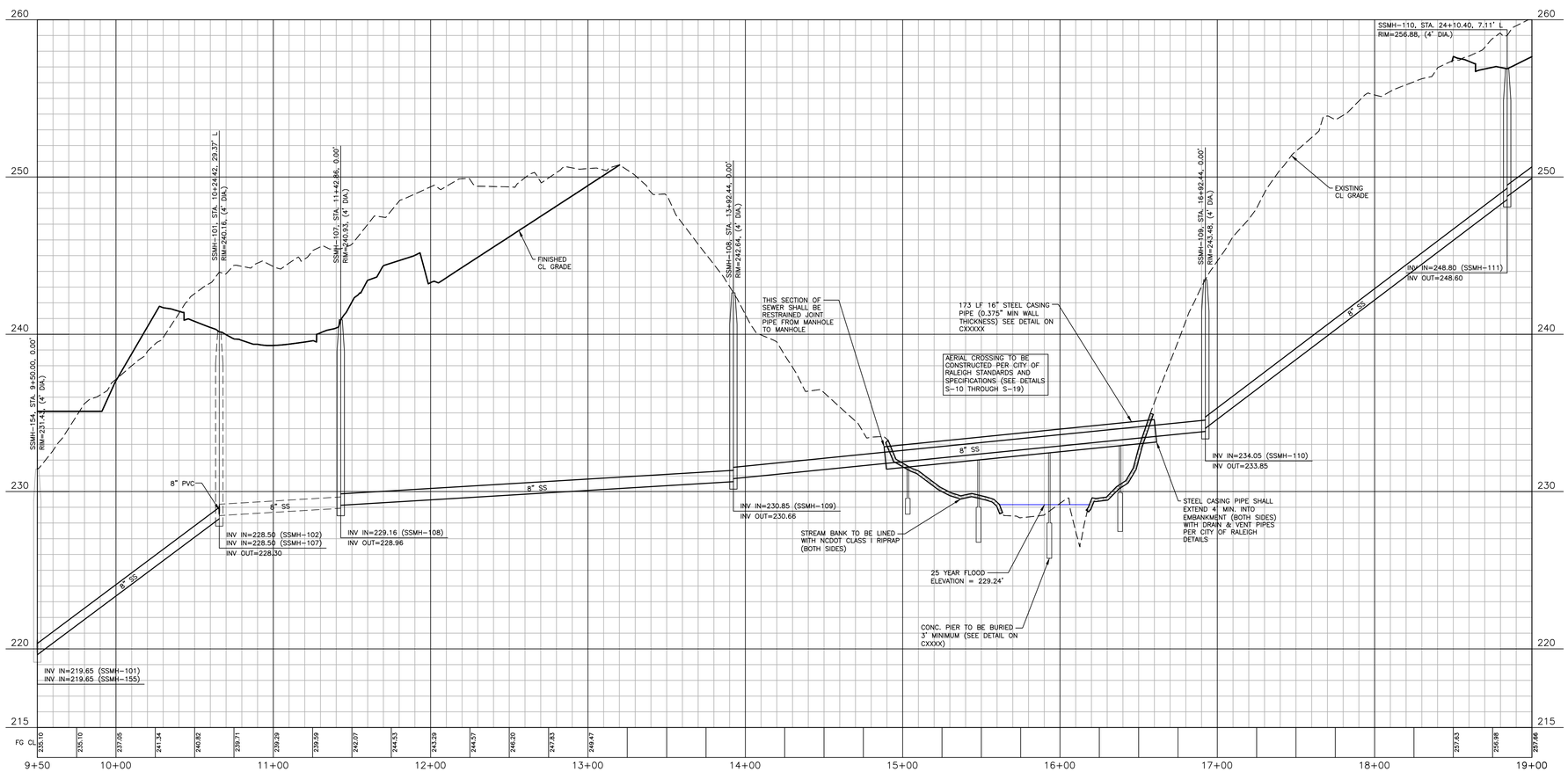
C5.35

M:\Projects\SU\C\2020110062\04-Production\Transportation\Roadway\Current Drawings\2020110062_RDY-P1.dwg, 7/3/2024 2:51:34 PM, Zach Lee



NC GRID (NAD83)
GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

AREAL OUTFALL 100



PSDE 20' PRIVATE STORM DRAINAGE EASEMENT
SCME PRIVATE SCM ACCESS & MAINTENANCE EASEMENT
TOKDE TOWN OF KNIGHTDALE DRAINAGE EASEMENT
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M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawing\Current Drawing\2020110062-P6.DWG, 7/26/2024 4:53:38 PM, Katie Anderson

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NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

BRIO - PHASE 1

CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	2020110062
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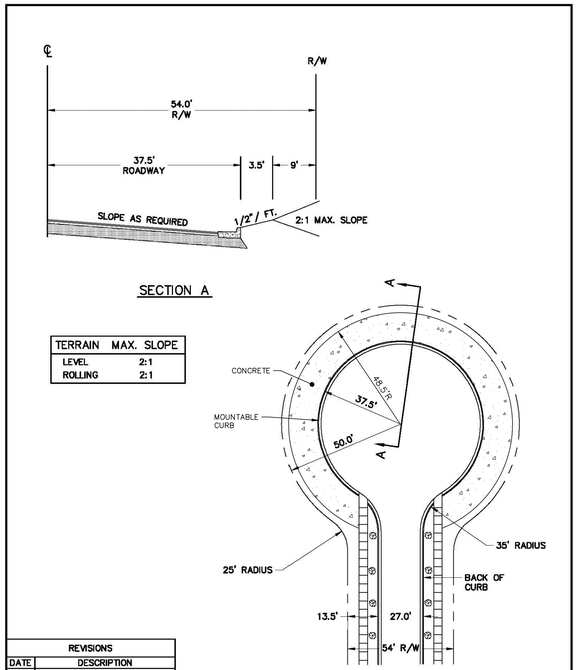
CHECKED BY	RKB
DRAWN BY	MRF
SCALE	1"=40'/1"=4'
DATE	12. 22. 2022

PLAN AND PROFILE
GREENWAY TRAIL EAST OF OLD CREWS ROAD
STA. 18+00 THRU STA. 25+50

C5.36



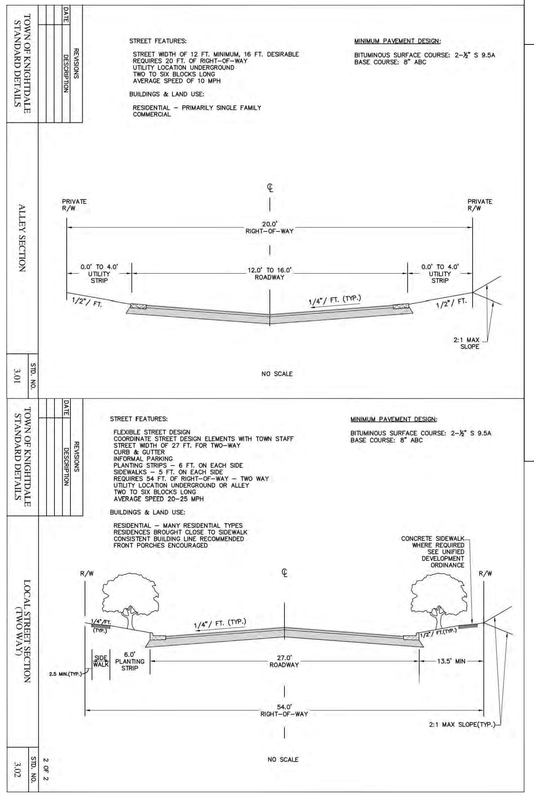


Figure 10.2: Local Street Cross Section Standards

INTERNAL LOCAL STREETS

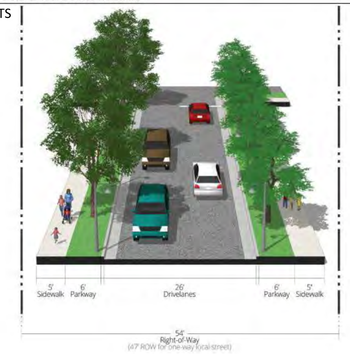


Figure 10.4: Main Street Cross Section Standards - Version 2

INTERNAL MAIN STREETS AND LUCAS ROAD

Figure 10.6: Avenue Cross Section Standards - Version 2

INTERNAL AVENUES

Figure 10.8: Urban Avenue Cross Section Standards - Version 2

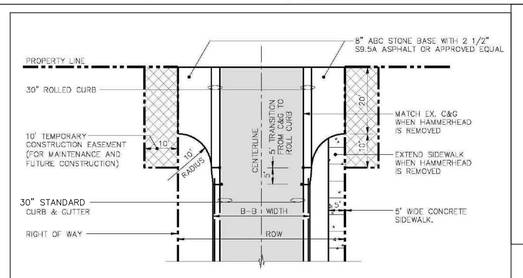
OLD CREWS ROAD

Figure 10.3: Main Street Cross Section Standards - Version 1

INTERNAL MAIN STREETS

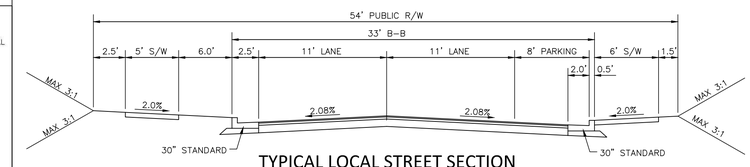
Figure 10.9: Boulevard Cross Section Standards

BUFFALOE ROAD



TEMPORARY HAMMERHEAD TURN-AROUND

SCALE: NOT TO SCALE



TYPICAL LOCAL STREET SECTION
PARALLEL PARKING ONE-SIDE
(54' R/W, 33' B-B)

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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

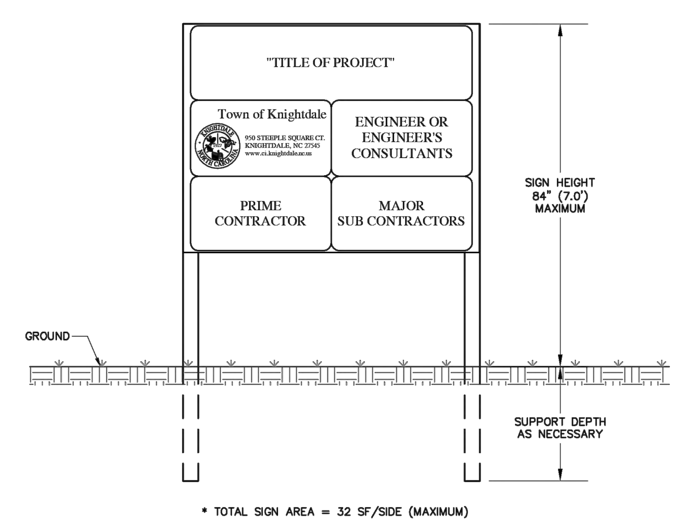
PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

TYPICAL SECTIONS

C8.00

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-D1.dwg, 7/26/2024 3:17:19 PM, Katie Anderson

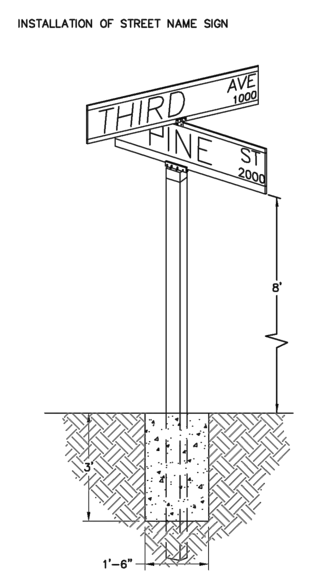


* TOTAL SIGN AREA = 32 SF/SIDE (MAXIMUM)

REVISIONS	
DATE	DESCRIPTION

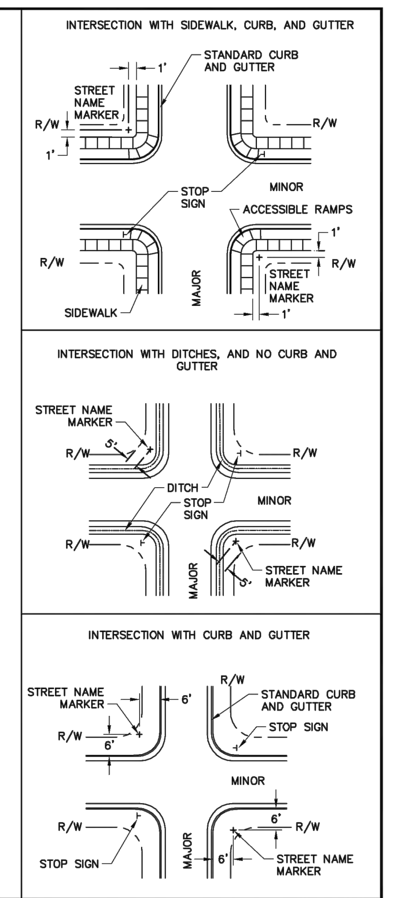
TOWN OF KNIGHTDALE STANDARD DETAILS — PROJECT IDENTIFICATION SIGN — STD. NO. 1.01

INSTALLATION OF STREET NAME SIGN



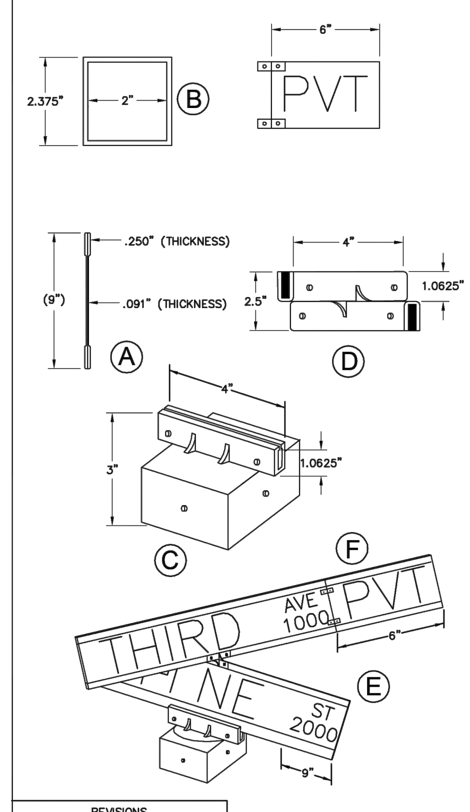
NOTES:

1. TWO STREET NAME MARKERS ARE REQUIRED IF THE MAJOR STREET HAS 3 OR MORE LANES.
2. ANY VARIANCE FROM THIS STANDARD MUST BE APPROVED BY THE TOWN OF KNIGHTDALE.



REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS — STREET NAME SIGN INSTALLATION LOCATIONS — STD. NO. 3.16

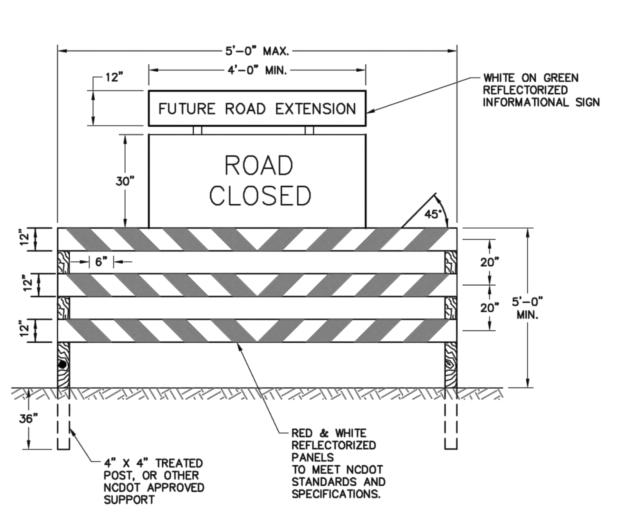


NOTES:

1. BLADES SHALL BE EXTRUDED ALUMINUM 6063T5 OR 6063T6 ALLOY .080" THICK. POST SHALL BE 10'-0" IN LENGTH, GLOSS GALVANIZED STEEL CONTINUOUS MILL DIPPED, WITH NO RAW ENDS; OR 40, 1540 WALL ALUMINUM (SEE DETAIL B).
2. CAP TO BE ALUMINUM #380 ALLOY OR EQUAL SLOTTED FOR .25" EXTRUDED BLADE; 2.375" I.D. BASE, DIE CAST AND POLISHED. CAP SHALL BE TAPPED TO RECEIVE AND INCLUDE 3 STAINLESS STEEL SET SCREWS FOR POST MOUNTING AND 2 STAINLESS STEEL SET SCREWS FOR BLADE MOUNTING. SET SCREWS TO HAVE ALLEN HEADS (SEE DETAIL C).
3. BLADE SPACER BRACKET SHALL MEET SAME SPECIFICATIONS AS THE CAP WITH 2 SCREWS TO EACH BLADE MOUNTING (SEE DETAIL D).
4. THE FACE OF ALL BLADES SHALL MEET COVERED WITH ENGINEERING GRADE SHEETING WITH #2290 WHITE DIE CUT LETTERS WITH REVERSED SCREENED #708 TRANSPARENT GREEN. THE PRIMARY LETTERS SHALL BE 5" HIGH UPPER CASE, FHWA SERIES B AND PREFIX/SUFFIX LETTERS SHALL BE 2-1/2" HIGH, UPPER CASE, FHWA SERIES C. BLOCK NUMBERS SHALL BE PLACED IN THE LOWER RIGHT CORNER AND SHALL BE 2-1/2" HIGH, FHWA SERIES C. ALL MATERIALS TO BE VACUUM AND HEAT APPLIED TO A PREPARED ALUMINUM BLADE, WHICH HAS BEEN CLEANED AND ALL FOREIGN MATERIAL REMOVED (SEE DETAIL E).
5. LETTERS, NUMBERS AND SPACING SHALL CONFORM TO THE STANDARD ALPHABETS FOR HIGHWAY SIGNS, 1966 EDITION, REPRINT MAY, 1972 BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, OFFICE OF TRAFFIC OPERATION.
6. ALL STREET NAME SIGNS ARE SUBJECT TO APPROVAL BY THE TOWN. BLOCK NUMBERS SHALL BE PROVIDED ON SIGNS AND CORRESPOND TO OFFICIALLY APPROVED ADDRESSES.
7. IF THE STREET IS INTENDED TO BE PRIVATE, A SUPPLEMENTAL PLATE IS REQUIRED. THE SUPPLEMENTAL PLATE MAY BE ATTACHED TO THE SIGN OR AN EXTENDED BLADE WITH BLACK ON YELLOW SHEETING MAY BE USED. THE SIGN SHALL HAVE BLACK LETTERS THAT SHOW PVT TO STAND FOR PRIVATE. THE LETTERS SHALL BE 2-1\2" HIGH, UPPER CASE, FHWA SERIES C, ON A BACKGROUND OF YELLOW ENGINEERING GRADE SHEETING. (SEE DETAIL F).

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS — STREET NAME SIGN — STD. NO. 3.17

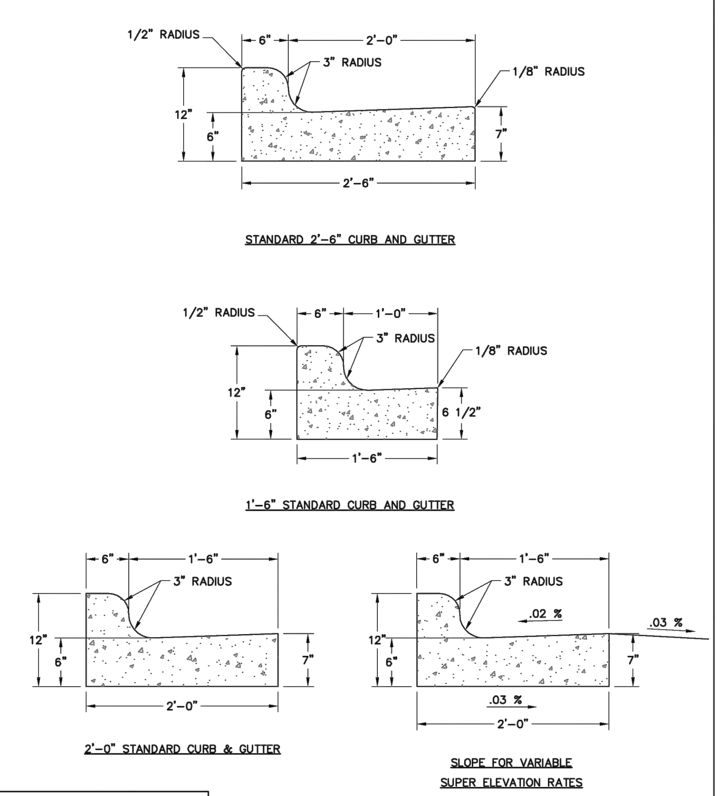


NOTES:

1. BARRICADE(S) TO BE ERECTED ACROSS ENTIRE ROADWAY INCLUDING CURB & GUTTER.
2. ADVANCE WARNING SIGN W14-1 (DEAD END) SHALL BE PLACED JUST AFTER LAST INTERSECTING STREET.
3. MARKINGS FOR BARRICADE RAILS SHALL BE REFLECTIVE AND ALTERNATE RED AND WHITE STRIPS.
4. "ROAD CLOSED" SIGN SHALL MEET SPECIFICATIONS OF M.U.T.C.D R11-2 AND BE REQUIRED ATOP EACH BARRICADE USED.

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS — TEMPORARY BARRICADE FOR DEAD END ROADS — STD. NO. 3.18



REVISIONS	
DATE	DESCRIPTION

1 of 3

TOWN OF KNIGHTDALE STANDARD DETAILS — CURB AND GUTTER — STD. NO. 4.01

1'-6" MEDIAN CURB AND GUTTER

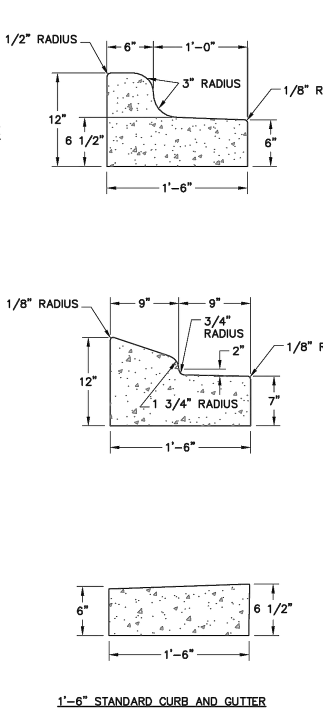
TO BE USED IN MEDIANS WHEN LANES ARE SLOPED FROM ISLAND OR AS SPECIFIED BY THE TOWN ENGINEER.

1'-6" MOUNTABLE CURB AND GUTTER

TO BE USED IN MEDIANS ONLY WHEN SPECIFIED BY THE TOWN ENGINEER.

1'-6" BINDER CURB

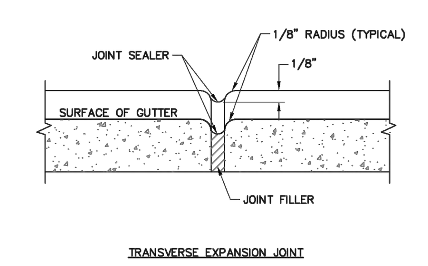
TO BE USED IN ALLEYS ONLY WHEN SPECIFIED BY THE TOWN ENGINEER.



REVISIONS	
DATE	DESCRIPTION

2 of 3

TOWN OF KNIGHTDALE STANDARD DETAILS — CURB AND GUTTER — STD. NO. 4.01



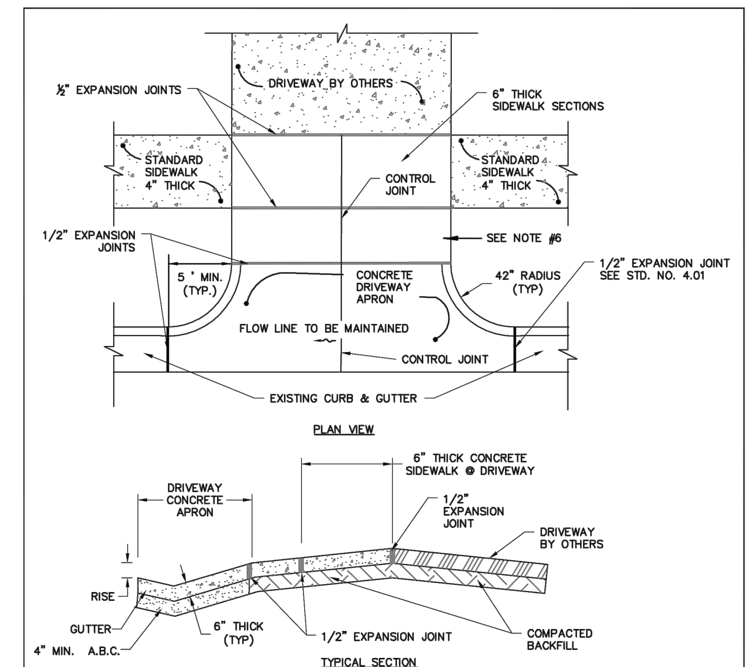
NOTES:

1. CONTRACTION JOINTS SHALL BE SPACED AT 10-FOOT INTERVALS. JOINT SPACING MAY BE ALTERED BY THE ENGINEER TO PREVENT UNCONTROLLED CRACKING.
2. CONTRACTION JOINTS MAY BE INSTALLED BY THE USE OF TEMPLATES OR FORMED BY OTHER APPROVED METHODS. WHERE SUCH JOINTS ARE NOT FORMED BY TEMPLATES, A MINIMUM DEPTH OF 1-1/2" SHALL BE OBTAINED.
3. ALL EXPANSION JOINTS SHALL BE SPACED AT 90-FOOT INTERVALS, AND ADJACENT TO ALL RIGID OBJECTS. JOINTS SHALL MATCH LOCATIONS WITH JOINTS IN ABUTTING SIDEWALK.
4. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3600 PSI IN 28 DAYS.
5. CURB SHALL BE DEPRESSED AT INTERSECTIONS TO PROVIDE FOR FUTURE ACCESSIBLE RAMPS.
6. TOP 6" OF SUBGRADE BENEATH THE CURB AND GUTTER SHALL BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.

REVISIONS	
DATE	DESCRIPTION

3 of 3

TOWN OF KNIGHTDALE STANDARD DETAILS — CURB AND GUTTER — STD. NO. 4.01

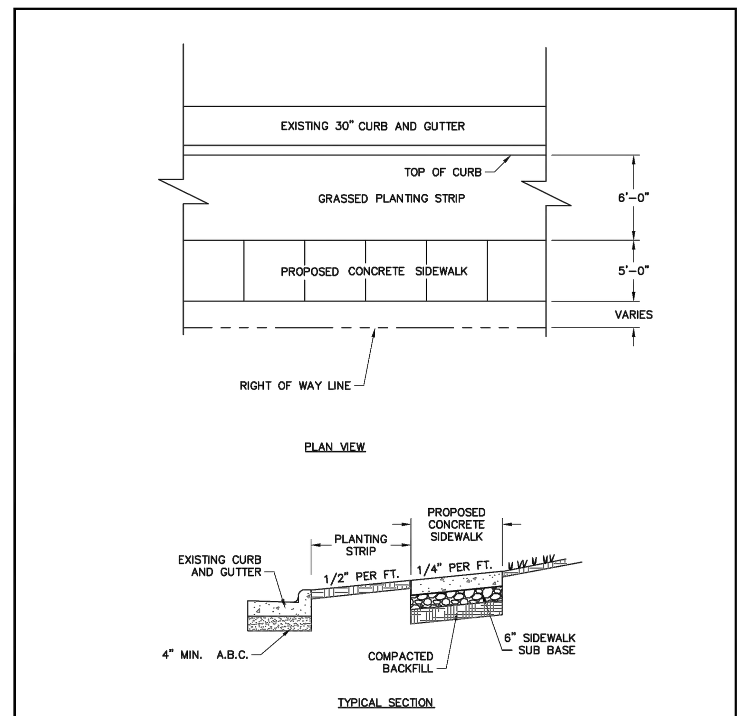


NOTES:

1. RESIDENTIAL DRIVEWAYS TO BE 12' TO 18'.
2. COMMERCIAL DRIVEWAYS TO BE A MAXIMUM OF 36' WIDE.
3. CONCRETE SHALL BE 3000 P.S.I.
4. CONTROL JOINTS NOT TO EXCEED 10' ON CENTER.
5. CURB RADIUS SHALL NOT RISE MORE THAN 1 (ONE) INCH.
6. IF THE DRIVEWAY SECTION BETWEEN THE SIDEWALK AND THE DRIVEWAY APRON IS 18" OR LESS THE SIDEWALK WILL BE WIDENED TO THE APRON AND AN EXPANSION JOINT ELIMINATED.
7. DRIVEWAY SHALL BE A MINIMUM OF 3.5 FEET FROM PROPERTY LINE.

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS — STANDARD DRIVEWAY APRON — STD. NO. 4.03



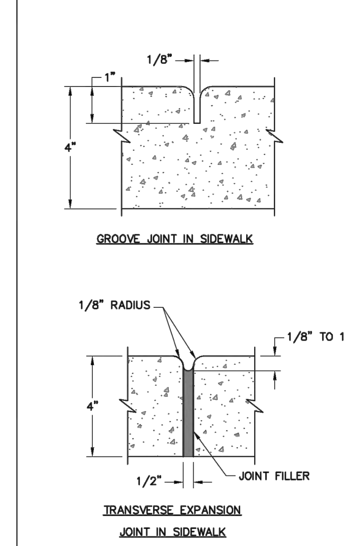
NOTES:

1. TRANSVERSE EXPANSION JOINTS TO BE A MAXIMUM OF 50 FEET APART.
2. CONTROL JOINTS TO BE AT 5 FEET O.C.
3. ALL CONCRETE TO BE FINISHED WITH CURING COMPOUND.
4. SIDEWALK SUB BASE TO BE A MIXTURE OF 70 PERCENT #57 STONE AND ASTM C33 SAND OR EQUAL.

REVISIONS	
DATE	DESCRIPTION

1 of 2

TOWN OF KNIGHTDALE STANDARD DETAILS — CONCRETE SIDEWALKS — STD. NO. 4.04



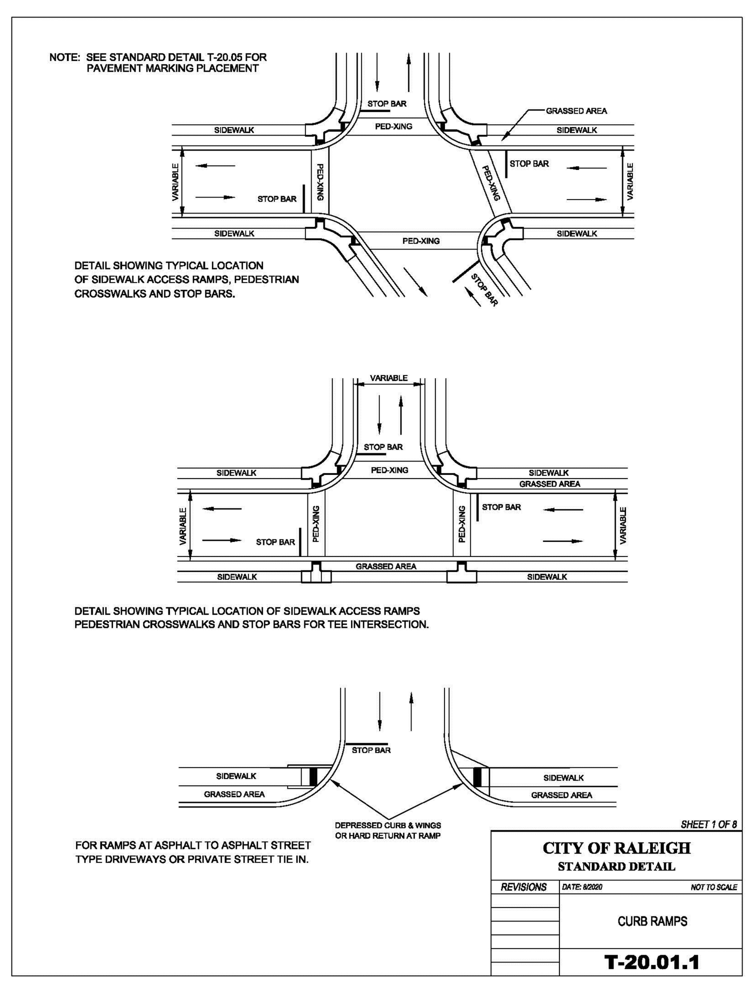
NOTES:

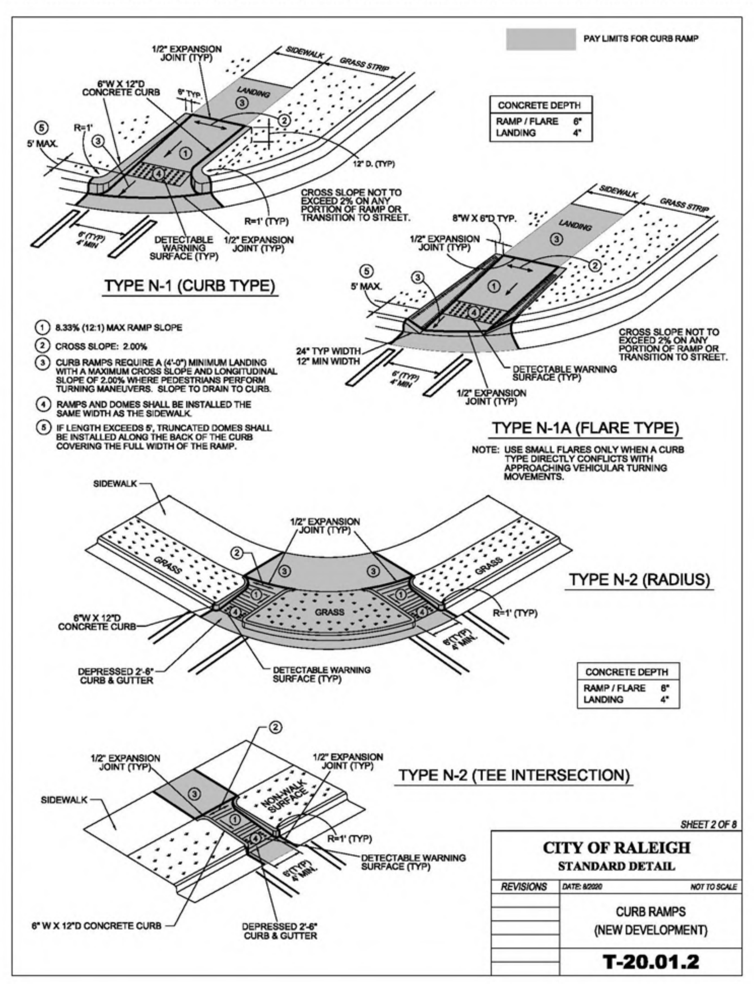
1. A GROOVE JOINT 1" DEEP WITH 1/8" RADII SHALL BE REQUIRED IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT WILL BE REQUIRED AT 45' INTERVALS NOT TO EXCEED 50' AND MATCHING EXPANSION/CONSTRUCTION JOINT IN ADJACENT CURB. A SEALED 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.
2. SIDEWALK AT DRIVEWAY ENTRANCES TO BE 6" THICK.
3. WIDTH OF SIDEWALK ON THOROUGHFARE STREETS SHALL BE A MINIMUM OF 5'. WIDTH OF SIDEWALKS IN THE CENTRAL BUSINESS DISTRICT WILL BE DETERMINED BY THE TOWN ENGINEER.
4. WIDTH OF SIDEWALKS ON NON-THOROUGHFARE STREETS SHALL BE A MINIMUM OF 5' UNLESS OTHERWISE SPECIFIED BY THE TOWN'S UNIFIED DEVELOPMENT ORDINANCE.
5. SIDEWALK TO BE POURED TO END OF RADIUS AT INTERSECTING STREETS.
6. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3600 PSI IN 28 DAYS.

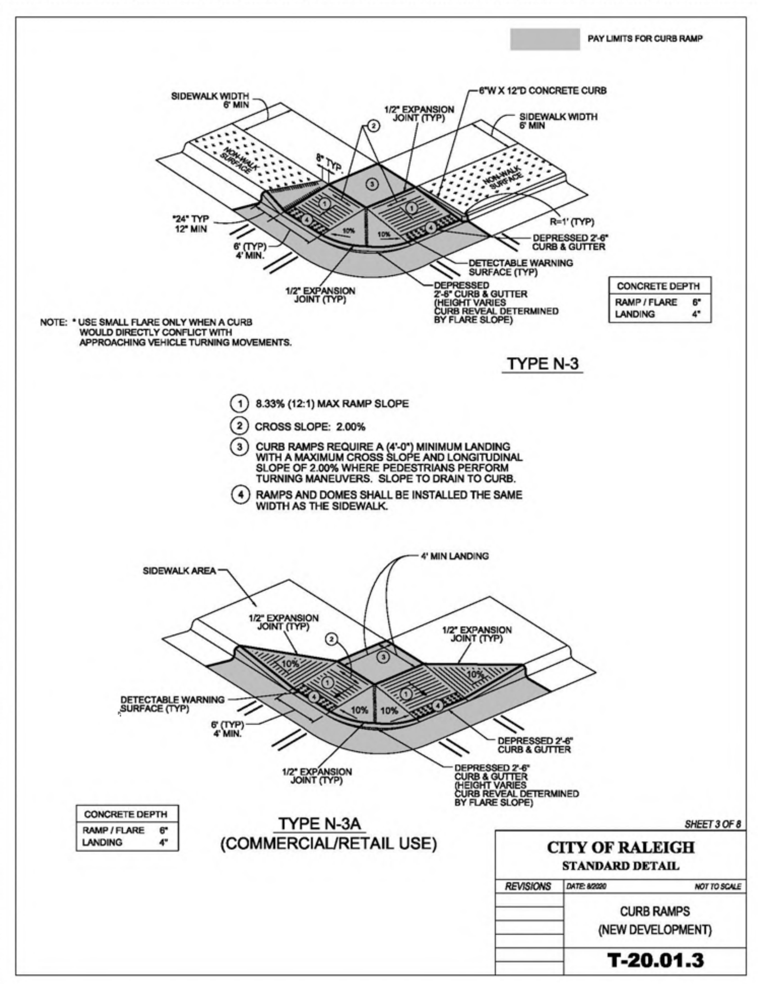
REVISIONS	
DATE	DESCRIPTION

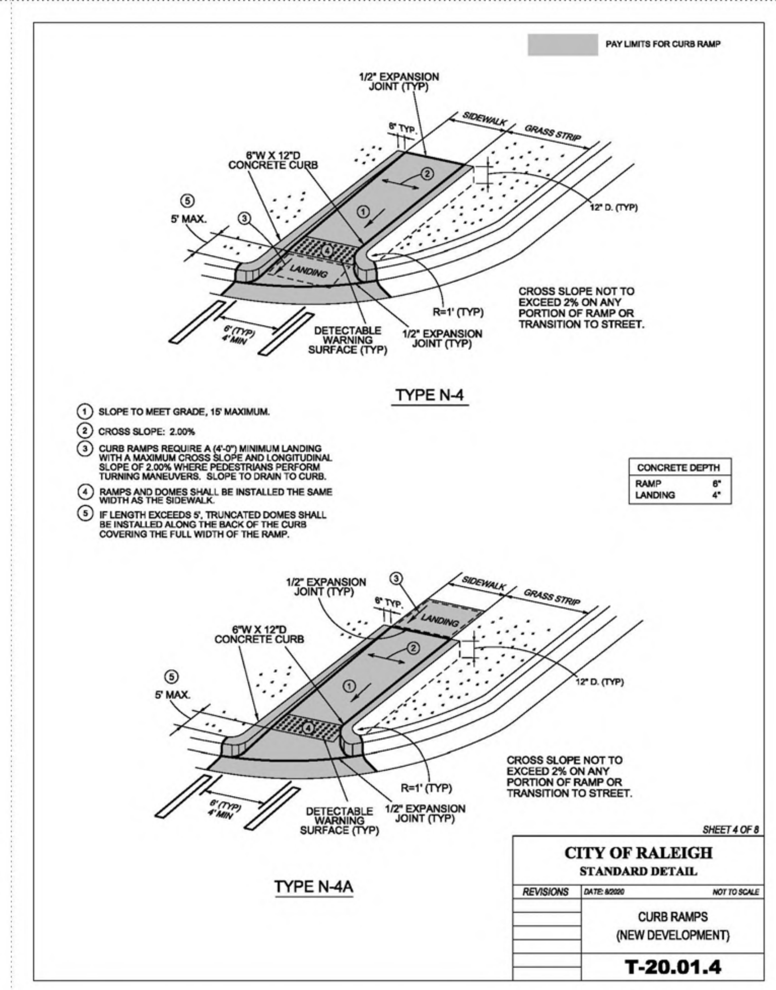
2 of 2

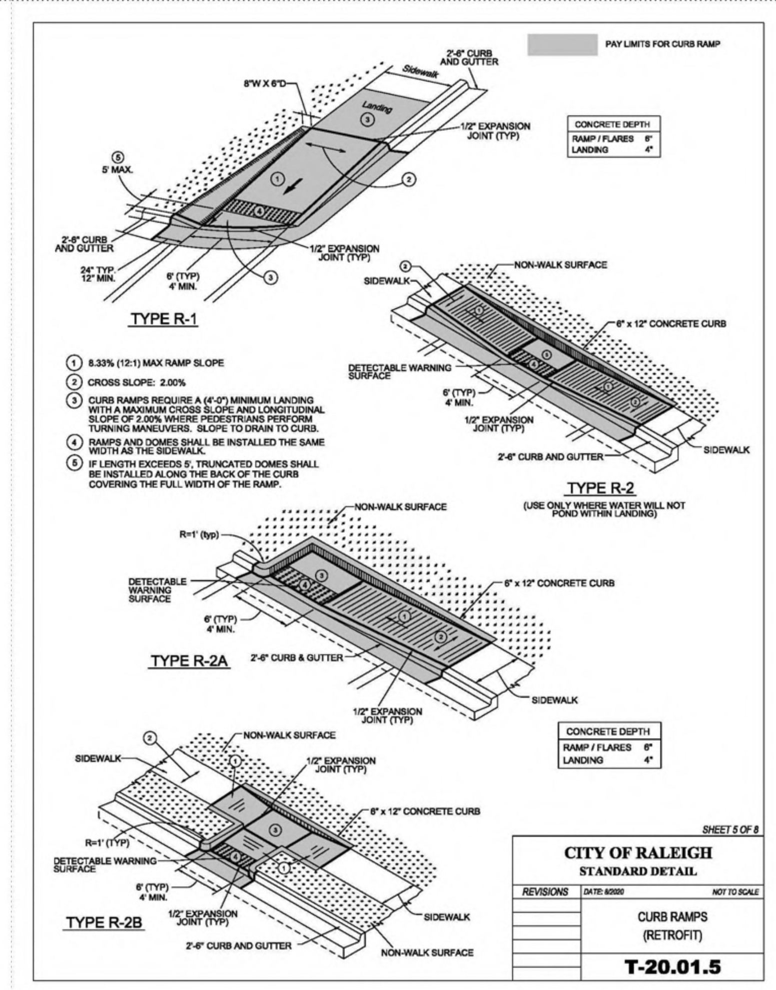
TOWN OF KNIGHTDALE STANDARD DETAILS — CONCRETE SIDEWALKS — STD. NO. 4.04

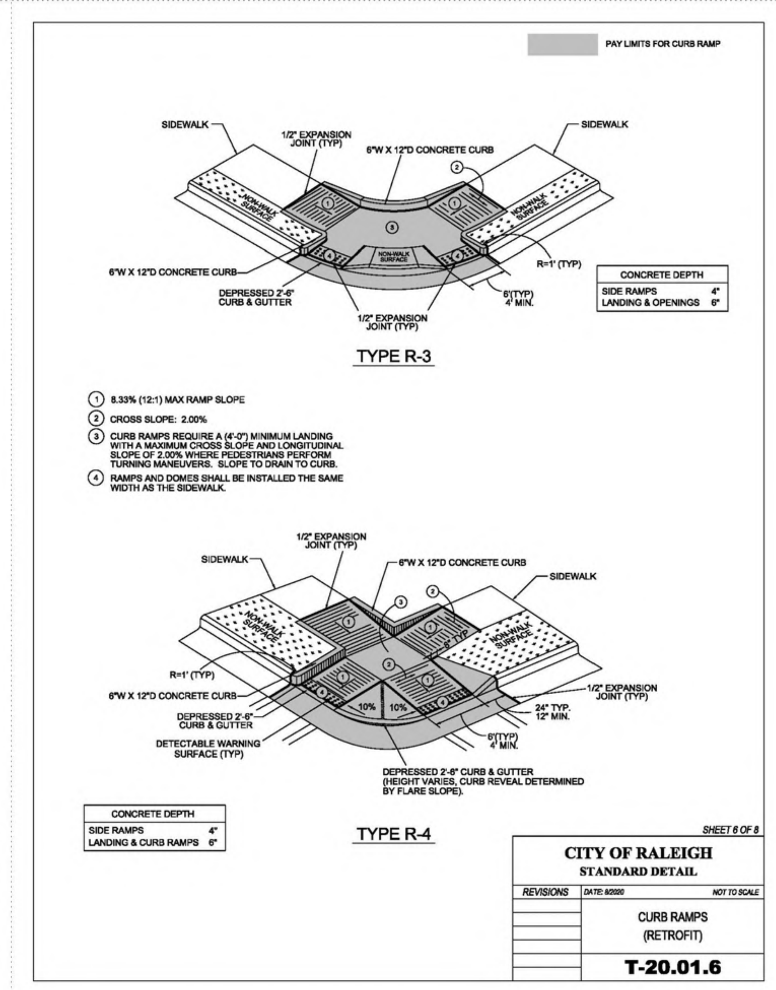












ALL MATERIAL & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH ALL CITY OF RALEIGH & TOWN OF KNIGHTDALE DESIGN STANDARDS, DETAILS, AND SPECIFICATIONS

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ________________ Date: ____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ________________ Date: ____________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713
phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187
www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER — PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
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4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

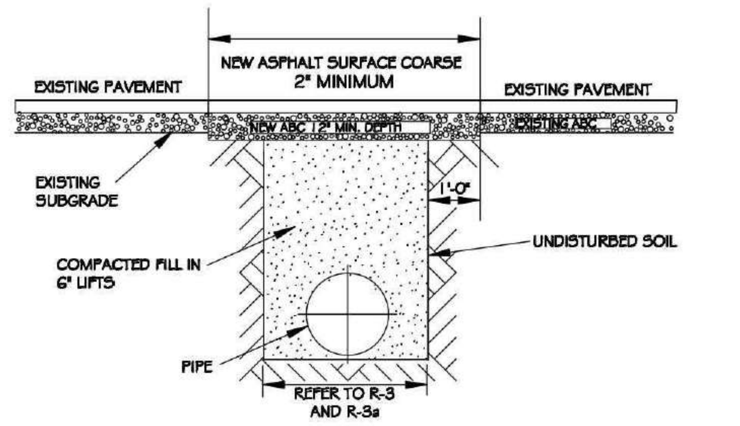
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

SITE DETAILS
C8.01

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-D1.dwg, 7/26/2024 3:17:50 PM, Katie Anderson



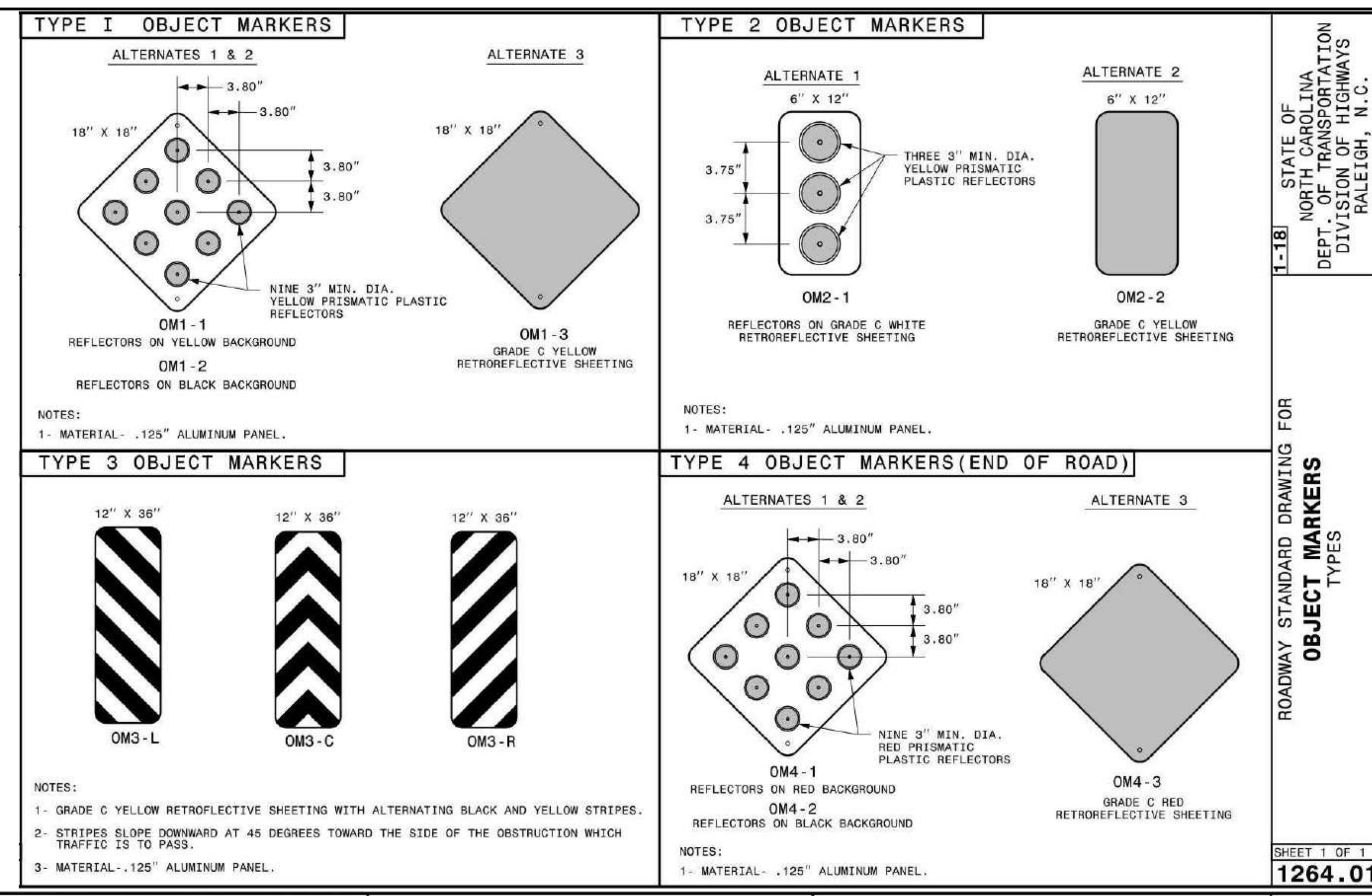
NOTES:

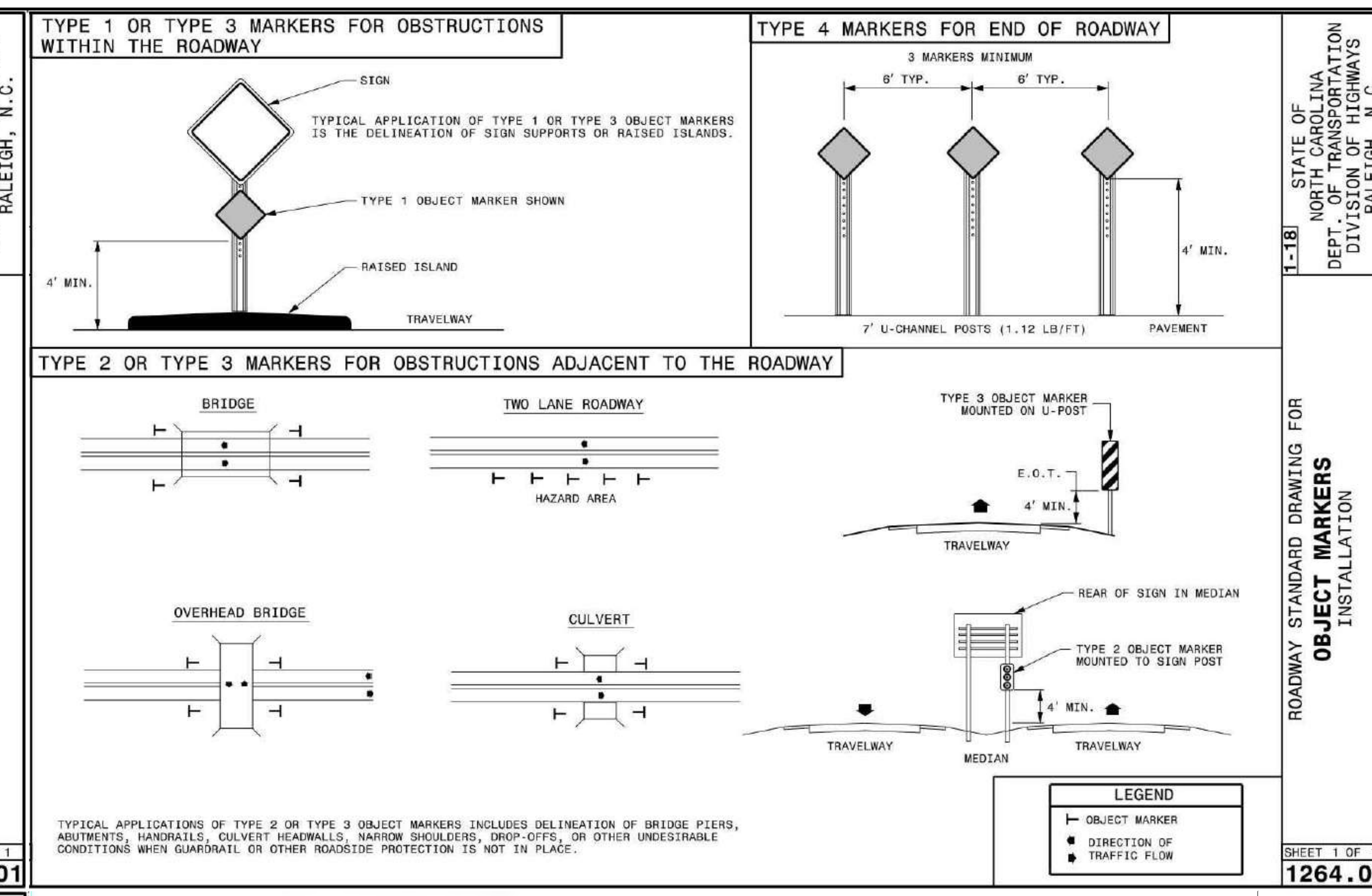
1. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROVED SAW CUT MACHINE.
2. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
3. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT.
4. THE ENTIRE THICKNESS/ VERTICAL EDGE OF CUT SHALL BE TACKED.
5. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 2" THICK.
6. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH LEVEL PATCH.
7. REFER TO CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING, R-3 AND R-3A. FOR ADDITIONAL DETAILS.
8. NO HAND PATCHING ALLOWED.
9. PAVEMENT CUTS WITHING NCDOT ROW SHALL FONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.

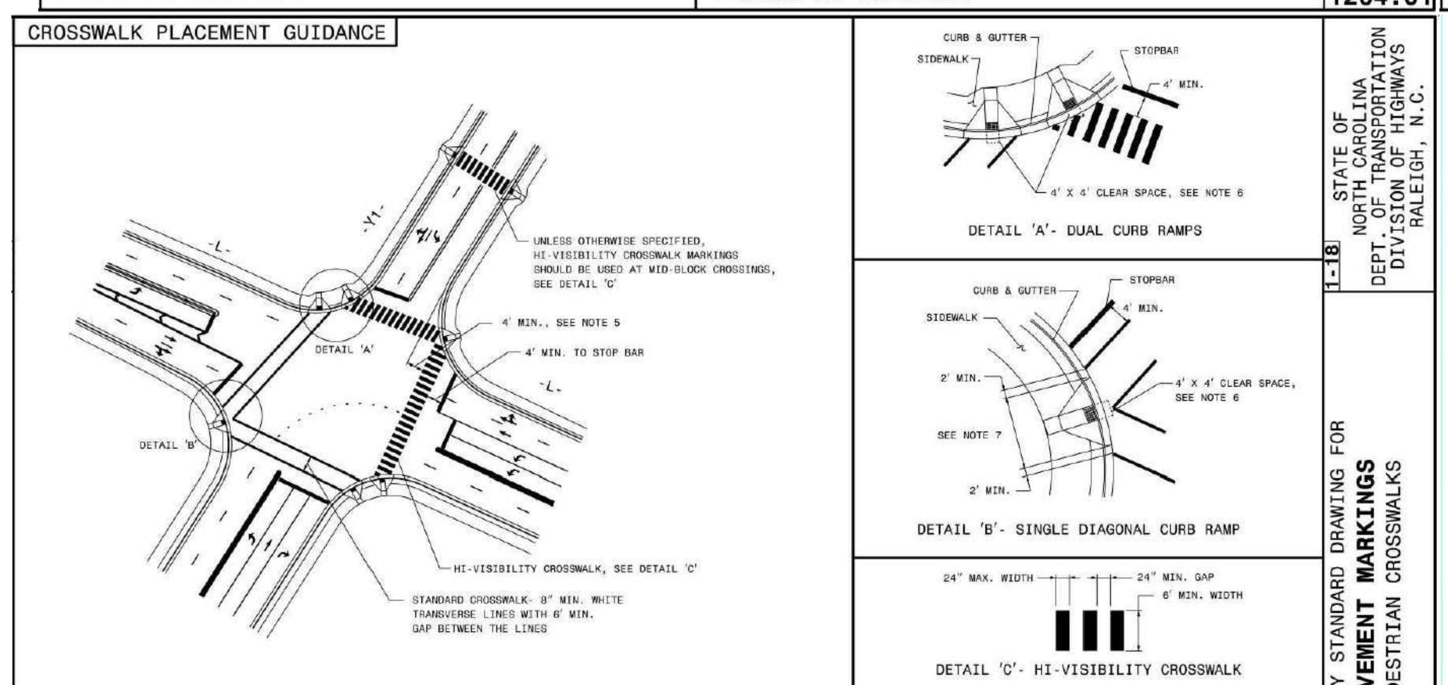
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES

STANDARD ASPHALT PAVEMENT PATCH DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
R-2	RRH	3-31-00	A.B.B.	4-16-04
	DWC	11-1-99	J.P.S.	10-1-10







GENERAL NOTES:

1- USE THE DETAILS ABOVE AND THE FOLLOWING NOTES FOR GUIDANCE IN PLACING CROSSWALK MARKINGS. REFER TO NCDOT ROADWAY STANDARD DRAWINGS, MUTCD AND ADA STANDARDS FOR ADDITIONAL GUIDANCE.

2- THE LOCATION AND TYPE OF CROSSWALK MARKINGS SHOWN ON THE ABOVE DETAILS ARE FOR REFERENCE ONLY. LOCATE CROSSWALK MARKINGS AS SHOWN ON THE PROJECT DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER. THE CROSSWALK MARKING TYPE, STANDARD OR HI-VISIBILITY, SHALL BE INSTALLED AS SPECIFIED ON THE PROJECT DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER.

3- THE STANDARD CROSSWALK IS TWO WHITE 8" MIN. TRANSVERSE LINES WITH A 6' MIN. GAP BETWEEN THE LINES. THE HI-VISIBILITY CROSSWALK IS WHITE 24" MAX. WIDE LONGITUDINAL LINES WITH 24" MIN. GAPS BETWEEN LINES, SEE DETAIL 'C'. HI-VISIBILITY CROSSWALKS SHOULD BE A MINIMUM OF 6' WIDE. CURB RAMPS SHALL BE WHOLLY CONTAINED WITHIN THE MARKINGS, EXCLUDING ANY FLARES.

4- STOP BARS SHOULD BE PLACED A 4' MIN. IN ADVANCE OF NEAREST CROSSWALK LINE.

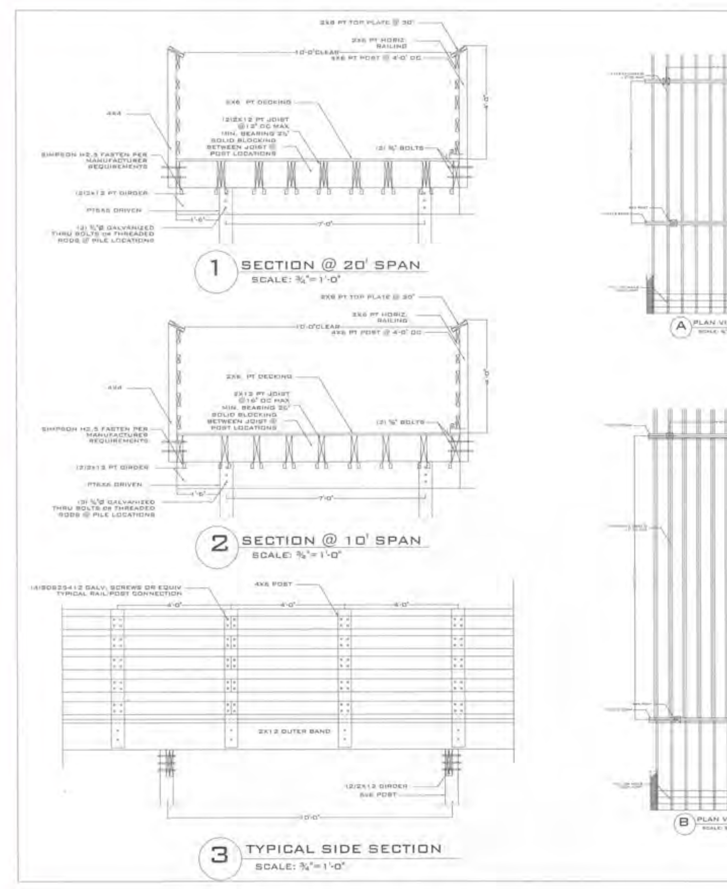
5- SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL IS 4' MIN.

6- BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE OF 4' X 4' MIN. SHALL BE PROVIDED WITHIN THE MARKINGS.

7- SINGLE DIAGONAL CURB RAMPS WITH FLARED SIDES SHALL HAVE A SEGMENT OF CURB 2' MIN. LONG LOCATED ON EACH SIDE OF THE CURB RAMP AND WITHIN THE MARKED CROSSING, SEE DETAIL 'B'.

8- CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE LATEST NCDOT ROADWAY STANDARD DRAWINGS. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT UNIT FOR DETAILS OR A SPECIAL DESIGN.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
ROADWAY STANDARD DRAWING FOR PAVEMENT MARKINGS PEDESTRIAN CROSSWALKS
SHEET 1 OF 1
1205.07



GENERAL NOTES:

GENERAL: ALL NOTES ARE FOR SUPPLEMENTING THE PLANS AND SPECIFICATIONS AND ARE IN NO WAY TO BE CONSIDERED AS EXCLUDING ANY ITEM IN THEM.

DESIGN CRITERIA PER AASHTO:
LIVE LOAD: 85 PSF
DEAD LOAD: 20 PSF
SNOW LOAD: 15 PSF
WIND SPEED: 100 MPH
HORIZONTAL WIND LOAD: 35 PSF
VEHICULAR LOAD: 2500 LBS

FOUNDATION: MINIMUM PILE PENETRATION SHALL BE 10'. SIZE AND PENETRATION ARE SUBJECT TO MODIFICATION BASED ON RECOMMENDATION OF GEOTECHNICAL REPORT PER 1803.5.5.

SITE SOIL PROPERTIES ARE ASSUMED TO SUPPORT FOUNDATION LOADS. CONTRACTOR SHALL PROVIDE GEOTECHNICAL REPORT BY PROFESSIONAL ENGINEER INDICATION SOIL PROPERTIES ARE SUFFICIENT TO SUPPORT ALL LOADS.

FOUNDATION CONSTRUCTION TO BE VERIFIED BY SPECIAL INSPECTION IN ACCORDANCE WITH TABLE 1704.8.

CONCRETE: ALL REINFORCED CONCRETE TO HAVE A COMPRESSIVE STRENGTH f'c OF 3000 PSI, IN ACCORDANCE WITH NCDOT CLASS A MIX SPECIFICATIONS.

EXPOSED CONCRETE SHALL BE AIR-ENTRAINED.

REINFORCING STEEL: ASTM A615 GRADE 60.

WOOD: ALL SAWN WOOD TO BE SOUTHERN YELLOW PINE (SYP) NO.2 OR HIGHER.

ALL FASTENERS AND HANGERS TO BE HOT DIPPED GALVINIZED (AT A MINIMUM).

PRESERVATIVE PRESSURE TREATMENT TO BE IN ACCORDANCE WITH AWPA STANDARD M4-08 & U1-07 AND MEET THE FOLLOWING REQUIREMENTS: DECKING, HANDRAILS AND JOISTS: UC3B POSTS & PILES: UC4A

NOTE:

1. BOARDWALK WIDTH SHOULD MATCH TRAIL WIDTH

Vital Cluster Box Unit, 16 Mailboxes, 2 Parcel Lockers, Black

Weights & Dimensions

Depth	17-7/8 in
Width	30-1/2 in
Collection Box Dimensions (W x D x H)	12" x 15" x 3-1/4"
Mailbox Dimensions (W x D x H)	12" x 15" x 3-1/4"
Parcel Box Dimensions (W x D x H)	12" x 15" x 15"
Height	62 in
2nd Parcel Box Dimensions (W x D x H)	12" x 15" x 18"
Weight	175 lbs

Product Details

Number of Parcel Boxes	2
Mounting Location	Pedestal (Included)
Assembly Required	Unassembled
Type	Front/Front Loading Master Access
Number of Mailboxes	16
Brand	Florence
Package Quantity	1
Number of Collection Boxes	1
Series	Vital™
Material	Aluminum
Style	Type III
Manufacturers Part Number	1570-16BKAF
Color Family	Black

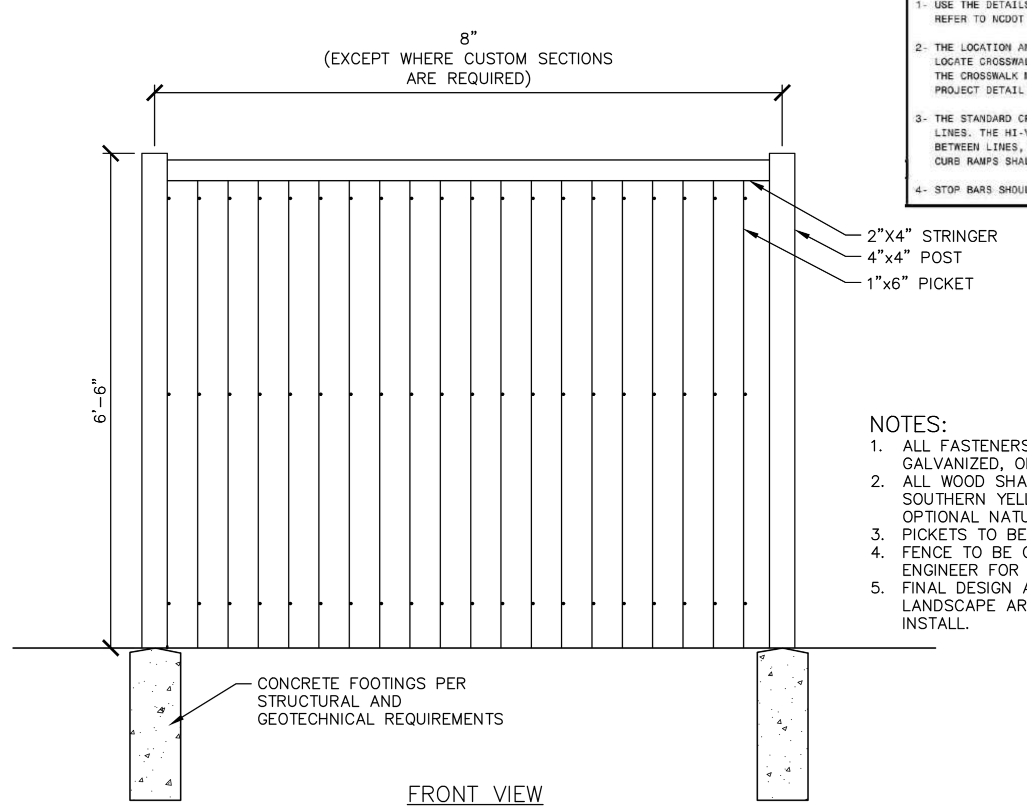
Warranty

Warranty	5 yr

Compliance & Certifications

Certifications	CDSEQ-08-B-0012

MAIL KIOSK DETAIL

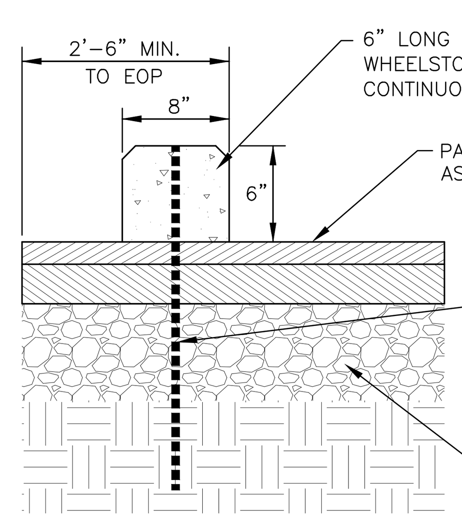


NOTES:
1. ALL FASTENERS AND HARDWARE SHALL BE S.S., GALVANIZED, OR ALUMINUM.
2. ALL WOOD SHALL BE PRESSURE-TREATED SOUTHERN YELLOW PINE WITH SMOOTH FINISH. OPTIONAL NATURAL STAIN BY OWNER.
3. PICKETS TO BE HAND-TIGHT.
4. FENCE TO BE CONFIRMED BY STRUCTURAL ENGINEER FOR WIND LOAD CAPACITY.
5. FINAL DESIGN AND PRODUCT TO BE APPROVED BY LANDSCAPE ARCHITECT PRIOR TO PURCHASE AND INSTALL.

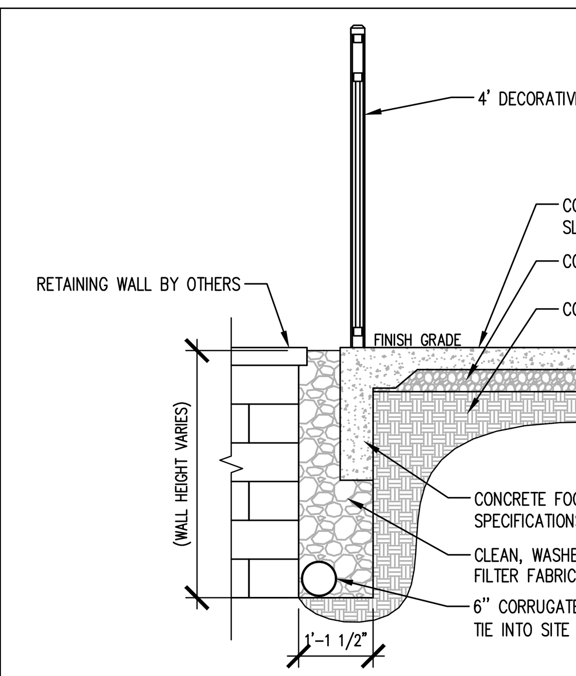
01 PRIVACY FENCE

SCALE: 1/2"=1'-0"

NOTE: CURB STOP SHALL BE SLOTTED, FOR DRAINAGE

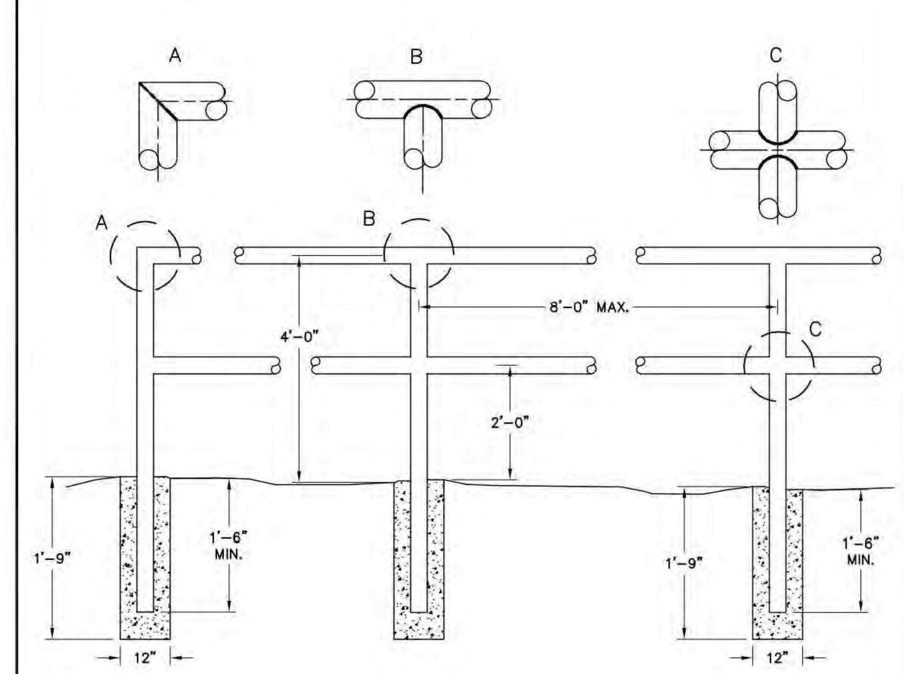


WHEEL STOP
N.T.S.



NOTES:
1. CONTRACTOR TO SUBMIT PRODUCT DRAWINGS TO LANDSCAPE ARCHITECT/ OWNER'S REPRESENTATIVE FOR APPROVAL.
2. INSTALL PER MANUFACTURER'S SPECIFICATIONS.

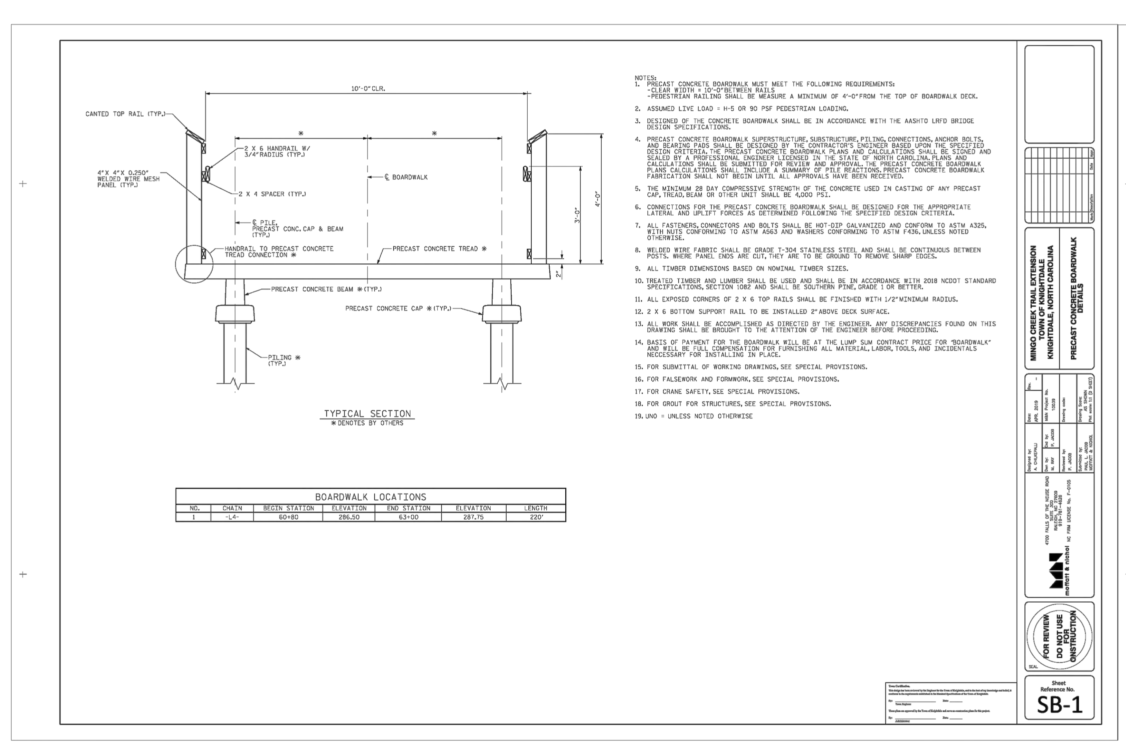
FENCING ALONG TOP OF RETAINING WALLS
N.T.S.

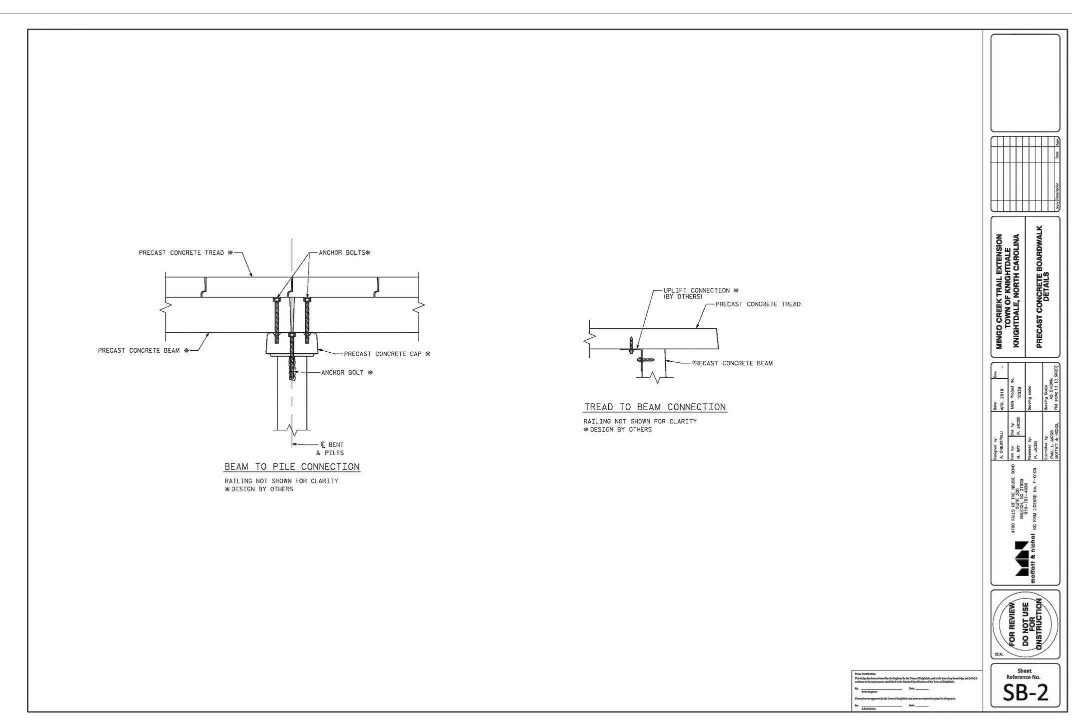


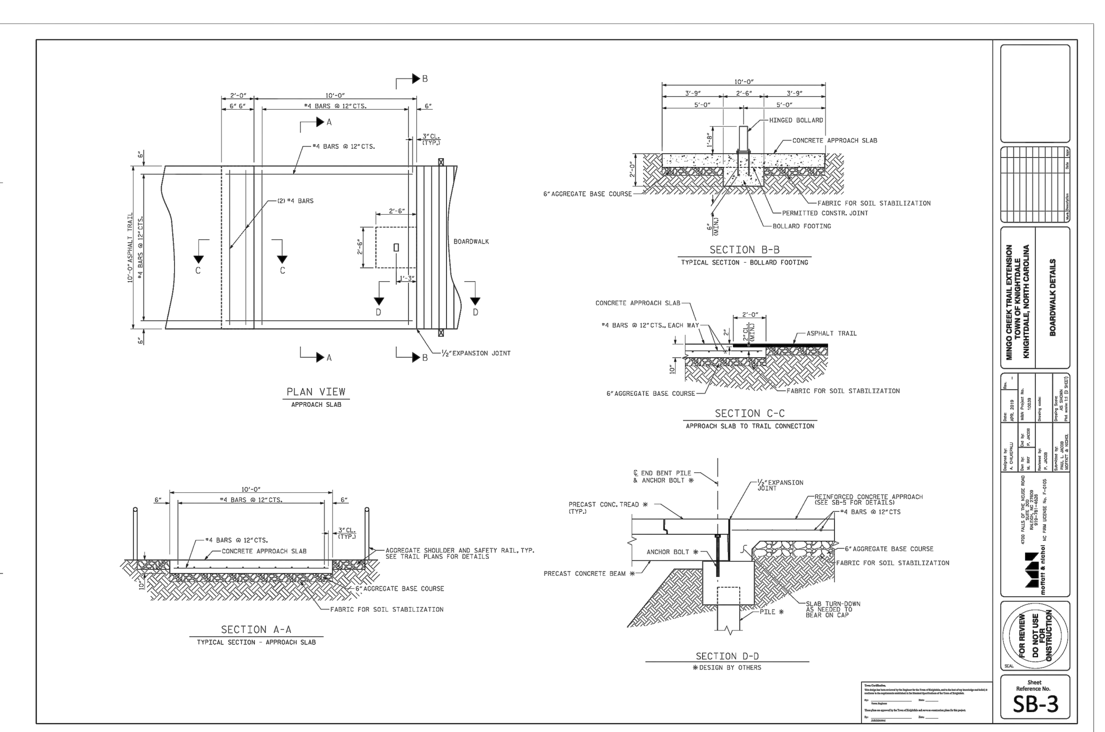
NOTES:
1. ALL CONCRETE TO BE 3600 PSI COMPRESSIVE STRENGTH.
2. TYPE OF PIPE TO BE USED IS 1-5/8" MAX. O.D. BLACK IRON, LOW CARBON PIPE.
3. ALL JOINTS TO HAVE A 1/2" FILLET WELD.
4. AFTER INSTALLATION, PAINT ASSEMBLY WITH BLACK ALL WEATHER ENAMEL.
5. TO BE USED AS REQUIRED BY THE TOWN ENGINEER.

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	TYPICAL HANDRAIL	STD. NO. 4.13







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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

SITE DETAILS
C8.02

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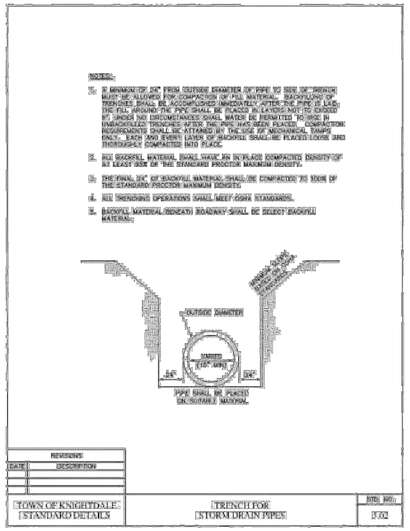
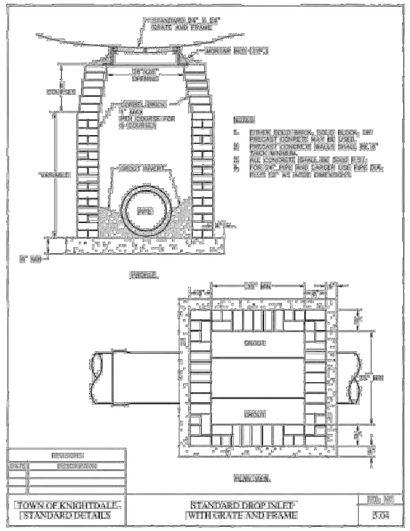
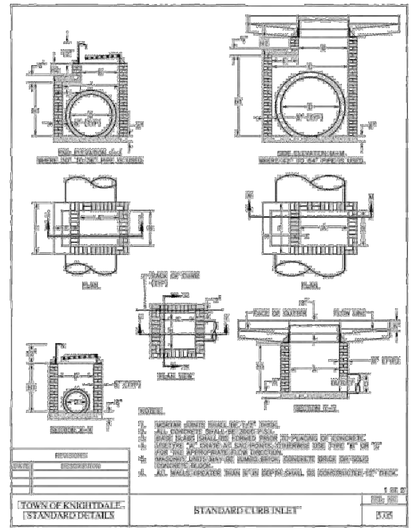
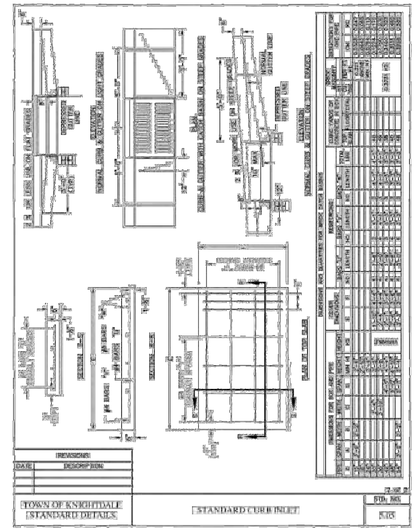
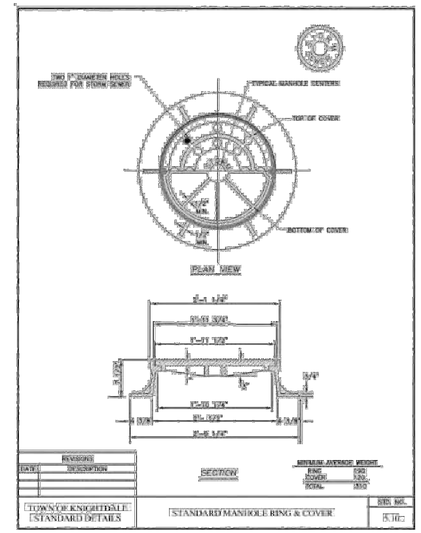
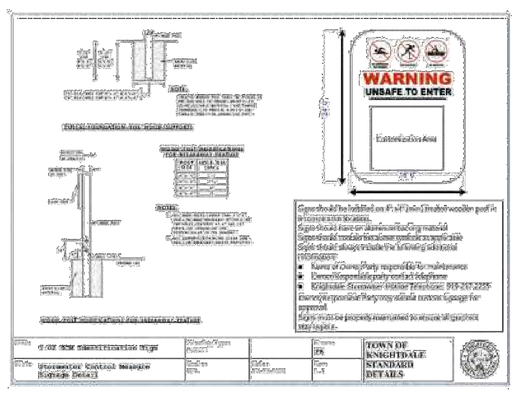


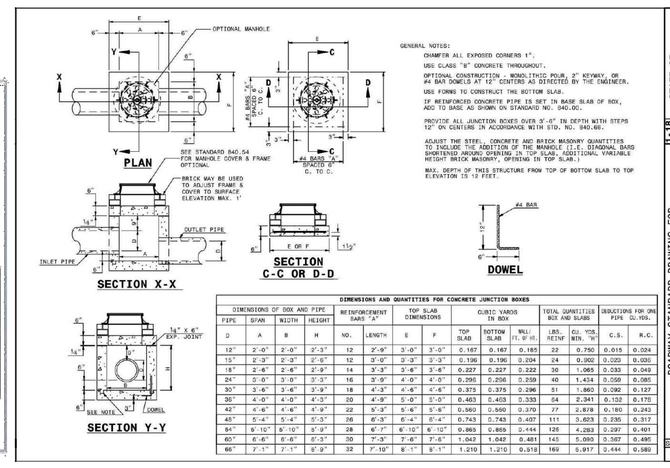






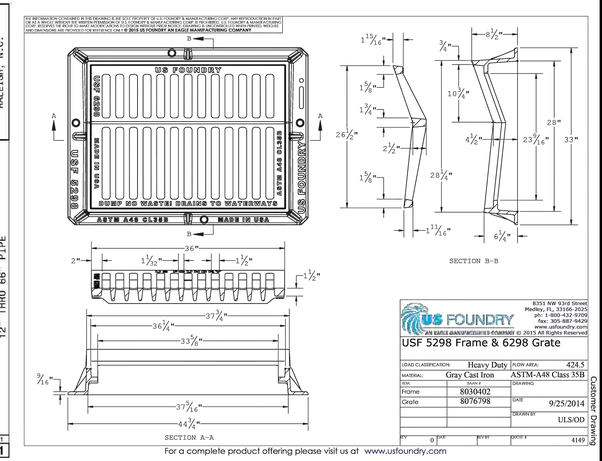






DIMENSIONS AND QUANTITIES FOR CONCRETE JUNCTION BOXES

DIMENSIONS OF BOX AND PIPE				REINFORCEMENT BARS "A"		TOP SLAB DIMENSIONS		CUBIC YARDS IN BOX		TOTAL QUANTITIES BOX AND SLABS		DEDUCTIONS FOR ONE PIPE CU.YDS.	
PIPE D	SPAN A	WIDTH B	HEIGHT H	NO.	LENGTH	E	F	TOP SLAB	BOTTOM SLAB	WALL FT. OF HT.	CU. YDS. REINF	C.S.	R.C.
12"	2'-0"	2'-0"	2'-3"	12	2'-9"	3'-0"	3'-0"	0.167	0.167	0.185	22	0.750	0.015	0.024
15"	2'-3"	2'-3"	2'-5"	12	3'-0"	3'-3"	3'-3"	0.196	0.196	0.204	24	0.902	0.020	0.030
18"	2'-6"	2'-6"	2'-9"	14	3'-3"	3'-6"	3'-6"	0.227	0.227	0.222	30	1.065	0.033	0.049
24"	3'-0"	3'-0"	3'-3"	16	3'-9"	4'-0"	4'-0"	0.296	0.296	0.259	40	1.434	0.059	0.085
30"	3'-6"	3'-6"	3'-9"	18	4'-3"	4'-6"	4'-6"	0.375	0.375	0.296	51	1.860	0.092	0.127
36"	4'-0"	4'-0"	4'-3"	20	4'-9"	5'-0"	5'-0"	0.463	0.463	0.333	64	2.341	0.132	0.170
42"	4'-6"	4'-6"	4'-9"	22	5'-3"	5'-6"	5'-6"	0.560	0.560	0.370	77	2.878	0.180	0.243
48"	5'-4"	5'-4"	5'-3"	26	6'-3"	6'-4"	6'-4"	0.743	0.743	0.407	111	3.623	0.235	0.317
54"	5'-10"	5'-10"	5'-9"	28	6'-7"	6'-10"	6'-10"	0.863	0.863	0.444	126	4.253	0.297	0.401
60"	6'-6"	6'-6"	6'-3"	30	7'-3"	7'-6"	7'-6"	1.042	1.042	0.481	145	5.080	0.367	0.495
66"	7'-1"	7'-1"	6'-9"	32	7'-10"	8'-1"	8'-1"	1.210	1.210	0.518	169	5.917	0.444	0.580



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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
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6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

STORMWATER DETAILS

C8.03

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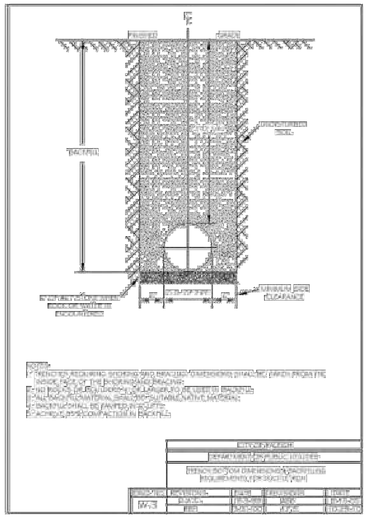

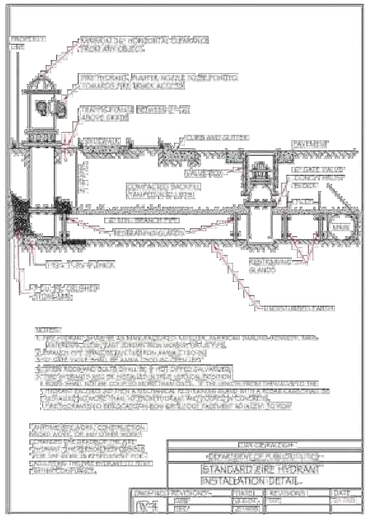

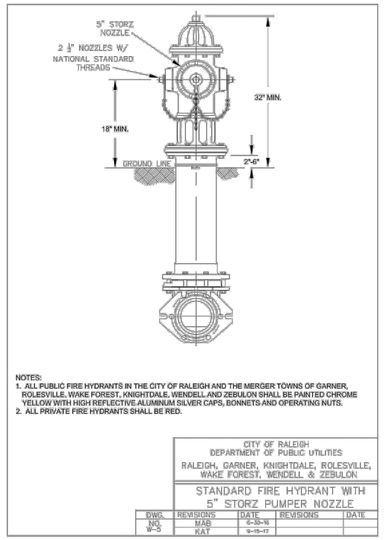

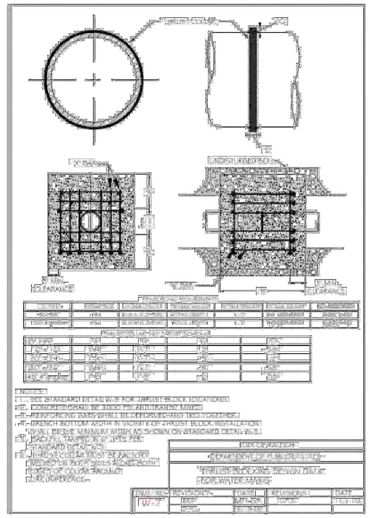

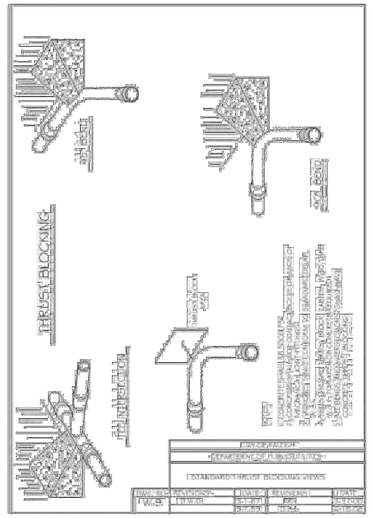

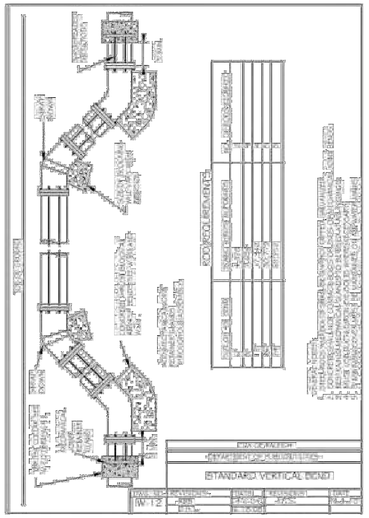

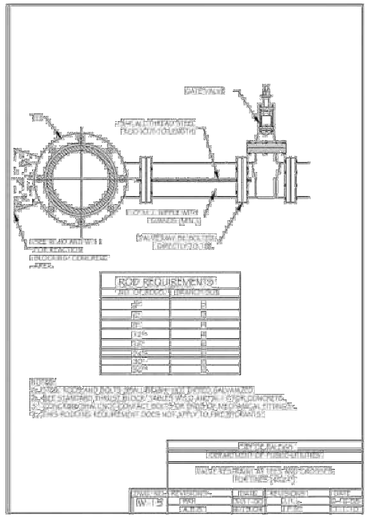

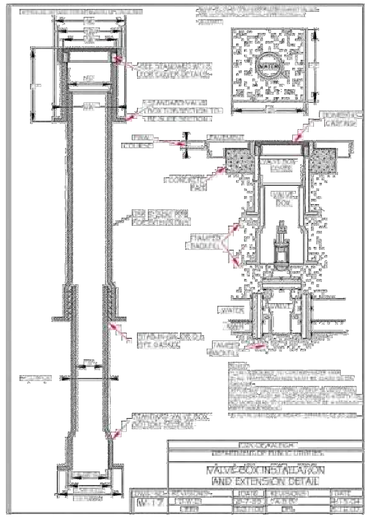

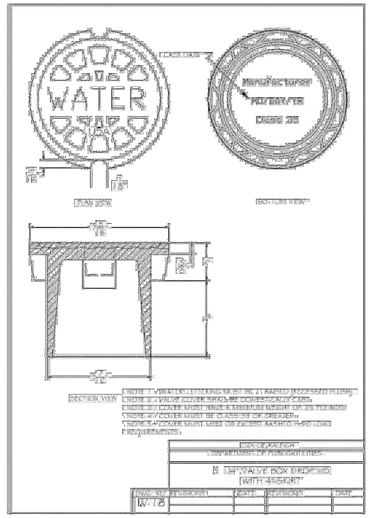

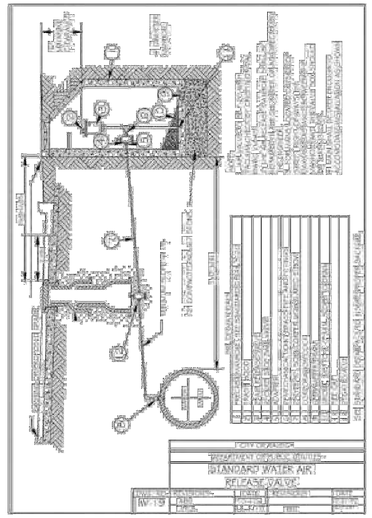

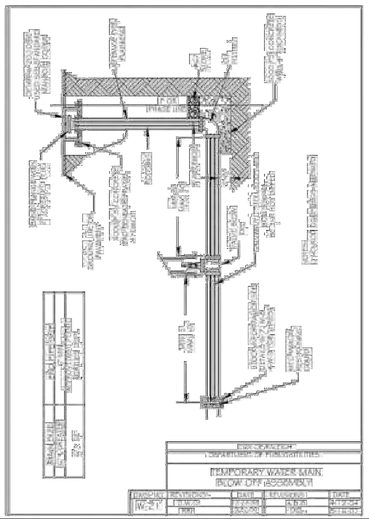

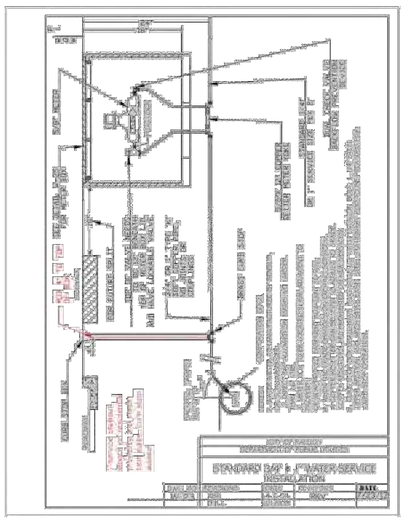

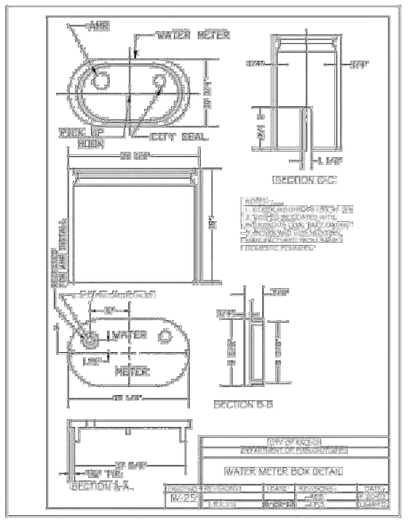

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

WATER DETAILS

C8.04

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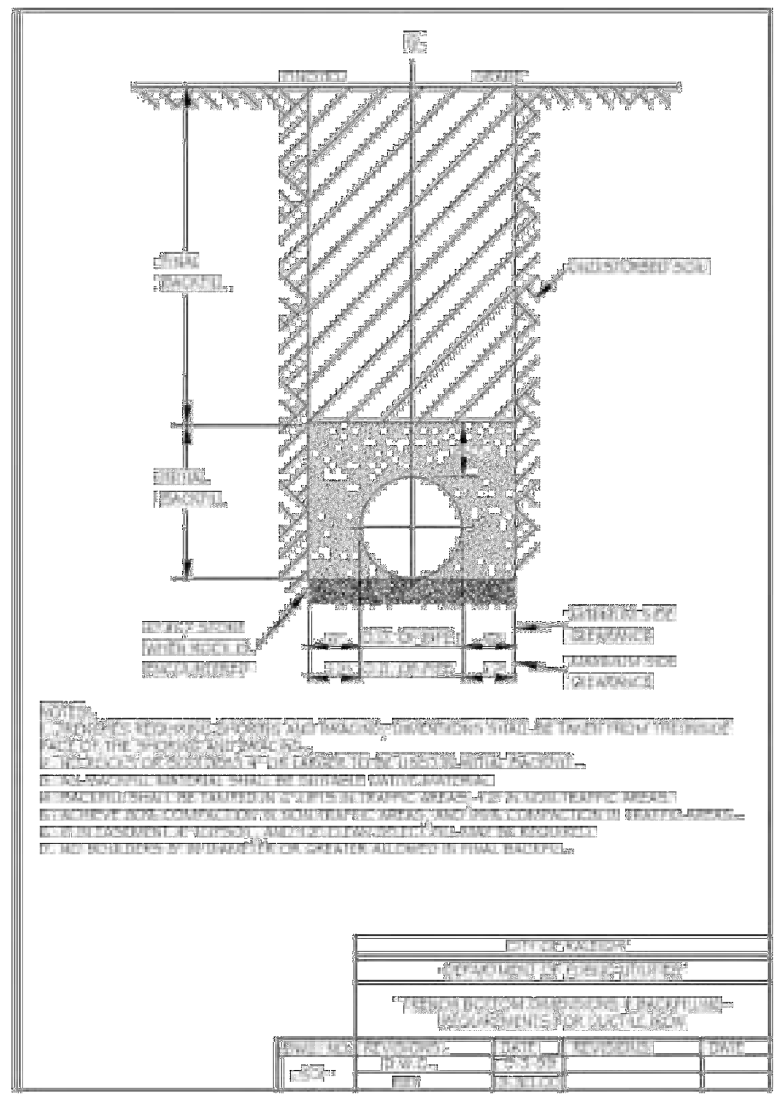
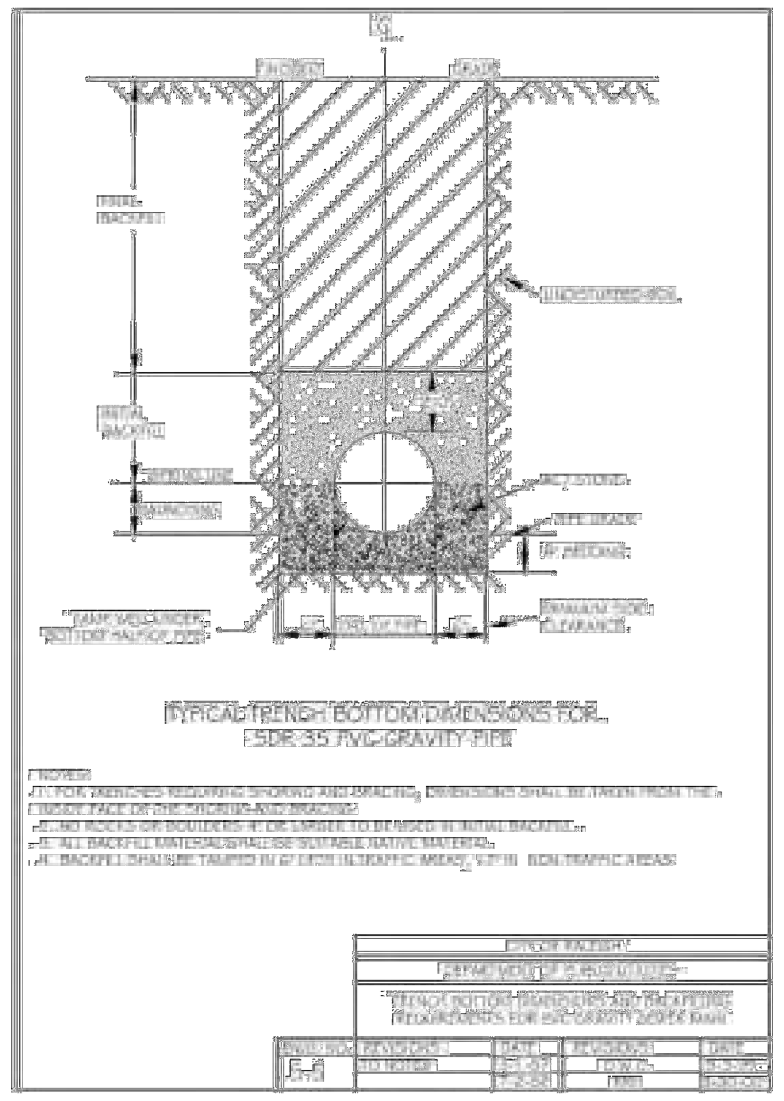


CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES



TYPICAL TRENCH BOTTOM DIMENSIONS FOR SDR 35 PVC GRAVITY PIPE

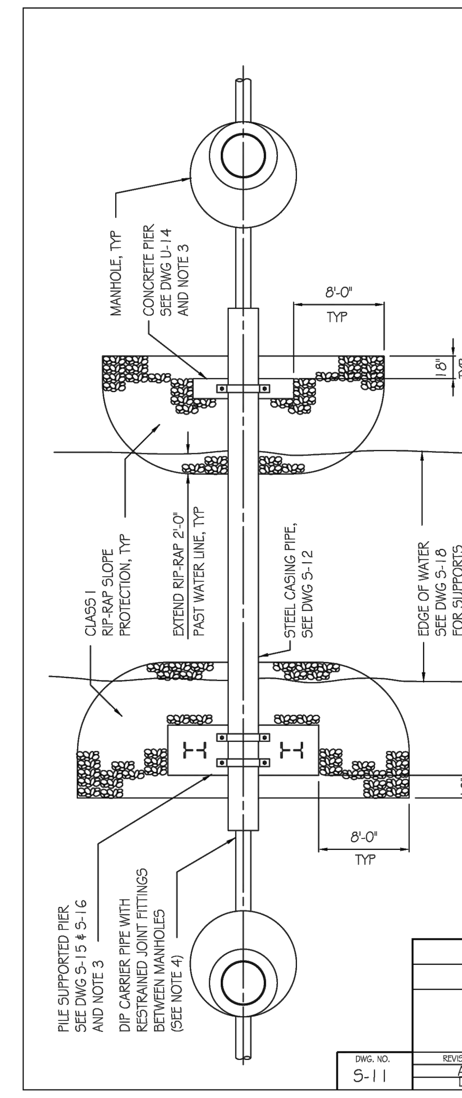
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES

AERIAL PIPE CROSSING

GENERAL NOTES:

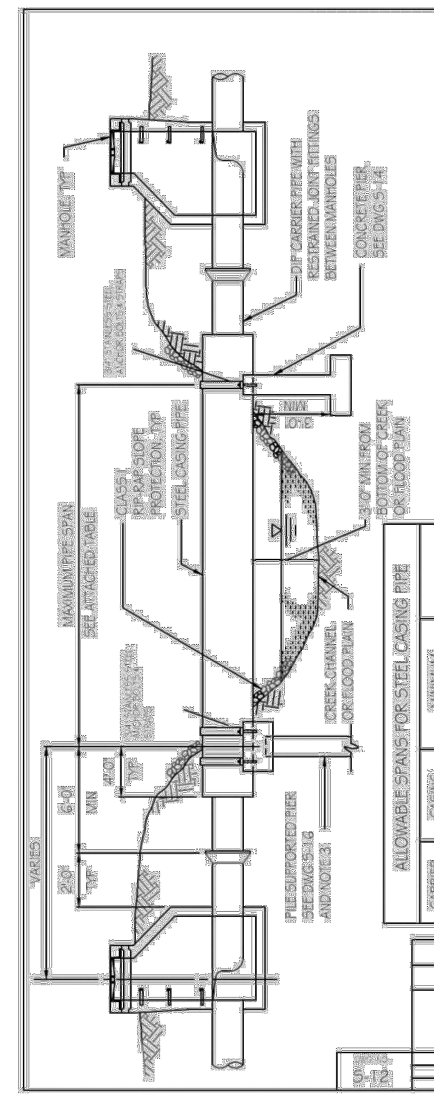
1. ALL MATERIALS UTILIZED ON THESE DETAIL SHEETS SHALL CONFORM TO THE APPROPRIATE SECTIONS OF THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK UNLESS NOTED OTHERWISE HEREIN.
2. RESTRAINED JOINT PIPE AND FITTINGS SHALL CONSIST OF BOLTED RETAINER RINGS AND WELDED RETAINER BARS OR BOLTLESS TYPE WHICH INCLUDE DUCTILE IRON LOCKING SEGMENTS AND RUBBER RETAINERS. BOLTS FOR RESTRAINED JOINTS (IF APPLICABLE) SHALL CONFORM TO ANSI B18.2. RESTRAINED PIPE AND FITTINGS SHALL BE FLEX-RING OR LOK-RING TYPE JOINTS AS MANUFACTURED BY AMERICAN CAST IRON PIPE CO.; TR FLEX AS MANUFACTURED BY US PIPE, SUPER-LOCK AS MANUFACTURED BY CLOW, BOLT-LOK OR SNAP-LOK AS MANUFACTURED BY GRIFFIN PIPE PRODUCTS, OR EQUAL.
3. CONCRETE PROPERTIES SHALL BE AS FOLLOWS:
   CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
   NOMINAL SLUMP = 4 INCHES
   WATER/CEMENTITOUS MATERIALS RATIO = 0.45 (MAX)
   AIR CONTENT = 6% * 1.5%
   CONCRETE SHALL BE COMPOSED OF CEMENT, WATER, COARSE AGGREGATES, FINE AGGREGATES AND AIR. CEMENT SHALL BE TYPE I/II OR II IN ACCORDANCE WITH ASTM C-150. MATERIAL REQUIREMENTS FOR ALL FINE AND COARSE AGGREGATES SHALL CONFORM TO ASTM C-33. COARSE AGGREGATE SHALL BE SIZE No. 57 OR 67. AN APPROVED CLASS 'F' FLYASH MAY BE SUBSTITUTED FOR AN EQUAL AMOUNT OF CEMENT BY WEIGHT UP TO 25%.
4. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4".
5. CONVENTIONAL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 AND SHALL BE PLACED IN ACCORDANCE WITH "RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS" (LATEST EDITION) AS PUBLISHED BY THE CONCRETE REINFORCING INSTITUTE. SPLICES SHALL BE CLASS 'B' CONFORMING TO THE PROVISIONS OF ACI 318 - "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
6. NEOPRENE BEARING PADS SHALL BE FORMED FROM PREVIOUSLY UNVULCANIZED, 100% VIRGIN NEOPRENE, WITH DUROMETER HARDNESS = 50.
7. PILES SHALL BE STRUCTURAL STEEL HP12x53 PILES AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36. PILES SHALL BE DRIVEN TO DEPTHS REQUIRED TO OBTAIN AN ULTIMATE BEARING CAPACITY OF NOT LESS THAN TWO TIMES THE DESIGN LOADING OF 30 TONS. PILES SHALL PENETRATE A MINIMUM OF FIFTEEN FEET INTO UNDISTURBED SOIL. IN DRIVING PILES, A METHOD APPROVED BY THE ENGINEER SHALL BE USED WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED. IF REQUESTED BY THE ENGINEER, PILES SHALL BE TESTED TO DETERMINE THE ULTIMATE CAPACITY OF THE PILES. THE METHOD OF LOAD TESTING SHALL CONFORM TO ASTM D1143 AND THE NORTH CAROLINA STATE BUILDING CODE. WHERE PILES ARE EXPOSED, PILES SHALL BE PAINTED AND/OR COATED IN ACCORDANCE WITH THE CITY SPECIFICATIONS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
GENERAL NOTES
DWG. NO. S-10 | REVISIONS D.H.L. | DATE 6/16/08



NOTES:
1. RIP RAP FOR SLOPE PROTECTION SHALL BE CLASS I RIP RAP IN ACCORDANCE WITH SECTION 868 OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATIONS "STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES".
2. RIP RAP SHALL BE PLACED IN ACCORDANCE WITH DRAWING 868.01 OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATIONS "ROADWAY STANDARD DRAWINGS".
3. SUPPORT TYPE FOR PIERS SHALL BE DETERMINED BY ENGINEER BASED ON SUBGRADE CONDITIONS AT SITE. SEE DRAWING S-14 FOR SUBGRADE PARAMETERS FOR EACH TYPE OF FOUNDATION.
4. WHERE DUCTILE IRON PIPE IS USED FOR CARRIER PIPE, DUCTILE IRON CARRIER PIPE SHALL BE INSTALLED UTILIZING 2 PIPE ALIGNMENT GUIDES PER JOINT ONE FOURTH OF THE PIPE JOINT LENGTH IN FROM BOTH THE BELL AND SPIGOT ENDS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
TYPICAL PLAN
DWG. NO. S-11 | REVISIONS A.B.B., D.H.L. | DATE 4-16-04, 6/16/08

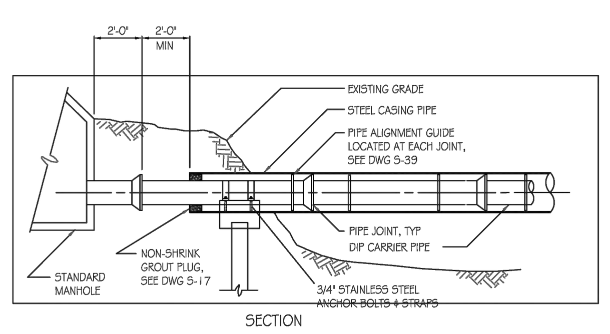


NOTES:
1. STEEL PIPE SHALL BE EITHER SPIRAL WELDED OR SMOOTH WALL SEAMLESS WITH A MINIMUM YIELD STRENGTH OF 35,000 PSI. PAINTING AND LINING SHALL BE AS REQUIRED BY THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK.
2. DUCTILE IRON PIPE SHALL BE SUPPORTED WITH TWO SPIDERS AT EVERY JOINT WITHIN THE CASING PIPE USING APPROVED PIPE ALIGNMENT GUIDE. SEE DRAWING S-39. ALL JOINTS SHALL BE RESTRAINED JOINT. SEE NOTE 2, DWG S-10.
3. SUPPORT TYPE FOR PIERS SHALL BE DETERMINED BY ENGINEER BASED ON SUBGRADE CONDITIONS AT SITE. SEE DRAWING S-14 FOR SUBGRADE PARAMETERS FOR EACH TYPE OF FOUNDATION. SEE DRAWING S-19 FOR SUPPORTS PLACED WITHIN STREAM.
4. BOTTOM OF PIPE TO BE AT A MINIMUM OF 1' ABOVE THE 25 YEAR FLOOD ELEVATION.

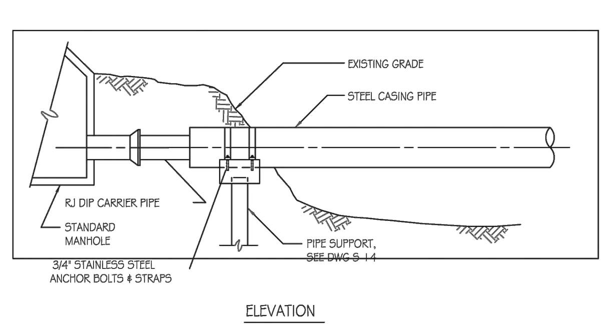
ALLOWABLE SPANS FOR STEEL CASING PIPE

CARRIER PIPE DIP DIAMETER (IN.)	CASING PIPE STEEL DIAMETER (IN.)	MINIMUM CASING PIPE WALL THICKNESS (IN.)	ALLOWABLE SPAN (FT.)
6	14	0.3750	40
8	16	0.3750	45
10	18	0.3750	50
12	20	0.3750	50
14	24	0.3750	55
16	26	0.3750	55
18	30	0.3750	60
20	32	0.3750	60
24	36	0.4375	65
30	42	0.4375	65
36	48	0.5000	65
42	56	0.5000	65

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
STEEL CASING PIPE ELEVATION
DWG. NO. S-12

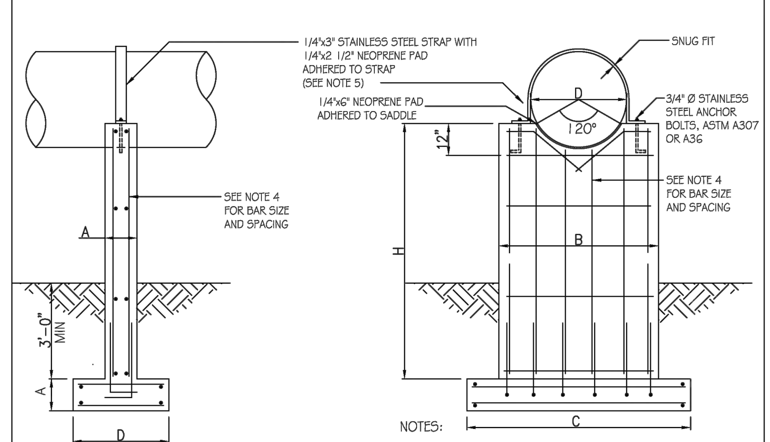


SECTION



ELEVATION

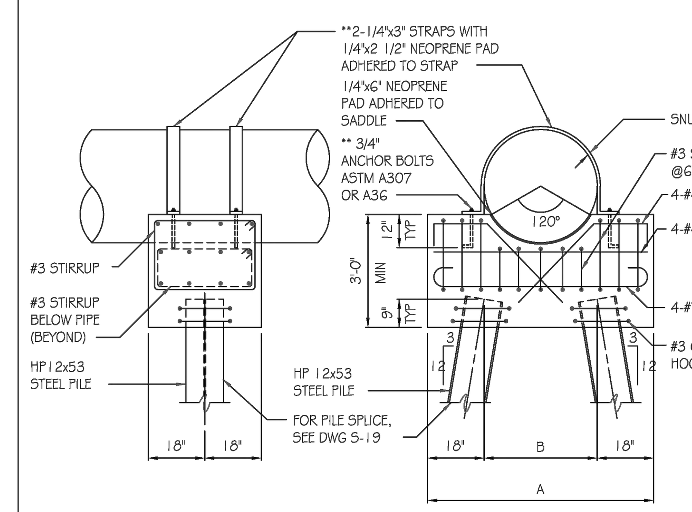
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
TYPICAL PIPE SECTION & ELEVATION
DWG. NO. S-13 | REVISIONS D.H.L. | DATE 6/16/08



CASING PIPE DIA. "D" (IN.)	"H" (FT.)	THICKNESS "A" (IN.)	PIER WIDTH "B" (FT.)	FOOTING LENGTH "C" (FT.)	FOOTING WIDTH "D" (FT.)
6-12	≤6	12	2'-4"	5'-6"	3'-0"
	8	12	2'-4"	6'-3"	3'-0"
	10	12	2'-4"	6'-8"	3'-0"
	12	12	2'-4"	7'-2"	3'-0"
14-20	≤6	12	3'-0"	8'-0"	3'-0"
	8	12	3'-0"	9'-0"	3'-0"
	10	12	3'-0"	9'-10"	3'-0"
	12	14	3'-0"	10'-6"	3'-0"
22-28	≤6	14	3'-8"	8'-9"	4'-0"
	8	14	3'-8"	10'-0"	4'-0"
	10	14	3'-8"	11'-0"	4'-0"
	12	14	3'-8"	11'-10"	4'-0"
30-36	≤6	18	4'-4"	9'-0"	4'-0"
	8	18	4'-4"	10'-6"	4'-0"
	10	18	4'-4"	11'-6"	4'-0"
	12	18	4'-4"	12'-4"	4'-0"
38-48	≤6	18	5'-4"	9'-6"	5'-0"
	8	18	5'-4"	11'-0"	5'-0"
	10	18	5'-4"	12'-0"	5'-0"
	12	18	5'-4"	12'-10"	5'-0"
51-56	≤6	18	6'-4"	9'-10"	5'-0"
	8	18	6'-4"	11'-4"	5'-0"
	10	18	6'-4"	12'-4"	5'-0"
	12	18	6'-4"	13'-2"	5'-0"

NOTES:
1. SHALLOW FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED ON THE FOLLOWING PARAMETERS:
   ALLOWABLE SOIL BEARING CAPACITY = 2000 PSF
   CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
   GRADE 60 REINFORCING STEEL
   MAXIMUM STREAM VELOCITY = 10 FT/SEC
   MAXIMUM SUPPORT HEIGHT (H) = 12'-0"
   IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, THE FOUNDATION DESIGN SHALL BE REVIEWED BY THE ENGINEER.
2. IF SUBGRADE AT LOCATION OF SUPPORTS IS DEEMED UNABLE TO WITHSTAND 2000 PSF BEARING PRESSURE, A PILE SUPPORTED FOUNDATION SHALL BE UTILIZED AS PER DRAWING S-15.
3. IF BEDROCK IS ENCOUNTERED WHICH WILL PREVENT 3-FEET MINIMUM COVER OVER FOOTING, DOWELS SHALL BE DRILLED INTO BEDROCK PRIOR TO PLACING FOUNDATION. SEE DRAWING S-17.
4. TWELVE-INCH AND FOURTEEN-INCH THICK PIERS AND FOOTINGS SHALL BE REINFORCED WITH #5 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. EIGHTEEN-INCH WIDE PIERS AND FOOTINGS SHALL BE REINFORCED WITH #7 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE.
5. EIGHTEEN-INCH THICK PIERS SHALL REQUIRE TWO STRAPS OVER THE PIPE INSTEAD OF ONE (AS SHOWN).
6. WHEN CONCRETE SUPPORTS ARE REQUIRED TO BE LOCATED WITHIN A STREAM AND ARE NOT COVERED WITH BACKFILL, SEE DRAWING S-19 FOR MODIFICATIONS TO UPSTREAM FACE OF SUPPORT.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
CONCRETE PIER DETAIL
DWG. NO. S-14 | REVISIONS D.H.L. | DATE 6/16/08

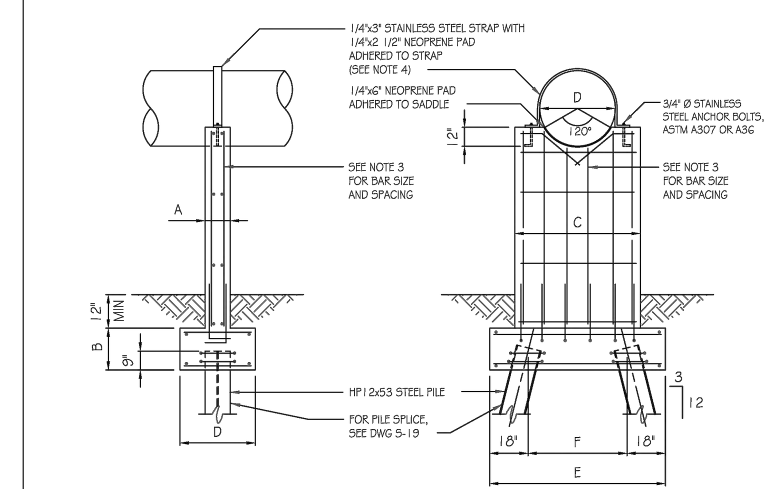


WIDTH OF PILE CAP		
CASING PIPE DIAMETER (IN.)	TOTAL WIDTH "A" (FT.)	PILE SPACING "B" (FT.)
≤ 36	6'-0"	3'-0"
38-42	6'-6"	3'-6"
45-51	7'-3"	4'-3"
54-60	8'-0"	5'-0"

NOTES:
1. PILE SUPPORTED FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED UPON THE FOLLOWING PARAMETERS:
   MINIMUM CAPACITY OF HP12x53 PILE = 30 TONS
   CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
   GRADE 60 REINFORCING STEEL
   MAXIMUM STREAM VELOCITY = 10 FT/SEC
   IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, FOUNDATION DESIGN SHALL BE REVIEWED BY THE PROJECT ENGINEER.
2. LENGTH OF PILES SHALL BE AS REQUIRED TO DEVELOP 30 TON CAPACITY BY EITHER END BEARING, FRICTION OR A COMBINATION OF END BEARING AND FRICTION. AS A MINIMUM, PILES SHALL BE DRIVEN AT LEAST 15 FEET INTO UNDISTURBED SOIL.

**3. ANCHOR BOLTS AND STRAPS SHALL BE STAINLESS STEEL.

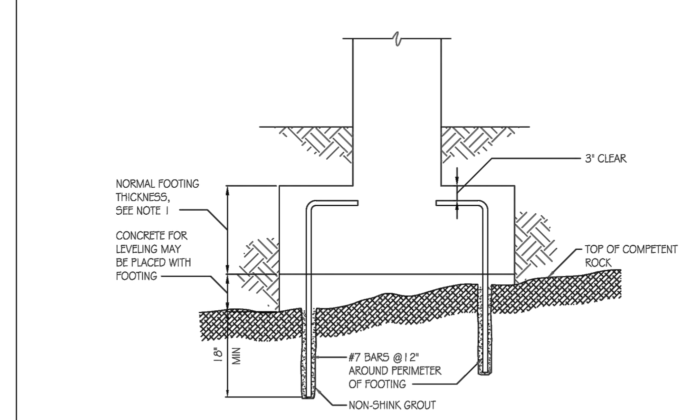
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
PILE CAP DETAIL
DWG. NO. S-15 | REVISIONS D.H.L. | DATE 6/16/08

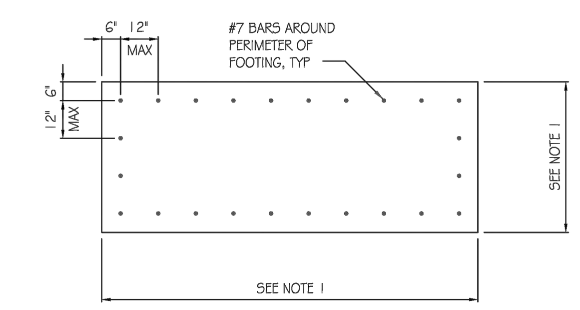


NOTES:
1. PILE SUPPORTED PIER FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED ON THE FOLLOWING PARAMETERS:
   MINIMUM CAPACITY OF HP12x53 PILE = 30 TONS
   CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
   GRADE 60 REINFORCING STEEL
   MAXIMUM STREAM VELOCITY = 10 FT/SEC
   IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, THE FOUNDATION DESIGN SHALL BE REVIEWED BY THE ENGINEER.
2. LENGTH OF PILES SHALL BE AS REQUIRED TO DEVELOP 30 TON CAPACITY BY EITHER END BEARING, FRICTION OR A COMBINATION OF END BEARING AND FRICTION. AS A MINIMUM, PILES SHALL BE DRIVEN AT LEAST 15 FEET INTO UNDISTURBED SOIL.
3. TWELVE-INCH AND FOURTEEN-INCH WIDE PIERS SHALL BE REINFORCED WITH #5 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. EIGHTEEN-INCH WIDE PIERS SHALL BE REINFORCED WITH #7 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. FOOTINGS SHALL BE REINFORCED TYPICALLY TO PIERS.
4. EIGHTEEN-INCH WIDE PIERS SHALL REQUIRE TWO STRAPS OVER THE PIPE INSTEAD OF ONE (AS SHOWN).
5. WHEN CONCRETE SUPPORTS ARE REQUIRED TO BE LOCATED WITHIN A STREAM AND ARE NOT COVERED WITH BACKFILL, SEE DRAWING S-19 FOR MODIFICATIONS TO UPSTREAM FACE OF SUPPORT.

CASING PIPE DIA. "D" (IN.)	PIER THICKNESS "A" (IN.)	FOOTING THICKNESS "B" (IN.)	PIER WIDTH "C" (FT.)	FOOTING WIDTH "D" (FT.)	FOOTING LENGTH "E" (FT.)	PILE SPACING "F" (FT.)
6-12	12	20	2'-4"	3'-0"	6'-0"	3'-0"
14-20	12	20	3'-0"	3'-0"	8'-0"	5'-0"
22-28	18	26	3'-8"	4'-0"	8'-9"	5'-9"
30-36	18	26	4'-4"	4'-0"	9'-0"	6'-0"
38-48	18	26	5'-4"	5'-0"	9'-6"	6'-6"
51-60	18	26	6'-4"	5'-0"	9'-10"	6'-10"

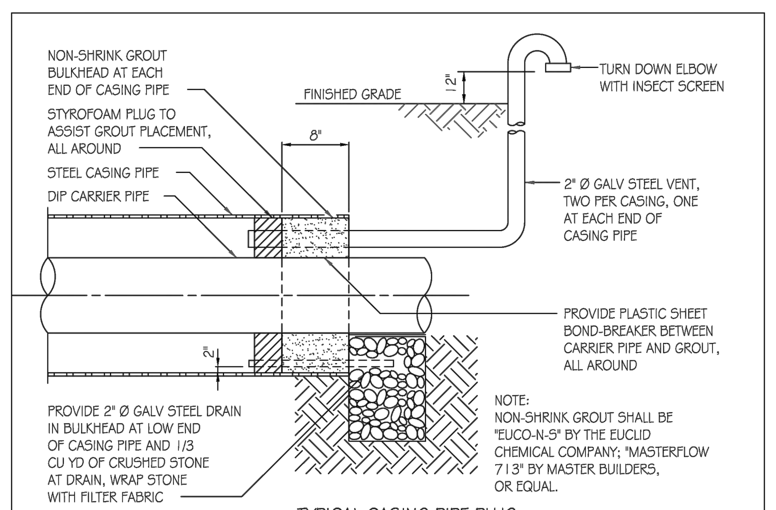
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
PILE SUPPORTED PIER DETAIL
DWG. NO. S-16 | REVISIONS D.H.L. | DATE 6/16/08



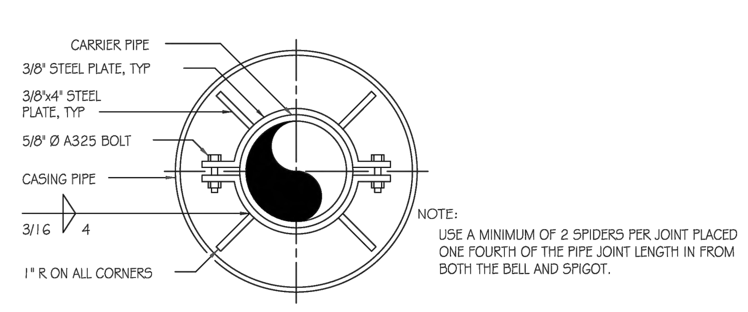


NOTES:
1. GEOMETRY OF FOOTING SHALL MATCH GEOMETRY OF CONCRETE PIERS WITH HEIGHT OF 6 FEET OR LESS AS PER DRAWING S-14.
2. NON-SHRINK GROUT SHALL BE "EUCO-N-S" BY THE EUCLID CHEMICAL COMPANY; "MASTERFLOW 713" BY MASTER BULDERS, OR EQUAL.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
CONCRETE PIER ON BEDROCK
DWG. NO. S-17

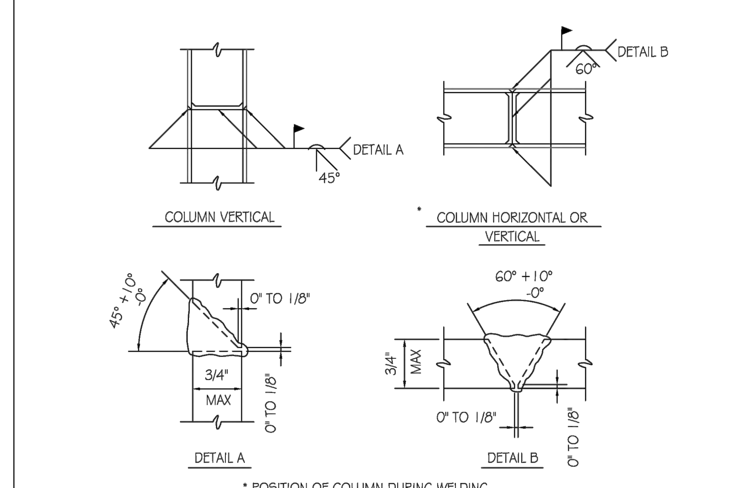


TYPICAL CASING PIPE PLUG

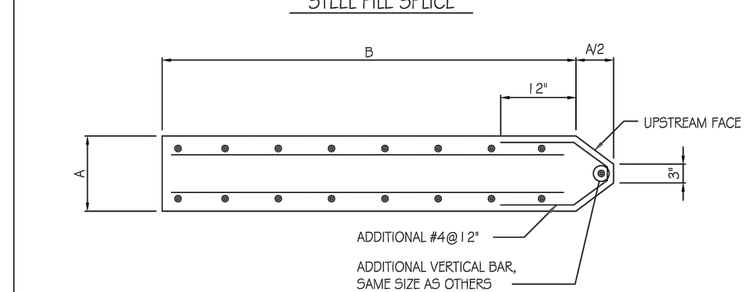


PIPE ALIGNMENT GUIDE

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
CASING PIPE DETAILS
DWG. NO. S-18 | REVISIONS A.B.B., D.H.L. | DATE 4-16-04, 6-18-08

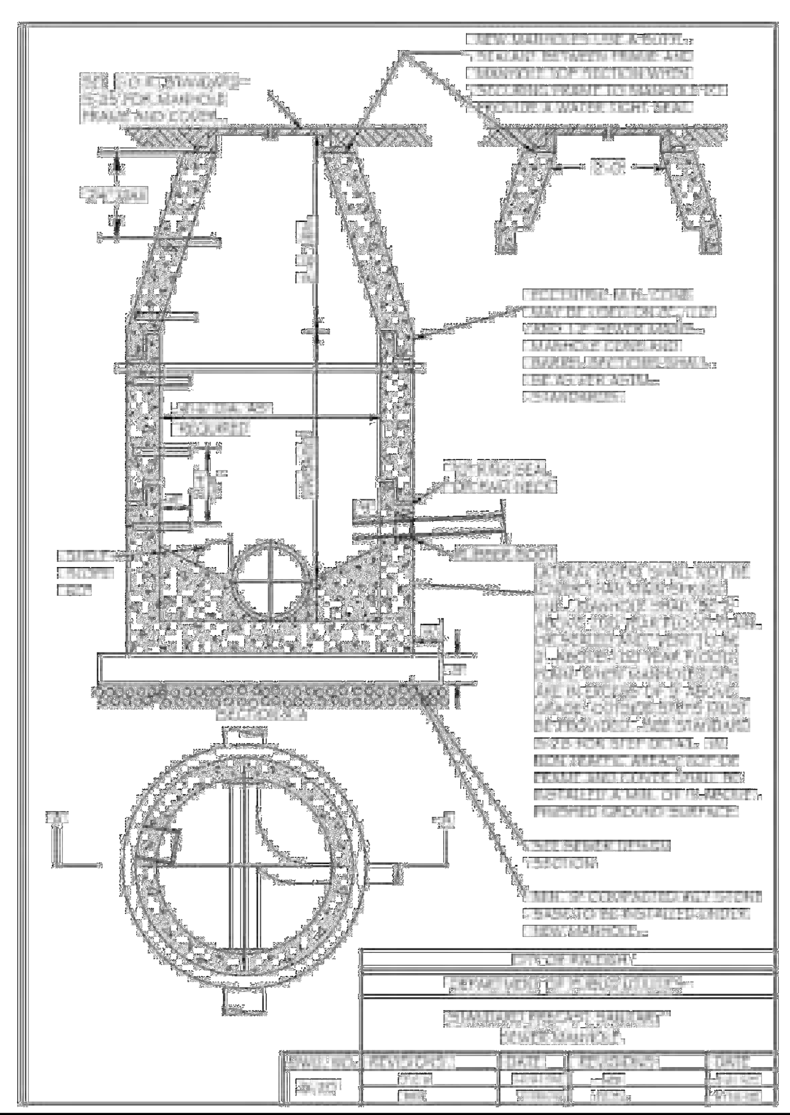


STEEL PILE SPLICE



PLAN - CONCRETE SUPPORT NOSING
(WHEN EXPOSED TO STREAM FLOW)

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
CONCRETE SUPPORT DETAILS
DWG. NO. S-19 | REVISIONS D.H.L. | DATE 6/16/08



CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD PRECAST SANITARY SEWER MANHOLE

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ___________________ Date: _____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ___________________ Date: _____________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS
6	07. 26. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

SEWER DETAILS
C8.05

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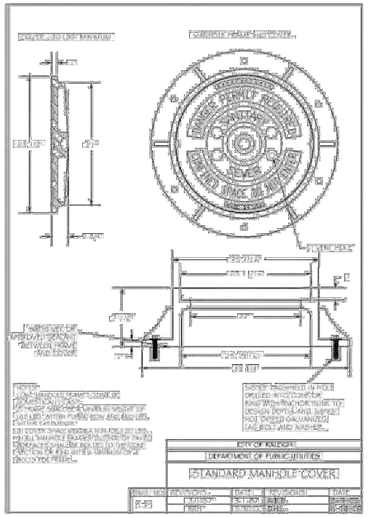

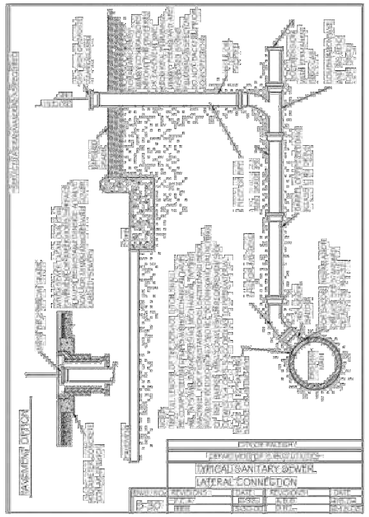

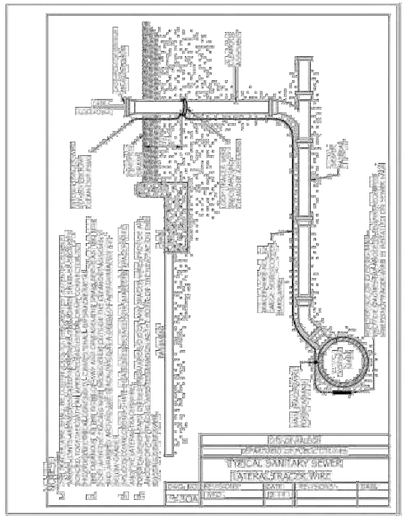

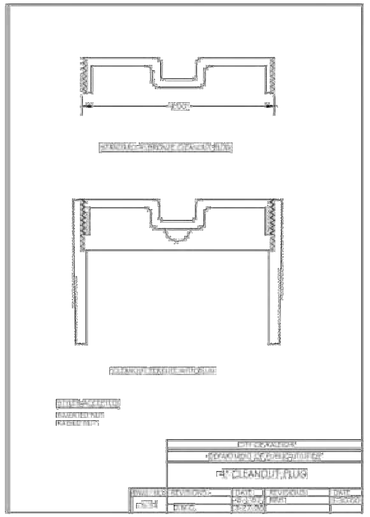

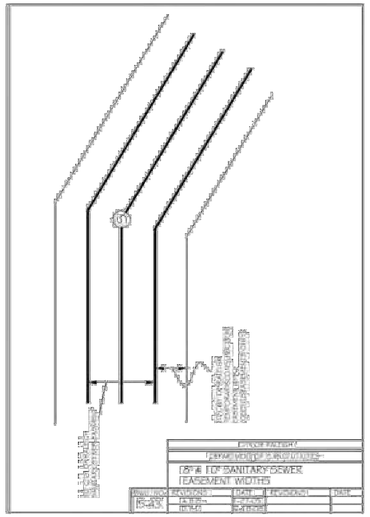

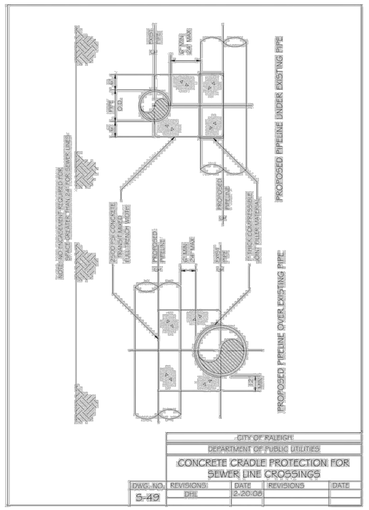

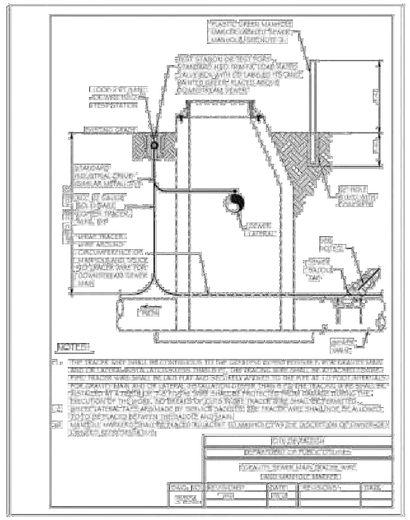

ALL MATERIAL & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH ALL CITY OF RALEIGH & TOWN OF KNIGHTDALE DESIGN STANDARDS, DETAILS, AND SPECIFICATIONS

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 049483 ENGINEER RYAN K. BARKER
NOT FOR CONSTRUCTION

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-D1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

SEWER DETAILS

C8.06

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STORMWATER CONTROL MEASURE 'M' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.

2. THE PROJECT WILL MEET ALL OF THE REQUIREMENTS RELATIVE TO BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE LAND DEVELOPMENT ORDINANCE. (CHAPTER 6, PART 4, UDO)

3. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.

4. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.

5. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:
   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.
   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE.
   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE BELOW NOTE 13.1-13.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.
   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, THE CONTRACTOR SHALL CONSTRUCT THE INTERIOR GRADING SHOWN ON THIS SHEET.
   E. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER CONTROL MEASURE PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
   F. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN.

6. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.

7. ON-SITE GEOTECHNICAL ENGINEER TO DETERMINE IF IN-SITU SOILS ENCOUNTERED WOULD MAINTAIN A STORMWATER CONTROL MEASURE PERMANENT POOL AT DESIGN ELEVATION. IF HIGHLY PERMEABLE SOILS ARE ENCOUNTERED THAT WOULD NOT MAINTAIN THE PERMANENT POOL ELEVATION AS DESIGNED, A CLAY LINER MAY BE REQUIRED TO MAINTAIN A PERMANENT POOL OF WATER IN THE STORMWATER CONTROL MEASURE. FINAL DETERMINATION IF A CLAY LINER IS NEEDED SHALL BE THE RESPONSIBILITY OF THE ON-SITE GEOTECHNICAL ENGINEER. UPON DETERMINATION OF HIGHLY PERMEABLE SOIL CONDITIONS, ON-SITE GEOTECHNICAL ENGINEER WILL INFORM THE DESIGN ENGINEER AND RECOMMEND LINER SPECIFICATIONS.

8. IT IS ANTICIPATED THAT DEWATERING WILL BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).

9. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THE WET POND PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE WET POND AS DIRECTED BY A LANDSCAPE PROFESSIONAL.

10. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT AND AQUATIC SHELF. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT AND AQUATIC SHELF.

11. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THIS FACILITY. CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION. PLEASE NOTE THAT NO TREES/SHRUBS OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS).

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 24"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4.

2. THE STRUCTURAL DESIGN FOR THE 4' X 4' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.

3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.01 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.

4. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.02 THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 7,587 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 13,632 LBS.

5. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT AND INSTALL GALVANIZED STEEL STRAPS PER DETAIL ON SHEET C9.01.

6. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.

7. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:

   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.

8. GEOTEXTILE FABRIC FOR THE 24"Ø RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).

9. STORMWATER CONTROL MEASURE EMERGENCY DRAW DOWN IS VIA AN 6"Ø PLUG VALVE. THE VALVE SHALL BE A M&H STYLE 1820 ECCENTRIC VALVE OR APPROVED EQUAL. THIS VALVE IS IN ACCORDANCE WITH AWWA C-517, AND SHALL BE OPERABLE FROM TOP OF OUTLET STRUCTURE VIA A HAND WHEEL (SEE DETAIL SHEET C9.24). THE CONTRACTOR SHALL PROVIDE A REMOVABLE VALVE WRENCH WITH A HAND WHEEL ON TOP FOR OPERATION OF THE 6"Ø PLUG VALVE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

CONSTRUCTION SEQUENCE

1. PRIOR TO CONSTRUCTION, THE OWNER SHALL OBTAIN A LAND DISTURBING (GRADING) PERMIT AND AN "APPROVAL TO CONSTRUCT" FROM THE TOWN OF KNIGHTDALE AND ALL OTHER NECESSARY PERMITS FROM APPLICABLE AGENCIES (E.G. 404 / 401 PERMITS)

2. INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES PER THE APPROVED SEDIMENT AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL MAINTAIN ALL APPROVED SEDIMENT AND EROSION CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT, AS REQUIRED. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE EROSION CONTROL INSPECTOR, AS REQUIRED BY GOVERNING AGENCIES, PRIOR TO ANY CLEARING.

3. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.

4. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 24"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.

5. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.

6. PRIOR TO INSTALLATION, SUBGRADE CONDITIONS ALONG THE SPILLWAY PIPES SHOULD BE EVALUATED BY THE ON-SITE GEOTECHNICAL ENGINEER TO ASSESS WHETHER SUITABLE BEARING CONDITIONS EXIST AT THE SUBGRADE LEVEL. SHOULD SOFT OR OTHERWISE UNSUITABLE CONDITIONS BE ENCOUNTERED ALONG THE PIPE ALIGNMENTS, THESE MATERIALS SHOULD BE UNDERCUT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE UNDERCUT MATERIALS SHALL BE REPLACED WITH ADEQUATELY COMPACTED STRUCTURAL FILL, LEAN CONCRETE OR FLOWABLE FILL AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. IN ORDER TO HELP PROTECT THE SOIL SUBGRADE FROM DETERIORATION (DUE TO EXPOSURE, RAINFALL, SEEPAGE, AND RUNOFF) BEFORE THE CRADLE CAN BE POURED, IT IS STRONGLY RECOMMENDED THAT A 3" TO 4" THICK CONCRETE MUD MAT BE POURED OVER THE SUBGRADE ONCE IT IS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE MUD MAT WILL ALSO PROVIDE BEARING FOR THE BLOCKS THAT TEMPORARILY SUPPORT THE SPILLWAY PIPE UNTIL THE CRADLE CAN BE POURED. THE METHOD OF BLOCK SUPPORT FOR THE PIPE PROPOSED BY THE CONTRACTOR SHOULD BE SUBMITTED TO THE JOHN R. McADAMS COMPANY FOR REVIEW.

8. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.

9. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.02). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:

   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.

   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS

10. INSTALL RISER / BARREL ASSEMBLY, ALONG WITH THE EMERGENCY DRAIN SYSTEM. INSTALL 24" RCP OUTLET BARREL SPILLWAY FILTER FROM THE DETAILS SHOWN ON SHEET C9.02.

11. CONSTRUCT EMBANKMENT PER SPECIFICATIONS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS" AND REQUIREMENTS OF THE ON-SITE GEOTECHNICAL ENGINEER. ALL CHARACTERISTICS OF THE EMBANKMENT FILL MATERIAL SHALL MEET THE STANDARDS SET FORTH IN "BERM AND SOIL COMPACTION SPECIFICATIONS", INCLUDING COMPACTION AND MOISTURE REQUIREMENTS. IF NECESSARY TO ACHIEVE PROPER COMPACTION, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO PROPER FINAL GRADE. ANY HAND COMPACTION ACTIVITIES AROUND SPILLWAY OR DRAIN STRUCTURES SHALL BE CONDUCTED IN 4-INCH LOOSE LIFTS AND BE TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT. ALL COMPACTION AND MOISTURE TESTING SHALL BE CARRIED OUT AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER AND AS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS".

12. UPON COMPLETION OF DAM EMBANKMENT, PROMPTLY STABILIZE AND SEED DAM EMBANKMENT PER SEEDING SCHEDULE. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER THE PERMANENT SEEDING SCHEDULE FOUND ON SHEET C9.03.

13. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.

   13.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
   13.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
   13.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
   13.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
   13.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
   13.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.

14. SCHEDULE A FINAL AS-BUILT INSPECTION AND AS-BUILT SURVEY WITH THE ENGINEER AND SURVEYOR. AN AS-BUILT INSPECTION AND SURVEY SHALL BE SCHEDULED BEFORE IMPOUNDING WATER IN THE FACILITY AND A MINIMUM OF 60 DAYS PRIOR TO THE ANTICIPATED DATE OF CERTIFICATION APPROVAL. ANY COMMENTS OR DEFICIENCIES IN THE SCM CONSTRUCTION MUST BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND OWNER BEFORE CERTIFICATION SHALL BE GRANTED.

BERM AND SOIL COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.

2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.

3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.

4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.

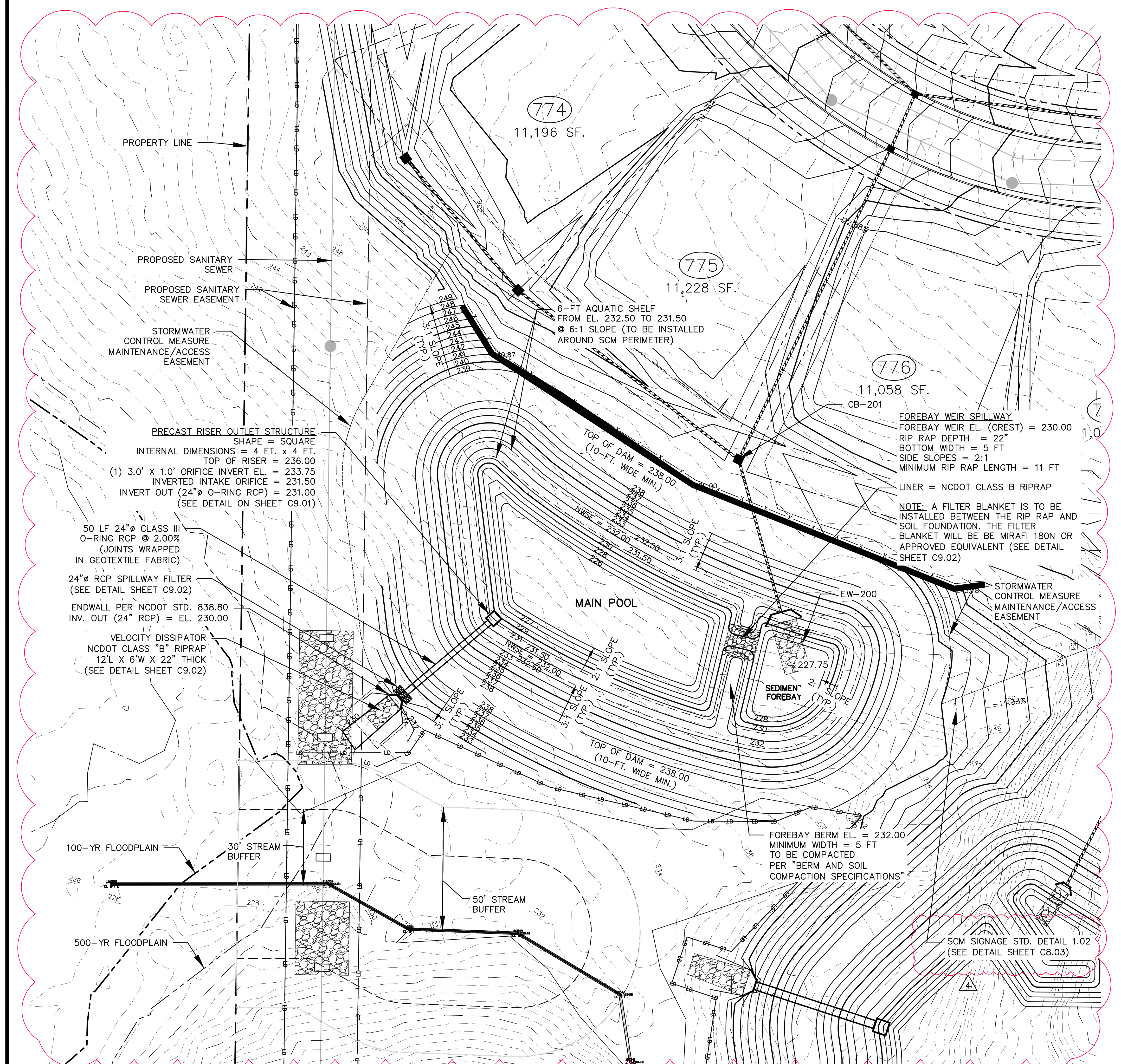
5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.

6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL OR AS RECOMMENDED BY THE ON-SITE GEOTECHNICAL ENGINEER.

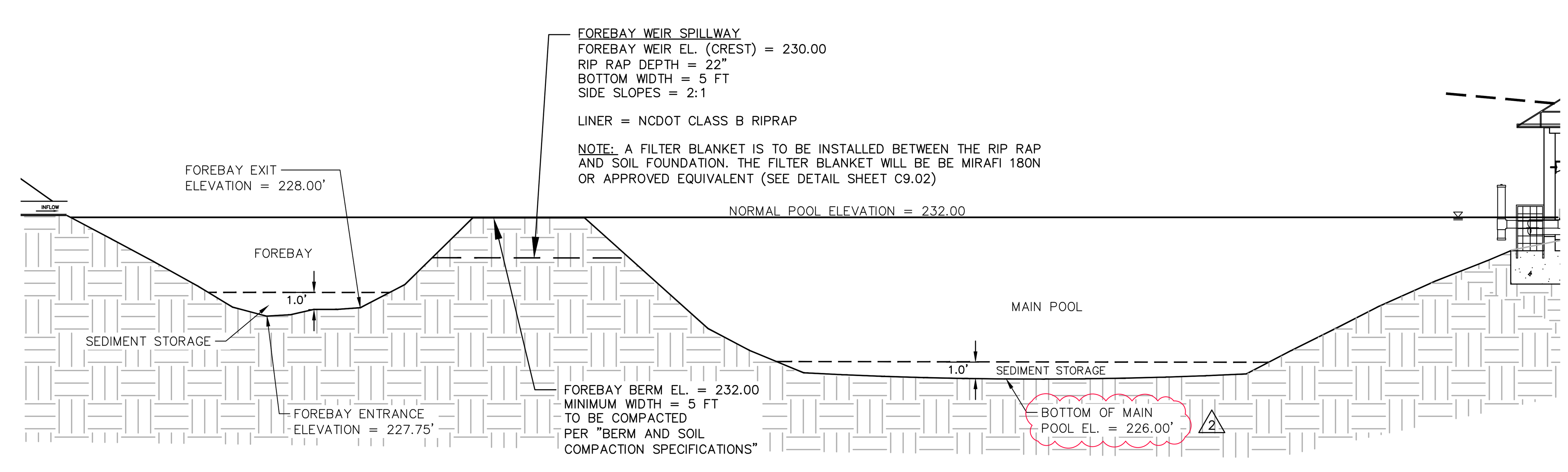
7. TESTING WILL BE REQUIRED ALONG THE 24"Ø RCP OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL OR AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

STATEMENT OF RESPONSIBILITY

1. ALL REQUIRED MAINTENANCE AND INSPECTIONS OF THE STORMWATER CONTROL MEASURE SHALL BE THE RESPONSIBILITY OF THE OWNER, PER THE EXECUTED OPERATION AND MAINTENANCE AGREEMENT FOR THIS FACILITY.



STORMWATER CONTROL MEASURE 'M PLAN VIEW
1" = 30'



FOREBAY AND MAIN POOL CROSS-SECTION (TYPICAL)
N.T.S

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ________________ Date: ____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ________________ Date: ____________
Administrator

FINAL DRAWING

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048334 ENGINEER JEREMY K. WOOSTER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

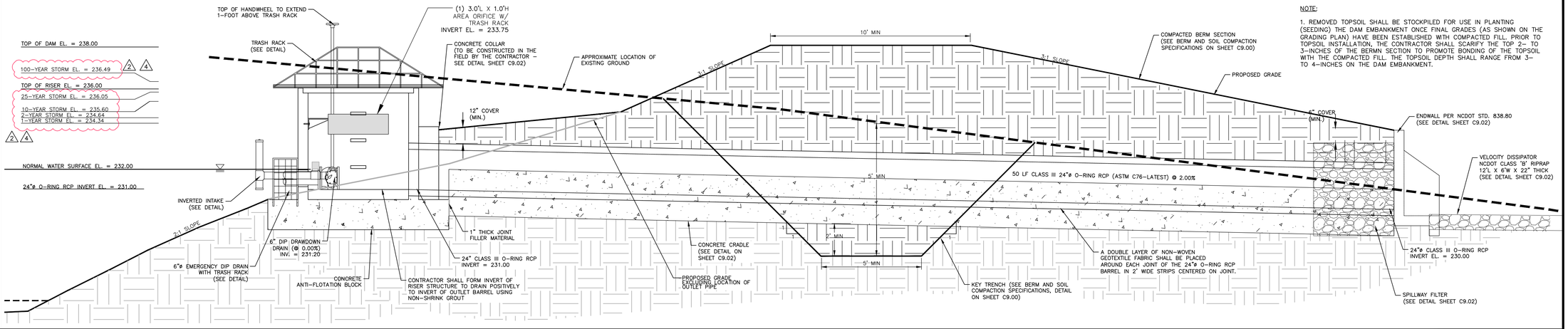
PROJECT NO.	2020110062
FILENAME	2020110062-SW-M
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE "M" PLAN VIEW

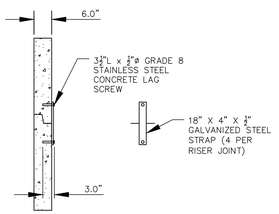
C9.00

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-M.dwg, 7/3/2024 2:54:33 PM, Zach Lee



NOTE:

1. REMOVED TOPSOIL SHALL BE STOCKPILED FOR USE IN PLANTING (SEEDING) THE DAM EMBANKMENT ONCE FINAL GRADES (AS SHOWN ON THE GRADING PLAN) HAVE BEEN ESTABLISHED WITH COMPACTED FILL. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2– TO 3–INCHES OF THE BERMN SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3– TO 4–INCHES ON THE DAM EMBANKMENT.



RISER JOINT CONNECTION DETAIL

N.T.S.

NOTES:

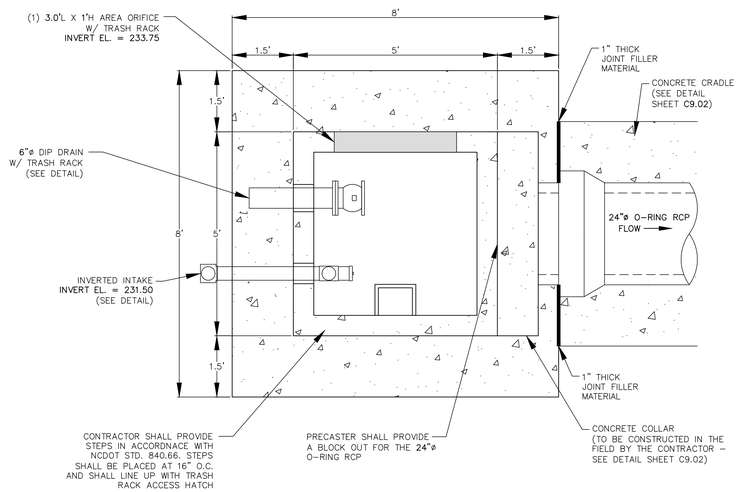
1. CONCRETE ANTI-FLOTATION BLOCK TO BE PROVIDED WITH MINIMUM TEMPERATURE AND SHRINKAGE STEEL REINFORCEMENT.

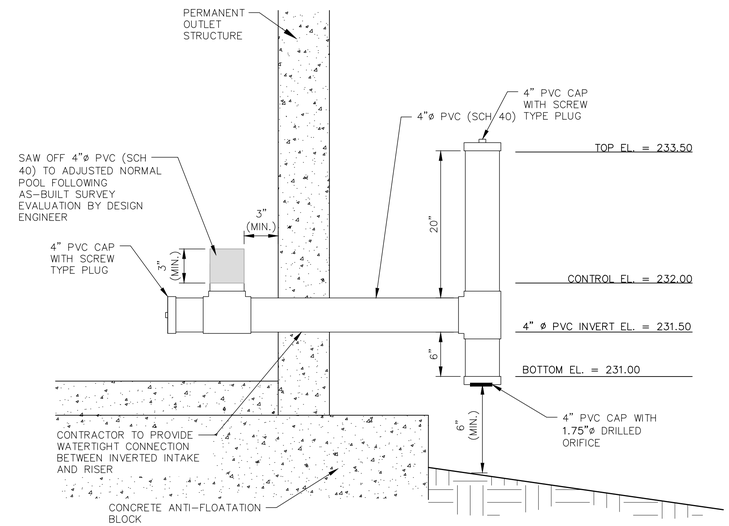
2. TRASH RACKS NOT SHOWN FOR CLARITY.

3. THE NUMBER OF GUIDES FOR THE VALVE STEM SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THE VALVE STEM MUST BE OPERABLE FROM THE TOP OF THE RISER VIA THE HANDWHEEL WITH AN INSIGNIFICANT AMOUNT OF PLAY IN THE VALVE STEM.

4. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

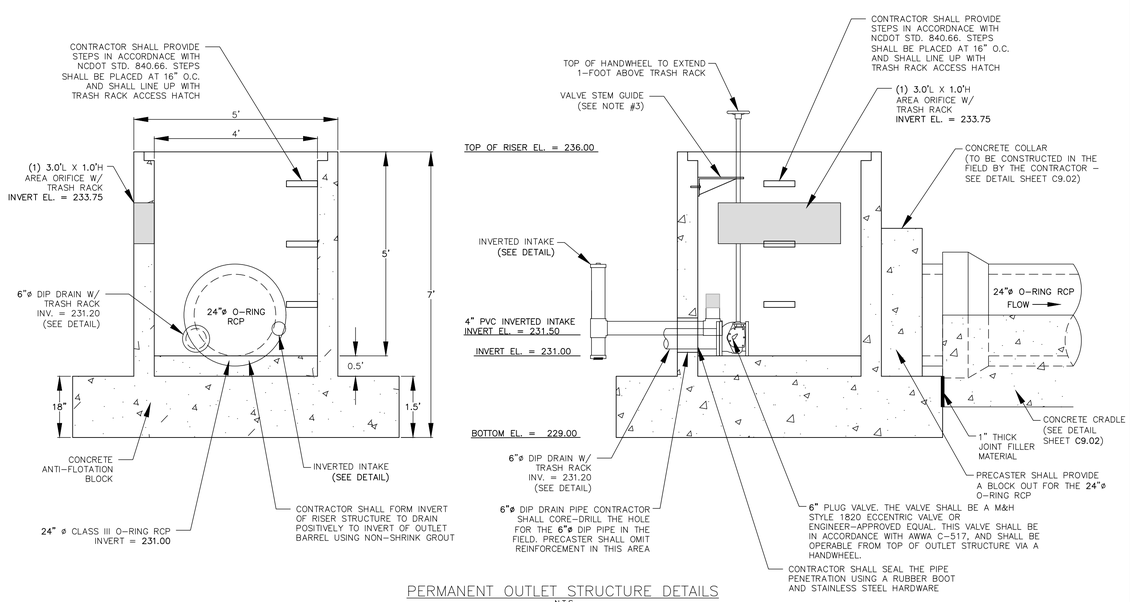
5. FIRST JOINT SHALL BE IN LINE WITH THE EDGE OF THE ANTI-FLOAT BLOCK.





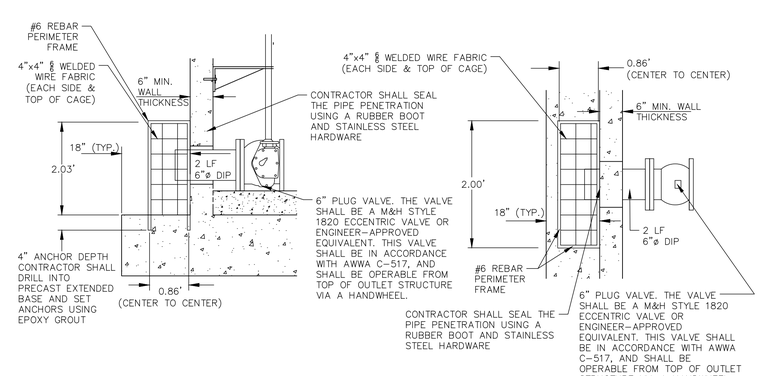
INVERTED INTAKE DETAIL (RISER)

N.T.S.



PERMANENT OUTLET STRUCTURE DETAILS

N.T.S.



6"ø EMERGENCY DIP DRAIN TRASH RACK DETAILS

N.T.S.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

FINAL DRAWING

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048394 JEREMY K. WOOSTER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-M
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'M' DETAILS

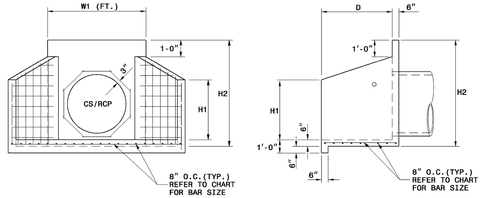
C9.01

M:\Projects\S\C\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-M.dwg, 7/3/2024 2:56:42 PM, Zach Lee

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

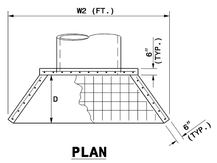
7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW



ELEVATION

SIDE



PLAN

NOTES:

- THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.21, 838.27, 838.33 AND 838.39.
- INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
- USE 4000 PSI CONCRETE.
- PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
- ALL ELEMENTS PRECAST TO MEET ASTM C913.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
- CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 8" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.

ENDWALL DIMENSIONS

FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

SHEET 1 OF 1
838.80

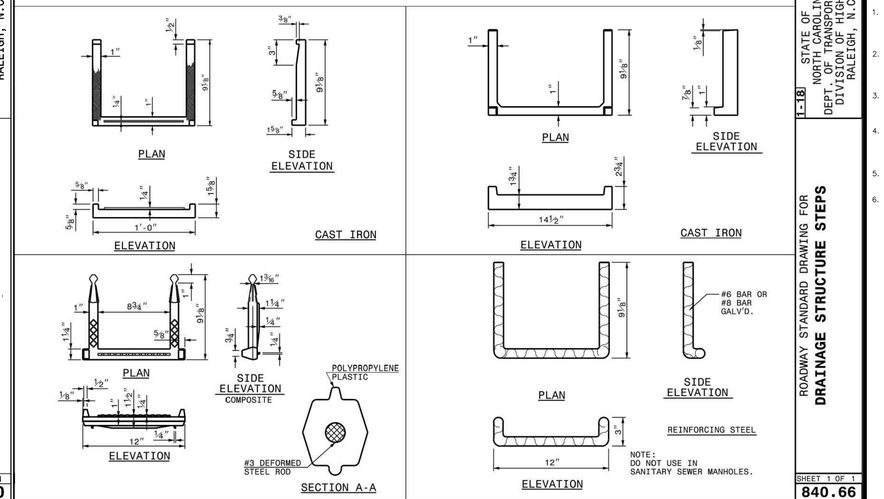
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80

NOTES:
INSTALL ALL STEPS PROTRUDING 4" FROM INSIDE FACE OF STRUCTURE WALL.
STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS OF THE PROPOSED STEPS AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.



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

1-18

ROADWAY STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

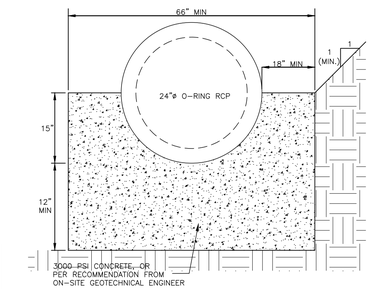
SHEET 1 OF 1
840.66

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

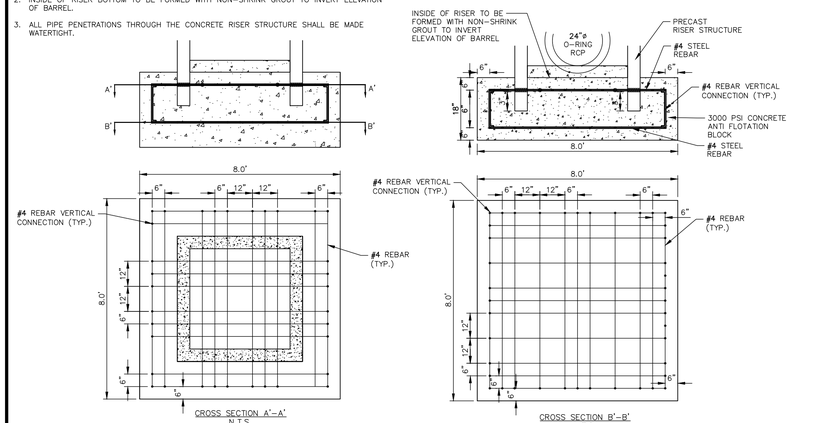
1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE **24"ø** O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON 24"ø RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



24" CONCRETE CRADLE DETAIL
N.T.S.

NOTES:

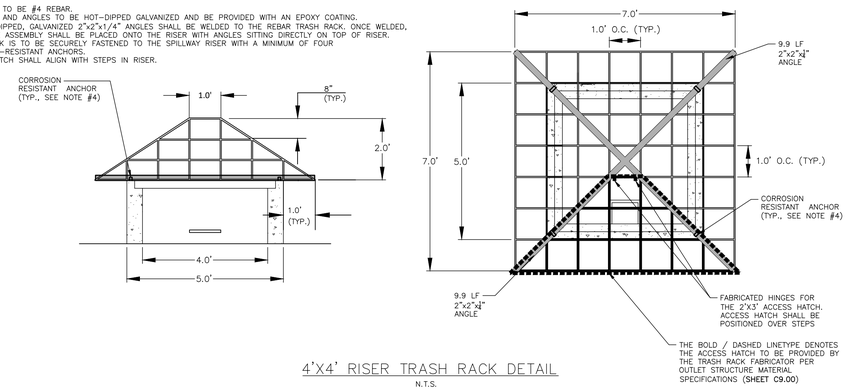
1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.



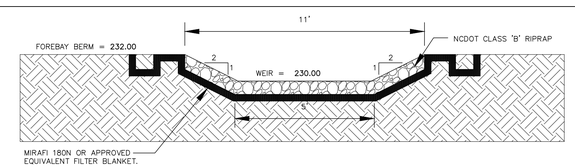
RISER/ANTI-FLOTATION BLOCK CONNECTION
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. ALL REBAR AND ANGLES TO BE HOT-DIPPED GALVANIZED AND BE PROVIDED WITH AN EPOXY COATING.
3. THE HOT-DIPPED, GALVANIZED 2"x2"x1/4" ANGLES SHALL BE WELDED TO THE REBAR TRASH RACK. ONCE WELDED, THE ENTIRE ASSEMBLY SHALL BE PLACED ONTO THE RISER WITH ANGLES SITTING DIRECTLY ON TOP OF RISER.
4. TRASH RACK IS TO BE SECURELY FASTENED TO THE SPILLWAY RISER WITH A MINIMUM OF FOUR CORROSION-RESISTANT ANCHORS.
5. ACCESS HATCH SHALL ALIGN WITH STEPS IN RISER.



4'X4' RISER TRASH RACK DETAIL
N.T.S.



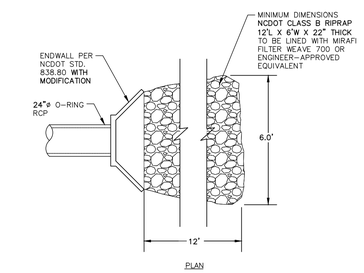
FOREBAY WEIR SPILLWAY CROSS-SECTION
N.T.S.

NOTES:

1. A FILTER BLANKET IS TO BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION. THE FILTER BLANKET WILL CONSIST OF A MINIMUM 4" THICK LAYER OF STONE (NCDOT #57) UNDERLAIN WITH MIRAFI FILTER WEAVE 700 OR ENGINEER-APPROVED EQUIVALENT.

ADDITIONAL NOTE TO INCLUDE IF OUTLETTING TO A CHANNEL:

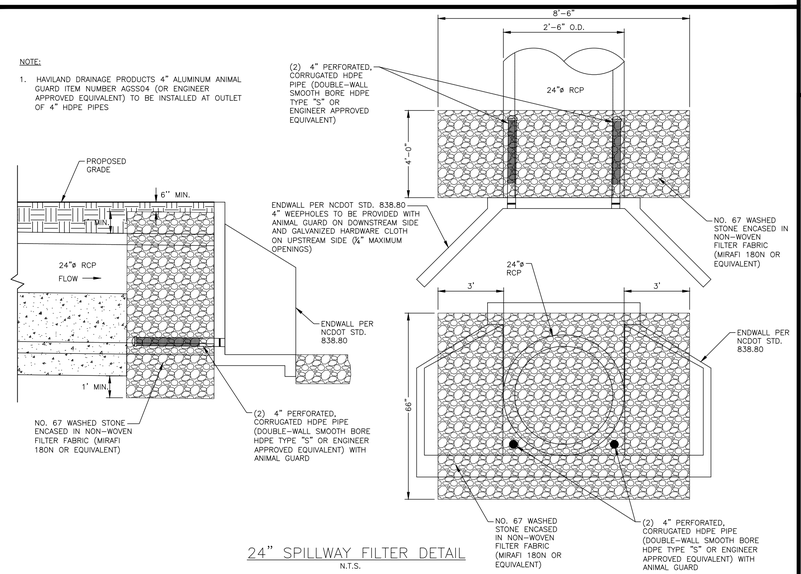
1. RIPRAP TO EXTEND TO TOP OF CHANNEL WITH 2:1 SIDE SLOPES THROUGHOUT THE EXTENT OF CHANNEL.



PLAN

NOTE:

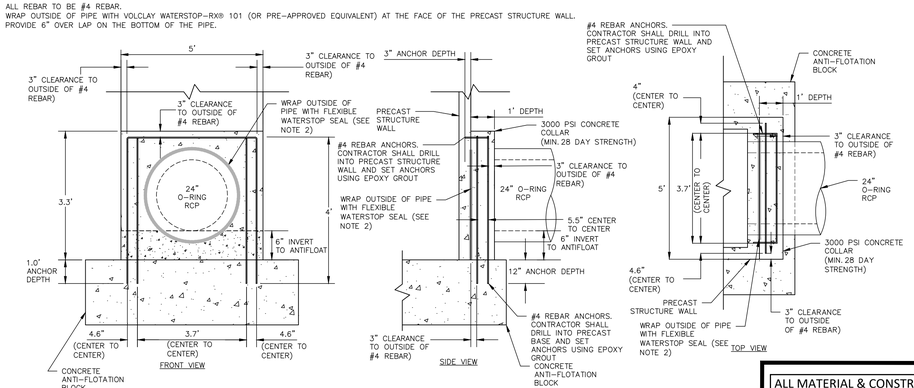
1. HAVILAND DRAINAGE PRODUCTS 4" ALUMINUM ANIMAL GUARD ITEM NUMBER AGSS04 (OR ENGINEER APPROVED EQUIVALENT) TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES



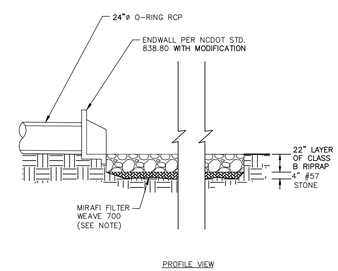
24" SPILLWAY FILTER DETAIL
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.



24"ø CONCRETE COLLAR DETAIL
N.T.S.



OUTLET BARREL VELOCITY DISSIPATER
N.T.S.

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NORTH CAROLINA PROFESSIONAL SEAL 048314 ENGINEER JEREMY K. WOOSTER
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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-M
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'M' DETAILS

C9.02

M:\Projects\SU\C\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-M.dwg, 7/3/2024 2:56:44 PM, Zach Lee

STORMWATER CONTROL MEASURE 'M' LANDSCAPE SPECIFICATIONS

PLANT SCHEDULE SCM M

GROUND COVERS	CODE	QTY	COMMON NAME	BOTANICAL NAME	CONT	SPACING	REMARKS
	AISM	121	Swamp Milkweed	Asclepias incarnata	4" pot	24" o.c.	SHALLOW WATER
	CTQS	128	Quill Sedge	Carex tenera	4" pot	24" o.c.	SHALLOW LAND
	CA	129	Swamp Lily	Crinum americanum	10 gal	24" o.c.	SHALLOW LAND
	LCCF	94	Cardinal Flower	Lobelia cardinalis	4" pot	24" o.c.	SHALLOW WATER
	RWWS	135	White-topped Sedge	Rhynchospora colorata	4" pot	24" o.c.	SHALLOW LAND
	STSB	97	Softstem Bulrush	Schoenoplectus tabernaemontani	4" pot	24" o.c.	SHALLOW WATER

EMBANKMENTS

HYBRID BERMUDA

SEEDBED PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND AQUATIC SHELF. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SEEDBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDED AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
9. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
	KOBE LESPEDEZA	50 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

NOTE: USE THE TEMPORARY SEEDING SCHEDULE ONLY WHEN DATE IS NOT CORRECT TO USE THE PERMANENT SEEDING SCHEDULE.

PERMANENT SEEDING SCHEDULE (DAM EMBANKMENTS)

SEEDING DATE	SEEDING MIXTURE OPTIONS (CHOOSE ONE)	APPLICATION RATE
MARCH 1 - JUNE 31	HYBRID BERMUDA GRASS	1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)
SEPT 1 - OCT 31		1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 1000 LB/AC 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR; USE SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

NOTE: PERMANENT SEEDING SCHEDULE IS FOR SLOPES OF THE BASIN AND TOP OF BERM. SEE REQUIRED TOWN OF KINIGHTDALE SCM BASIN REMOVAL SEQUENCE NOTE 13 ON SHEET C9.00 FOR PERMANENT SEEDING CONSTRUCTION SEQUENCE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   - A. CONCRETE CRADLE
   - B. ANTI-SEEP COLLAR
   - C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
- A. SUBRADE OR CONSTRUCTED FOUNDATION
- B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
- C. FILTER MEDIA
- D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

PLANTING INSTRUCTIONS

PLANTING TECHNIQUES
- A. ENSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
- B. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
- C. PLACE PLANTS IN PIT, ENSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
- D. HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
- E. NEWLY PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
- F. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS SHALL BE CUT OFF CLEANLY.
- G. THE DIAMETER OF THE PITS FOR ALL VEGETATIVE STOCK SHALL BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. PLANT PIT WALL SHALL BE SCARIFIED PRIOR TO PLANT INSTALLATION.
- H. SET THE PLANTS UPRIGHT, IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
- I. PLACE THE BACKFILL AROUND THE BASE AND SIDES OF THE ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
- J. BROKEN OR DAMAGED PARTS WILL BE CUT BACK TO UNDAMAGED TISSUE, LEAVING AS MUCH GREEN BASAL TISSUE AS POSSIBLE ABOVE THE ROOTS. IF MORE THAN FIFTY PERCENT (50%) OF THE PLANT IS DAMAGED THEN CONTRACTOR SHALL REPLACE THE PLANT.

CONTAINER STOCK / BARE ROOT
- A. STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
- B. CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
- C. BARE ROOT PLANTS ARE FOR IMMEDIATE PLANTING, OTHERWISE SEE D) BELOW.
- D. IF BARE ROOTS SPECIMENS ARE NOT TO BE PLANTED WITHIN FOUR (4) DAYS, TEMPORARY HOLDING OF BARE ROOT SPECIMENS ARE TO BE COVERED ENTIRELY BY A SUITABLE MEDIUM (ETC. SOIL, SAWDUST, MULCH OR THE LIKE) AND WATERED REGULARLY SO AS TO NOT DRY OUT.

PLANT LOCATIONS
- A. NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE IN PROPOSED CONSTRUCTION.
- B. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.

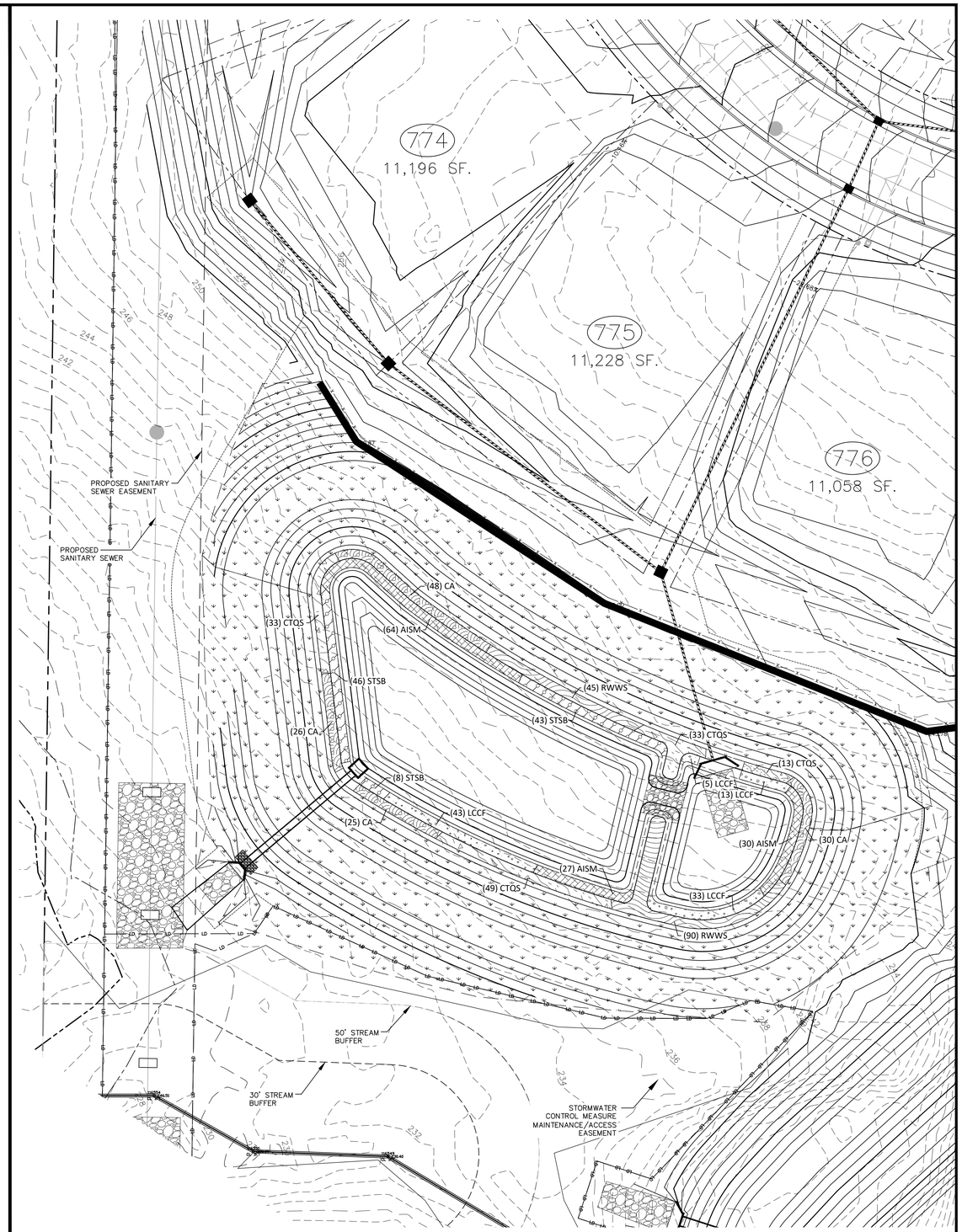
WATER
WATER SHALL BE POTABLE AND SHALL NOT CONTAIN ELEMENTS TOXIC TO PLANT LIFE.

PLANTING SCHEDULE

1. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER MANAGEMENT FACILITY PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
2. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER MANAGEMENT FACILITY PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER MANAGEMENT FACILITY PLANTING PLAN. 90% GERMINATION REQUIRED OF NON-CLUMPING TURF GRASS PRIOR TO FINAL CERTIFICATION.
3. OPTIMAL PLANTING PERIODS RANGE APPROXIMATELY FROM APRIL 15TH THRU JUNE 30TH AND SEPTEMBER 1ST THRU OCTOBER 31ST. FOR FINAL DETERMINATION OF THE SITE'S PLANTING PERIOD, THE CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION.
4. IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PREVENT WILDLIFE FROM DAMAGING OR CONSUMING WETLAND PLANTINGS.

TOWN OF KNIGHTDALE SCM PLANTING NOTES

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. THE VEGETATED SHELF SHALL BE PLANTED WITH A MINIMUM OF THREE DIVERSE SPECIES OF HERBACEOUS, NATIVE VEGETATION AT A MINIMUM DENSITY OF 50 PLANTS PER 200 FEET OF SHELF AREA.
3. CONTRACTOR TO WORK WITH SOILS SCIENTIST TO ENSURE SOILS ARE ADEQUATE TO SUPPORT PROPER ESTABLISHMENT AND GROWTH OF THE AQUATIC PLANTINGS. CONTRACTOR TO AMEND SOILS AND INSTALL SOILS IN PLANT, SHRUB, AND TREE AREAS PER DETAILS, SOIL SPECIFICATIONS. NCDENR SPECIFICATION, AND SOIL SCIENTIST RECOMMENDATIONS.
4. ALL AQUATIC PLANTINGS ARE TO BE INSTALLED DURING THE APPROPRIATE TIME OF YEAR TO ENSURE SURVIVABILITY. (LAST SPRING FROST AND THE FIRST FALL FROST)
5. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
6. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP, THE BASIN MUST BE CLEANED OUT, GRADED, APPROPRIATE AREAS COVERED WITH 4" OF TOPSOIL AS SPECIFIED IN NOTE #2 ABOVE, AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



STORMWATER CONTROL MEASURE 'M' LANDSCAPE PLAN VIEW
1" = 20'

GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

FINAL DRAWING

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713
phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187
www.mcadamsco.com

CLIENT
SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048394 JEREMY K. WOOSTER
NOT VALID WITHOUT ORIGINAL SIGNATURE

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-M
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET
STORMWATER CONTROL MEASURE "M" LANDSCAPE PLAN
C9.03

M:\Projects\SU\C\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-M.dwg, 7/3/2024 2:57:10 PM, Zach Lee

STORMWATER CONTROL MEASURE 'N' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.

2. THE PROJECT WILL MEET ALL OF THE REQUIREMENTS RELATIVE TO BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE LAND DEVELOPMENT ORDINANCE. (CHAPTER 6, PART 4, UDO)

3. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.

4. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.

5. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:
   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.
   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE.
   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE BELOW NOTE 13.1-13.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.
   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, THE CONTRACTOR SHALL CONSTRUCT THE INTERIOR GRADING SHOWN ON THIS SHEET.
   E. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER CONTROL MEASURE PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
   F. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN.

6. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.

7. ON-SITE GEOTECHNICAL ENGINEER TO DETERMINE IF IN-SITU SOILS ENCOUNTERED WOULD MAINTAIN A STORMWATER CONTROL MEASURE PERMANENT POOL AT DESIGN ELEVATION. IF HIGHLY PERMEABLE SOILS ARE ENCOUNTERED THAT WOULD NOT MAINTAIN THE PERMANENT POOL ELEVATION AS DESIGNED, A CLAY LINER MAY BE REQUIRED TO MAINTAIN A PERMANENT POOL OF WATER IN THE STORMWATER CONTROL MEASURE. FINAL DETERMINATION IF A CLAY LINER IS NEEDED SHALL BE THE RESPONSIBILITY OF THE ON-SITE GEOTECHNICAL ENGINEER. UPON DETERMINATION OF HIGHLY PERMEABLE SOIL CONDITIONS, ON-SITE GEOTECHNICAL ENGINEER WILL INFORM THE DESIGN ENGINEER AND RECOMMEND LINER SPECIFICATIONS.

8. IT IS ANTICIPATED THAT DEWATERING WILL BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).

9. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THE WET POND PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE WET POND AS DIRECTED BY A LANDSCAPE PROFESSIONAL.

10. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT AND AQUATIC SHELF. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT AND AQUATIC SHELF.

11. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THIS FACILITY. CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION. PLEASE NOTE THAT NO TREES/SHRUBS OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS).

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 24"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4.

2. THE STRUCTURAL DESIGN FOR THE 4' X 4' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.

3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.05 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.

4. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.06. THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 9,858 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 13,632 LBS.

5. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT AND INSTALL GALVANIZED STEEL STRAPS PER DETAIL ON SHEET C9.05.

6. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.

7. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:

   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.

8. GEOTEXTILE FABRIC FOR THE 24"Ø CLASS III RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).

9. STORMWATER CONTROL MEASURE EMERGENCY DRAW DOWN IS VIA AN 6"Ø PLUG VALVE. THE VALVE SHALL BE A M&H STYLE 1820 ECCENTRIC VALVE OR APPROVED EQUAL. THIS VALVE IS IN ACCORDANCE WITH AWWA C-517, AND SHALL BE OPERABLE FROM TOP OF OUTLET STRUCTURE VIA A HAND WHEEL (SEE DETAIL SHEET C9.05). THE CONTRACTOR SHALL PROVIDE A REMOVABLE VALVE WRENCH WITH A HAND WHEEL ON TOP FOR OPERATION OF THE 6"Ø PLUG VALVE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

CONSTRUCTION SEQUENCE

1. PRIOR TO CONSTRUCTION, THE OWNER SHALL OBTAIN A LAND DISTURBING (GRADING) PERMIT AND AN "APPROVAL TO CONSTRUCT" FROM THE TOWN OF KNIGHTDALE AND ALL OTHER NECESSARY PERMITS FROM APPLICABLE AGENCIES (E.G. 404 / 401 PERMITS)

2. INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES PER THE APPROVED SEDIMENT AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL MAINTAIN ALL APPROVED SEDIMENT AND EROSION CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT, AS REQUIRED. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE EROSION CONTROL INSPECTOR, AS REQUIRED BY GOVERNING AGENCIES, PRIOR TO ANY CLEARING.

3. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.

4. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 24"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.

5. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.

6. PRIOR TO INSTALLATION, SUBGRADE CONDITIONS ALONG THE SPILLWAY PIPES SHOULD BE EVALUATED BY THE ON-SITE GEOTECHNICAL ENGINEER TO ASSESS WHETHER SUITABLE BEARING CONDITIONS EXIST AT THE SUBGRADE LEVEL. SHOULD SOFT OR OTHERWISE UNSUITABLE CONDITIONS BE ENCOUNTERED ALONG THE PIPE ALIGNMENTS, THESE MATERIALS SHOULD BE UNDERCUT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE UNDERCUT MATERIALS SHALL BE REPLACED WITH ADEQUATELY COMPACTED STRUCTURAL FILL, LEAN CONCRETE OR FLOWABLE FILL AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. IN ORDER TO HELP PROTECT THE SOIL SUBGRADE FROM DETERIORATION (DUE TO EXPOSURE, RAINFALL, SEEPAGE, AND RUNOFF) BEFORE THE CRADLE CAN BE POURED, IT IS STRONGLY RECOMMENDED THAT A 3" TO 4" THICK CONCRETE MUD MAT BE POURED OVER THE SUBGRADE ONCE IT IS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE MUD MAT WILL ALSO PROVIDE BEARING FOR THE BLOCKS THAT TEMPORARILY SUPPORT THE SPILLWAY PIPE UNTIL THE CRADLE CAN BE POURED. THE METHOD OF BLOCK SUPPORT FOR THE PIPE PROPOSED BY THE CONTRACTOR SHOULD BE SUBMITTED TO THE JOHN R. McADAMS COMPANY FOR REVIEW.

8. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.

9. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.06). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:

   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.

   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS

10. INSTALL RISER / BARREL ASSEMBLY, ALONG WITH THE EMERGENCY DRAIN SYSTEM. INSTALL 24" RCP OUTLET BARREL SPILLWAY FILTER FROM THE DETAILS SHOWN ON SHEET C9.06.

11. CONSTRUCT EMBANKMENT PER SPECIFICATIONS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS" AND REQUIREMENTS OF THE ON-SITE GEOTECHNICAL ENGINEER. ALL CHARACTERISTICS OF THE EMBANKMENT FILL MATERIAL SHALL MEET THE STANDARDS SET FORTH IN "BERM AND SOIL COMPACTION SPECIFICATIONS", INCLUDING COMPACTION AND MOISTURE REQUIREMENTS. IF NECESSARY TO ACHIEVE PROPER COMPACTION, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO PROPER FINAL GRADE. ANY HAND COMPACTION ACTIVITIES AROUND SPILLWAY OR DRAIN STRUCTURES SHALL BE CONDUCTED IN 4-INCH LOOSE LIFTS AND BE TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT. ALL COMPACTION AND MOISTURE TESTING SHALL BE CARRIED OUT AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER AND AS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS".

12. UPON COMPLETION OF DAM EMBANKMENT, PROMPTLY STABILIZE AND SEED DAM EMBANKMENT PER SEEDING SCHEDULE. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER THE PERMANENT SEEDING SCHEDULE FOUND ON SHEET C9.07.

13. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.

13.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
13.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
13.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
13.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
13.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
13.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.

14. SCHEDULE A FINAL AS-BUILT INSPECTION AND AS-BUILT SURVEY WITH THE ENGINEER AND SURVEYOR. AN AS-BUILT INSPECTION AND SURVEY SHALL BE SCHEDULED BEFORE IMPOUNDING WATER IN THE FACILITY AND A MINIMUM OF 60 DAYS PRIOR TO THE ANTICIPATED DATE OF CERTIFICATION APPROVAL. ANY COMMENTS OR DEFICIENCIES IN THE SCM CONSTRUCTION MUST BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND OWNER BEFORE CERTIFICATION SHALL BE GRANTED.

BERM AND SOIL COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.

2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.

3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.

4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.

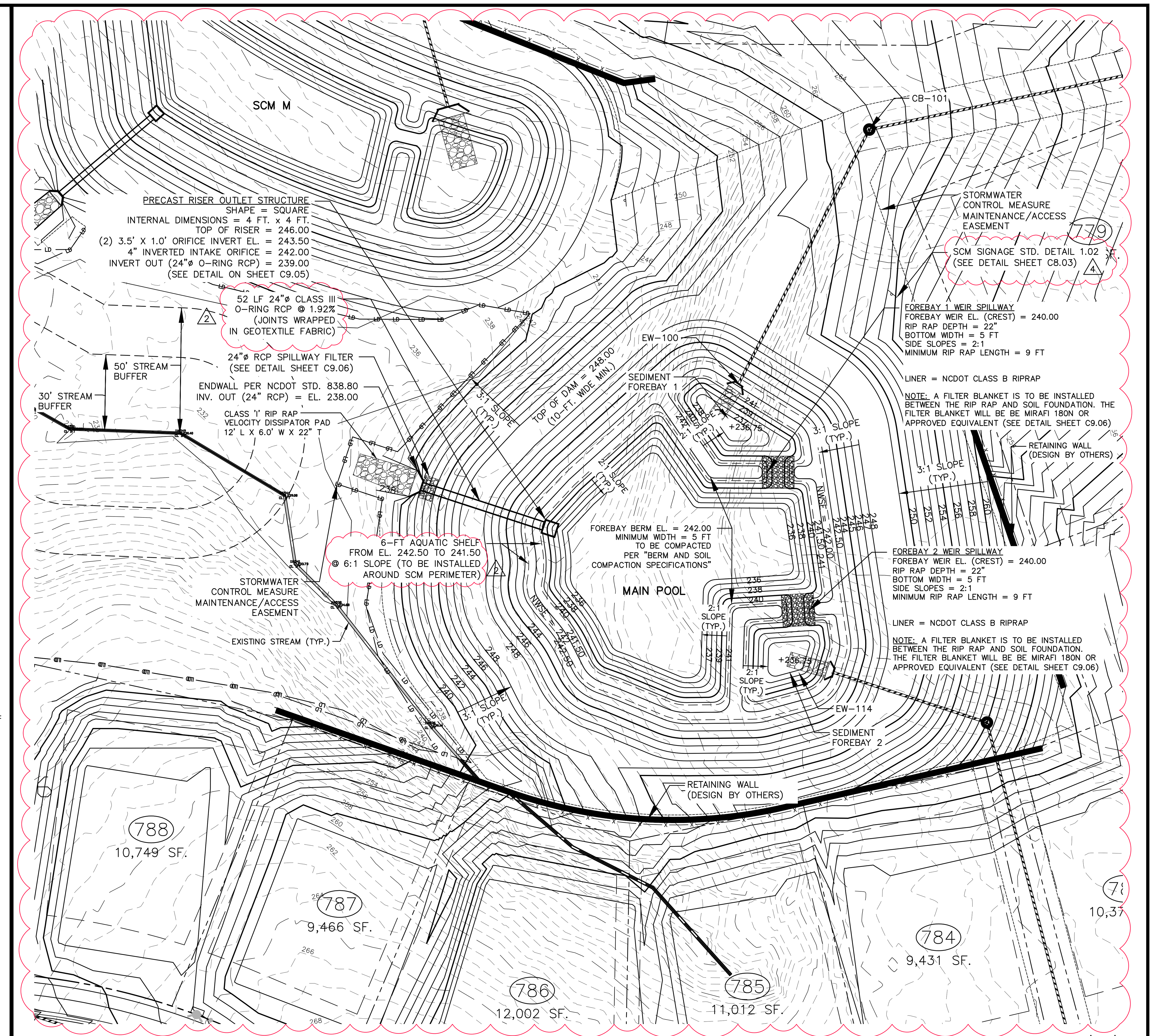
5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.

6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL OR AS RECOMMENDED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. TESTING WILL BE REQUIRED ALONG THE 24"Ø RCP OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL OR AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

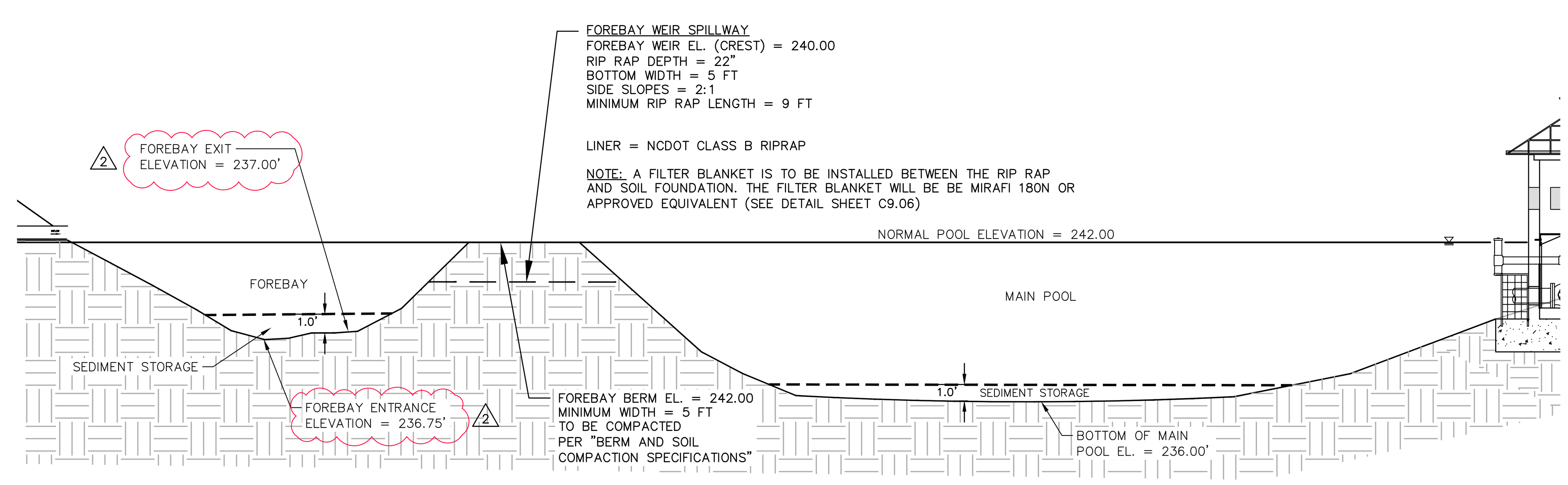
STATEMENT OF RESPONSIBILITY

1. ALL REQUIRED MAINTENANCE AND INSPECTIONS OF THE STORMWATER CONTROL MEASURE SHALL BE THE RESPONSIBILITY OF THE OWNER, PER THE EXECUTED OPERATION AND MAINTENANCE AGREEMENT FOR THIS FACILITY.



STORMWATER CONTROL MEASURE 'N' PLAN VIEW

1" = 30'



FOREBAY AND MAIN POOL CROSS-SECTION (TYPICAL)

N.T.S

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ____________________ Date: ____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ____________________ Date: ____________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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2905 Meridian Parkway
Durham, NC 27713

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fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048394 JEREMY K. WOOSTER
PRELIMINARY - NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
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4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-N
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE "N" PLAN VIEW

C9.04

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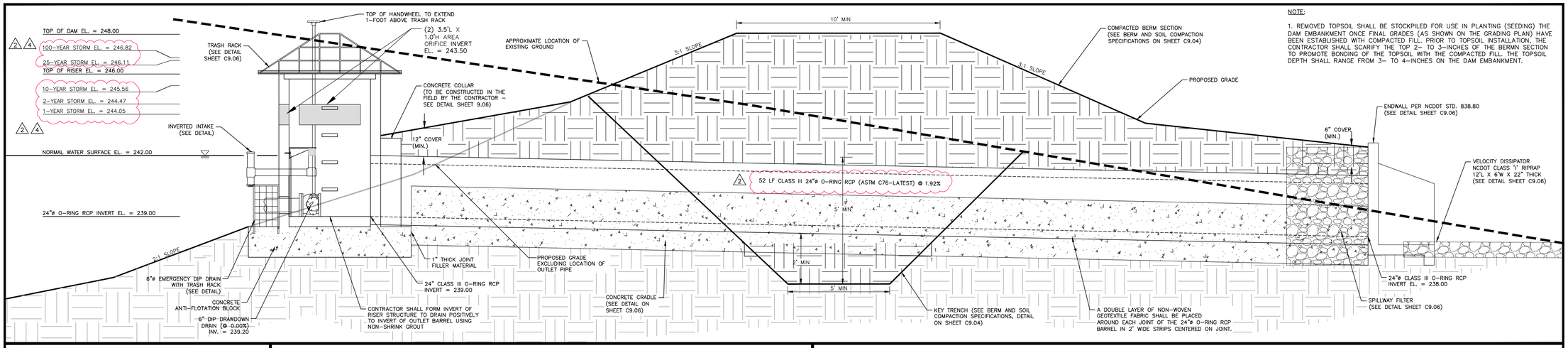
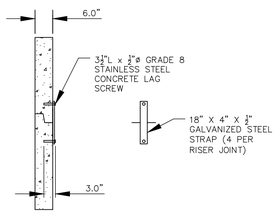


NOTE:

1. REMOVED TOPSOIL SHALL BE STOCKPILED FOR USE IN PLANTING (SEEDING) THE DAM EMBANKMENT ONCE FINAL GRADES (AS SHOWN ON THE GRADING PLAN) HAVE BEEN ESTABLISHED WITH COMPACTED FILL. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2– TO 3–INCHES OF THE BERMN SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3– TO 4–INCHES ON THE DAM EMBANKMENT.



RISER JOINT CONNECTION DETAIL

N.T.S.

NOTES:

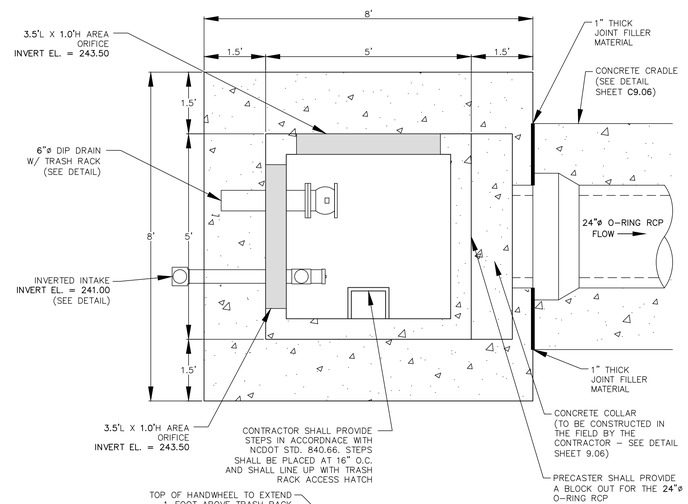
1. CONCRETE ANTI-FLOTATION BLOCK TO BE PROVIDED WITH MINIMUM TEMPERATURE AND SHRINKAGE STEEL REINFORCEMENT.

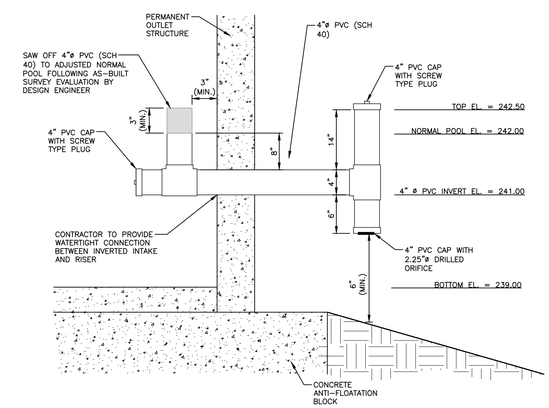
2. TRASH RACKS NOT SHOWN FOR CLARITY.

3. THE NUMBER OF GUIDES FOR THE VALVE STEM SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THE VALVE STEM MUST BE OPERABLE FROM THE TOP OF THE RISER VIA THE HANDWHEEL WITH AN INSIGNIFICANT AMOUNT OF PLAY IN THE VALVE STEM.

4. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

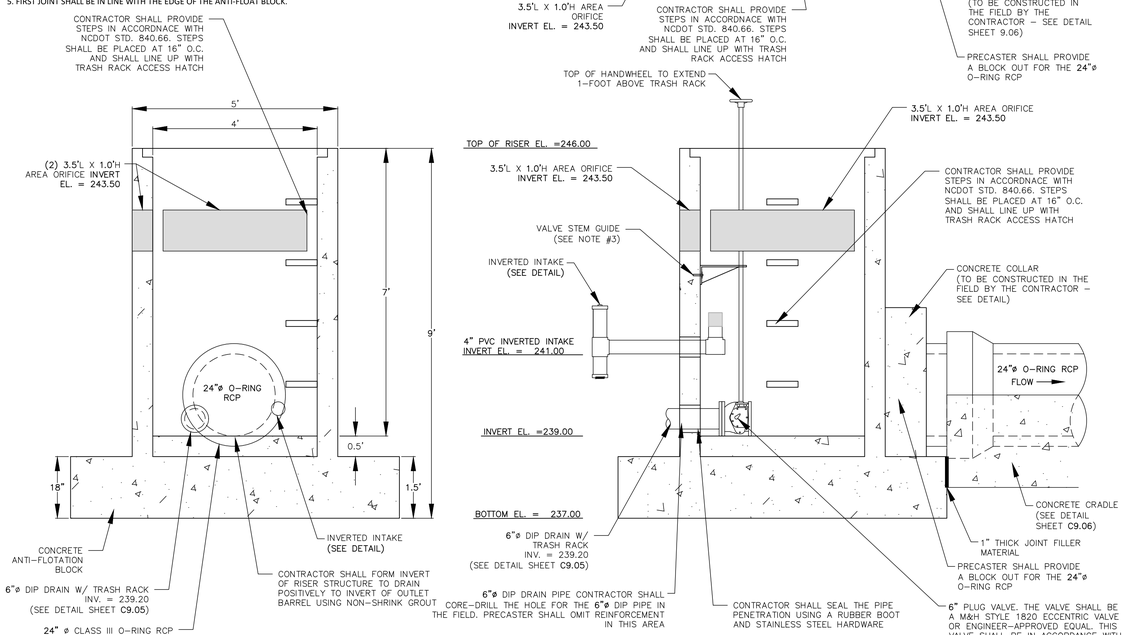
5. FIRST JOINT SHALL BE IN LINE WITH THE EDGE OF THE ANTI-FLOAT BLOCK.





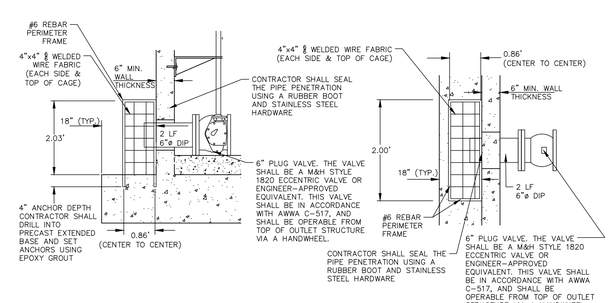
INVERTED INTAKE OUTLET DETAIL

N.T.S.



PERMANENT OUTLET STRUCTURE DETAILS

N.T.S.



6"ø EMERGENCY DIP DRAIN TRASH RACK DETAILS

N.T.S.

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CHECKED BY	EAM
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SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'N' DETAILS

C9.05

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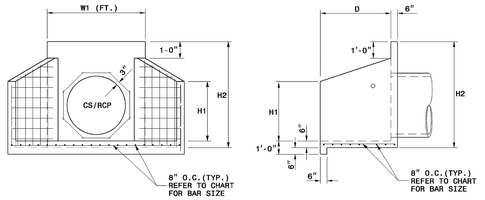
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

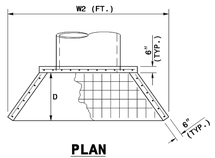
7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80



ELEVATION **SIDE**



PLAN

NOTES:

* THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.21, 838.27, 838.33 AND 838.39.
* INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
* USE 4000 PSI CONCRETE.
* PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
* PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
* PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
* ALL ELEMENTS PRECAST TO MEET ASTM C913.
* WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
* CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 8" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.

ENDWALL DIMENSIONS

FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

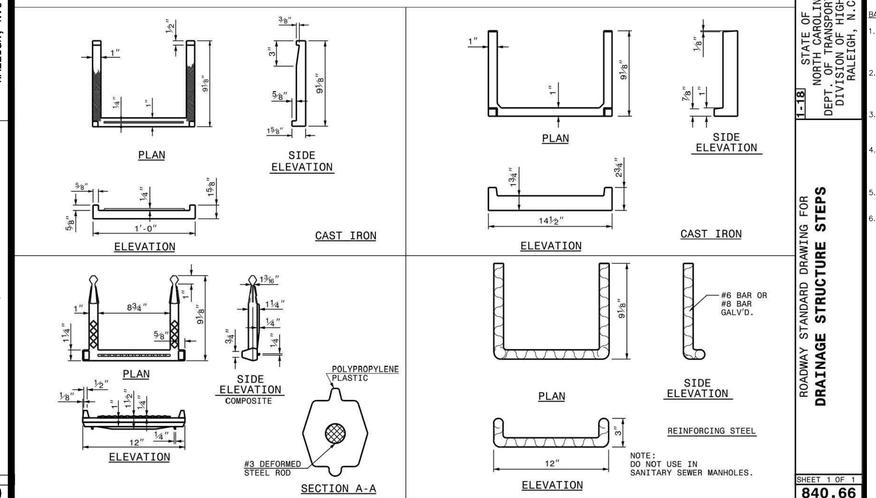
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80

NOTES:
INSTALL ALL STEPS PROTRUDING 4" FROM INSIDE FACE OF STRUCTURE WALL.
STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS OF THE PROPOSED STEPS AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.



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

1-18

ROADWAY STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

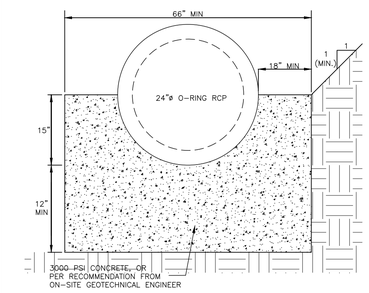
SHEET 1 OF 1
840.66

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

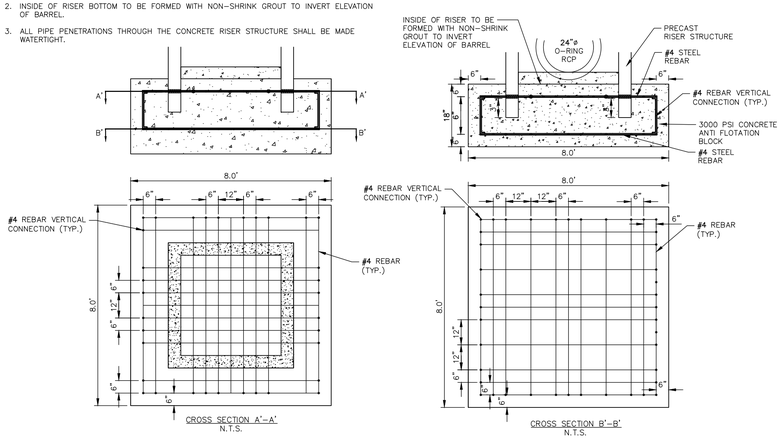
1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE **9** OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE **9** OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE **9** OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE **24"ø** O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON **24"ø** RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



24" CONCRETE CRADLE DETAIL
N.T.S.

NOTES:

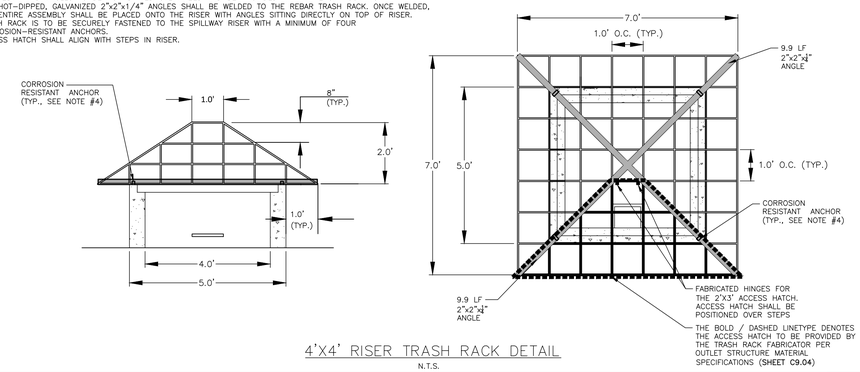
1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.



RISER/ANTI-FLOTATION BLOCK CONNECTION
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. ALL REBAR AND ANGLES TO BE HOT-DIPPED GALVANIZED AND BE PROVIDED WITH AN EPOXY COATING.
3. THE HOT-DIPPED, GALVANIZED 2"x2"x1/4" ANGLES SHALL BE WELDED TO THE REBAR TRASH RACK. ONCE WELDED, THE ENTIRE ASSEMBLY SHALL BE PLACED ONTO THE RISER WITH ANGLES SITTING DIRECTLY ON TOP OF RISER.
4. TRASH RACK IS TO BE SECURELY FASTENED TO THE SPILLWAY RISER WITH A MINIMUM OF FOUR CORROSION-RESISTANT ANCHORS.
5. ACCESS HATCH SHALL ALIGN WITH STEPS IN RISER.



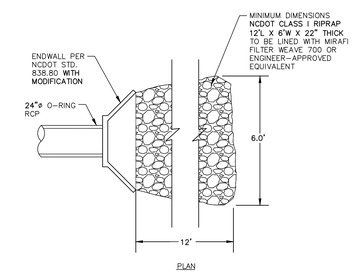
4'X4' RISER TRASH RACK DETAIL
N.T.S.

NOTES:

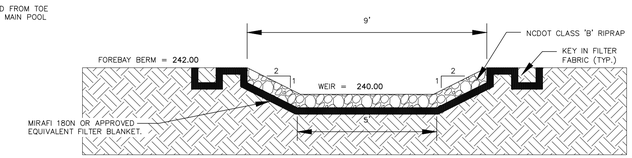
1. A FILTER BLANKET IS TO BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION. THE FILTER BLANKET WILL CONSIST OF A MINIMUM 4" THICK LAYER OF STONE (NCDOT #57) UNDERLAIN WITH MIRAFI FILTER WEAVE 700 OR ENGINEER-APPROVED EQUIVALENT.

ADDITIONAL NOTE TO INCLUDE IF OUTLETTING TO A CHANNEL:

1. RIPRAP TO EXTEND TO TOP OF CHANNEL WITH 2:1 SIDE SLOPES THROUGHOUT THE EXTENT OF CHANNEL.



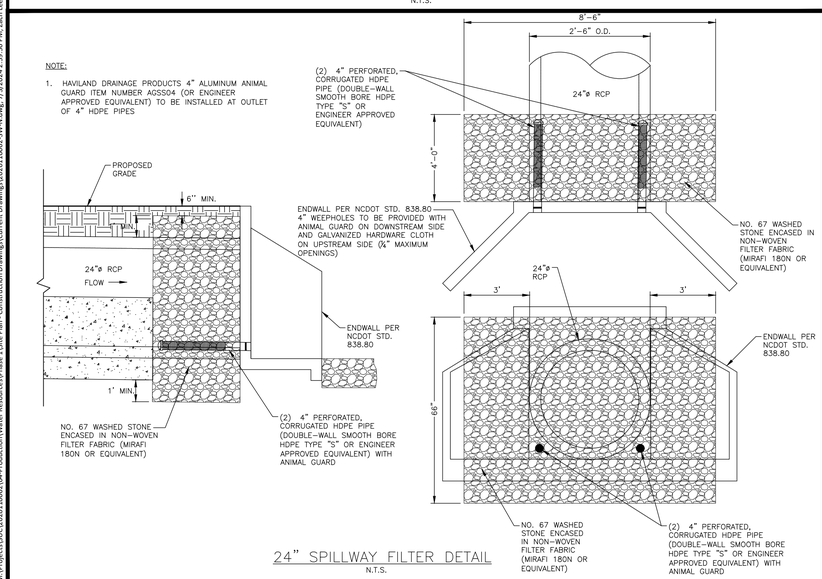
NOTE: RIPRAP TO EXTEND FROM TOE OF FOREBAY TO TOE OF MAIN POOL



FOREBAY WEIR SPILLWAY CROSS-SECTION
N.T.S.

NOTE:

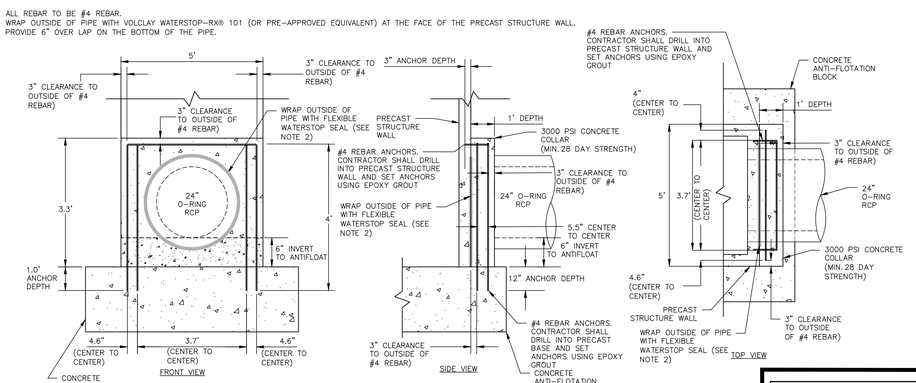
1. HAVILAND DRAINAGE PRODUCTS 4" ALUMINUM ANIMAL GUARD ITEM NUMBER AGSS04 (OR ENGINEER APPROVED EQUIVALENT) TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES



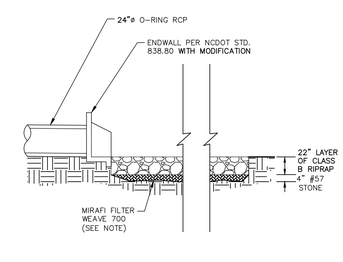
24" SPILLWAY FILTER DETAIL
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.



24"ø CONCRETE COLLAR DETAIL
N.T.S.



OUTLET BARREL VELOCITY DISSIPATER
N.T.S.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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#180 BILTMORE PARK
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PHONE: 602. 698. 8655

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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-N
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'N' DETAILS

C9.06

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STORMWATER CONTROL MEASURE 'N' LANDSCAPE SPECIFICATIONS

PLANT SCHEDULE SCM N

GROUND COVERS	CODE	QTY	COMMON NAME	BOTANICAL NAME	CONT	SPACING	REMARKS
	AISM	98	Swamp Milkweed	Asclepias incarnata	4" pot	24" o.c.	SHALLOW WATER
	CTQS	153	Quill Sedge	Carex tenera	4" pot	24" o.c.	SHALLOW LAND
	CA	143	Swamp Lily	Crinum americanum	10 gal	24" o.c.	SHALLOW LAND
	LCCF	92	Cardinal Flower	Lobelia cardinalis	4" pot	24" o.c.	SHALLOW WATER
	RWWS	199	White-topped Sedge	Rhynchospora colorata	4" pot	24" o.c.	SHALLOW LAND
	STSB	154	Softstem Bulrush	Schoenoplectus tabernaemontani	4" pot	24" o.c.	SHALLOW WATER

2

EMBANKMENTS

HYBRID BERMUDA

SEEDBED PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND AQUATIC SHELF. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SEEDBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDED AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
9. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
	KOBE LESPEDEZA	50 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

NOTE: USE THE TEMPORARY SEEDING SCHEDULE ONLY WHEN DATE IS NOT CORRECT TO USE THE PERMANENT SEEDING SCHEDULE.

PERMANENT SEEDING SCHEDULE (DAM EMBANKMENTS)

SEEDING DATE	SEEDING MIXTURE OPTIONS (CHOOSE ONE)	APPLICATION RATE
MARCH 1 - JUNE 31	HYBRID BERMUDA GRASS	1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)
SEPT 1 - OCT 31		1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 1000 LB/AC 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR; USE SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

NOTE: PERMANENT SEEDING SCHEDULE IS FOR SLOPES OF THE BASIN AND TOP OF BERM. SEE REQUIRED TOWN OF KINIGHTDALE SCM BASIN REMOVAL SEQUENCE NOTE 13 ON SHEET C9.04 FOR PERMANENT SEEDING CONSTRUCTION SEQUENCE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   - A. CONCRETE CRADLE
   - B. ANTI-SEEP COLLAR
   - C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
- A. SUBRADE OR CONSTRUCTED FOUNDATION
- B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
- C. FILTER MEDIA
- D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

PLANTING INSTRUCTIONS

PLANTING TECHNIQUES
- A. ENSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
- B. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
- C. PLACE PLANTS IN PIT, ENSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
- D. HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
- E. NEWLY PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
- F. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS SHALL BE CUT OFF CLEANLY.
- G. THE DIAMETER OF THE PITS FOR ALL VEGETATIVE STOCK SHALL BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. PLANT PIT WALL SHALL BE SCARIFIED PRIOR TO PLANT INSTALLATION.
- H. SET THE PLANTS UPRIGHT, IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
- I. PLACE THE BACKFILL AROUND THE BASE AND SIDES OF THE ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
- J. BROKEN OR DAMAGED PARTS WILL BE CUT BACK TO UNDAMAGED TISSUE, LEAVING AS MUCH GREEN BASAL TISSUE AS POSSIBLE ABOVE THE ROOTS. IF MORE THAN FIFTY PERCENT (50%) OF THE PLANT IS DAMAGED THEN CONTRACTOR SHALL REPLACE THE PLANT.

CONTAINER STOCK / BARE ROOT
- A. STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
- B. CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
- C. BARE ROOT PLANTS ARE FOR IMMEDIATE PLANTING, OTHERWISE SEE D) BELOW.
- D. IF BARE ROOTS SPECIMENS ARE NOT TO BE PLANTED WITHIN FOUR (4) DAYS, TEMPORARY HOLDING OF BARE ROOT SPECIMENS ARE TO BE COVERED ENTIRELY BY A SUITABLE MEDIUM (ETC. SOIL, SAWDUST, MULCH OR THE LIKE) AND WATERED REGULARLY SO AS TO NOT DRY OUT.

PLANT LOCATIONS
- A. NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE IN PROPOSED CONSTRUCTION.
- B. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.

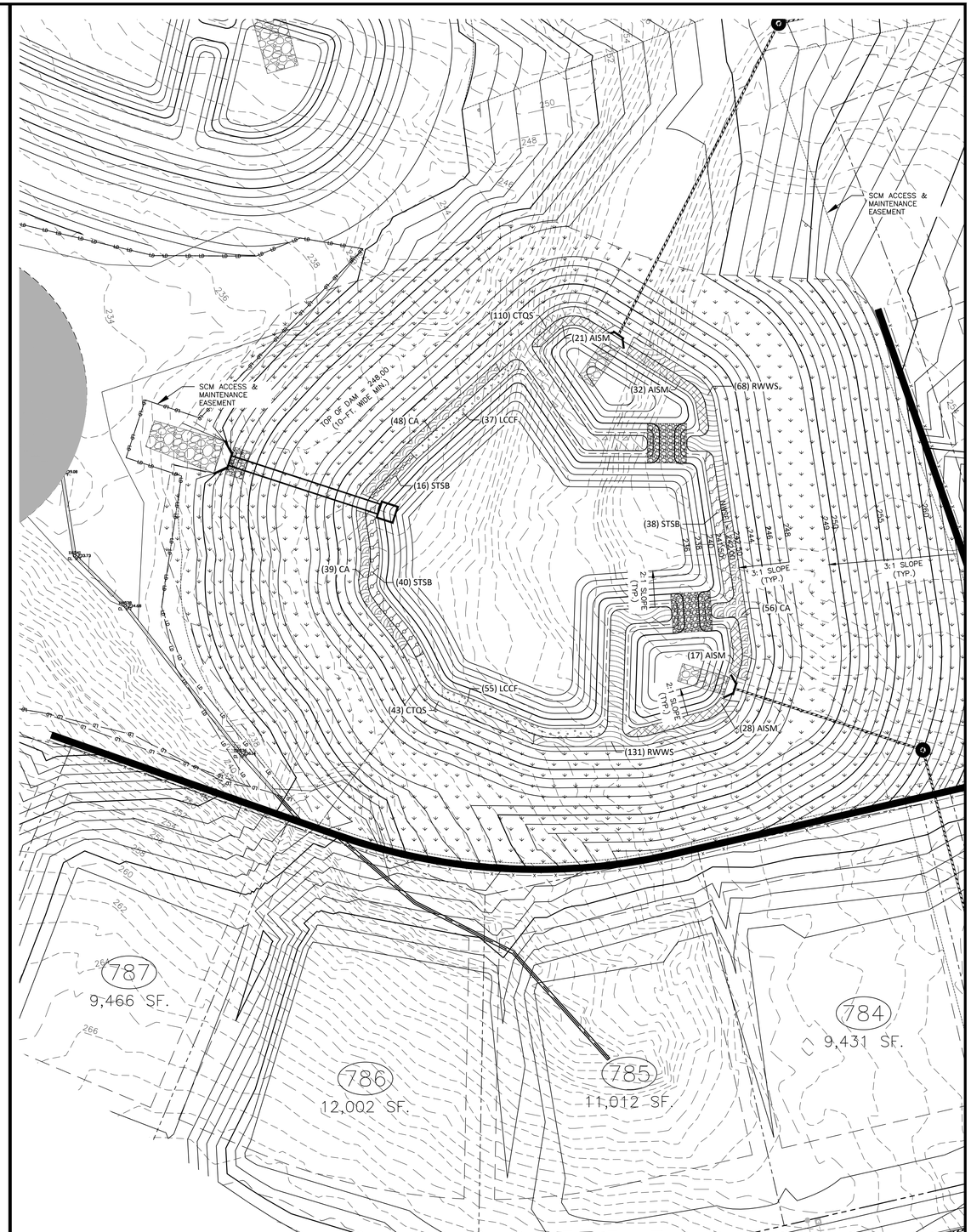
WATER
WATER SHALL BE POTABLE AND SHALL NOT CONTAIN ELEMENTS TOXIC TO PLANT LIFE.

PLANTING SCHEDULE

1. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER MANAGEMENT FACILITY PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
2. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER MANAGEMENT FACILITY PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER MANAGEMENT FACILITY PLANTING PLAN. 90% GERMINATION REQUIRED OF NON-CLUMPING TURF GRASS PRIOR TO FINAL CERTIFICATION.
3. OPTIMAL PLANTING PERIODS RANGE APPROXIMATELY FROM APRIL 15TH THRU JUNE 30TH AND SEPTEMBER 1ST THRU OCTOBER 31ST. FOR FINAL DETERMINATION OF THE SITE'S PLANTING PERIOD, THE CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION.
4. IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PREVENT WILDLIFE FROM DAMAGING OR CONSUMING WETLAND PLANTINGS.

TOWN OF KNIGHTDALE SCM PLANTING NOTES

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. THE VEGETATED SHELF SHALL BE PLANTED WITH A MINIMUM OF THREE DIVERSE SPECIES OF HERBACEOUS, NATIVE VEGETATION AT A MINIMUM DENSITY OF 50 PLANTS PER 200 FEET OF SHELF AREA.
3. CONTRACTOR TO WORK WITH SOILS SCIENTIST TO ENSURE SOILS ARE ADEQUATE TO SUPPORT PROPER ESTABLISHMENT AND GROWTH OF THE AQUATIC PLANTINGS. CONTRACTOR TO AMEND SOILS AND INSTALL SOILS IN PLANT, SHRUB, AND TREE AREAS PER DETAILS, SOIL SPECIFICATIONS. NCDENR SPECIFICATION, AND SOIL SCIENTIST RECOMMENDATIONS.
4. ALL AQUATIC PLANTINGS ARE TO BE INSTALLED DURING THE APPROPRIATE TIME OF YEAR TO ENSURE SURVIVABILITY. (LAST SPRING FROST AND THE FIRST FALL FROST)
5. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
6. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP, THE BASIN MUST BE CLEANED OUT, GRADED, APPROPRIATE AREAS COVERED WITH 4" OF TOPSOIL AS SPECIFIED IN NOTE #2 ABOVE, AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



STORMWATER CONTROL MEASURE 'N' LANDSCAPE PLAN VIEW
1" = 20'

GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
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KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048234 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION

REVISIONS

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-N
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET
STORMWATER CONTROL MEASURE "N" LANDSCAPE PLAN
C9.07

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-N.dwg, 7/3/2024 3:00:24 PM, Zach Lee

STORMWATER CONTROL MEASURE 'O' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.

2. THE PROJECT WILL MEET ALL OF THE REQUIREMENTS RELATIVE TO BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE LAND DEVELOPMENT ORDINANCE. (CHAPTER 6, PART 4, UDO)

3. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.

4. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.

5. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:
   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.
   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE.
   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE, NOTE 13.1-13.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.
   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, THE CONTRACTOR SHALL CONSTRUCT THE INTERIOR GRADING SHOWN ON THIS SHEET.
   E. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER CONTROL MEASURE PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
   F. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN.

6. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.

7. ON-SITE GEOTECHNICAL ENGINEER TO DETERMINE IF IN-SITU SOILS ENCOUNTERED WOULD MAINTAIN A STORMWATER CONTROL MEASURE PERMANENT POOL AT DESIGN ELEVATION. IF HIGHLY PERMEABLE SOILS ARE ENCOUNTERED THAT WOULD NOT MAINTAIN THE PERMANENT POOL ELEVATION AS DESIGNED, A CLAY LINER MAY BE REQUIRED TO MAINTAIN A PERMANENT POOL OF WATER IN THE STORMWATER CONTROL MEASURE. FINAL DETERMINATION IF A CLAY LINER IS NEEDED SHALL BE THE RESPONSIBILITY OF THE ON-SITE GEOTECHNICAL ENGINEER. UPON DETERMINATION OF HIGHLY PERMEABLE SOIL CONDITIONS, ON-SITE GEOTECHNICAL ENGINEER WILL INFORM THE DESIGN ENGINEER AND RECOMMEND LINER SPECIFICATIONS.

8. IT IS ANTICIPATED THAT DEWATERING WILL BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).

9. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THEWET POND PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE WET PONDAS DIRECTED BY A LANDSCAPE PROFESSIONAL.

10. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT AND AQUATIC SHELF. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT AND AQUATIC SHELF.

11. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THIS FACILITY. CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION. PLEASE NOTE THAT NO TREES/SHRUBS OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS).

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 36"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4.

2. THE STRUCTURAL DESIGN FOR THE 5' X 5' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.

3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.09 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.

4. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.10. THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 14,953 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 34,506 LBS.

5. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT AND INSTALL GALVANIZED STEEL STRAPS PER DETAIL ON SHEET C9.09.

6. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.

7. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:

   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.

8. GEOTEXTILE FABRIC FOR THE 36"Ø RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).

9. STORMWATER CONTROL MEASURE EMERGENCY DRAW DOWN IS VIA AN 6"Ø PLUG VALVE. THE VALVE SHALL BE A M&H STYLE 1820 ECCENTRIC VALVE OR APPROVED EQUAL. THIS VALVE IS IN ACCORDANCE WITH AWWA C-517, AND SHALL BE OPERABLE FROM TOP OF OUTLET STRUCTURE VIA A HAND WHEEL (SEE DETAIL SHEET C9.09). THE CONTRACTOR SHALL PROVIDE A REMOVABLE VALVE WRENCH WITH A HAND WHEEL ON TOP FOR OPERATION OF THE 6"Ø PLUG VALVE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

CONSTRUCTION SEQUENCE

1. PRIOR TO CONSTRUCTION, THE OWNER SHALL OBTAIN A LAND DISTURBING (GRADING) PERMIT AND AN "APPROVAL TO CONSTRUCT" FROM THE TOWN OF KNIGHTDALE AND ALL OTHER NECESSARY PERMITS FROM APPLICABLE AGENCIES (E.G. 404 / 401 PERMITS)

2. INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES PER THE APPROVED SEDIMENT AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL MAINTAIN ALL APPROVED SEDIMENT AND EROSION CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT, AS REQUIRED. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE EROSION CONTROL INSPECTOR, AS REQUIRED BY GOVERNING AGENCIES, PRIOR TO ANY CLEARING.

3. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.

4. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 36"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.

5. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.

6. PRIOR TO INSTALLATION, SUBGRADE CONDITIONS ALONG THE SPILLWAY PIPES SHOULD BE EVALUATED BY THE ON-SITE GEOTECHNICAL ENGINEER TO ASSESS WHETHER SUITABLE BEARING CONDITIONS EXIST AT THE SUBGRADE LEVEL. SHOULD SOFT OR OTHERWISE UNSUITABLE CONDITIONS BE ENCOUNTERED ALONG THE PIPE ALIGNMENTS, THESE MATERIALS SHOULD BE UNDERCUT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE UNDERCUT MATERIALS SHALL BE REPLACED WITH ADEQUATELY COMPACTED STRUCTURAL FILL, LEAN CONCRETE OR FLOWABLE FILL AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. IN ORDER TO HELP PROTECT THE SOIL SUBGRADE FROM DETERIORATION (DUE TO EXPOSURE, RAINFALL, SEEPAGE, AND RUNOFF) BEFORE THE CRADLE CAN BE POURED, IT IS STRONGLY RECOMMENDED THAT A 3" TO 4" THICK CONCRETE MUD MAT BE POURED OVER THE SUBGRADE ONCE IT IS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE MUD MAT WILL ALSO PROVIDE BEARING FOR THE BLOCKS THAT TEMPORARILY SUPPORT THE SPILLWAY PIPE UNTIL THE CRADLE CAN BE POURED. THE METHOD OF BLOCK SUPPORT FOR THE PIPE PROPOSED BY THE CONTRACTOR SHOULD BE SUBMITTED TO THE JOHN R. McADAMS COMPANY FOR REVIEW.

8. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.

9. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.10). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:

   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.

   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS

10. INSTALL RISER / BARREL ASSEMBLY, ALONG WITH THE EMERGENCY DRAIN SYSTEM. INSTALL 36" RCP OUTLET BARREL SPILLWAY FILTER FROM THE DETAILS SHOWN ON SHEET C9.10.

11. CONSTRUCT EMBANKMENT PER SPECIFICATIONS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS" AND REQUIREMENTS OF THE ON-SITE GEOTECHNICAL ENGINEER. ALL CHARACTERISTICS OF THE EMBANKMENT FILL MATERIAL SHALL MEET THE STANDARDS SET FORTH IN "BERM AND SOIL COMPACTION SPECIFICATIONS", INCLUDING COMPACTION AND MOISTURE REQUIREMENTS. IF NECESSARY TO ACHIEVE PROPER COMPACTION, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO PROPER FINAL GRADE. ANY HAND COMPACTION ACTIVITIES AROUND SPILLWAY OR DRAIN STRUCTURES SHALL BE CONDUCTED IN 4-INCH LOOSE LIFTS AND BE TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT. ALL COMPACTION AND MOISTURE TESTING SHALL BE CARRIED OUT AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER AND AS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS".

12. UPON COMPLETION OF DAM EMBANKMENT, PROMPTLY STABILIZE AND SEED DAM EMBANKMENT PER SEEDING SCHEDULE. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER THE PERMANENT SEEDING SCHEDULE FOUND ON SHEET C9.11.

13. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.

   13.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
   13.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
   13.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
   13.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
   13.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
   13.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.

14. SCHEDULE A FINAL AS-BUILT INSPECTION AND AS-BUILT SURVEY WITH THE ENGINEER AND SURVEYOR. AN AS-BUILT INSPECTION AND SURVEY SHALL BE SCHEDULED BEFORE IMPOUNDING WATER IN THE FACILITY AND A MINIMUM OF 60 DAYS PRIOR TO THE ANTICIPATED DATE OF CERTIFICATION APPROVAL. ANY COMMENTS OR DEFICIENCIES IN THE SCM CONSTRUCTION MUST BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND OWNER BEFORE CERTIFICATION SHALL BE GRANTED.

BERM AND SOIL COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.

2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.

3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.

4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.

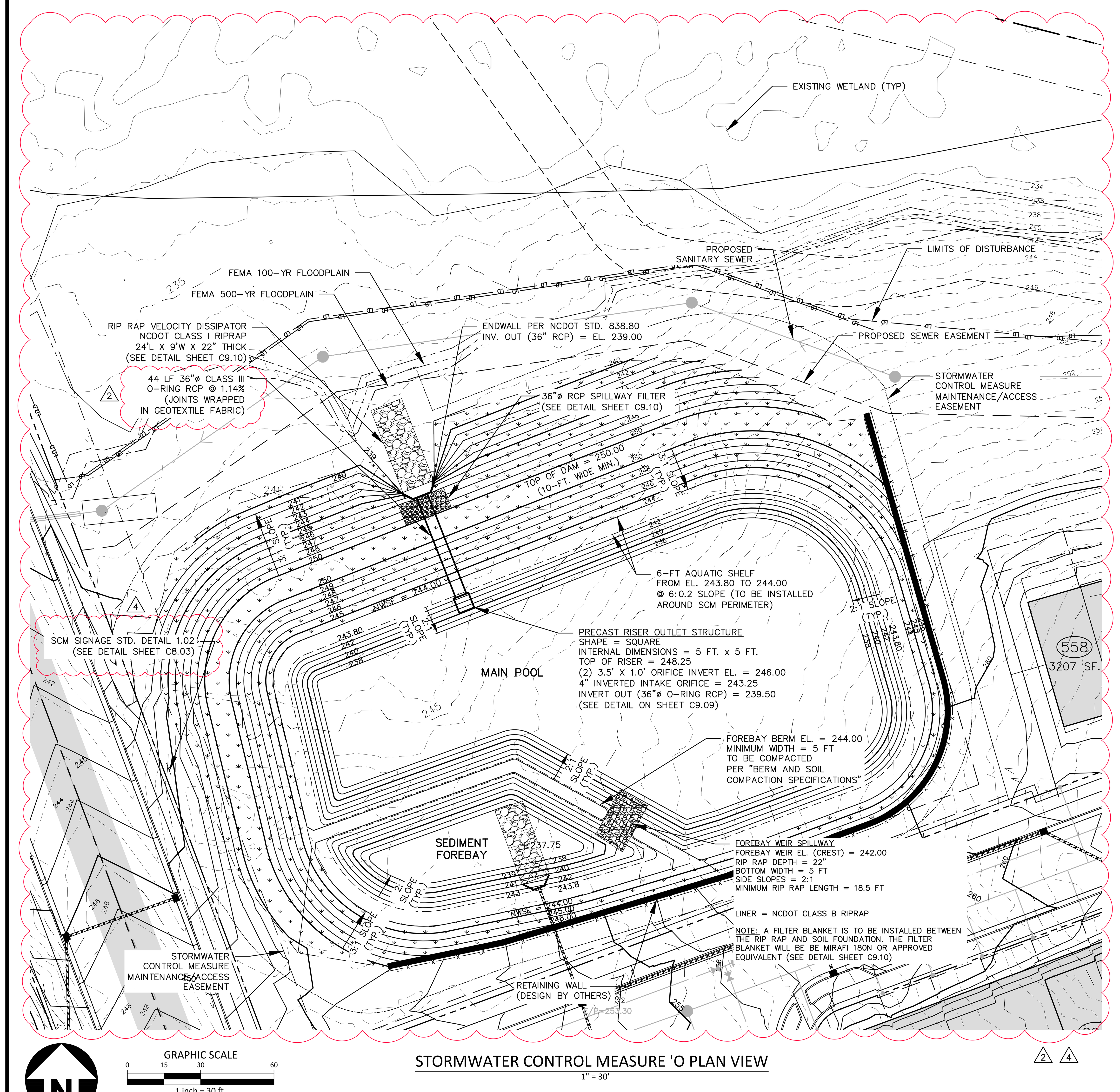
5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.

6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL OR AS RECOMMENDED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. TESTING WILL BE REQUIRED ALONG THE 36"Ø RCP OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL OR AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

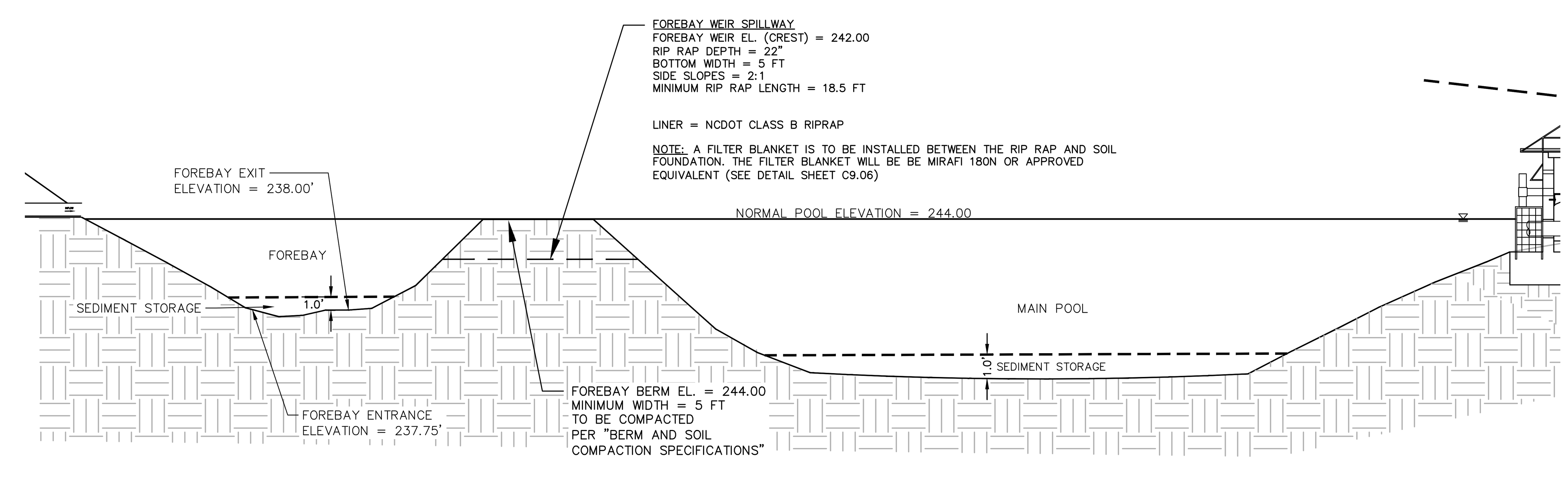
STATEMENT OF RESPONSIBILITY

1. ALL REQUIRED MAINTENANCE AND INSPECTIONS OF THE STORMWATER CONTROL MEASURE SHALL BE THE RESPONSIBILITY OF THE OWNER, PER THE EXECUTED OPERATION AND MAINTENANCE AGREEMENT FOR THIS FACILITY.



STORMWATER CONTROL MEASURE 'O PLAN VIEW

1" = 30'



FOREBAY AND MAIN POOL CROSS-SECTION (TYPICAL)

N.T.S

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ____________________ Date: ______________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ____________________ Date: ______________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

MCADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

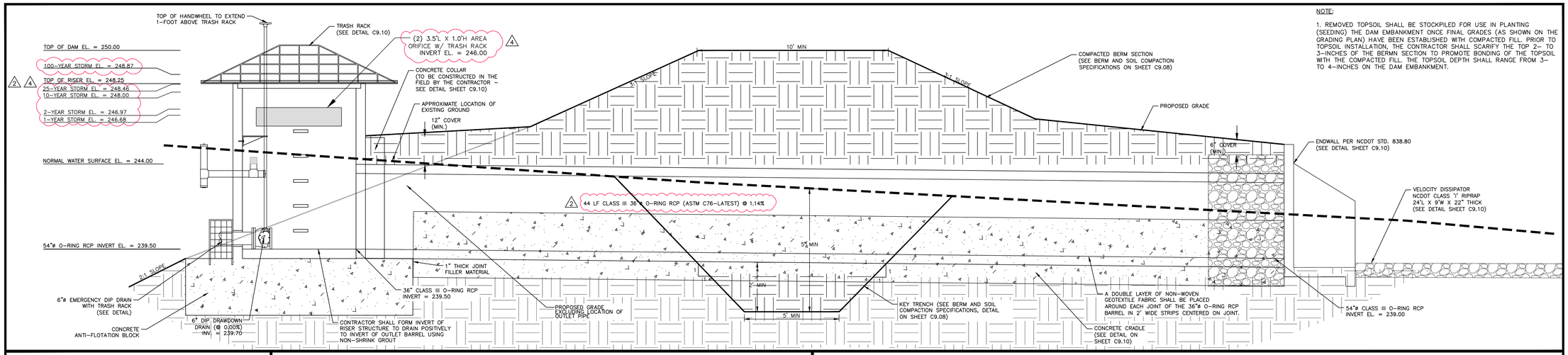
PROJECT NO.	2020110062
FILENAME	2020110062-SW-O
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE "O" PLAN VIEW

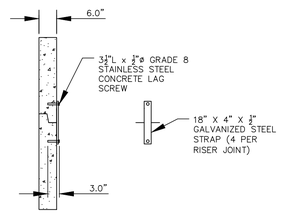
C9.08

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-O.dwg, 7/3/2024 3:04:49 PM, Zach Lee



NOTE:

1. REMOVED TOPSOIL SHALL BE STOCKPILED FOR USE IN PLANTING (SEEDING) THE DAM EMBANKMENT ONCE FINAL GRADES (AS SHOWN ON THE GRADING PLAN) HAVE BEEN ESTABLISHED WITH COMPACTED FILL. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2– TO 3–INCHES OF THE BERMN SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3– TO 4–INCHES ON THE DAM EMBANKMENT.



RISER JOINT CONNECTION DETAIL

N.T.S.

NOTES:

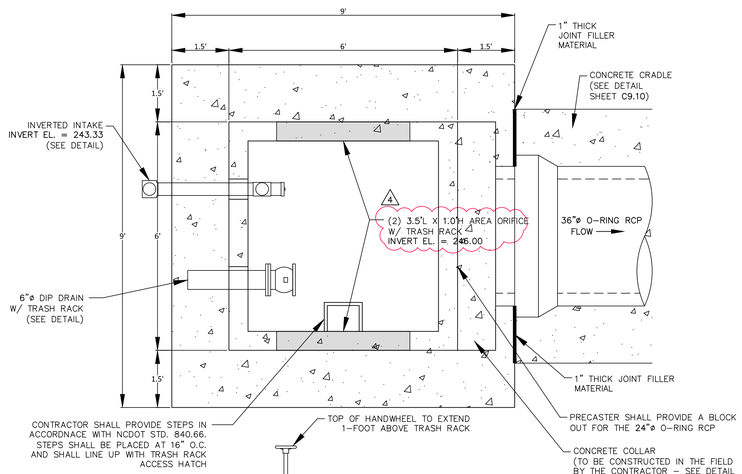
1. CONCRETE ANTI-FLOTATION BLOCK TO BE PROVIDED WITH MINIMUM TEMPERATURE AND SHRINKAGE STEEL REINFORCEMENT.

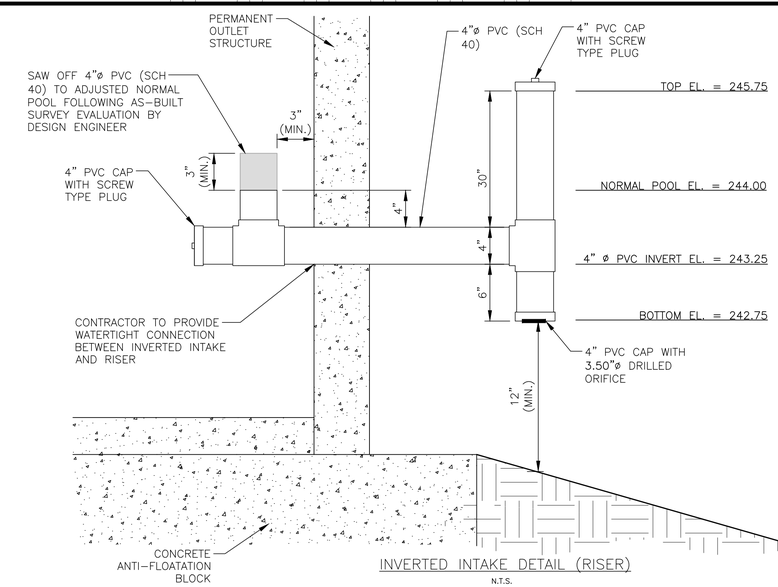
2. TRASH RACKS NOT SHOWN FOR CLARITY.

3. THE NUMBER OF GUIDES FOR THE VALVE STEM SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THE VALVE STEM MUST BE OPERABLE FROM THE TOP OF THE RISER VIA THE HANDWHEEL WITH AN INSIGNIFICANT AMOUNT OF PLAY IN THE VALVE STEM.

4. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

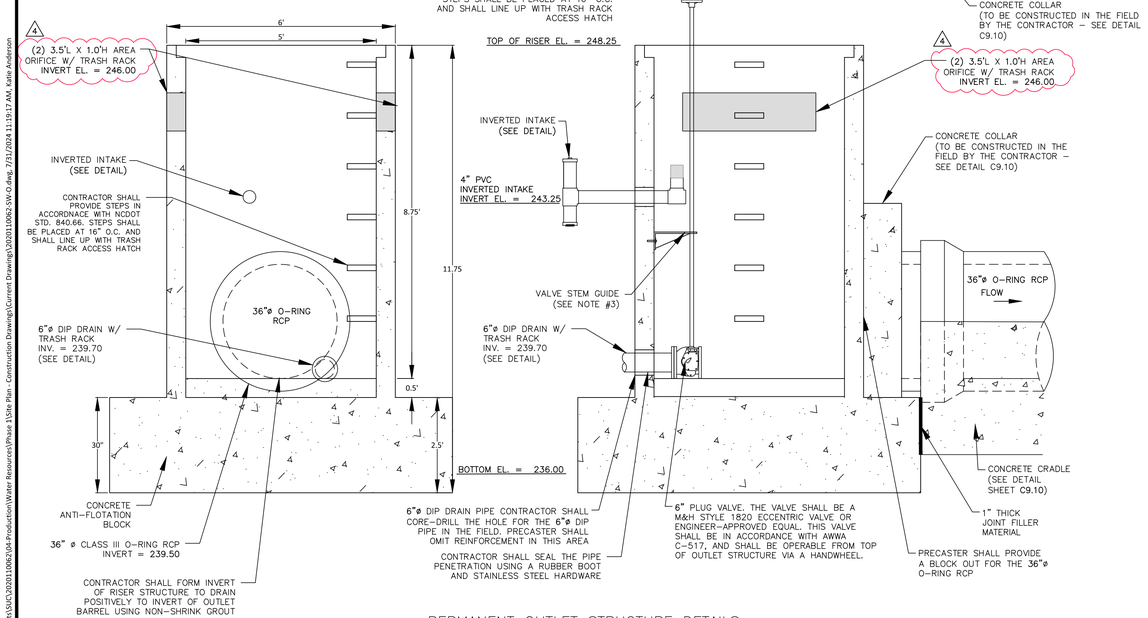
5. FIRST JOINT SHALL BE IN LINE WITH THE EDGE OF THE ANTI-FLOAT BLOCK.





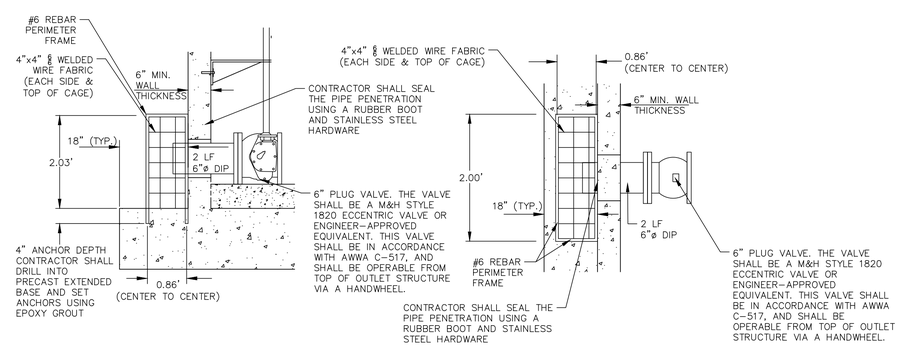
INVERTED INTAKE DETAIL (RISER)

N.T.S.



PERMANENT OUTLET STRUCTURE DETAILS

N.T.S.



6"Ø EMERGENCY DIP DRAIN TRASH RACK DETAILS

N.T.S.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

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SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER BOBBY K. WOOSTER
NOT FOR CONSTRUCTION

REVISIONS

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PLAN INFORMATION

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FILENAME	2020110062-SW-O
CHECKED BY	EAM
DRAWN BY	OVL
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DATE	12. 22. 2022

SHEET

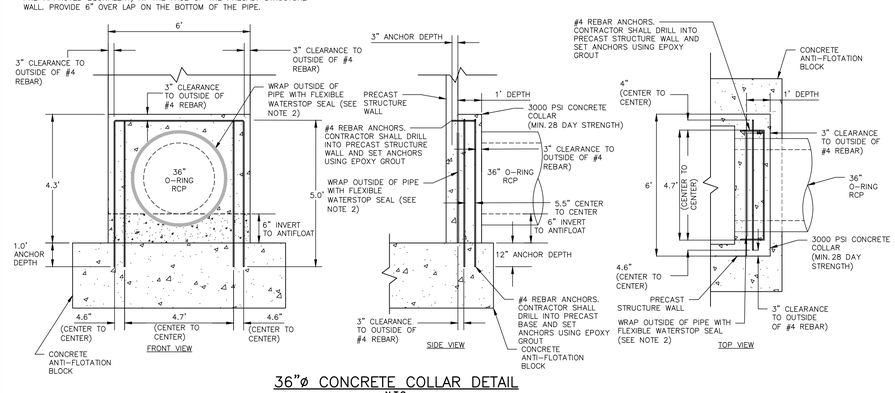
STORMWATER CONTROL MEASURE 'O' DETAILS

C9.09

M:\Projects\SA\C\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-O.dwg, 7/31/2024 11:19:17 AM, Kalie Anderson

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.

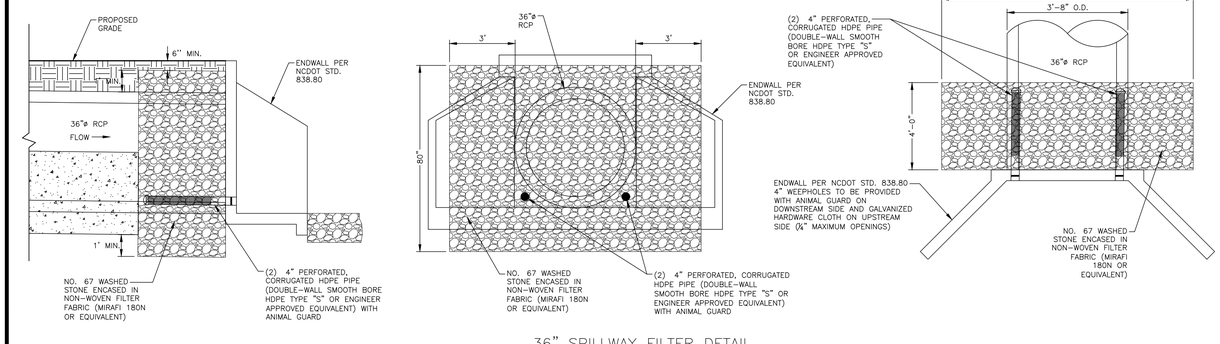


36"ø CONCRETE COLLAR DETAIL

N.T.S.

NOTE:

1. HAVILAND DRAINAGE PRODUCTS 4" ALUMINUM ANIMAL GUARD ITEM NUMBER AGS504 (OR ENGINEER APPROVED EQUIVALENT) TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES



36" SPILLWAY FILTER DETAIL

N.T.S.

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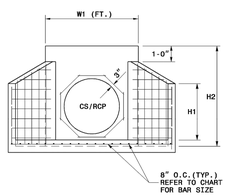
SUNCREST Real Estate & Land

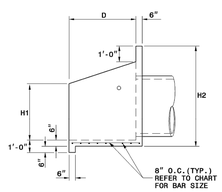
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW



ELEVATION

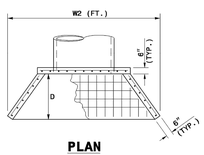


SIDE

NOTES:

- THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.21, 838.27, 838.33 AND 838.39.
- INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
- USE 4000 PSI CONCRETE.
- PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
- ALL ELEMENTS PRECAST TO MEET ASTM C913.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
- CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 8" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.



PLAN

ENDWALL DIMENSIONS

FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

SHEET 1 OF 1
838.80

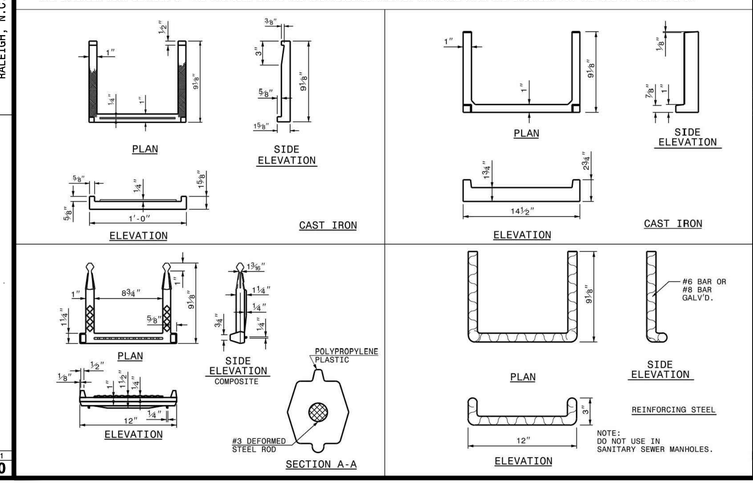
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80

NOTES:
INSTALL ALL STEPS PROTRUDING 4" FROM INSIDE FACE OF STRUCTURE WALL.
STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS OF THE PROPOSED STEPS AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.



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

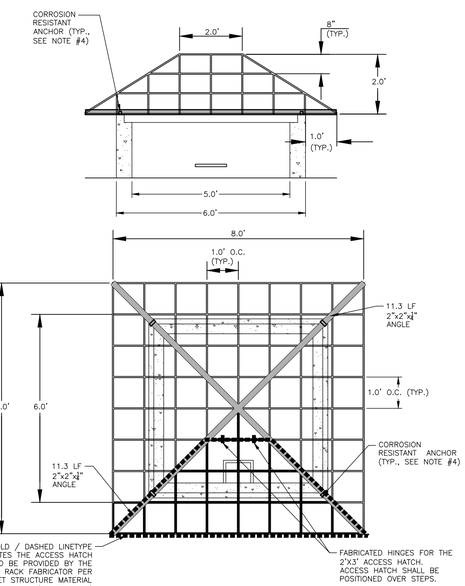
1-18

ROADWAY STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

SHEET 1 OF 1
840.66

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. ALL REBAR AND ANGLES TO BE HOT-DIPPED GALVANIZED AND BE PROVIDED WITH AN EPOXY COATING.
3. THE HOT-DIPPED, GALVANIZED 2"x2"x1/4" ANGLES SHALL BE WELDED TO THE REBAR TRASH RACK. ONCE WELDED, THE ENTIRE ASSEMBLY SHALL BE PLACED ONTO THE RISER WITH ANGLES SITTING DIRECTLY ON TOP OF RISER.
4. TRASH RACK IS TO BE SECURELY FASTENED TO THE SPILLWAY RISER WITH A MINIMUM OF FOUR CORROSION-RESISTANT ANCHORS.
5. ACCESS HATCH SHALL ALIGN WITH STEPS IN RISER.



5'X5' RISER TRASH RACK DETAIL

N.T.S.

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
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NOT FOR CONSTRUCTION

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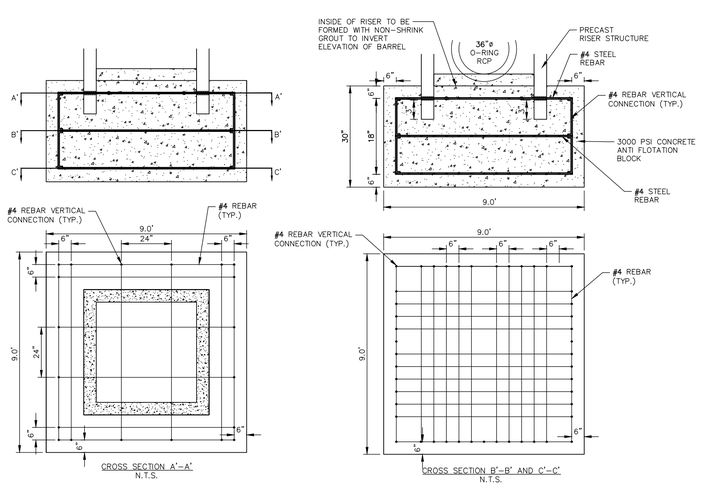
SHEET

STORMWATER CONTROL MEASURE 'O' DETAILS

C9.10

NOTES:

1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.



RISER/ANTI-FLOTATION BLOCK CONNECTION

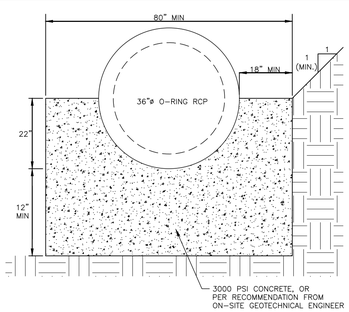
N.T.S.

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE 36"ø O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON 36"ø RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



36" CONCRETE CRADLE DETAIL

N.T.S.

BARREL PIPE CRADLE MATERIAL SPECIFICATIONS

CONCRETE

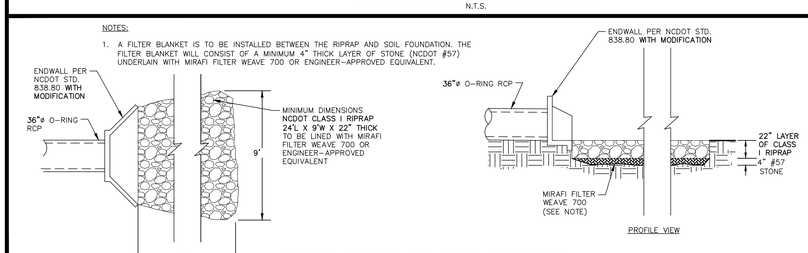
- COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS (SEE NOTE #5)
- SHALL BE PLACED ON A 2- TO 2.5-INCH SLUMP (SEE NOTE #5)
- APPROVED MIX DESIGN
- 4-6% AIR ENTRAINED
- MAXIMUM MIX TO POUR TIME OF 90 MINUTES
- FOUR CYLINDERS SHALL BE PREPARED FOR TESTING FOR EACH LIFT. ONE SHALL BE TESTED AT SEVEN DAYS, TWO AT 28 DAYS, AND THE FOURTH SHALL BE HELD FOR 54 DAYS.
- A MINIMUM OF 3" OF CONCRETE COVER ON ALL STEEL IS REQUIRED (INCLUDING TIES).
- CONCRETE TO BE VIBRATED VERTICALLY. WET CONCRETE SHALL NOT BE MOVED HORIZONTALLY WITH THE VIBRATOR.

STEEL

- ALL STEEL TO BE GRADE 60.
- ALL STEEL SHALL BE FREE OF RUST OR OTHER DEBRIS THAT MIGHT PREVENT BONDING TO THE CONCRETE.
- ALL STEEL SHALL BE BENT WITH A MINIMUM RADIUS OF 3DB AS SHOWN ON THE DRAWINGS.
- THE #6 BARS IN THE CONCRETE CRADLE SHALL BE SPLICED WITH A MINIMUM OVERLAP OF 32". THE SPLICES SHALL BE SPACED SUCH THAT NO TWO SPLICES OCCUR WITHIN THE SAME LENGTH OF PIPE.

NOTES:

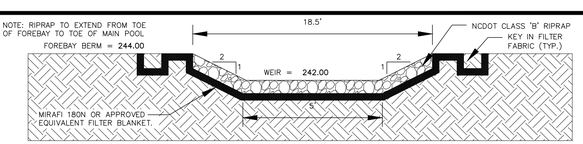
1. A FILTER BLANKET IS TO BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION. THE FILTER BLANKET WILL CONSIST OF A MINIMUM 4" THICK LAYER OF STONE (NCDOT #57) UNDERLAIN WITH MIRAFI FILTER WEAVE 700 OR ENGINEER-APPROVED EQUIVALENT.



OUTLET BARREL VELOCITY DISSIPATER

N.T.S.

NOTE: RIPRAP TO EXTEND FROM TOE OF FOREBAY TO TOE OF MAIN POOL



FOREBAY WEIR SPILLWAY CROSS-SECTION

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M:\Projects\US\C\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-O.dwg, 7/3/2024 3:06:12 PM, Zach Lee

STORMWATER CONTROL MEASURE 'O' LANDSCAPE SPECIFICATIONS

LEGEND

QTY.	SYM.	SCIENTIFIC NAME	COMMON NAME	HATCH	TYPE	SPACING
SHALLOW WATER (0-6 INCHES BELOW NORMAL POOL ELEVATION)						
322	IV	IRIS VIRGINIANA	BLUE FLAG IRIS		4-INCH CONTAINER	24" O.C.
324	PC	PONTEDERIA CORDATA	PICKEREL WEED		4-INCH CONTAINER	24" O.C.
324	ST	SCHOENOPLECTUS TABERNAEMONTANI	SOFT-STEM BULRUSH		4-INCH CONTAINER	24" O.C.
SHALLOW LAND (0-6 INCHES ABOVE NORMAL POOL ELEVATION)						
65	CS	CAREX SPP.	SEDGES		4-INCH CONTAINER	24" O.C.
67	CA	CRINUM AMERICANUM	AMERICAN CRINUM LILY		4-INCH CONTAINER	24" O.C.
69	HA	HIBISCUS ACULEATUS	PINELANDS MALLOW		4-INCH CONTAINER	24" O.C.
EMBANKMENTS						
			HYBRID BERMUDA			

2

2

SEEDBED PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND AQUATIC SHELF. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SEEDBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDED AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
9. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
	KOBE LESPEDEZA	50 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

NOTE: USE THE TEMPORARY SEEDING SCHEDULE ONLY WHEN DATE IS NOT CORRECT TO USE THE PERMANENT SEEDING SCHEDULE.

PERMANENT SEEDING SCHEDULE (DAM EMBANKMENTS)

SEEDING DATE	SEEDING MIXTURE OPTIONS	APPLICATION RATE
MARCH 1 - JUNE 31	HYBRID BERMUDA	1000 LBS/1000 SF (OR MANUFACTURER SPECIFICATIONS)
SEPT 1 - OCT 31		1000 LBS/1000 SF (OR MANUFACTURER SPECIFICATIONS)

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 1000 LB/AC 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR; USE SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

NOTE: PERMANENT SEEDING SCHEDULE IS FOR SLOPES OF THE BASIN AND TOP OF BERM. SEE REQUIRED TOWN OF KINIGHTDALE SCM BASIN REMOVAL SEQUENCE NOTE 13 ON SHEET C9.08 FOR PERMANENT SEEDING CONSTRUCTION SEQUENCE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
A. SUBRADE OR CONSTRUCTED FOUNDATION
B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
C. FILTER MEDIA
D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

PLANTING INSTRUCTIONS

PLANTING TECHNIQUES
A. ENSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
B. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
C. PLACE PLANTS IN PIT, ENSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
D. HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
E. NEWLY PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
F. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS SHALL BE CUT OFF CLEANLY.
G. THE DIAMETER OF THE PITS FOR ALL VEGETATIVE STOCK SHALL BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. PLANT PIT WALL SHALL BE SCARIFIED PRIOR TO PLANT INSTALLATION.
H. SET THE PLANTS UPRIGHT, IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
I. PLACE THE BACKFILL AROUND THE BASE AND SIDES OF THE ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
J. BROKEN OR DAMAGED PARTS WILL BE CUT BACK TO UNDAMAGED TISSUE, LEAVING AS MUCH GREEN BASAL TISSUE AS POSSIBLE ABOVE THE ROOTS. IF MORE THAN FIFTY PERCENT (50%) OF THE PLANT IS DAMAGED THEN CONTRACTOR SHALL REPLACE THE PLANT.

CONTAINER STOCK / BARE ROOT
A. STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
B. CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
C. BARE ROOT PLANTS ARE FOR IMMEDIATE PLANTING, OTHERWISE SEE D) BELOW.
D. IF BARE ROOTS SPECIMENS ARE NOT TO BE PLANTED WITHIN FOUR (4) DAYS, TEMPORARY HOLDING OF BARE ROOT SPECIMENS ARE TO BE COVERED ENTIRELY BY A SUITABLE MEDIUM (ETC. SOIL, SAWDUST, MULCH OR THE LIKE) AND WATERED REGULARLY SO AS TO NOT DRY OUT.

PLANT LOCATIONS
A. NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE IN PROPOSED CONSTRUCTION.
B. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.

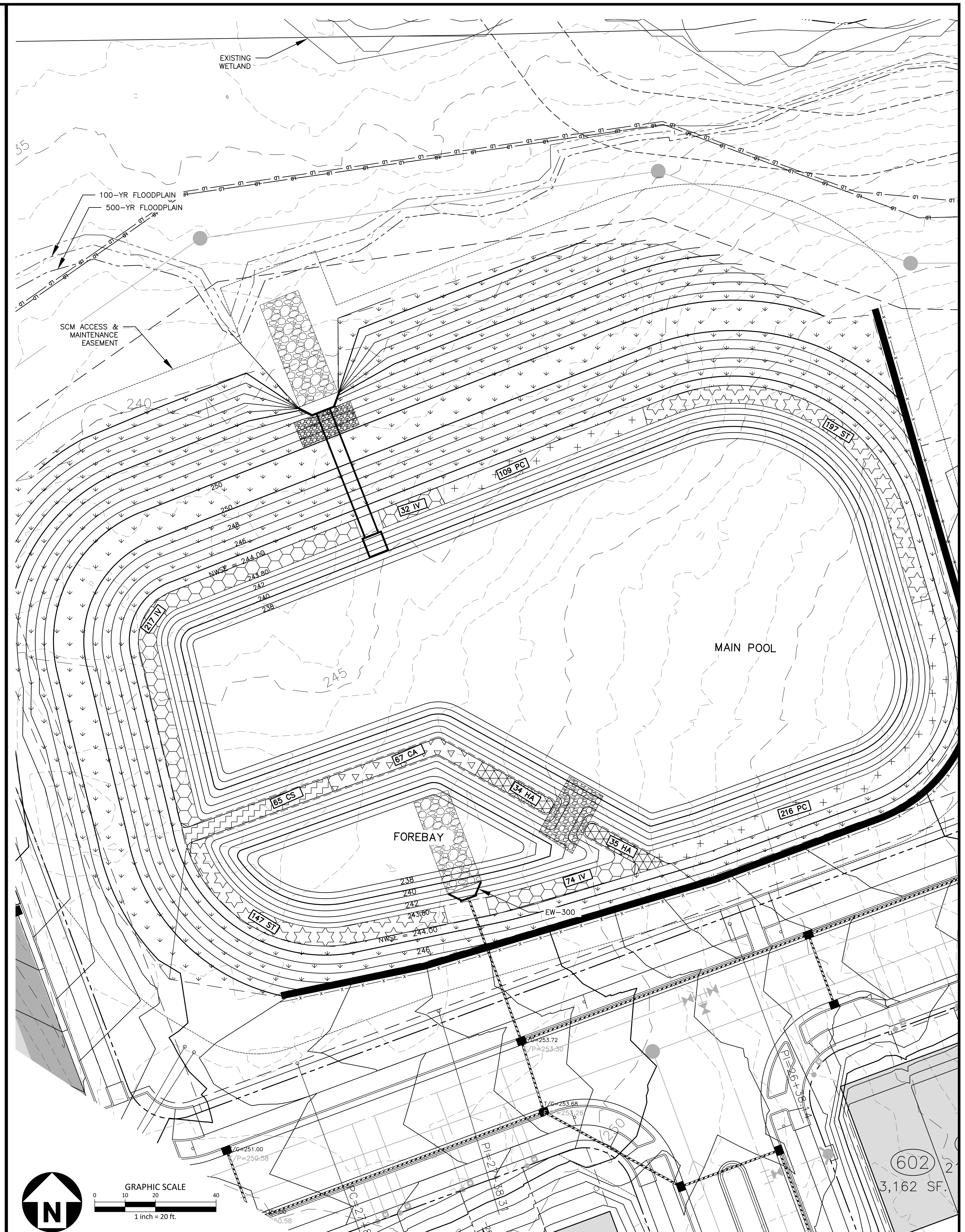
WATER
WATER SHALL BE POTABLE AND SHALL NOT CONTAIN ELEMENTS TOXIC TO PLANT LIFE.

PLANTING SCHEDULE

1. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER MANAGEMENT FACILITY PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
2. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER MANAGEMENT FACILITY PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER MANAGEMENT FACILITY PLANTING PLAN. 90% GERMINATION REQUIRED OF NON-CLUMPING TURF GRASS PRIOR TO FINAL CERTIFICATION.
3. OPTIMAL PLANTING PERIODS RANGE APPROXIMATELY FROM APRIL 15TH THRU JUNE 30TH AND SEPTEMBER 1ST THRU OCTOBER 31ST. FOR FINAL DETERMINATION OF THE SITE'S PLANTING PERIOD, THE CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION.
4. IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PREVENT WILDLIFE FROM DAMAGING OR CONSUMING WETLAND PLANTINGS.

TOWN OF KNIGHTDALE SCM PLANTING NOTES

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. THE VEGETATED SHELF SHALL BE PLANTED WITH A MINIMUM OF THREE DIVERSE SPECIES OF HERBACEOUS, NATIVE VEGETATION AT A MINIMUM DENSITY OF 50 PLANTS PER 200 FEET OF SHELF AREA.
3. CONTRACTOR TO WORK WITH SOILS SCIENTIST TO ENSURE SOILS ARE ADEQUATE TO SUPPORT PROPER ESTABLISHMENT AND GROWTH OF THE AQUATIC PLANTINGS. CONTRACTOR TO AMEND SOILS AND INSTALL SOILS IN PLANT, SHRUB, AND TREE AREAS PER DETAILS, SOIL SPECIFICATIONS. NCDENR SPECIFICATION, AND SOIL SCIENTIST RECOMMENDATIONS.
4. ALL AQUATIC PLANTINGS ARE TO BE INSTALLED DURING THE APPROPRIATE TIME OF YEAR TO ENSURE SURVIVABILITY. (LAST SPRING FROST AND THE FIRST FALL FROST)
5. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
6. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP, THE BASIN MUST BE CLEANED OUT, GRADED, APPROPRIATE AREAS COVERED WITH 4" OF TOPSOIL AS SPECIFIED IN NOTE #2 ABOVE, AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



STORMWATER CONTROL MEASURE 'O' LANDSCAPE PLAN VIEW
1" = 20'

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ____________________ Date: ____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ____________________ Date: ____________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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SUNCREST REAL ESTATE & LAND
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#180 BILTMORE PARK
PHOENIX, AZ 85016
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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048334 ENGINEER JEREMY K. WOOSTER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-O
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE "O" LANDSCAPE PLAN

C9.11

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-O.dwg, 7/3/2024 3:06:39 PM, Zach Lee

STORMWATER CONTROL MEASURE 'P' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.

2. THE PROJECT WILL MEET ALL OF THE REQUIREMENTS RELATIVE TO BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE LAND DEVELOPMENT ORDINANCE. (CHAPTER 6, PART 4, UDO)

3. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.

4. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.

5. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:
   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.
   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE.
   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE, NOTE 14.1-14.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.
   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, THE CONTRACTOR SHALL CONSTRUCT THE INTERIOR GRADING SHOWN ON THIS SHEET.
   E. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER CONTROL MEASURE PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
   F. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN.
6. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.

7. ON-SITE GEOTECHNICAL ENGINEER TO DETERMINE IF IN-SITU SOILS ENCOUNTERED WOULD MAINTAIN A STORMWATER CONTROL MEASURE PERMANENT POOL AT DESIGN ELEVATION. IF HIGHLY PERMEABLE SOILS ARE ENCOUNTERED THAT WOULD NOT MAINTAIN THE PERMANENT POOL ELEVATION AS DESIGNED, A CLAY LINER MAY BE REQUIRED TO MAINTAIN A PERMANENT POOL OF WATER IN THE STORMWATER CONTROL MEASURE. FINAL DETERMINATION IF A CLAY LINER IS NEEDED SHALL BE THE RESPONSIBILITY OF THE ON-SITE GEOTECHNICAL ENGINEER. UPON DETERMINATION OF HIGHLY PERMEABLE SOIL CONDITIONS, ON-SITE GEOTECHNICAL ENGINEER WILL INFORM THE DESIGN ENGINEER AND RECOMMEND LINER SPECIFICATIONS.

8. IT IS ANTICIPATED THAT DEWATERING WILL BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).

9. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THE WETLAND PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE WETLAND AS DIRECTED BY A LANDSCAPE PROFESSIONAL.

10. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT AND WETLAND. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT AND WETLAND.

11. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THIS FACILITY. CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION. PLEASE NOTE THAT NO TREES/SHRUBS OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS).

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 24"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4.

2. THE STRUCTURAL DESIGN FOR THE 4' X 4' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.

3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.13 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.

4. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.14. THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 7,586 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 10,437 LBS.

5. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT AND INSTALL GALVANIZED STEEL STRAPS PER DETAIL ON SHEET C9.13.

6. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.

7. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:

   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.

8. GEOTEXTILE FABRIC FOR THE 24"Ø RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).

9. STORMWATER CONTROL MEASURE EMERGENCY DRAW DOWN IS VIA AN 6"Ø PLUG VALVE. THE VALVE SHALL BE A M&H STYLE 1820 ECCENTRIC VALVE OR APPROVED EQUAL. THIS VALVE IS IN ACCORDANCE WITH AWWA C-517, AND SHALL BE OPERABLE FROM TOP OF OUTLET STRUCTURE VIA A HAND WHEEL (SEE DETAIL SHEET C9.13). THE CONTRACTOR SHALL PROVIDE A REMOVABLE VALVE WRENCH WITH A HAND WHEEL ON TOP FOR OPERATION OF THE 6"Ø PLUG VALVE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

CONSTRUCTION SEQUENCE

1. PRIOR TO CONSTRUCTION, THE OWNER SHALL OBTAIN A LAND DISTURBING (GRADING) PERMIT AND AN "APPROVAL TO CONSTRUCT" FROM THE TOWN OF KNIGHTDALE AND ALL OTHER NECESSARY PERMITS FROM APPLICABLE AGENCIES (E.G. 404 / 401 PERMITS)

2. INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES PER THE APPROVED SEDIMENT AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL MAINTAIN ALL APPROVED SEDIMENT AND EROSION CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT, AS REQUIRED. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE EROSION CONTROL INSPECTOR, AS REQUIRED BY GOVERNING AGENCIES, PRIOR TO ANY CLEARING.

3. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.

4. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 24"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.

5. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.

6. PRIOR TO INSTALLATION, SUBGRADE CONDITIONS ALONG THE SPILLWAY PIPES SHOULD BE EVALUATED BY THE ON-SITE GEOTECHNICAL ENGINEER TO ASSESS WHETHER SUITABLE BEARING CONDITIONS EXIST AT THE SUBGRADE LEVEL. SHOULD SOFT OR OTHERWISE UNSUITABLE CONDITIONS BE ENCOUNTERED ALONG THE PIPE ALIGNMENTS, THESE MATERIALS SHOULD BE UNDERCUT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE UNDERCUT MATERIALS SHALL BE REPLACED WITH ADEQUATELY COMPACTED STRUCTURAL FILL, LEAN CONCRETE OR FLOWABLE FILL AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. IN ORDER TO HELP PROTECT THE SOIL SUBGRADE FROM DETERIORATION (DUE TO EXPOSURE, RAINFALL, SEEPAGE, AND RUNOFF) BEFORE THE CRADLE CAN BE POURED, IT IS STRONGLY RECOMMENDED THAT A 3" TO 4" THICK CONCRETE MUD MAT BE POURED OVER THE SUBGRADE ONCE IT IS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE MUD MAT WILL ALSO PROVIDE BEARING FOR THE BLOCKS THAT TEMPORARILY SUPPORT THE SPILLWAY PIPE UNTIL THE CRADLE CAN BE POURED. THE METHOD OF BLOCK SUPPORT FOR THE PIPE PROPOSED BY THE CONTRACTOR SHOULD BE SUBMITTED TO THE JOHN R. McADAMS COMPANY FOR REVIEW.

8. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.

9. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.14). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:

   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.

   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS

10. AS AN ALTERNATE TO A CONCRETE CRADLE UNDER THE BARREL PIPE (SEE SHEET C9.14), THE CONTRACTOR MAY CHOOSE TO ELIMINATE THE CONCRETE CRADLE AND USE COMPACTED BACKFILL IF THE ON-SITE GEOTECHNICAL ENGINEER WILL PROVIDE A NC PE SEALED LETTER CERTIFYING THAT THE COMPACTION UNDER, AROUND, AND ABOVE THE BARREL MEETS THE SPECIFICATIONS OF THE EMBANKMENT COMPACTION REQUIREMENTS AND MOISTURE CONTENT. THIS CERTIFICATION LETTER MUST BE SUBMITTED TO THE DESIGN ENGINEER PRIOR TO BACKFILL. THIS SEPARATE CERTIFICATION MUST BE SPECIFIC TO THE BARREL PIPE FOR THE FACILITY, AND MUST CLEARLY STATE THAT ALL SOIL MATERIAL UNDER, AROUND, AND ABOVE THE BARREL PIPE MEETS THE BERM AND SOIL COMPACTION SPECIFICATIONS ON THIS SHEET. THIS CERTIFICATION IS TO INCLUDE REFERENCE TO BOTH MATERIAL AND COMPACTION, AND MUST STATE THAT ALL MATERIALS UNDER, AROUND, AND ABOVE THE BARREL HAVE BEEN COMPACTED PER THE BERM MATERIAL SPECIFICATIONS (AT LEAST 95% OF MAXIMUM DRY DENSITY USING ASTM D698 STANDARD PROCTOR) WITH NO VOID SPACES PRESENT. THE CONTRACTORS INTENT TO UTILIZE THIS ALTERNATIVE MUST BE STATED PRIOR TO CONSTRUCTION TAKING PLACE. THIS CONTRACTORS CERTIFICATION MUST BE PRESENTED TO THE DESIGN ENGINEER BEFORE AN AS-BUILT CERTIFICATION CAN BE ISSUED FOR THIS FACILITY.

11. INSTALL RISER / BARREL ASSEMBLY, ALONG WITH THE EMERGENCY DRAIN SYSTEM. INSTALL 24" RCP OUTLET BARREL SPILLWAY FILTER FROM THE DETAILS SHOWN ON SHEET C9.14.

12. CONSTRUCT EMBANKMENT PER SPECIFICATIONS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS" AND REQUIREMENTS OF THE ON-SITE GEOTECHNICAL ENGINEER. ALL CHARACTERISTICS OF THE EMBANKMENT FILL MATERIAL SHALL MEET THE STANDARDS SET FORTH IN "BERM AND SOIL COMPACTION SPECIFICATIONS", INCLUDING COMPACTION AND MOISTURE REQUIREMENTS. IF NECESSARY TO ACHIEVE PROPER COMPACTION, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO PROPER FINAL GRADE. ANY HAND COMPACTION ACTIVITIES AROUND SPILLWAY OR DRAIN STRUCTURES SHALL BE CONDUCTED IN 4-INCH LOOSE LIFTS AND BE TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT. ALL COMPACTION AND MOISTURE TESTING SHALL BE CARRIED OUT AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER AND AS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS".

13. UPON COMPLETION OF DAM EMBANKMENT, PROMPTLY STABILIZE AND SEED DAM EMBANKMENT PER SEEDING SCHEDULE. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER THE PERMANENT SEEDING SCHEDULE FOUND ON SHEET C9.15.

14. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.

   14.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
   14.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
   14.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
   14.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
   14.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
   14.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.

15. SCHEDULE A FINAL AS-BUILT INSPECTION AND AS-BUILT SURVEY WITH THE ENGINEER AND SURVEYOR. AN AS-BUILT INSPECTION AND SURVEY SHALL BE SCHEDULED BEFORE IMPOUNDING WATER IN THE FACILITY AND A MINIMUM OF 60 DAYS PRIOR TO THE ANTICIPATED DATE OF CERTIFICATION APPROVAL. ANY COMMENTS OR DEFICIENCIES IN THE SCM CONSTRUCTION MUST BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND OWNER BEFORE CERTIFICATION SHALL BE GRANTED.

BERM AND SOIL COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.

2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.

3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.

4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.

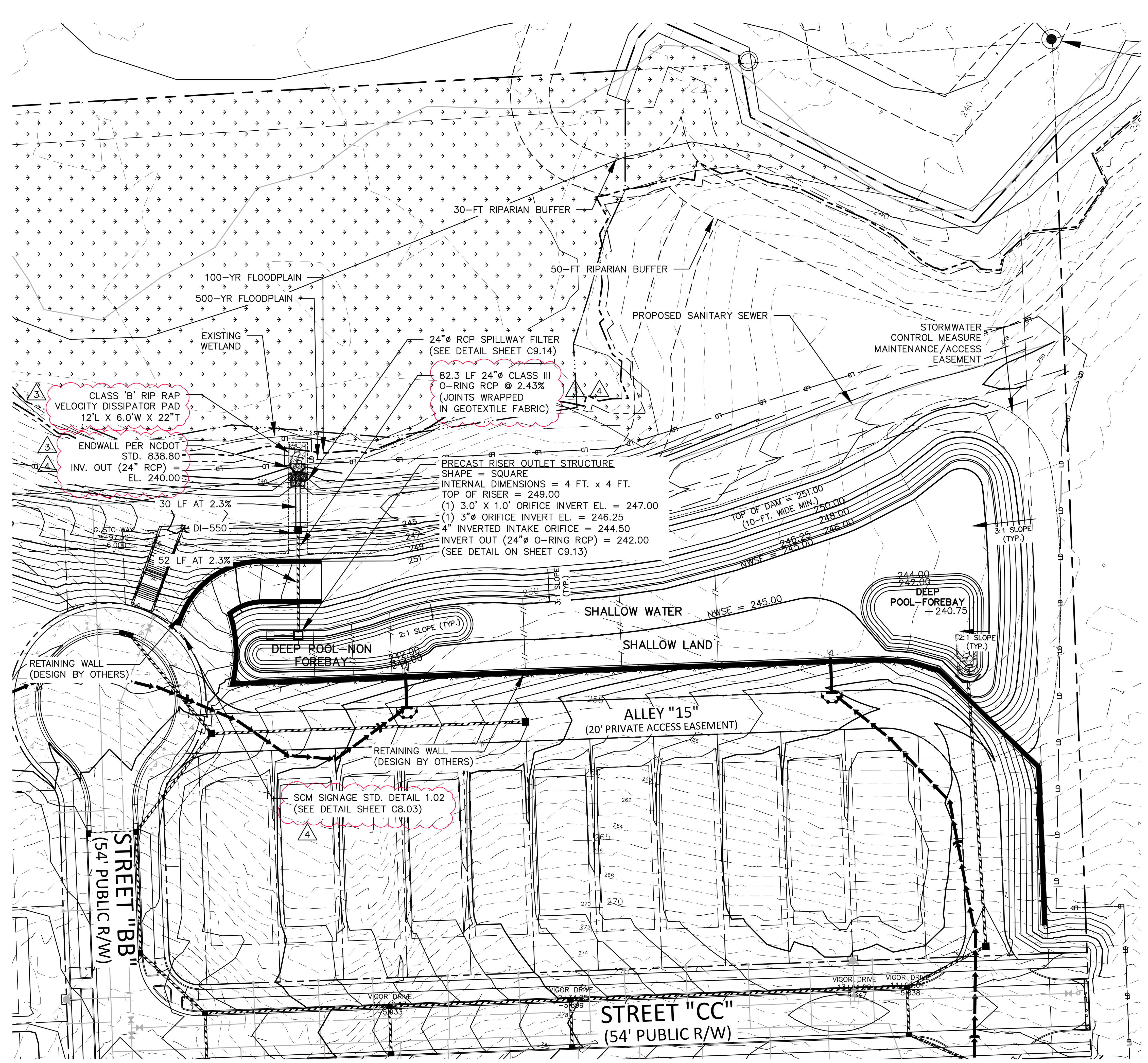
5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.

6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL OR AS RECOMMENDED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. TESTING WILL BE REQUIRED ALONG THE 24"Ø RCP OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL OR AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

STATEMENT OF RESPONSIBILITY

1. ALL REQUIRED MAINTENANCE AND INSPECTIONS OF THE STORMWATER CONTROL MEASURE SHALL BE THE RESPONSIBILITY OF THE OWNER, PER THE EXECUTED OPERATION AND MAINTENANCE AGREEMENT FOR THIS FACILITY.



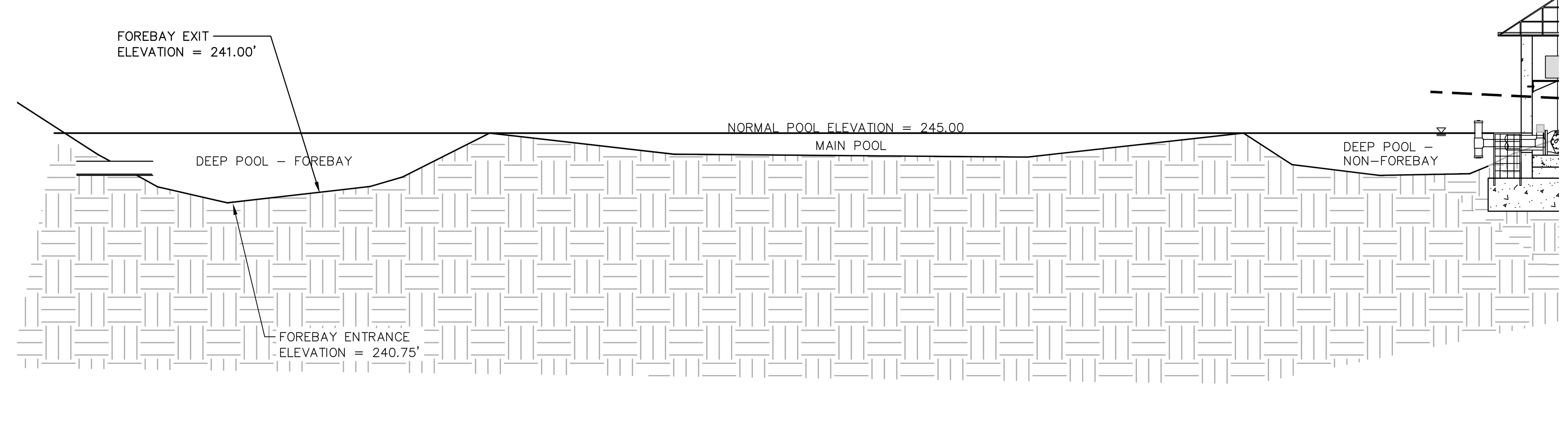
GRAPHIC SCALE

0 20 40 80

1 inch = 40 ft.

STORMWATER CONTROL MEASURE 'P' PLAN VIEW

1" = 40'



FOREBAY AND MAIN POOL CROSS-SECTION (TYPICAL)

N.T.S

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ____________________ Date: ______________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ____________________ Date: ______________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048334 ENGINEER JEREMY K. WOOSTER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

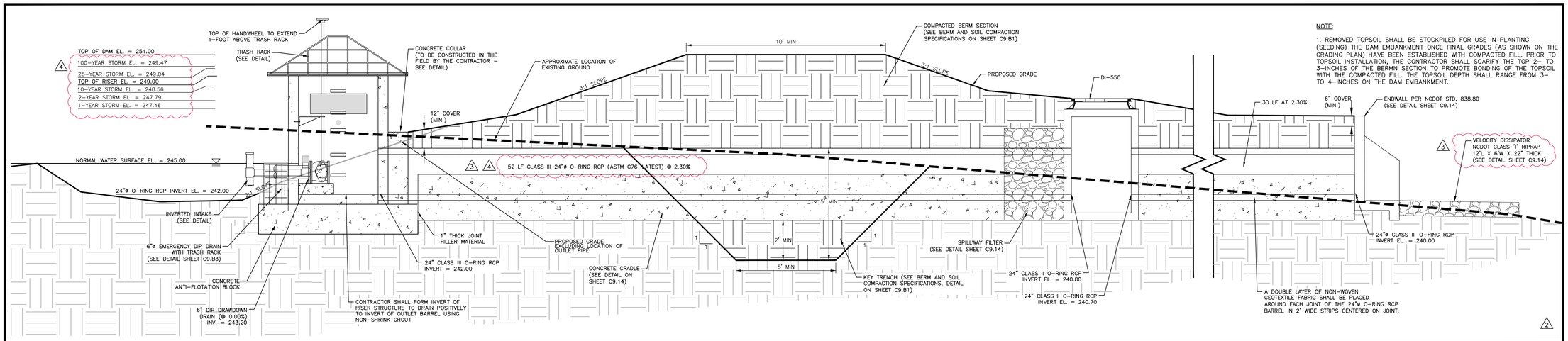
PROJECT NO.	2020110062
FILENAME	2020110062-SW-P
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL "P" MEASURE PLAN VIEW

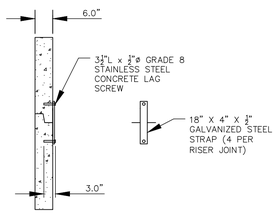
C9.12

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-P.dwg, 7/3/2024 3:08:35 PM, Zach Lee



NOTE:

1. REMOVED TOPSOIL SHALL BE STOCKPILED FOR USE IN PLANTING (SEEDING) THE DAM EMBANKMENT ONCE FINAL GRADES (AS SHOWN ON THE GRADING PLAN) HAVE BEEN ESTABLISHED WITH COMPACTED FILL. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2- TO 3-INCHES OF THE BERMN SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3- TO 4-INCHES ON THE DAM EMBANKMENT.



RISER JOINT CONNECTION DETAIL
N.T.S.

NOTES:

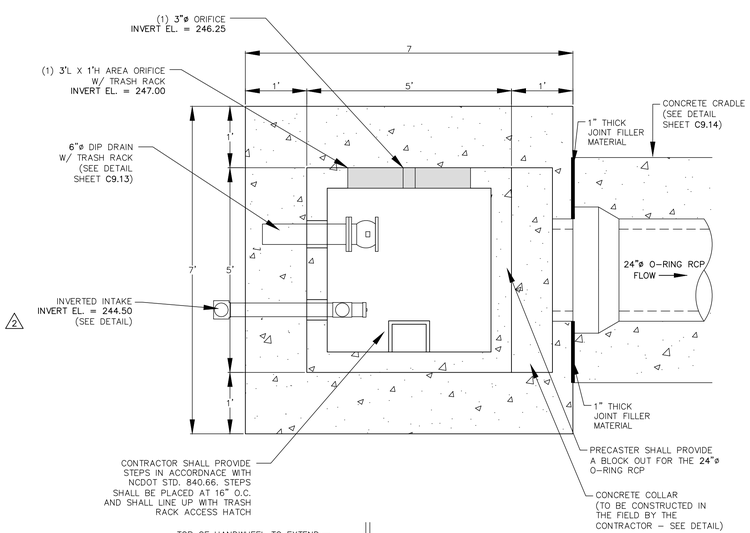
1. CONCRETE ANTI-FLOTATION BLOCK TO BE PROVIDED WITH MINIMUM TEMPERATURE AND SHRINKAGE STEEL REINFORCEMENT.

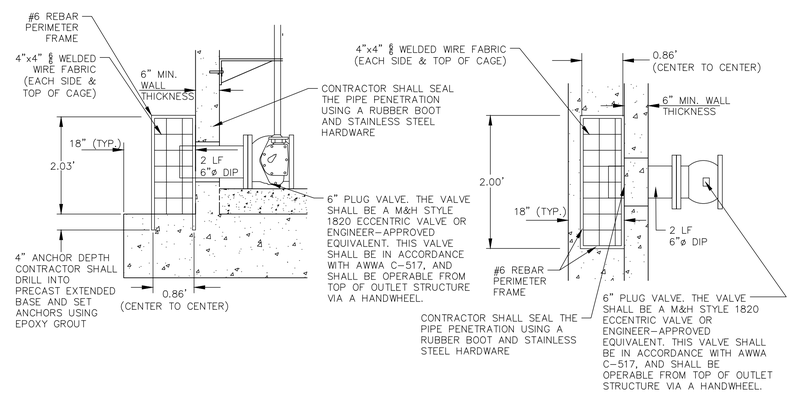
2. TRASH RACKS NOT SHOWN FOR CLARITY.

3. THE NUMBER OF GUIDES FOR THE VALVE STEM SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THE VALVE STEM MUST BE OPERABLE FROM THE TOP OF THE RISER VIA THE HANDWHEEL WITH AN INSIGNIFICANT AMOUNT OF PLAY IN THE VALVE STEM.

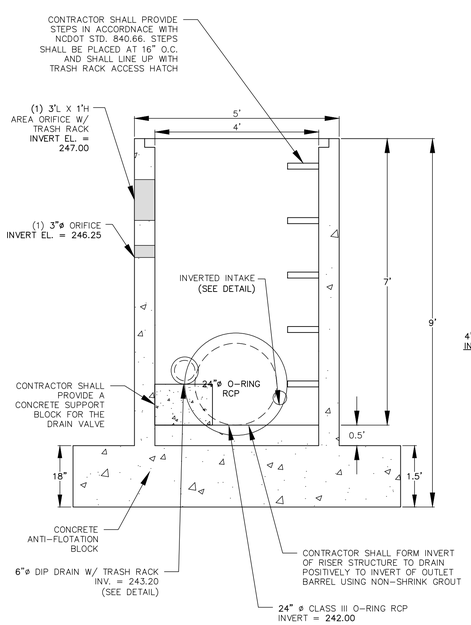
4. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

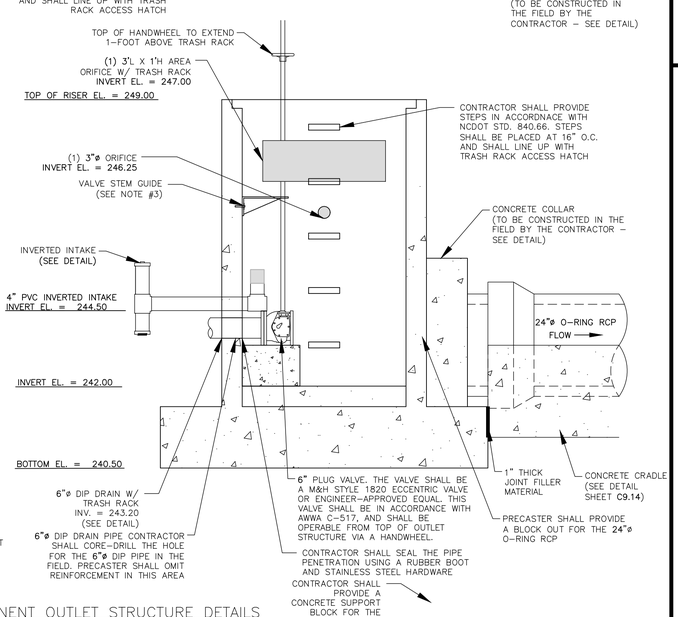
5. FIRST JOINT SHALL BE IN LINE WITH THE EDGE OF THE ANTI-FLOAT BLOCK.



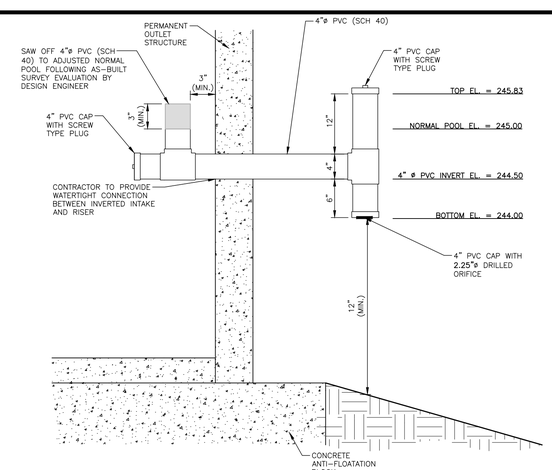


6"ø EMERGENCY DIP DRAIN TRASH RACK DETAILS
N.T.S.





PERMANENT OUTLET STRUCTURE DETAILS
N.T.S.



INVERTED INTAKE OUTLET DETAIL
N.T.S.

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SHEET

STORMWATER CONTROL MEASURE 'P' DETAILS

C9.13

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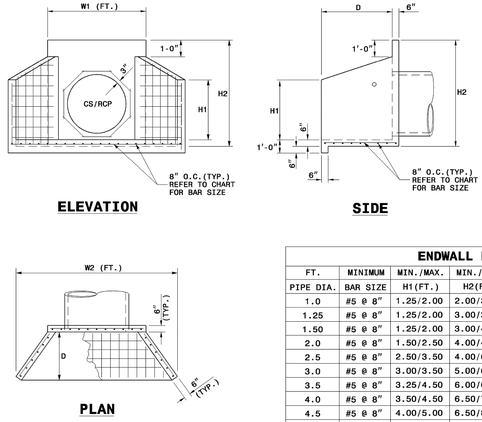
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80



NOTES:

- THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.21, 838.27, 838.33 AND 838.39.
- INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
- USE 4000 PSI CONCRETE.
- PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
- ALL ELEMENTS PRECAST TO MEET ASTM C913.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
- CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 8" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.

ENDWALL DIMENSIONS

FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

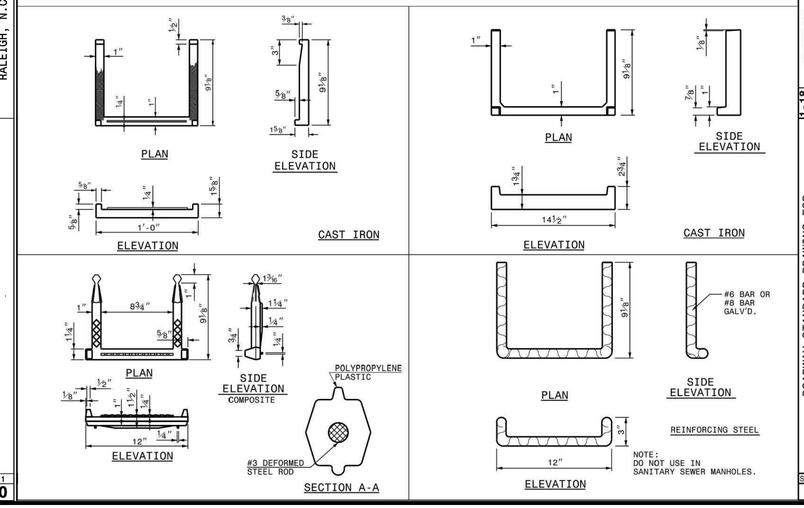
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80

NOTES:
INSTALL ALL STEPS PROTRUDING 4" FROM INSIDE FACE OF STRUCTURE WALL.
STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS OF THE PROPOSED STEPS AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.



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

1-18

ROADWAY STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

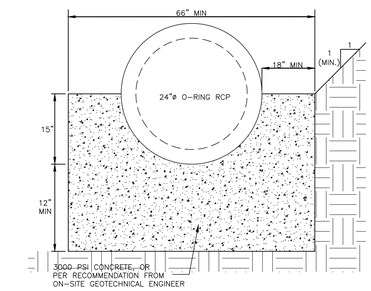
SHEET 1 OF 1
840.66

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

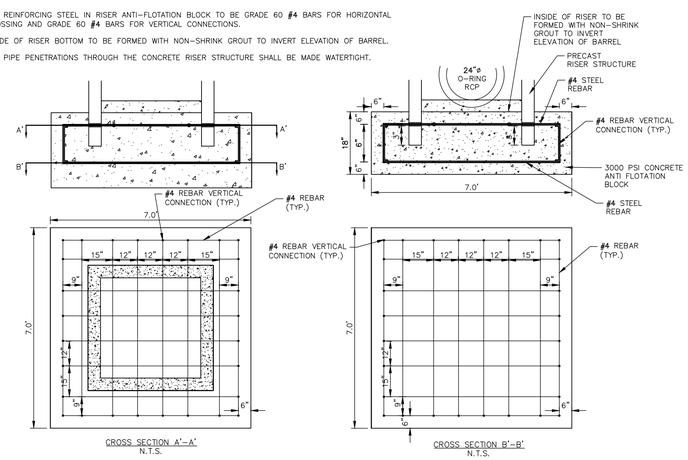
1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE **24"ø** O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON 24"ø RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



24" CONCRETE CRADLE DETAIL
N.T.S.

NOTES:

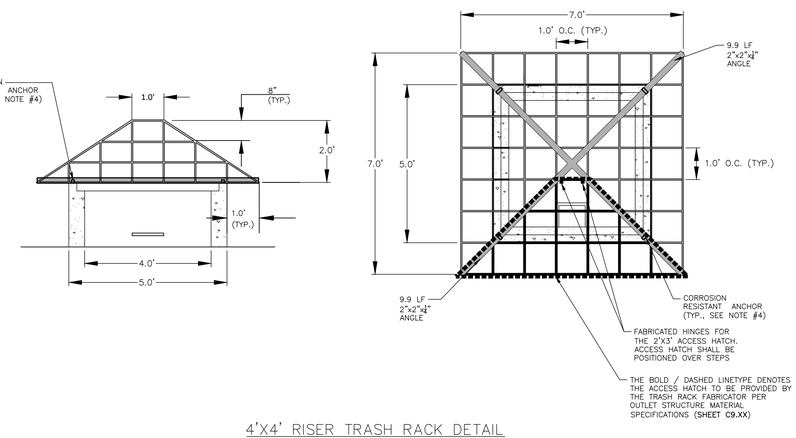
1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.



RISER/ANTI-FLOTATION BLOCK CONNECTION
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. ALL REBAR AND ANGLES TO BE HOT-DIPPED GALVANIZED AND BE PROVIDED WITH AN EPOXY COATING.
3. THE HOT-DIPPED, GALVANIZED 2"x2"x1/4" ANGLES SHALL BE WELDED TO THE REBAR TRASH RACK. ONCE WELDED, THE ENTIRE ASSEMBLY SHALL BE PLACED ONTO THE RISER WITH ANGLES SITTING DIRECTLY ON TOP OF RISER.
4. TRASH RACK IS TO BE SECURELY FASTENED TO THE SPILLWAY RISER WITH A MINIMUM OF FOUR CORROSION-RESISTANT ANCHORS.
5. ACCESS HATCH SHALL ALIGN WITH STEPS IN RISER.



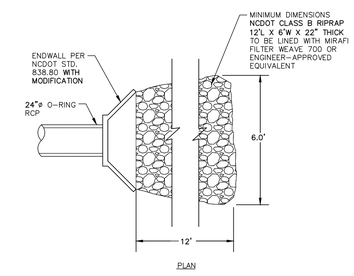
4'X4' RISER TRASH RACK DETAIL
N.T.S.

NOTES:

1. A FILTER BLANKET IS TO BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION. THE FILTER BLANKET WILL CONSIST OF A MINIMUM 4" THICK LAYER OF STONE (NCDOT #57) UNDERLAIN WITH MIRAFI FILTER WEAVE 700 OR ENGINEER-APPROVED EQUIVALENT.

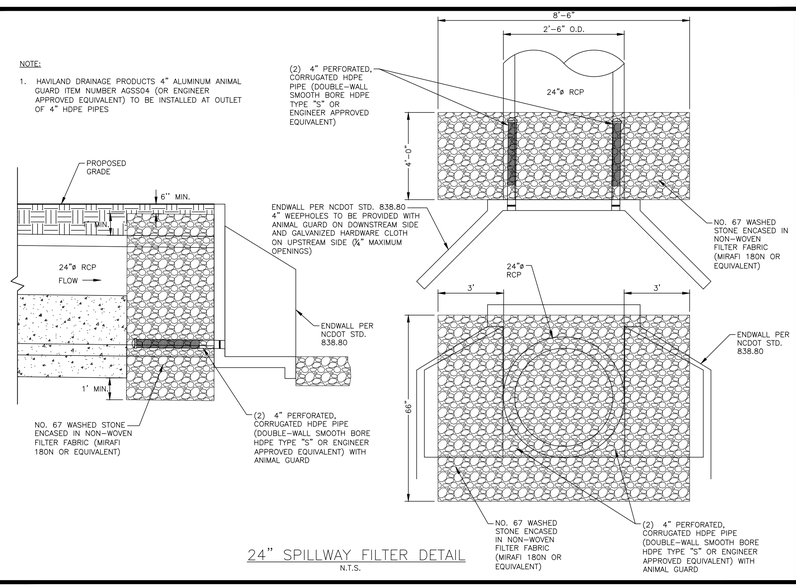
ADDITIONAL NOTE TO INCLUDE IF OUTLETTING TO A CHANNEL:

1. RIPRAP TO EXTEND TO TOP OF CHANNEL WITH 2:1 SIDE SLOPES THROUGHOUT THE EXTENT OF CHANNEL.



NOTE:

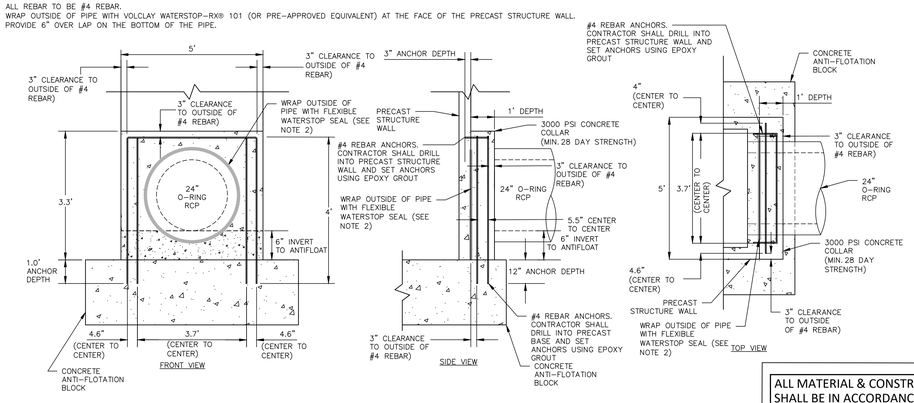
1. HAVILAND DRAINAGE PRODUCTS 4" ALUMINUM ANIMAL GUARD ITEM NUMBER AGSS04 (OR ENGINEER APPROVED EQUIVALENT) TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES



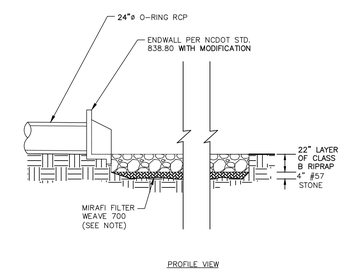
24" SPILLWAY FILTER DETAIL
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.



24"ø CONCRETE COLLAR DETAIL
N.T.S.



OUTLET BARREL VELOCITY DISSIPATER
N.T.S.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT VALID WITHOUT ORIGINAL SEAL

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-P
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'P' DETAILS

C9.14

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-P.dwg, 7/3/2024 3:09:40 PM, Zach Lee

STORMWATER CONTROL MEASURE 'P' PLANTING PLAN SPECIFICATIONS

LEGEND

QTY.	SYM.	SCIENTIFIC NAME	COMMON NAME	HATCH	TYPE	SPACING	% OF TOTAL AREA	PROVIDED AREA
LOW MARSH (SHALLOW WATER, TOTAL AREA = 1,535 SF)								
664	AC	ACORUS CALAMUS	SWEETFLAG		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 32%	2,654 SF
667	PP	PONTEDERIA PECTINATUS	PICKEREL WEED		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	2,665 SF
662	NL	NUPHAR LUTEA SSP. ADVENA	YELLOW POND-LILY		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	2,648 SF
HIGH MARSH (SHALLOW LAND, TOTAL AREA = 1,782 SF)								
639	SC	SAURURUS CERNUUS	LIZARD'S TAIL		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 30%	2,553 SF
644	HA	HELENIUM AUTUMNALE	SNEEZEWEED		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	2,576 SF
649	CG	CHELONE GLABRA	WHITE TURTLEHEAD		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 35%	2,593 SF
EMBANKMENTS								
			HYBRID BERMUDA					

SEEDBED PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND SHALLOW LAND AND SHALLOW WATER AREAS. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SEEDBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDED AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
9. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
	KOBE LESPEDEZA	50 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

NOTE: USE THE TEMPORARY SEEDING SCHEDULE ONLY WHEN DATE IS NOT CORRECT TO USE THE PERMANENT SEEDING SCHEDULE.

PERMANENT SEEDING SCHEDULE (DAM EMBANKMENTS)

SEEDING DATE	SEEDING MIXTURE OPTIONS (CHOOSE ONE)	APPLICATION RATE
MARCH 1 - JUNE 31	HYBRID BERMUDA GRASS	1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)
SEPT 1 - OCT 31		1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 1000 LB/AC 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR; USE SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

NOTE: PERMANENT SEEDING SCHEDULE IS FOR SLOPES OF THE BASIN AND TOP OF BERM. SEE REQUIRED TOWN OF KINIGHTDALE SCM BASIN REMOVAL SEQUENCE NOTE 13 ON SHEET C9.04 FOR PERMANENT SEEDING CONSTRUCTION SEQUENCE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   - A. CONCRETE CRADLE
   - B. ANTI-SEEP COLLAR
   - C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
- A. SUBRADE OR CONSTRUCTED FOUNDATION
- B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
- C. FILTER MEDIA
- D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

PLANTING INSTRUCTIONS

PLANTING TECHNIQUES
- A. INSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
- B. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
- C. PLACE PLANTS IN PIT INSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
- D. HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
- E. NEWLY PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
- F. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS HALL BE CUT OFF CLEANLY.
- G. THE DIAMETER OF THE PITS FOR ALL VEGETATIVE STOCK SHALL BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. PLANT PIT WALL SHALL BE SCARIFIED PRIOR TO PLANT INSTALLATION.
- H. SET THE PLANTS UPRIGHT, IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
- I. PLACE THE BACKFILL AROUND THE BASE AND SIDES OF THE ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
- J. BROKEN OR DAMAGED PARTS WILL BE CUT BACK TO UNDAMAGED TISSUE, LEAVING AS MUCH GREEN BASAL TISSUE AS POSSIBLE ABOVE THE ROOTS. IF MORE THAN FIFTY PERCENT (50%) OF THE PLANT IS DAMAGED THEN CONTRACTOR SHALL REPLACE THE PLANT.

CONTAINER STOCK / BARE ROOT
- A. STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
- B. CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
- C. BARE ROOT PLANTS ARE FOR IMMEDIATE PLANTING, OTHERWISE SEE D) BELOW.
- D. IF BARE ROOTS SPECIMENS ARE NOT TO BE PLANTED WITHIN FOUR (4) DAYS, TEMPORARY HOLDING OF BARE ROOT SPECIMENS ARE TO BE COVERED ENTIRELY BY A SUITABLE MEDIUM (ETC. SOIL, SAWDUST, MULCH OR THE LIKE) AND WATERED REGULARLY SO AS TO NOT DRY OUT.

PLANT LOCATIONS
- A. NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE IN PROPOSED CONSTRUCTION.
- B. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.

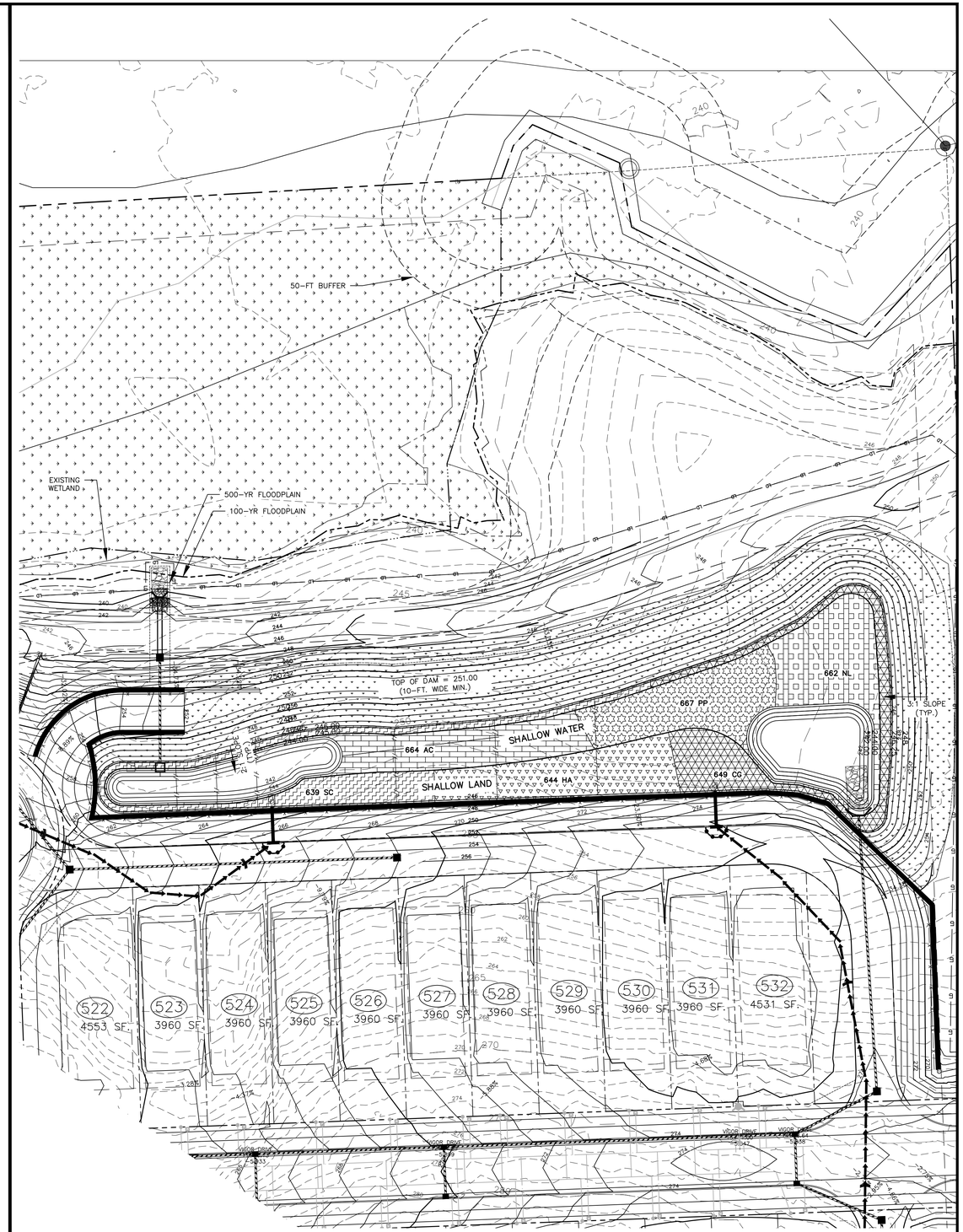
WATER
WATER SHALL BE POTABLE AND SHALL NOT CONTAIN ELEMENTS TOXIC TO PLANT LIFE.

PLANTING SCHEDULE

1. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER MANAGEMENT FACILITY PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
2. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER MANAGEMENT FACILITY PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER MANAGEMENT FACILITY PLANTING PLAN. 90% GERMINATION REQUIRED OF NON-CLUMPING TURF GRASS PRIOR TO FINAL CERTIFICATION.
3. OPTIMAL PLANTING PERIODS RANGE APPROXIMATELY FROM APRIL 15TH THRU JUNE 30TH AND SEPTEMBER 1ST THRU OCTOBER 31ST. FOR FINAL DETERMINATION OF THE SITE'S PLANTING PERIOD, THE CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION.
4. IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PREVENT WILDLIFE FROM DAMAGING OR CONSUMING WETLAND PLANTINGS.

TOWN OF KNIGHTDALE SCM PLANTING NOTES

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. THE VEGETATED SHELF SHALL BE PLANTED WITH A MINIMUM OF THREE DIVERSE SPECIES OF HERBACEOUS, NATIVE VEGETATION AT A MINIMUM DENSITY OF 50 PLANTS PER 200 FEET OF SHELF AREA.
3. CONTRACTOR TO WORK WITH SOILS SCIENTIST TO ENSURE SOILS ARE ADEQUATE TO SUPPORT PROPER ESTABLISHMENT AND GROWTH OF THE AQUATIC PLANTINGS. CONTRACTOR TO AMEND SOILS AND INSTALL SOILS IN PLANT, SHRUB, AND TREE AREAS PER DETAILS, SOIL SPECIFICATIONS. NCDENR SPECIFICATION, AND SOIL SCIENTIST RECOMMENDATIONS.
4. ALL AQUATIC PLANTINGS ARE TO BE INSTALLED DURING THE APPROPRIATE TIME OF YEAR TO ENSURE SURVIVABILITY. (LAST SPRING FROST AND THE FIRST FALL FROST)
5. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
6. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP, THE BASIN MUST BE CLEANED OUT, GRADED, APPROPRIATE AREAS COVERED WITH 4" OF TOPSOIL AS SPECIFIED IN NOTE #2 ABOVE, AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



STORMWATER CONTROL MEASURE 'P' LANDSCAPE PLAN VIEW
1" = 30'

GRAPHIC SCALE
0 15 30 60
1 inch = 30 ft.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048334 JEREMY K. WOOSTER
NOT VALID WITHOUT ORIGINAL SIGNATURE

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-P
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET
STORMWATER CONTROL MEASURE "P" LANDSCAPE PLAN
C9.15

M:\Projects\SU\C\2020110062\04-Production\Water Resource\Phase 1\Site Plan - Construction Drawings\Current Drawing\2020110062-SW-P.dwg, 7/3/2024 3:10:04 PM, Zach Lee

STORMWATER CONTROL MEASURE 'Q' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.

2. THE PROJECT WILL MEET ALL OF THE REQUIREMENTS RELATIVE TO BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE LAND DEVELOPMENT ORDINANCE. (CHAPTER 6, PART 4, UDO)

3. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.

4. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.

5. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:
   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.
   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE.
   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE, NOTE 14.1-14.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.
   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, THE CONTRACTOR SHALL CONSTRUCT THE INTERIOR GRADING SHOWN ON THIS SHEET.
   E. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER CONTROL MEASURE PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
   F. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN.
6. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.

7. ON-SITE GEOTECHNICAL ENGINEER TO DETERMINE IF IN-SITU SOILS ENCOUNTERED WOULD MAINTAIN A STORMWATER CONTROL MEASURE PERMANENT POOL AT DESIGN ELEVATION. IF HIGHLY PERMEABLE SOILS ARE ENCOUNTERED THAT WOULD NOT MAINTAIN THE PERMANENT POOL ELEVATION AS DESIGNED, A CLAY LINER MAY BE REQUIRED TO MAINTAIN A PERMANENT POOL OF WATER IN THE STORMWATER CONTROL MEASURE. FINAL DETERMINATION IF A CLAY LINER IS NEEDED SHALL BE THE RESPONSIBILITY OF THE ON-SITE GEOTECHNICAL ENGINEER. UPON DETERMINATION OF HIGHLY PERMEABLE SOIL CONDITIONS, ON-SITE GEOTECHNICAL ENGINEER WILL INFORM THE DESIGN ENGINEER AND RECOMMEND LINER SPECIFICATIONS.

8. IT IS ANTICIPATED THAT DEWATERING WILL BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).

9. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THE WETLAND PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE WETLAND AS DIRECTED BY A LANDSCAPE PROFESSIONAL.

10. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT AND WETLAND. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT AND WETLAND.

11. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THIS FACILITY. CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION. PLEASE NOTE THAT NO TREES/SHRUBS OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS).

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 24"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4.

2. THE STRUCTURAL DESIGN FOR THE 4' X 4' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.

3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.17 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.

4. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.18. THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 8,295 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 10,437 LBS.

5. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT AND INSTALL GALVANIZED STEEL STRAPS PER DETAIL ON SHEET C9.17.

6. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.

7. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:

   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.

8. GEOTEXTILE FABRIC FOR THE 24"Ø RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).

9. STORMWATER CONTROL MEASURE EMERGENCY DRAW DOWN IS VIA AN 6"Ø PLUG VALVE. THE VALVE SHALL BE A M&H STYLE 1820 ECCENTRIC VALVE OR APPROVED EQUAL. THIS VALVE IS IN ACCORDANCE WITH AWWA C-517, AND SHALL BE OPERABLE FROM TOP OF OUTLET STRUCTURE VIA A HAND WHEEL (SEE DETAIL SHEET C9.17). THE CONTRACTOR SHALL PROVIDE A REMOVABLE VALVE WRENCH WITH A HAND WHEEL ON TOP FOR OPERATION OF THE 6"Ø PLUG VALVE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

CONSTRUCTION SEQUENCE

1. PRIOR TO CONSTRUCTION, THE OWNER SHALL OBTAIN A LAND DISTURBING (GRADING) PERMIT AND AN "APPROVAL TO CONSTRUCT" FROM THE TOWN OF KNIGHTDALE AND ALL OTHER NECESSARY PERMITS FROM APPLICABLE AGENCIES (E.G. 404 / 401 PERMITS)

2. INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES PER THE APPROVED SEDIMENT AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL MAINTAIN ALL APPROVED SEDIMENT AND EROSION CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT, AS REQUIRED. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE EROSION CONTROL INSPECTOR, AS REQUIRED BY GOVERNING AGENCIES, PRIOR TO ANY CLEARING.

3. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.

4. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 24"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.

5. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.

6. PRIOR TO INSTALLATION, SUBGRADE CONDITIONS ALONG THE SPILLWAY PIPES SHOULD BE EVALUATED BY THE ON-SITE GEOTECHNICAL ENGINEER TO ASSESS WHETHER SUITABLE BEARING CONDITIONS EXIST AT THE SUBGRADE LEVEL. SHOULD SOFT OR OTHERWISE UNSUITABLE CONDITIONS BE ENCOUNTERED ALONG THE PIPE ALIGNMENTS, THESE MATERIALS SHOULD BE UNDERCUT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE UNDERCUT MATERIALS SHALL BE REPLACED WITH ADEQUATELY COMPACTED STRUCTURAL FILL, LEAN CONCRETE OR FLOWABLE FILL AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. IN ORDER TO HELP PROTECT THE SOIL SUBGRADE FROM DETERIORATION (DUE TO EXPOSURE, RAINFALL, SEEPAGE, AND RUNOFF) BEFORE THE CRADLE CAN BE POURED, IT IS STRONGLY RECOMMENDED THAT A 3" TO 4" THICK CONCRETE MUD MAT BE POURED OVER THE SUBGRADE ONCE IT IS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE MUD MAT WILL ALSO PROVIDE BEARING FOR THE BLOCKS THAT TEMPORARILY SUPPORT THE SPILLWAY PIPE UNTIL THE CRADLE CAN BE POURED. THE METHOD OF BLOCK SUPPORT FOR THE PIPE PROPOSED BY THE CONTRACTOR SHOULD BE SUBMITTED TO THE JOHN R. McADAMS COMPANY FOR REVIEW.

8. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.

9. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.18). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:

   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.

   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS

10. AS AN ALTERNATE TO A CONCRETE CRADLE UNDER THE BARREL PIPE (SEE SHEET C9.18), THE CONTRACTOR MAY CHOOSE TO ELIMINATE THE CONCRETE CRADLE AND USE COMPACTED BACKFILL IF THE ON-SITE GEOTECHNICAL ENGINEER WILL PROVIDE A NC PE SEALED LETTER CERTIFYING THAT THE COMPACTION UNDER, AROUND, AND ABOVE THE BARREL MEETS THE SPECIFICATIONS OF THE EMBANKMENT COMPACTION REQUIREMENTS AND MOISTURE CONTENT. THIS CERTIFICATION LETTER MUST BE SUBMITTED TO THE DESIGN ENGINEER PRIOR TO BACKFILL. THIS SEPARATE CERTIFICATION MUST BE SPECIFIC TO THE BARREL PIPE FOR THE FACILITY, AND MUST CLEARLY STATE THAT ALL SOIL MATERIAL UNDER, AROUND, AND ABOVE THE BARREL PIPE MEETS THE BERM AND SOIL COMPACTION SPECIFICATIONS ON THIS SHEET. THIS CERTIFICATION IS TO INCLUDE REFERENCE TO BOTH MATERIAL AND COMPACTION, AND MUST STATE THAT ALL MATERIALS UNDER, AROUND, AND ABOVE THE BARREL HAVE BEEN COMPACTED PER THE BERM MATERIAL SPECIFICATIONS (AT LEAST 95% OF MAXIMUM DRY DENSITY USING ASTM D698 STANDARD PROCTOR) WITH NO VOID SPACES PRESENT. THE CONTRACTORS INTENT TO UTILIZE THIS ALTERNATIVE MUST BE STATED PRIOR TO CONSTRUCTION TAKING PLACE. THIS CONTRACTORS CERTIFICATION MUST BE PRESENTED TO THE DESIGN ENGINEER BEFORE AN AS-BUILT CERTIFICATION CAN BE ISSUED FOR THIS FACILITY.

11. INSTALL RISER / BARREL ASSEMBLY, ALONG WITH THE EMERGENCY DRAIN SYSTEM. INSTALL 24" RCP OUTLET BARREL SPILLWAY FILTER FROM THE DETAILS SHOWN ON SHEET C9.18.

12. CONSTRUCT EMBANKMENT PER SPECIFICATIONS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS" AND REQUIREMENTS OF THE ON-SITE GEOTECHNICAL ENGINEER. ALL CHARACTERISTICS OF THE EMBANKMENT FILL MATERIAL SHALL MEET THE STANDARDS SET FORTH IN "BERM AND SOIL COMPACTION SPECIFICATIONS", INCLUDING COMPACTION AND MOISTURE REQUIREMENTS. IF NECESSARY TO ACHIEVE PROPER COMPACTION, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO PROPER FINAL GRADE. ANY HAND COMPACTION ACTIVITIES AROUND SPILLWAY OR DRAIN STRUCTURES SHALL BE CONDUCTED IN 4-INCH LOOSE LIFTS AND BE TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT. ALL COMPACTION AND MOISTURE TESTING SHALL BE CARRIED OUT AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER AND AS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS".

13. UPON COMPLETION OF DAM EMBANKMENT, PROMPTLY STABILIZE AND SEED DAM EMBANKMENT PER SEEDING SCHEDULE. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER THE PERMANENT SEEDING SCHEDULE FOUND ON SHEET C9.19.
14. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.

   14.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
   14.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
   14.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
   14.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
   14.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
   14.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.

15. SCHEDULE A FINAL AS-BUILT INSPECTION AND AS-BUILT SURVEY WITH THE ENGINEER AND SURVEYOR. AN AS-BUILT INSPECTION AND SURVEY SHALL BE SCHEDULED BEFORE IMPOUNDING WATER IN THE FACILITY AND A MINIMUM OF 60 DAYS PRIOR TO THE ANTICIPATED DATE OF CERTIFICATION APPROVAL. ANY COMMENTS OR DEFICIENCIES IN THE SCM CONSTRUCTION MUST BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND OWNER BEFORE CERTIFICATION SHALL BE GRANTED.

BERM AND SOIL COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.

2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.

3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.

4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.

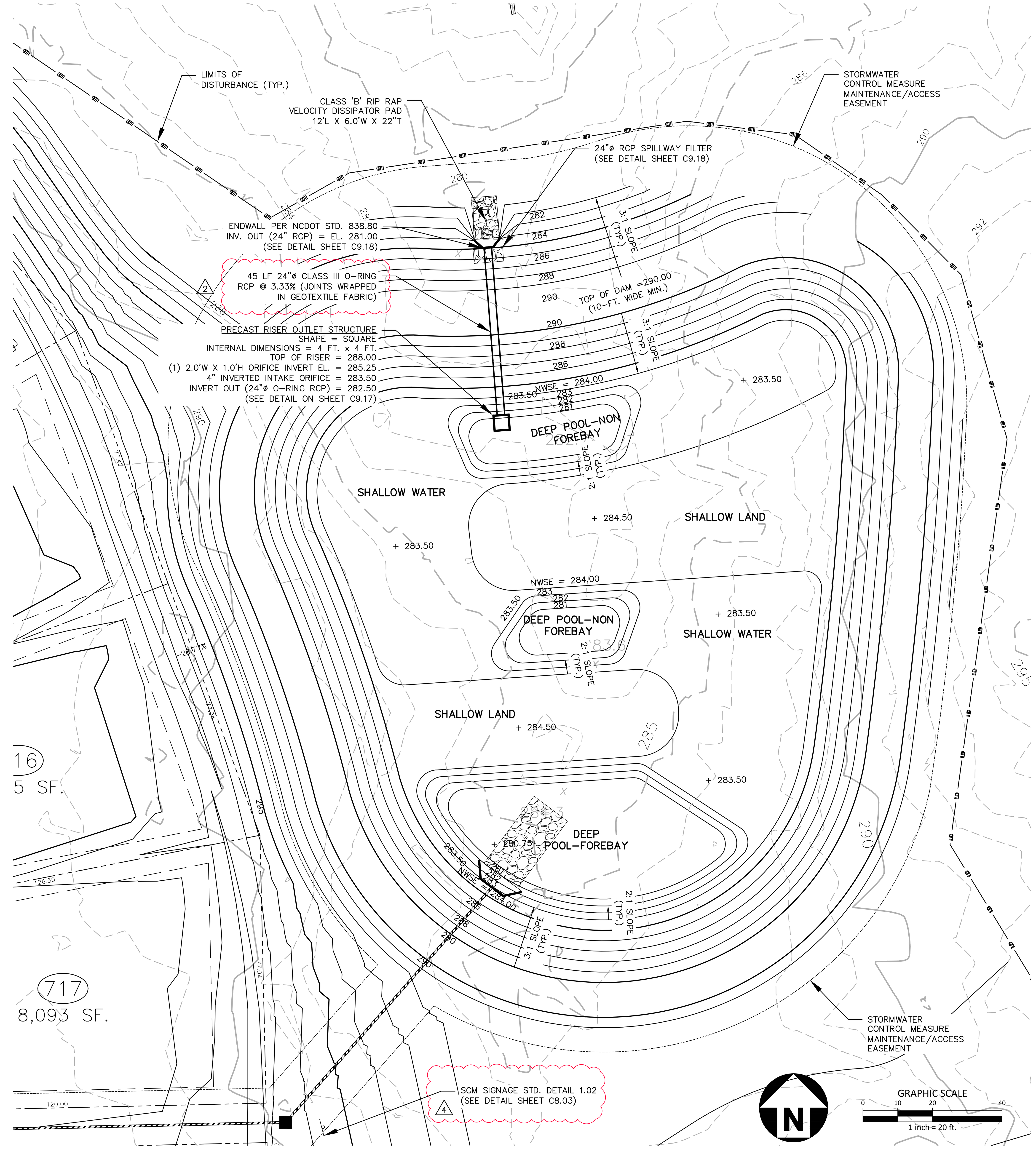
5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.

6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL OR AS RECOMMENDED BY THE ON-SITE GEOTECHNICAL ENGINEER.

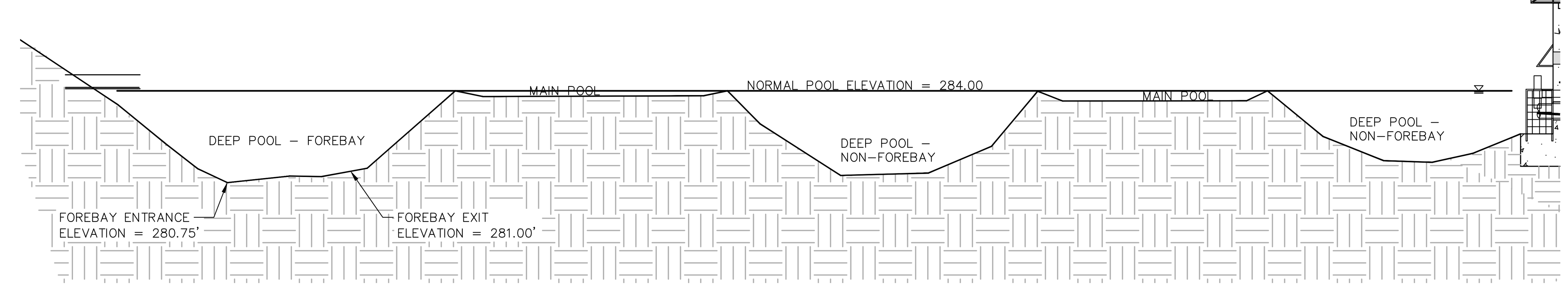
7. TESTING WILL BE REQUIRED ALONG THE 24"Ø RCP OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL OR AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

STATEMENT OF RESPONSIBILITY

1. ALL REQUIRED MAINTENANCE AND INSPECTIONS OF THE STORMWATER CONTROL MEASURE SHALL BE THE RESPONSIBILITY OF THE OWNER, PER THE EXECUTED OPERATION AND MAINTENANCE AGREEMENT FOR THIS FACILITY.



STORMWATER CONTROL MEASURE 'Q' PLAN VIEW
1" = 20'



FOREBAY AND MAIN POOL CROSS SECTION (TYPICAL)
N.T.S

N

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ________________ Date: ____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ________________ Date: ____________
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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PHOENIX, AZ 85016
PHONE: 602. 698. 8655

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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048334 JEREMY K. WOOSTER
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
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PLAN INFORMATION

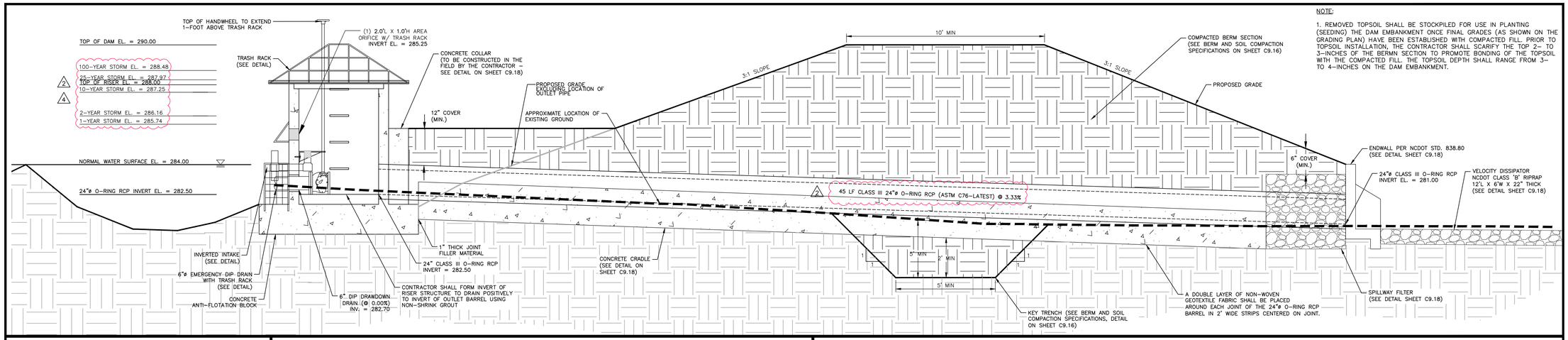
PROJECT NO.	2020110062
FILENAME	2020110062-SW-Q
CHECKED BY	JKW
DRAWN BY	ABT
SCALE	1" = 20'
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'Q' PLAN VIEW

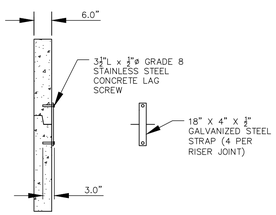
C9.16

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-Q.dwg, 7/3/2024 3:12:26 PM, Zach Lee



NOTE:

1. REMOVED TOPSOIL SHALL BE STOCKPILED FOR USE IN PLANTING (SEEDING) THE DAM EMBANKMENT ONCE FINAL GRADES (AS SHOWN ON THE GRADING PLAN) HAVE BEEN ESTABLISHED WITH COMPACTED FILL. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2- TO 3-INCHES OF THE BERMN SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3- TO 4-INCHES ON THE DAM EMBANKMENT.



RISER JOINT CONNECTION DETAIL
N.T.S.

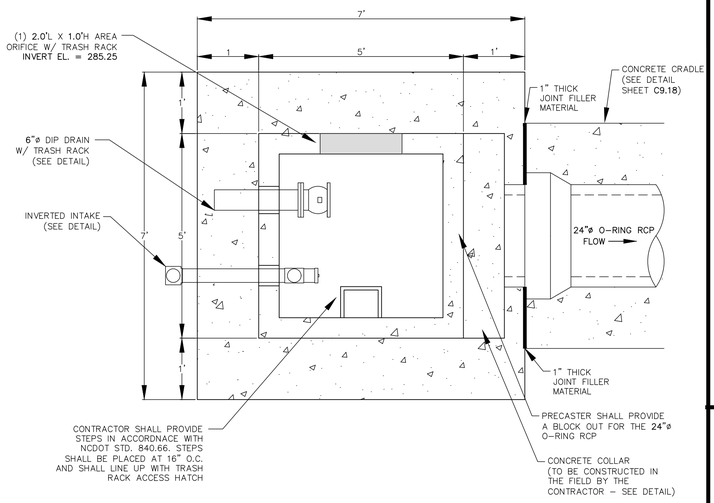
NOTES:

1. CONCRETE ANTI-FLOTATION BLOCK TO BE PROVIDED WITH MINIMUM TEMPERATURE AND SHRINKAGE STEEL REINFORCEMENT.

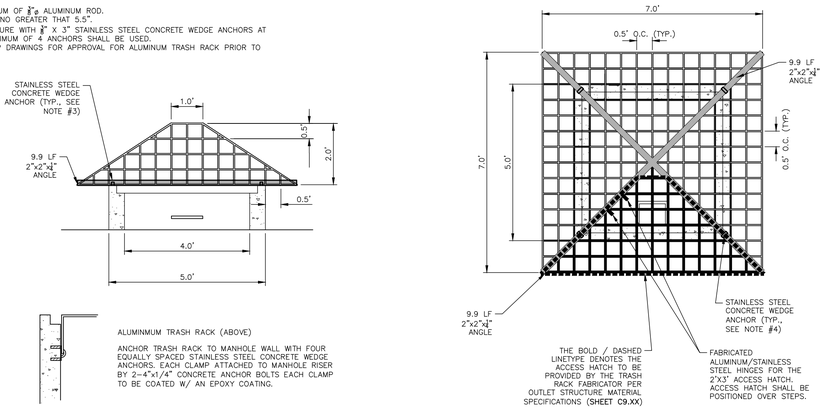
2. TRASH RACKS NOT SHOWN FOR CLARITY.

3. THE NUMBER OF GUIDES FOR THE VALVE STEM SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THE VALVE STEM MUST BE OPERABLE FROM THE TOP OF THE RISER VIA THE HANDWHEEL WITH AN INSIGNIFICANT AMOUNT OF PLAY IN THE VALVE STEM.

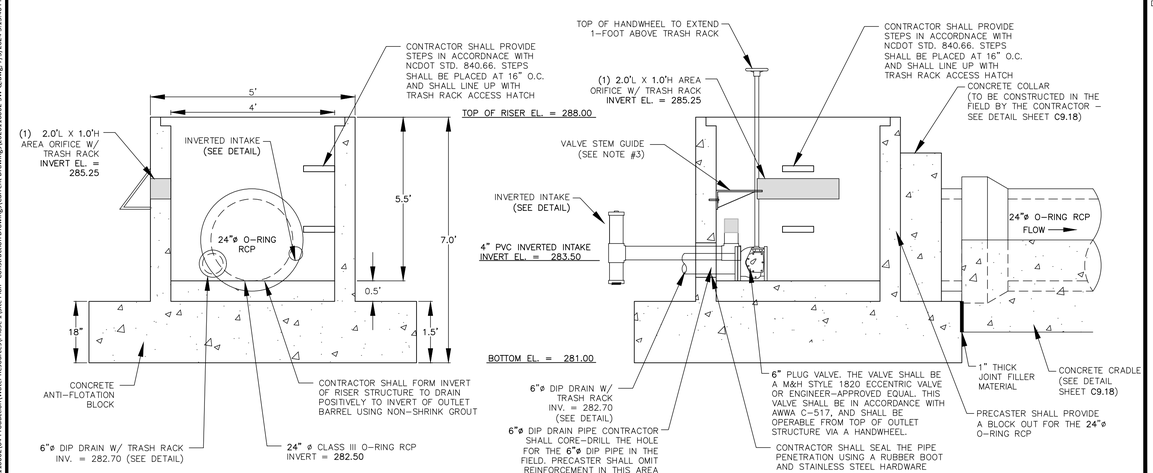
4. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.



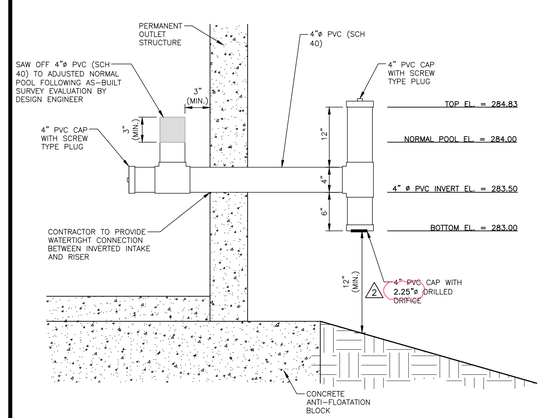
NOTES:
1. ALL MATERIAL TO BE A MINIMUM OF ⅜"ø ALUMINUM ROD.
2. MAXIMUM OPENING SHALL BE NO GREATER THAT 5.5".
3. FASTEN TO CONCRETE STRUCTURE WITH ⅜" X 3" STAINLESS STEEL CONCRETE WEDGE ANCHORS AT 24" MAXIMUM SPACING. A MINIMUM OF 4 ANCHORS SHALL BE USED.
4. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL FOR ALUMINUM TRASH RACK PRIOR TO CONSTRUCTION/FABRICATION.



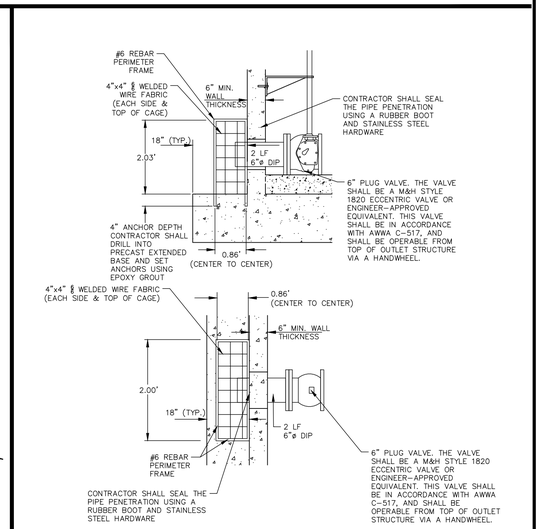
4'X4' RISER TRASH RACK DETAIL
N.T.S.



PERMANENT OUTLET STRUCTURE DETAILS
N.T.S.



INVERTED INTAKE OUTLET DETAIL
N.T.S.



6"ø EMERGENCY DIP DRAIN TRASH RACK DETAILS
N.T.S.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
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Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
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Administrator

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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION UNLESS SIGNED & SEALED

REVISIONS

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-Q
CHECKED BY	JKW
DRAWN BY	ABT
SCALE	N.T.S.
DATE	12. 22. 2022

SHEET

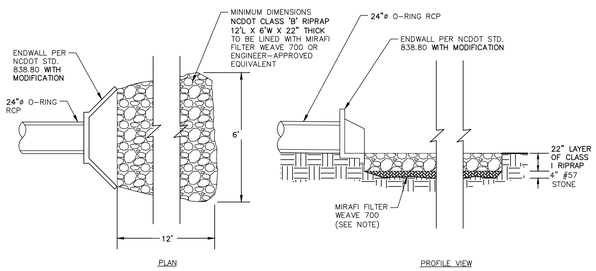
STORMWATER CONTROL MEASURE 'Q' DETAILS

C9.17

M:\Projects\SJC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-Q.dwg, 7/3/2024 3:13:40 PM, Zach Lee

NOTES:

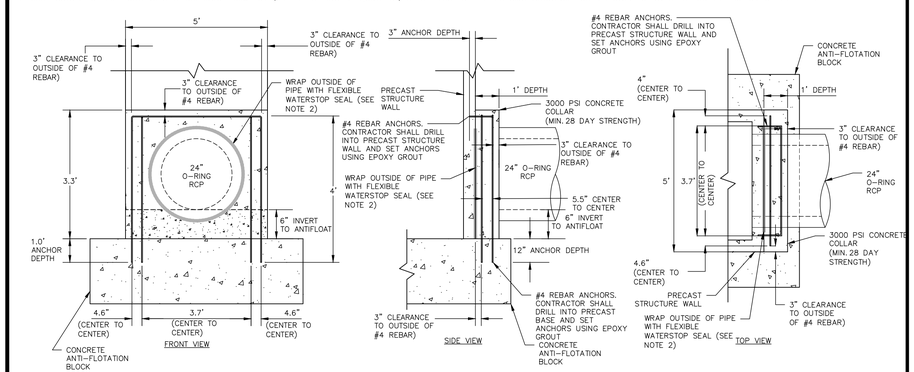
1. A FILTER BLANKET IS TO BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION. THE FILTER BLANKET WILL CONSIST OF A MINIMUM 4" THICK LAYER OF STONE (NCDOT #57) UNDERLAIN WITH MIRAFI FILTER WEAVE 700 OR ENGINEER-APPROVED EQUIVALENT.



OUTLET BARREL VELOCITY DISSIPATER
N.T.S.

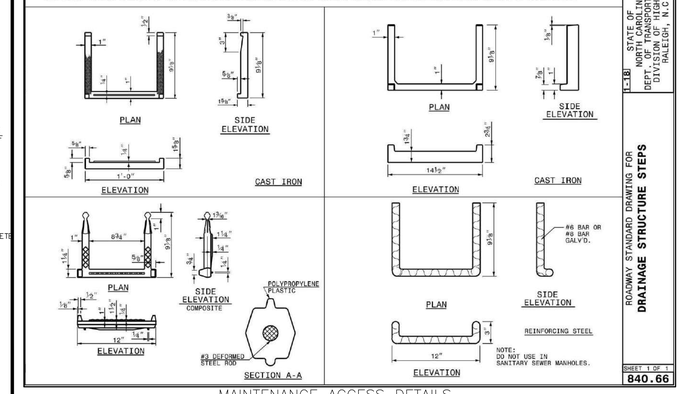
NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.



24"ø CONCRETE COLLAR DETAIL
N.T.S.

NOTES:
INSTALL ALL STEPS PROTRUDING 4" FROM INSIDE FACE OF STRUCTURE WALL.
STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS OF THE PROPOSED STEPS AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.



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

1-18

ROADWAY STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

SHEET 1 OF 1
840.66

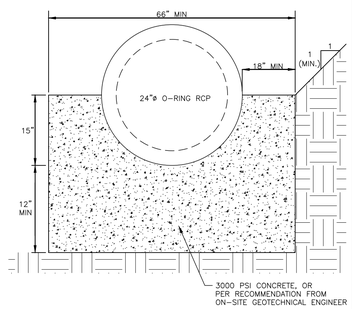
MAINTENANCE ACCESS DETAILS
N.T.S.

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

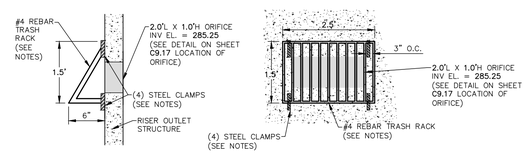
1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE 24"ø O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON 24"ø RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



24" CONCRETE CRADLE DETAIL
N.T.S.

NOTES:

1. ATTACH TRASH RACK WITH (4) HOT DIPPED GALVANIZED STEEL CLAMPS. EACH CLAMP ATTACHED TO WEIR BOX BY (2) 4"x1/4" CONCRETE ANCHOR BOLTS. EACH CLAMP SHALL BE COATED WITH AN EPOXY COATING.
2. ALL REBAR TO BE GALVANIZED #4 REBAR WITH AN EPOXY COATING.
3. BARS TO EXTEND ON BOTTOM OF TRASH RACK.

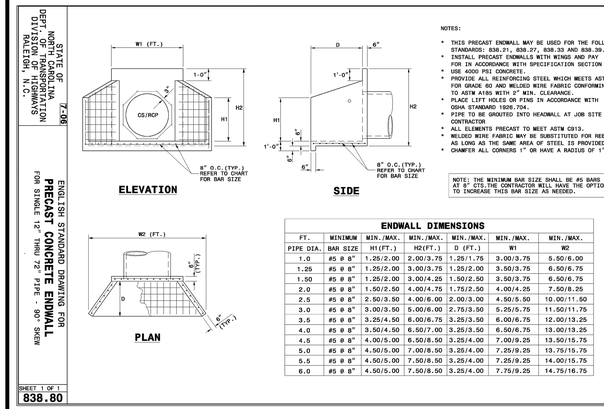


AREA ORIFICE TRASH RACK DETAIL
N.T.S.

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

Z-36B

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW



NOTES:

- THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.21, 838.27, 838.33 AND 838.39.
- INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
- USE 4000 PSI CONCRETE.
- PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
- ALL ELEMENTS PRECAST TO MEET ASTM C913.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
- CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 6" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.

ENDWALL DIMENSIONS

FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

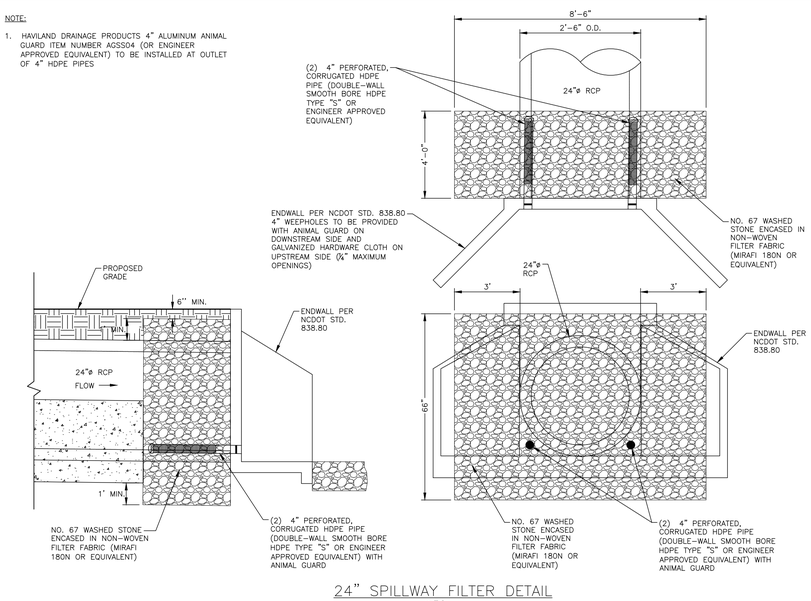
ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80

ENDWALL DETAILS
N.T.S.

NOTE:

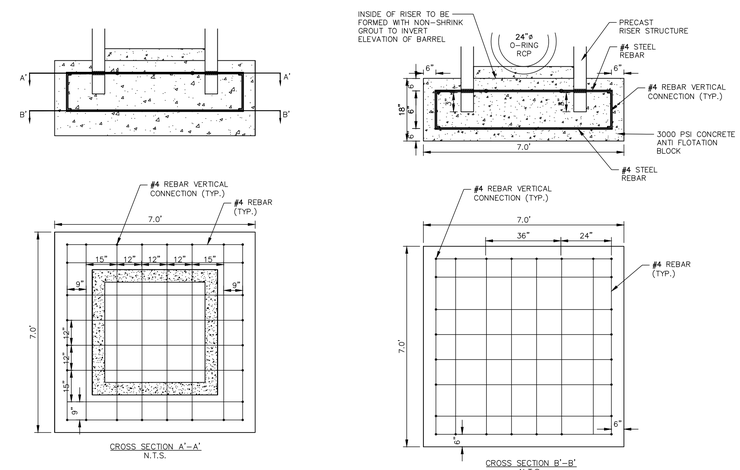
1. HAVILAND DRAINAGE PRODUCTS 4" ALUMINUM ANIMAL GUARD ITEM NUMBER AGSS04 (OR ENGINEER APPROVED EQUIVALENT) TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES



24" SPILLWAY FILTER DETAIL
N.T.S.

NOTES:

1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.



RISER/ANTI-FLOTATION BLOCK CONNECTION
N.T.S.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048304 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-Q
CHECKED BY	JKW
DRAWN BY	ABT
SCALE	N.T.S.
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'Q' DETAILS

C9.18

M:\Projects\S\SC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-Q.dwg, 7/3/2024 3:13:42 PM, Zach Lee

STORMWATER CONTROL MEASURE 'Q' PLANTING PLAN SPECIFICATIONS

LEGEND

QTY.	SYM.	SCIENTIFIC NAME	COMMON NAME	HATCH	TYPE	SPACING	% OF TOTAL AREA	PROVIDED AREA
LOW MARSH (SHALLOW WATER, TOTAL AREA = 9,342 SF)								
538	AC	ACORUS CALAMUS	SWEETFLAG		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 32%	2150 SF
953	PP	PONTEDERIA PECTINATUS	PICKEREL WEED		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	3812 SF
845	NL	NUPHAR LUTEA SSP. ADVENA	YELLOW POND-LILY		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	3380 SF
HIGH MARSH (SHALLOW LAND, TOTAL AREA = 7,782 SF)								
336	SC	SAURURUS CERNUUS	LIZARD'S TAIL		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 30%	1556 SF
574	HA	HELENIUM AUTUMNALE	SNEEZEWEED		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	2293 SF
734	CG	CHELONE GLABRA	WHITE TURTLEHEAD		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 35%	3933 SF
EMBANKMENTS								
			HYBRID BERMUDA					

SEEDBED PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND SHALLOW LAND AND SHALLOW WATER AREAS. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SEEDBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDED AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
9. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
	KOBE LESPEDEZA	50 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

NOTE: USE THE TEMPORARY SEEDING SCHEDULE ONLY WHEN DATE IS NOT CORRECT TO USE THE PERMANENT SEEDING SCHEDULE.

PERMANENT SEEDING SCHEDULE (DAM EMBANKMENTS)

SEEDING DATE	SEEDING MIXTURE OPTIONS (CHOOSE ONE)	APPLICATION RATE
MARCH 1 - JUNE 31	HYBRID BERMUDA GRASS	1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)
SEPT 1 - OCT 31		1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 1000 LB/AC 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR; USE SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

NOTE: PERMANENT SEEDING SCHEDULE IS FOR SLOPES OF THE BASIN AND TOP OF BERM. SEE REQUIRED TOWN OF KINIGHTDALE SCM BASIN REMOVAL SEQUENCE NOTE 14 ON SHEET C9.16 FOR PERMANENT SEEDING CONSTRUCTION SEQUENCE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

PLANTING INSTRUCTIONS

PLANTING TECHNIQUES
A. INSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
B. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
C. PLACE PLANTS IN PIT INSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
D. HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
E. NEWLY PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
F. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS HALL BE CUT OFF CLEANLY.
G. THE DIAMETER OF THE PITS FOR ALL VEGETATIVE STOCK SHALL BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. PLANT PIT WALL SHALL BE SCARIFIED PRIOR TO PLANT INSTALLATION.
H. SET THE PLANTS UPRIGHT, IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
I. PLACE THE BACKFILL AROUND THE BASE AND SIDES OF THE ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
J. BROKEN OR DAMAGED PARTS WILL BE CUT BACK TO UNDAMAGED TISSUE, LEAVING AS MUCH GREEN BASAL TISSUE AS POSSIBLE ABOVE THE ROOTS. IF MORE THAN FIFTY PERCENT (50%) OF THE PLANT IS DAMAGED THEN CONTRACTOR SHALL REPLACE THE PLANT.

CONTAINER STOCK / BARE ROOT
A. STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
B. CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
C. BARE ROOT PLANTS ARE FOR IMMEDIATE PLANTING, OTHERWISE SEE D) BELOW.
D. IF BARE ROOTS SPECIMENS ARE NOT TO BE PLANTED WITHIN FOUR (4) DAYS, TEMPORARY HOLDING OF BARE ROOT SPECIMENS ARE TO BE COVERED ENTIRELY BY A SUITABLE MEDIUM (ETC. SOIL, SAWDUST, MULCH OR THE LIKE) AND WATERED REGULARLY SO AS TO NOT DRY OUT.

PLANT LOCATIONS
A. NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE IN PROPOSED CONSTRUCTION.
B. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.

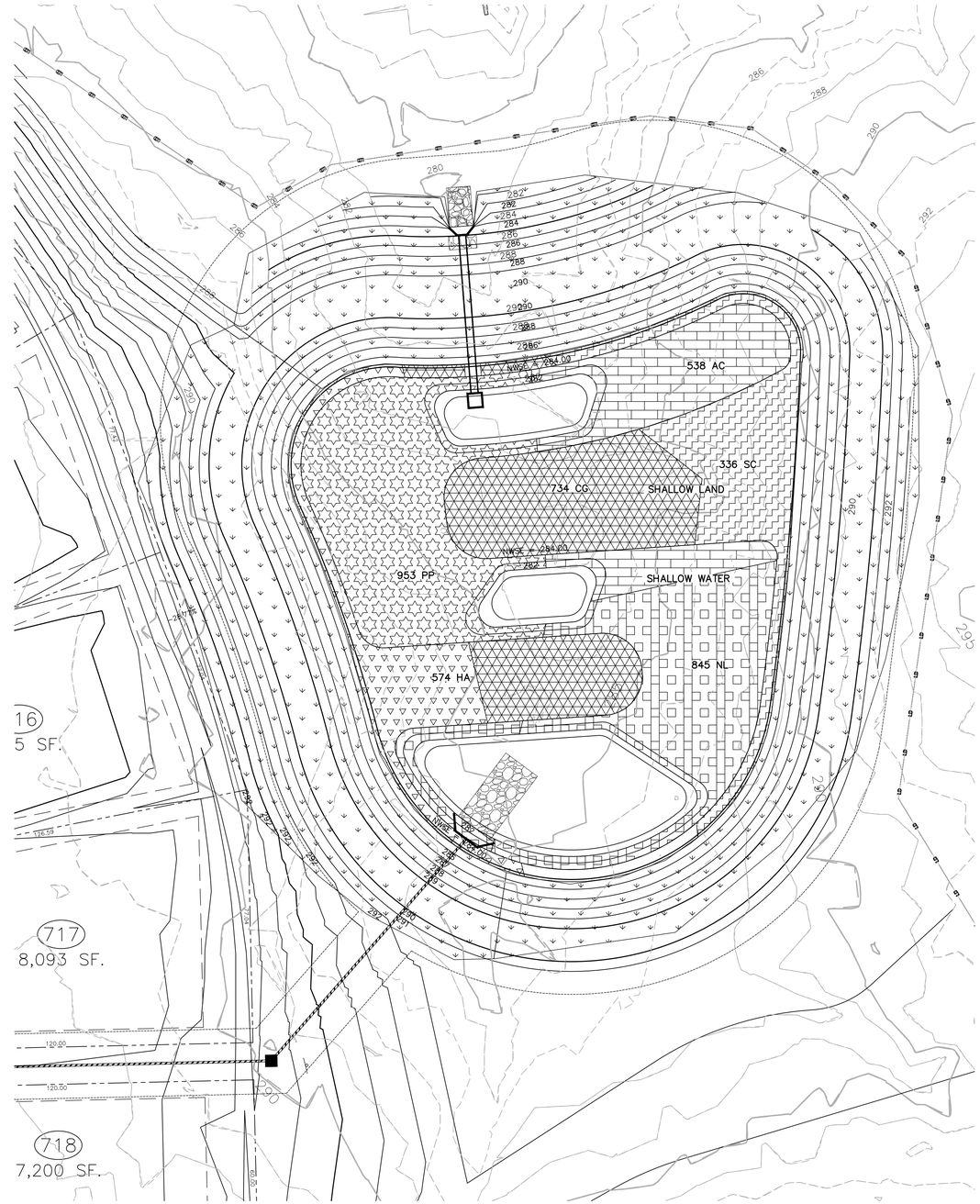
WATER
WATER SHALL BE POTABLE AND SHALL NOT CONTAIN ELEMENTS TOXIC TO PLANT LIFE.

PLANTING SCHEDULE

1. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER MANAGEMENT FACILITY PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
2. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER MANAGEMENT FACILITY PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER MANAGEMENT FACILITY PLANTING PLAN. 90% GERMINATION REQUIRED OF NON-CLUMPING TURF GRASS PRIOR TO FINAL CERTIFICATION.
3. OPTIMAL PLANTING PERIODS RANGE APPROXIMATELY FROM APRIL 15TH THRU JUNE 30TH AND SEPTEMBER 1ST THRU OCTOBER 31ST. FOR FINAL DETERMINATION OF THE SITE'S PLANTING PERIOD, THE CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION.
4. IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PREVENT WILDLIFE FROM DAMAGING OR CONSUMING WETLAND PLANTINGS.

TOWN OF KNIGHTDALE SCM PLANTING NOTES

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. THE VEGETATED SHELF SHALL BE PLANTED WITH A MINIMUM OF THREE DIVERSE SPECIES OF HERBACEOUS, NATIVE VEGETATION AT A MINIMUM DENSITY OF 50 PLANTS PER 200 FEET OF SHELF AREA.
3. CONTRACTOR TO WORK WITH SOILS SCIENTIST TO ENSURE SOILS ARE ADEQUATE TO SUPPORT PROPER ESTABLISHMENT AND GROWTH OF THE AQUATIC PLANTINGS. CONTRACTOR TO AMEND SOILS AND INSTALL SOILS IN PLANT, SHRUB, AND TREE AREAS PER DETAILS, SOIL SPECIFICATIONS. NCDENR SPECIFICATION, AND SOIL SCIENTIST RECOMMENDATIONS.
4. ALL AQUATIC PLANTINGS ARE TO BE INSTALLED DURING THE APPROPRIATE TIME OF YEAR TO ENSURE SURVIVABILITY. (LAST SPRING FROST AND THE FIRST FALL FROST)
5. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
6. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP, THE BASIN MUST BE CLEANED OUT, GRADED, APPROPRIATE AREAS COVERED WITH 4" OF TOPSOIL AS SPECIFIED IN NOTE #2 ABOVE, AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



STORMWATER CONTROL MEASURE 'Q' LANDSCAPE PLAN VIEW
1" = 20'

GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
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KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT VALID WITHOUT ORIGINAL SEAL OR SIGNATURE

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PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-Q
CHECKED BY	JKW
DRAWN BY	ABT
SCALE	1" = 20'
DATE	12. 22. 2022

SHEET
STORMWATER CONTROL MEASURE LANDSCAPE 'Q' PLAN
C9.19

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-Q.dwg, 7/3/2024 3:14:12 PM, Zach Lee

BIORETENTION AREA 'R' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.

2. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.

3. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.

4. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:

   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, KEY TRENCH, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING AND THE BIORETENTION MEDIA FOR THE FACILITY. THE INTERIOR FINE GRADING AND BIORETENTION MEDIA WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.

   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE 6" UNDERDRAIN OUTLET ORIFICE.

   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE BELOW NOTE 13.1-13.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.

   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, PLEASE REFER TO THE "CONSTRUCTION SEQUENCE FOR BIORETENTION AREA" NOTES ON THIS SHEET.

5. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.

6. IT IS ANTICIPATED THAT DEWATERING MAY BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).

7. PRIOR TO CONSTRUCTION, THE ONSITE GEOTECHNICAL ENGINEER SHALL VERIFY THE FILTRATION AND PERMEABILITY ASPECTS OF THE PROPOSED BIORETENTION MATERIALS. SPECIAL ATTENTION SHALL BE PAID TO PREVENT MIGRATION OF FINER SOIL PARTICLES THROUGH UNDERLYING GRAVEL LAYERS.

8. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THE BIORETENTION AREA PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE BIORETENTION AREA AS DIRECTED BY A LANDSCAPE PROFESSIONAL.

9. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN ON SHEET C9.23 FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THE INTERIOR OF THE BIORETENTION AREA. THE PERMANENT VEGETATION FOR THE PROPOSED DAM EMBANKMENT SHALL BE BERMUDA GRASS SOD GROWN ON NON-CLAY SOIL. PLEASE NOTE THAT NO TREES/SHRUBS OR WOODY VEGETATION OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS). THE INTERIOR SLOPES OF THE BIORETENTION AREA ARE TO BE PROVIDED WITH A BERMUDA GRASS SOD STRIP THAT IS GROWN ON NON-CLAY SOIL AROUND THE ENTIRE PERIMETER OF THE CELL FROM ELEVATION 267.00-269.40'.

10. ANY EXPOSED EDGE/SIDE OF THE BIORETENTION CELL SHALL BE SODDED AS SOON AS POSSIBLE AFTER CONSTRUCTION IS COMPLETE. PLEASE REFER TO THE LANDSCAPE PLAN FOR ADDITIONAL INFORMATION.

CONSTRUCTION SEQUENCE FOR BIORETENTION AREA

1. PRIOR TO PLACEMENT OF THE NEW FILL, THE AREAS ON WHICH FILL IS TO BE PLACED SHALL BE CLEARED AND STRIPPED OF TOPSOIL, TREES, ROOTS, VEGETATION, AND OTHER OBJECTIONABLE MATERIAL GREATER THAN 6" IN SIZE. THE AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED.

2. FOUNDATION AREAS MAY REQUIRE UNDERCUTTING OF COMPRESSIBLE AND/OR UNSUITABLE SOILS IN ADDITION TO THAT INDICATED ON THE PLANS. ALL SUCH UNDERCUTTING SHALL BE PERFORMED AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER AND SHALL BE MONITORED AND DOCUMENTED. IN NO CASE SHALL THERE BE AN ATTEMPT TO STABILIZE ANY PORTIONS OF THE FOUNDATION SOILS WITH CRUSHED STONE.

3. TREATMENT OF SEEPAGE AREAS, SUBGRADE PREPARATION, FOUNDATION DEWATERING AND ROCK FORMATION PREPARATION (I.E., TREATMENT WITH SLUSH GROUTING, DENTAL CONCRETE, ETC.) MAY BE REQUIRED AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER. ALL SUCH ACTIVITIES SHALL BE CLOSELY MONITORED AND DOCUMENTED BY THE GEOTECHNICAL ENGINEER.

4. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.

5. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 24"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.

6. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.

7. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.

8. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.21). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:

   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.

   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS

9. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.

   9.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
   9.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
   9.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
   9.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
   9.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
   9.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.

10. PRIOR TO PLACING THE BIORETENTION AREA BACKFILL MATERIAL INCLUDING GRAVEL, CHOKE STONE, AND WASHED SAND, THE CONTRACTOR SHALL REQUEST AN ON-SITE MEETING WITH THE DESIGN ENGINEER AND THE EROSION CONTROL INSPECTOR TO ENSURE THE UPSTREAM DRAINAGE AREA IS COMPLETELY STABILIZED (I.E. GOOD VEGETATIVE COVER). IF THE CONTRACTOR DECIDES TO PLACE THE BACKFILL FOR THE BIORETENTION AREA PRIOR TO APPROVAL FROM THE DESIGN ENGINEER AND THE EROSION CONTROL INSPECTOR, THEN THE CONTRACTOR SHALL EXCAVATE / REPLACE, AS NECESSARY, ANY BACKFILL MATERIAL NEEDED FOR THE SYSTEM TO FUNCTION PROPERLY AT THEIR EXPENSE SHOULD THE BIORETENTION AREA NOT FUNCTION PROPERLY (I.E. WILL NOT DRAIN DUE TO SEDIMENT DEPOSITION) DUE TO AN UNSTABILIZED UPSTREAM DRAINAGE AREA.

11. SOD SHALL BE PLANTED ON SIDE SLOPES OF BIORETENTION AREA. SOD MUST BE GROWN ON A SAND BASE AND NOT GROWN ON CLAY. CONTRACTOR SHOULD LINE THE INTERIOR TOE OF SLOPE WITH SILT FENCE OR WATTLE UNTIL SOD HAS TAKEN ROOT AND RUNOFF UNDER SOD IS NO LONGER OCCURRING.

12. UNDERCUT BIORETENTION AREA TO NECESSARY DEPTH (SEE BIORETENTION AREA CROSS SECTION ON SHEET C9.21).

13. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT.

14. PLACE 6" Ø SCHEDULE 40 OR SDR 35 SMOOTH WALL PVC UNDERDRAIN PIPES. THE ENDS OF THE UNDERDRAIN PIPES NOT TERMINATING IN AN OBSERVATION WELL SHALL BE CAPPED. THE COLLECTOR PIPES SHALL BE CONSTRUCTED AT A MINIMUM SLOPE OF 0.5%.

15. PLACE 2" OF CHOKING STONE AND 4" OF WASHED SAND PER THE CROSS-SECTION ON SHEET C9.21.

16. PLACE LAYER OF PLANTING SOIL (PER PLANTING SOIL SPECIFICATION) TO ELEVATION 266.75'. PLACEMENT OF THE SOIL IN THE BIORETENTION AREA SHOULD BE IN LIFTS OF 18" OR LESS AND COMPACTED BY WATERING.

17. PLACE 3" LAYER OF MULCH (PER MULCH SPECIFICATIONS) TO GRADE.

18. BIORETENTION SURFACE AREA SHALL BE 8,201 SF (MINIMUM) AT EL. 267.00. THIS REQUIRED SURFACE AREA EXCLUDES THE SURFACE AREA OCCUPIED BY THE INLET RIPRAP VELOCITY DISSIPATOR.

19. ONCE CONSTRUCTION OF THE BIORETENTION INTERIOR IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF ANY LANDSCAPING/PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED LANDSCAPING PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.

20. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN. THE CONTRACTOR SHALL PROVIDE A ONE-YEAR WARRANTY FOR ALL PLANTS INSTALLED.

TESTING OF THE EMBANKMENT

1. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH REPORTS TO VERIFY THAT THE DAM EMBANKMENT MEETS THE SPECIFIED COMPACTION REQUIREMENTS. COMPACTION REPORTS WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER FACILITY. THEREFORE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE COMPACTION TESTS ARE PROPERLY PERFORMED DURING CONSTRUCTION.

2. TESTING FOR PROPER COMPACTION WILL BE REQUIRED ALONG THE 24"Ø O-RING OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL.

3. TESTING OF THE DEGREE (%) OF COMPACTION OF THE PLACED FILL IN THE DAM SHALL BE PERFORMED AS A PART OF THE PERMITTEE'S NORMAL QUALITY CONTROL PROGRAM FOR THE CONSTRUCTION OF THE DAM. TESTS SHALL BE CONDUCTED CONCURRENT WITH THE INSTALLATION OF COMPACTED FILL AND THE CONTRACTOR SHALL COORDINATE THE CONSTRUCTION OF THE DAM SO THAT TESTING CAN BE COMPLETED. SHOULD THE RESULTS OF THE TESTS INDICATE THAT THE SPECIFIED DEGREE OF COMPACTION HAS NOT BEEN OBTAINED; THE PORTIONS OF THE DAM REPRESENTED BY SUCH TESTS SHALL BE REWORKED OR REBUILT. ALL PORTIONS OF THE DAM SHALL ACHIEVE THE SPECIFIED MINIMUM DEGREE OF COMPACTION.

BERM SOIL AND COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.

2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.

3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.

4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.

5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.

6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORMED FOR EVERY 2,500 SQUARE FEET OF AREA FOR EVERY LIFT OF FILL OR AS RECOMMENDED BY THE ON-SITE GEOTECHNICAL ENGINEER.

7. TESTING WILL BE REQUIRED ALONG THE 24"Ø RCP OUTLET BARREL AT A FREQUENCY OF ONE TEST PER 25 LF OF PIPE PER VERTICAL FOOT OF FILL OR AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.

BIORETENTION AREA MATERIAL SPECIFICATIONS

1. THE MULCH SHALL CONSIST OF DOUBLE OR TRIPLE SHREDDED HARDWOOD OR STONE MULCH. MULCH OR STONE MULCH SHALL BE WELL-AGED AND UNIFORM IN COLOR. WELL-AGED MULCH IS DEFINED AS MULCH THAT HAS BEEN STOCKPILED OR STORED FOR AT LEAST 12 MONTHS. MULCH SHOULD BE FREE OF WEED SEEDS, SOIL, ROOTS, OR ANY OTHER SUBSTANCE NOT CONSISTING OF EITHER BOLE OR BRANCH WOOD AND BARK. THE MULCH DEPTH SHALL BE 2-4 INCHES UNIFORMLY PLACED. GRASS CLIPPINGS ARE UNSUITABLE FOR MULCH AND SHOULD BE AVOIDED FOR USE WITHIN THE BIORETENTION AREA.

2. THE DRAINAGE STONE LAYER SHALL CONSIST OF NCDOT WASHED #57 STONE OR ENGINEER APPROVED EQUIVALENT

3. THE WASHED SAND SHALL MEET REQUIREMENTS OF WASHED ASTM-C-33 FINE AGGREGATE CONCRETE SAND. IN ADDITION TO THE ASTM-C-33 SPECIFICATION, THE WASHED SAND MUST MEET THE FOLLOWING CONDITIONS:
   - SAND MUST MEET GRADATION REQUIREMENTS FOR ASTM-C-33 FINE AGGREGATE CONCRETE SAND. AASHTO M-6/M-80, ASTM C330, AASHTO M195 GRADATION IS ALSO ACCEPTABLE.
   - SAND MUST BE SILICA BASED. NO LIMESTONE BASED PRODUCTS MAY BE USED. IF THE MATERIAL IS WHITE OR GRAY IN COLOR, IT IS PROBABLY NOT ACCEPTABLE.
   - SAND MUST BE CLEAN. NATURAL, UNWASHED SAND DEPOSITS MAY NOT BE USED. LIKEWISE, SAND THAT HAS BECOME CONTAMINATED BY IMPROPER STORAGE OR INSTALLATION PRACTICES WILL BE REJECTED.
   - MANUFACTURED SAND OR STONE DUST IS NOT ACCEPTABLE UNDER ANY CIRCUMSTANCE.

4. THE CHOKING STONE LAYER SHALL BE WASHED #8 OR WASHED #89 STONE LAYER MEETING THE REQUIREMENTS OF ASTM-C-33.

5. THE UNDERDRAIN PIPING FOR THE BIORETENTION AREA SHALL BE 6" Ø SCHEDULE 40 OR SDR 35 SMOOTH WALL SLOTTED OR PERFORATED PVC PIPE. THE PIPE AND FITTINGS SHALL BE TYPE 'S' AND SHALL MEET THE REQUIREMENTS OF AASHTO M-252. THE 6" Ø SLOTTED OR PERFORATED PIPE SHALL CONTAIN CIRCULAR PERFORATIONS MEETING AASHTO CLASS II, SEE DETAIL ON SHEET C9.21.

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 24"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4

2. THE STRUCTURAL DESIGN FOR THE 5' X 5' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.

3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.21 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.

5. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.22. THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 7,540 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 13,632 LBS.

6. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT. JOINT STRAPS SHALL BE PROVIDED PER THE DETAIL ON C9.21.

7. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.

8. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:
   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.

9. GEOTEXTILE FABRIC FOR THE 24"Ø RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).

STATEMENT OF RESPONSIBILITY

ALL REQUIRED MAINTENANCE AND INSPECTIONS OF THIS FACILITY SHALL BE THE RESPONSIBILITY OF THE PROPERTY OWNER, PER THE EXECUTED OPERATION AND MAINTENANCE AGREEMENT FOR THIS FACILITY.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

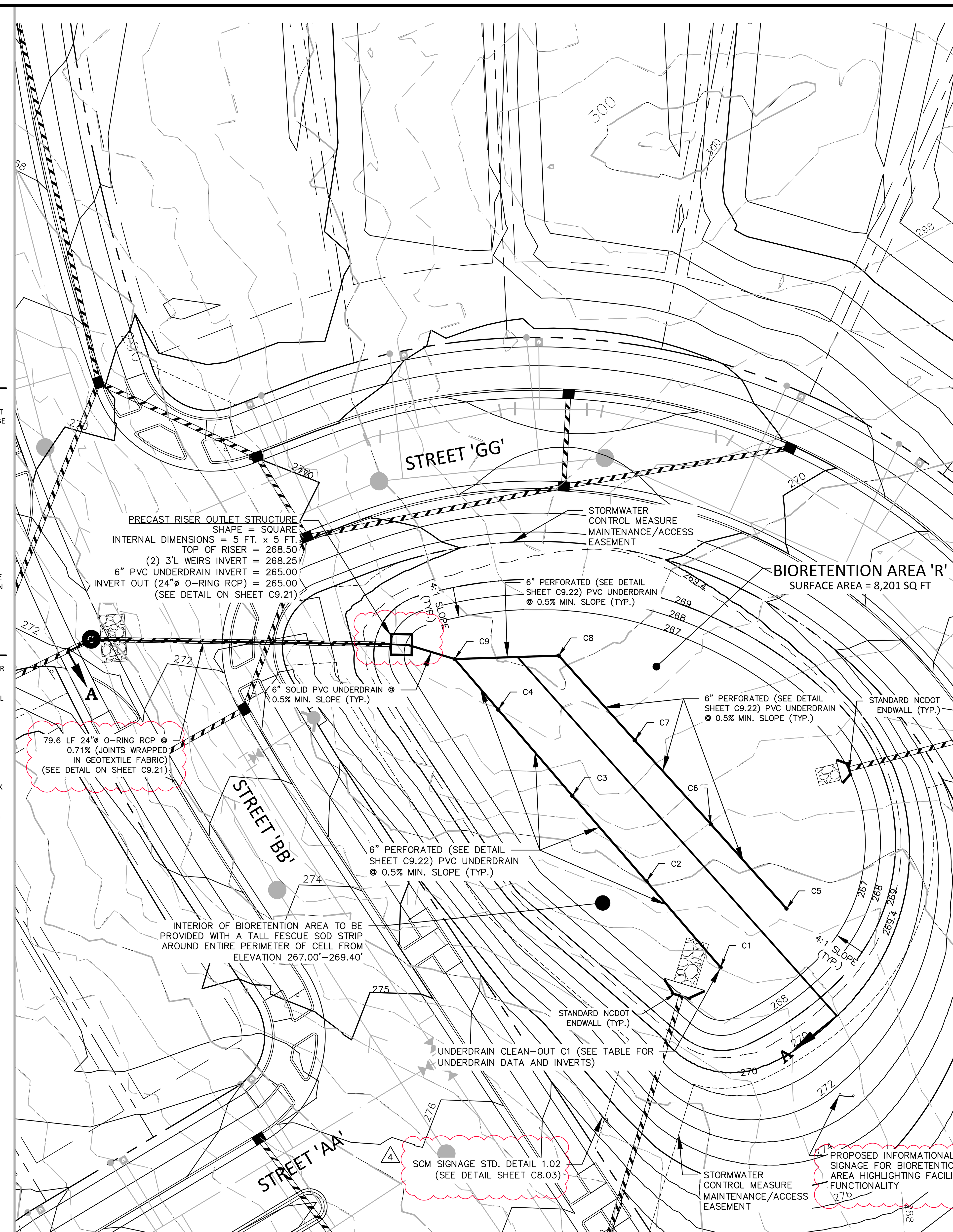
THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

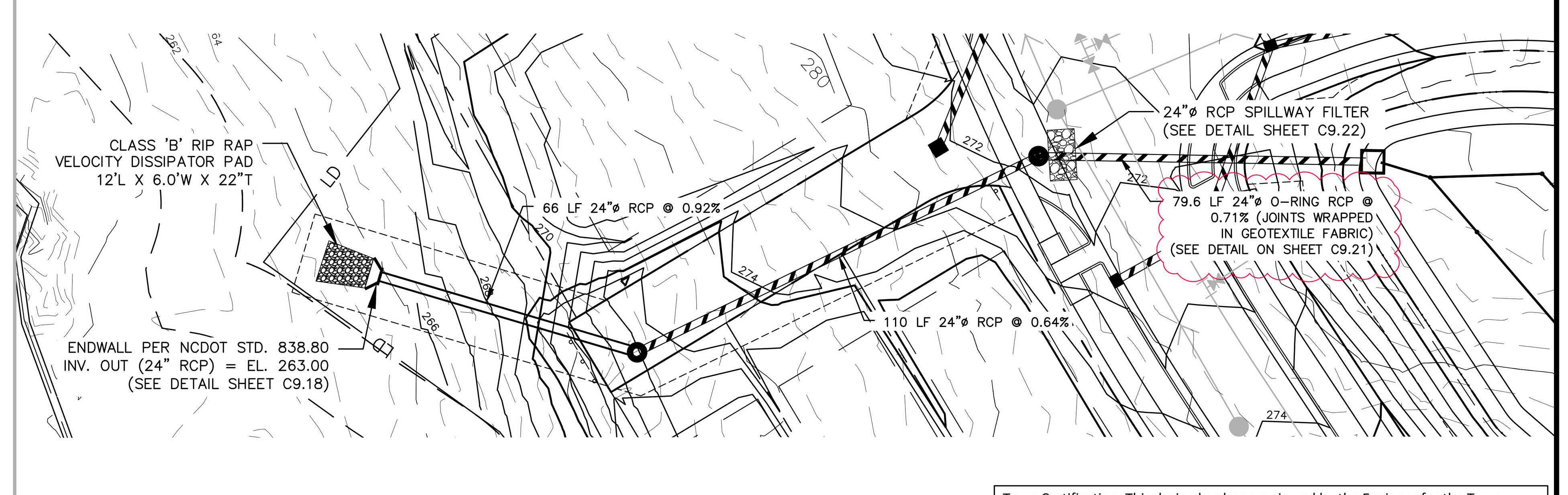
SCM R

UPSTREAM STRUCTURE	UPSTREAM INVERT	DOWNSTREAM STRUCTURE	DOWNSTREAM INVERT	PVC LENGTH	SLOPE (FT/FT)	SOLID/PERFORATED	PVC DIAMETER
C1	262.67	C2	262.52	30	0.005	PERFORATED	6"
C2	262.52	C3	262.37	30	0.005	PERFORATED	6"
C3	262.37	C4	262.22	30	0.005	PERFORATED	6"
C4	262.22	C9	262.13	17.6	0.005	PERFORATED	6"
C5	262.67	C6	262.52	30	0.005	PERFORATED	6"
C6	262.52	C7	262.37	30	0.005	PERFORATED	6"
C7	262.37	C8	262.22	30	0.005	PERFORATED	6"
C8	262.22	C9	262.08	27.5	0.005	PERFORATED	6"
C9	262.08	OUTLET STRUCTURE	265.00	12.6	0.005	SOLID	6"



GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

BIORETENTION AREA 'R' PLAN VIEW
1"=20'



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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
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REVISIONS

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PLAN INFORMATION

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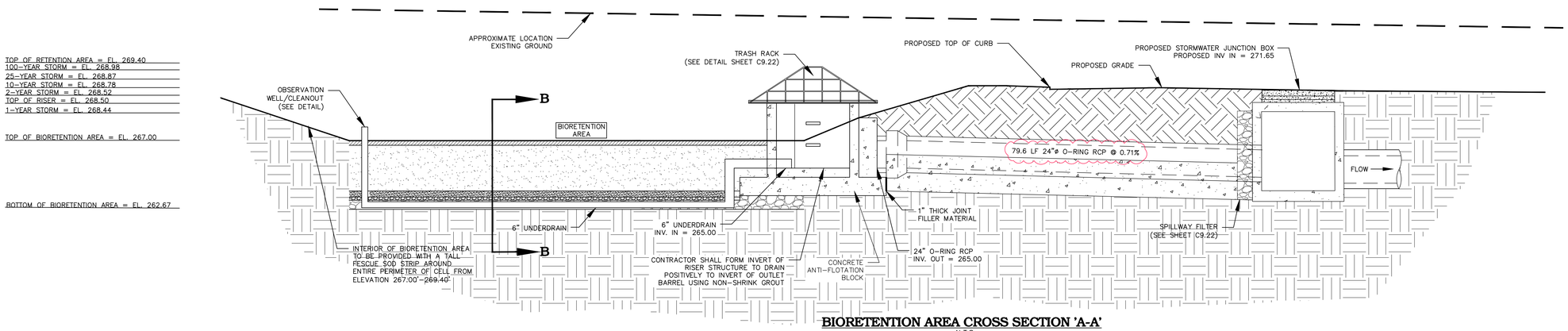
CHECKED BY	EAM
DRAWN BY	OVI
SCALE	1" = 20'
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'R' PLAN VIEW

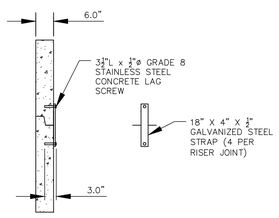
C9.20

M:\Projects\SUC\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-R.dwg, 7/3/2024 3:16:54 PM, Zach Lee



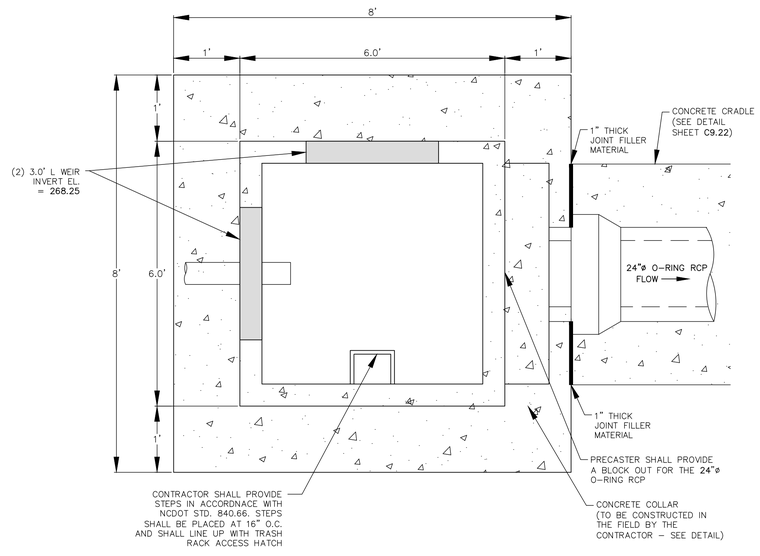
BIORETENTION AREA CROSS SECTION 'A-A'

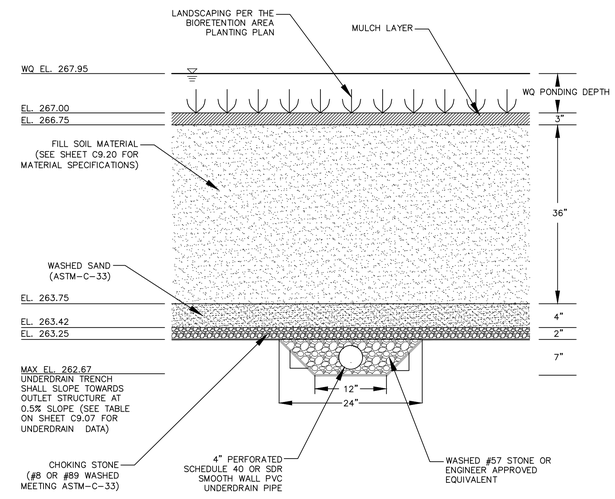
N.T.S.



RISER JOINT CONNECTION DETAIL

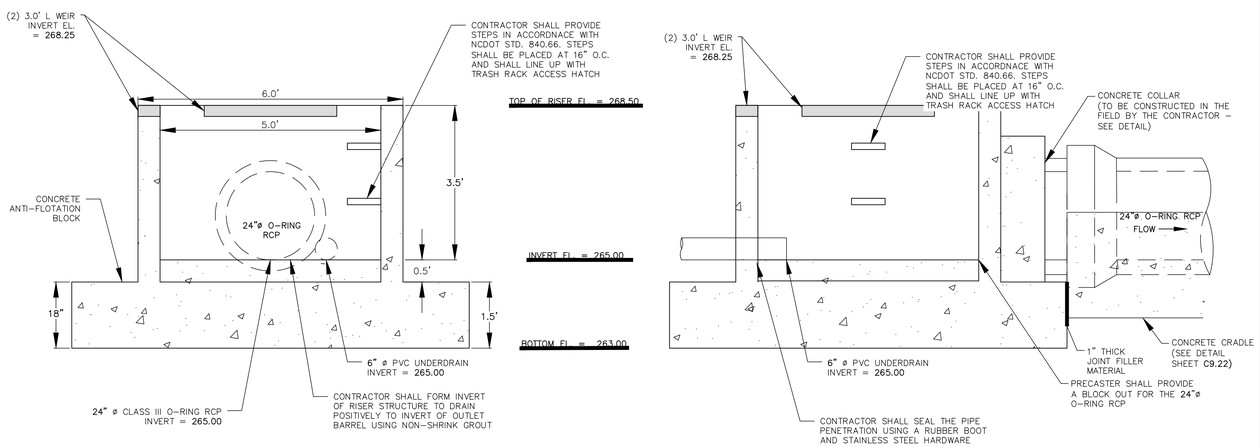
N.T.S.





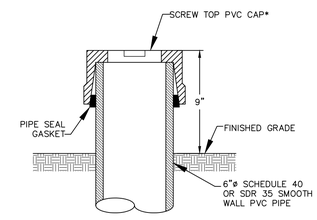
BIORETENTION AREA SECTION 'B-B'

N.T.S.



PERMANENT OUTLET STRUCTURE DETAILS

N.T.S.



*DETAIL PROVIDED AS SCHEMATIC SCREW TOP P.V.C. WELL CAP ONLY

EACH OBSERVATION WELL/CLEANOUT SHALL INCLUDE THE FOLLOWING:

1. CLEANOUTS TO EXTEND TO EXTEND 9" ABOVE FINISHED GRADE (TO PONDING DEPTH 504.25').

2. FOR AN UNDERGROUND OBSERVATION WELL/CLEANOUT, PROVIDE A TUBE MADE OF NON-CORROSIVE MATERIAL, SCHEDULE 40 OR EQUAL, AT LEAST THREE FEET LONG WITH AN INSIDE DIAMETER OF AT LEAST 8 INCHES.

3. THE TUBE SHALL HAVE A FACTORY ATTACHED CAST IRON OR HIGH IMPACT PLASTIC COLLAR WITH RIBS TO PREVENT ROTATION WHEN REMOVING SCREW TOP LID. THE SCREW TOP LID SHALL BE CAST IRON OR HIGH IMPACT PLASTIC THAT WILL WITHSTAND ULTRAVIOLET RAYS.

OBSERVATION WELL/CLEANOUT DETAIL

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STORMWATER CONTROL MEASURE 'R' DETAILS

C9.21

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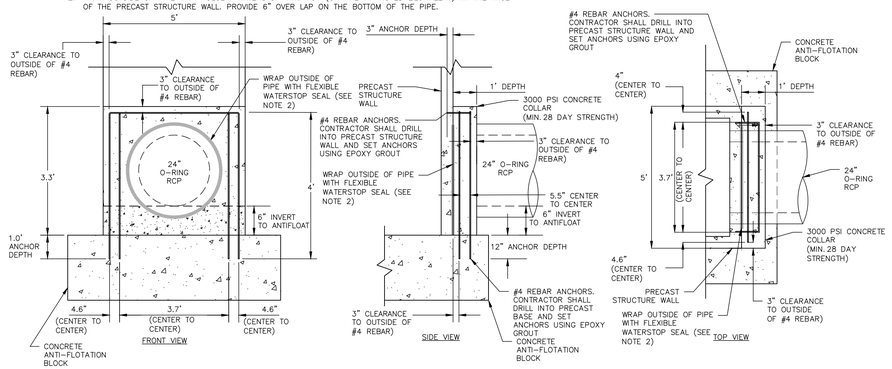
NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.

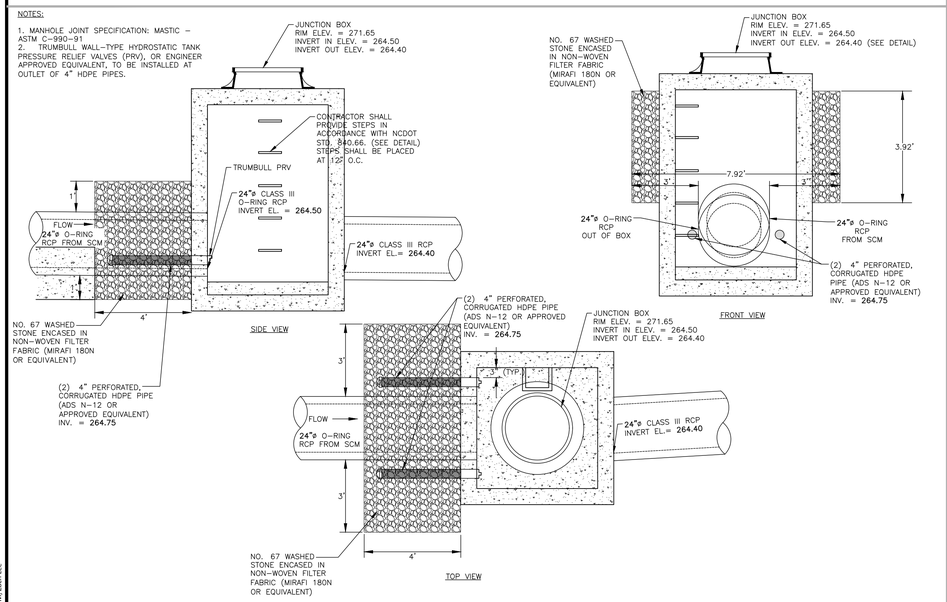


24"ø CONCRETE COLLAR DETAIL

N.T.S.

NOTES:

1. MANHOLE JOINT SPECIFICATION: MASTIC – ASTM C-990-91
2. TRUMBULL WALL-TYPE HYDROSTATIC TANK PRESSURE RELIEF VALVES (PRV), OR ENGINEER APPROVED EQUIVALENT, TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES.



24"ø RCP SPILLWAY FILTER DETAIL

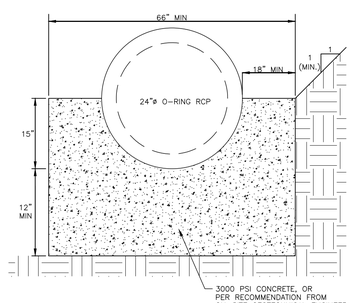
N.T.S.

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE **9** OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE **9** OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE **9** OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE **24"ø** O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON 24"ø RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



24" CONCRETE CRADLE DETAIL

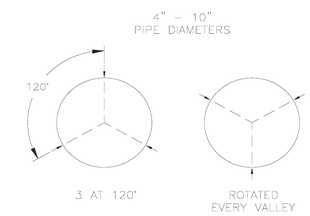
N.T.S.

AASHTO Class II Perforation

The following terminology for perforations is derived from the applicable AASHTO specification. Differences between the specifications are covered in the table below. Class II perforations shall be located in the outside valleys of the corrugations, be circular and/or slotted and evenly spaced around the circumference and length of the pipe. The perforations shall be located in the outside valleys of the corrugations. The water inlet area shall be no less than 0.945 in^2/ft (20 cm^2/m) for pipe diameters 4- through 10-inch (100 - 250mm), 1.42 in^2/ft (30 cm^2/m) for pipe diameters 12- through 18-inch (300 - 450 mm) and 1.89 in^2/ft (40 cm^2/m) for pipe diameters larger than and equal to 24 inches (600 mm). Table 1 below represents ADS standard perforation patterns for AASHTO Class II.

Nominal I.D.		Perforation Type	Maximum Slot Length or Diameter		Maximum Slot Width		Minimum Inlet Area	
in	mm		in	mm	in	mm	in^2/ft	cm^2/m
4	100	Slot	0.875	22	0.125	3	1.0	21
6	150	Slot	0.875	22	0.125	3	1.0	21
8	200	Slot	1.18	30	0.125	3	1.0	21
10	250	Slot	1.18	30	0.125	3	1.0	21
12	300	Circular	0.313	8	-	-	1.5	32
15	375	Circular	0.313	8	-	-	1.5	32
18	450	Circular	0.313	8	-	-	1.5	32
24	600	Circular	0.313	8	-	-	2.0	42
30	750	Circular	0.375	9.5	-	-	2.0	42
36	900	Circular	0.375	9.5	-	-	2.0	42
42	1050	Circular	0.375	9.5	-	-	2.0	42
48	1200	Circular	0.375	9.5	-	-	2.0	42
54	1350	Circular	0.375	9.5	-	-	2.0	42
60	1500	Circular	0.375	9.5	-	-	2.0	42

Figure 1
AASHTO Class II Perforation Patterns
Note: Actual pattern may vary by region, however all patterns meet the AASHTO and ASTM minimum requirements for the open inlet area.



NOTES:

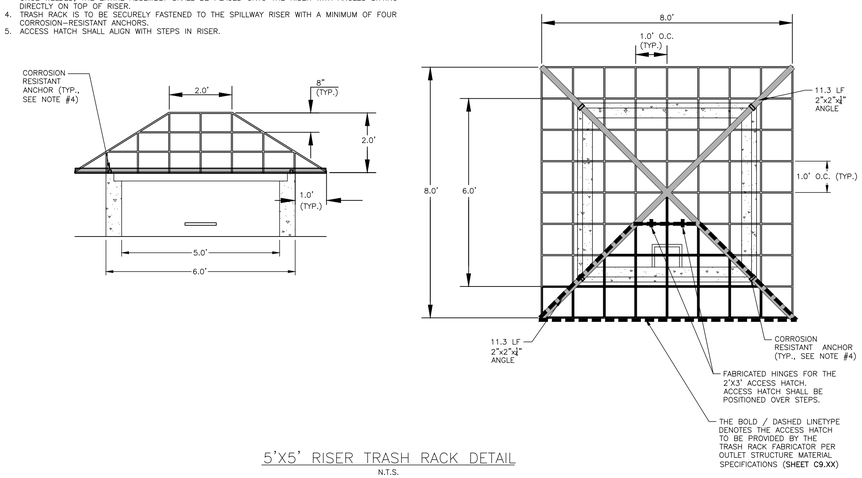
1. UNDERDRAIN PERFORATIONS SHALL BE PLACED 6" APART ALONG THE LENGTH OF THE HDPE PIPE.
2. PERFORATIONS SHALL BE 3/8"ø.

PVC PIPE PERFORATION REFERENCE TABLE AND DETAIL

NTS

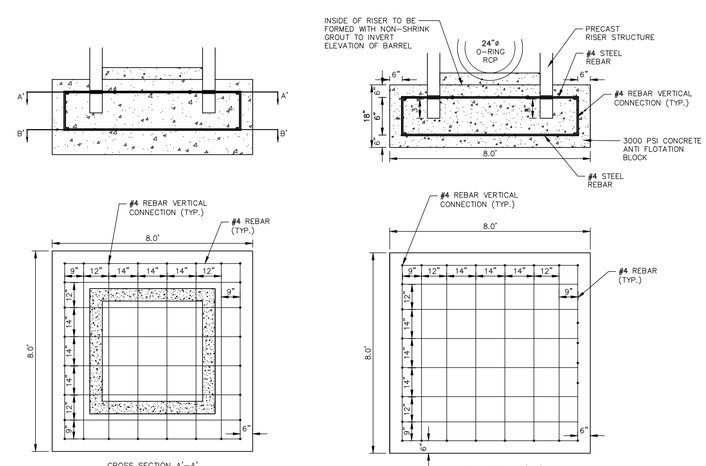
NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. ALL REBAR AND ANGLES TO BE HOT-DIPPED GALVANIZED AND BE PROVIDED WITH AN EPOXY COATING.
3. THE HOT-DIPPED, GALVANIZED 2"x2"x1/4" ANGLES SHALL BE WELDED TO THE REBAR TRASH RACK. ONCE WELDED, THE ENTIRE ASSEMBLY SHALL BE PLACED ONTO THE RISER WITH ANGLES SITTING DIRECTLY ON TOP OF RISER.
4. TRASH RACK IS TO BE SECURELY FASTENED TO THE SPILLWAY RISER WITH A MINIMUM OF FOUR CORROSION-RESISTANT ANCHORS.
5. ACCESS HATCH SHALL ALIGN WITH STEPS IN RISER.



5'X5' RISER TRASH RACK DETAIL

N.T.S.



NOTES:

1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.

RISER/ANTI-FLOTATION BLOCK CONNECTION

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DRAWN BY	OVI
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SHEET

STORMWATER CONTROL MEASURE 'R' DETAILS

C9.22

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BIORETENTION AREA 'R' PLANTING PLAN

AREA.	SYM.	SCIENTIFIC NAME	COMMON NAME	TYPE
12,350 SF		CYNODON DACTYLON	BERMUDA 419	SOD

SOD PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND SHALLOW LAND AND SHALLOW WATER AREAS. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SODBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SOD ON A FRESHLY PREPARED SODBED AND COVER.
7. INSPECT ALL SODDED AREAS AND MAKE NECESSARY REPAIRS OR RESODDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
8. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

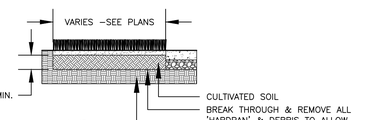
SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
3. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP (SEE SHEET C9.20 NOTE 9-9.5), THE BASIN MUST BE CLEANED OUT, GRADED, AND MEDIA INSTALLED WITH PLANTINGS PER SHEETS C9.21 AND C9.23 AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
4. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



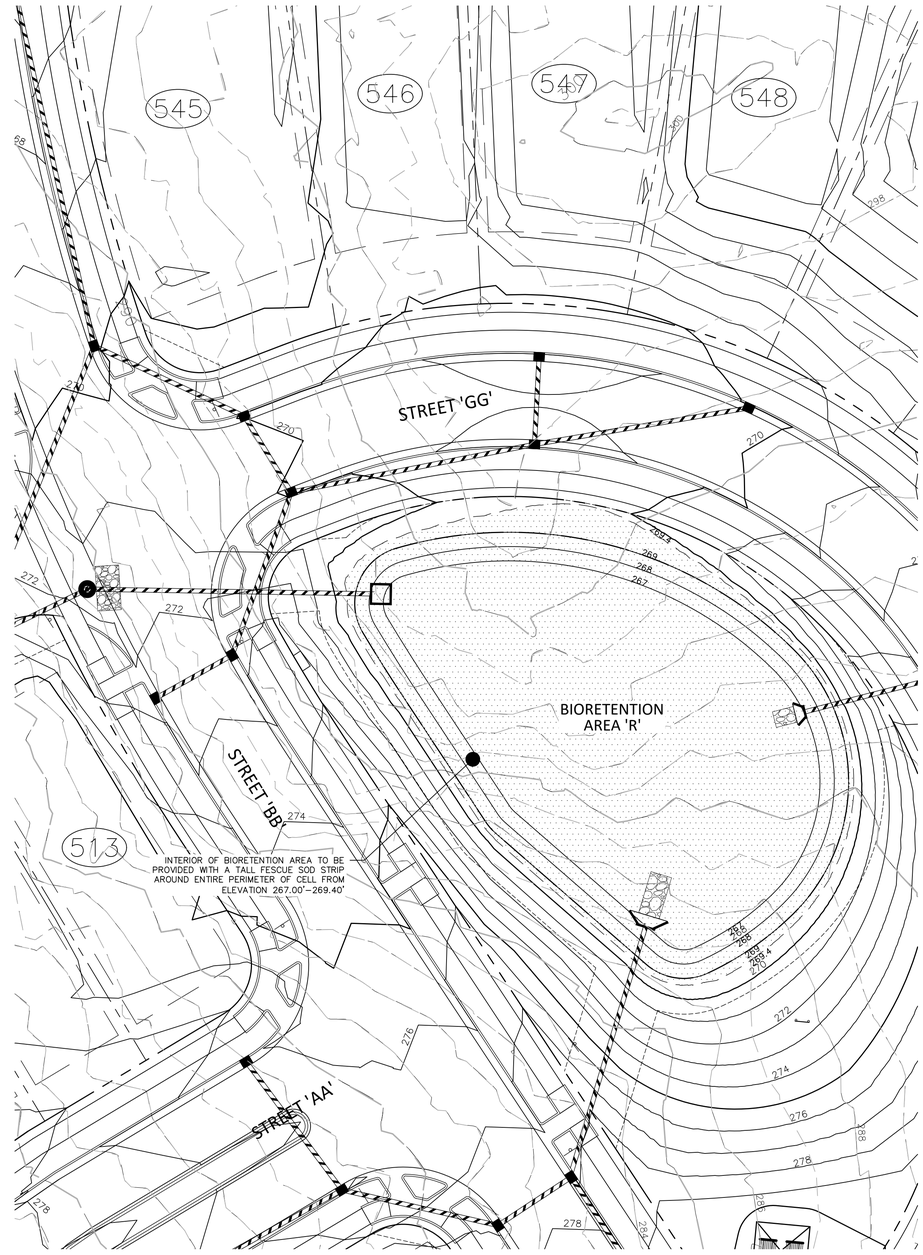
SODDING PROCEDURE:
1. SCARIFY ENTIRE AREA TO A MINIMUM DEPTH OF 6" AND REMOVE DEBRIS.
2. INSTALL 6" OF TOPSOIL AND MIX IN WITH SCARIFIED TOP LAYER.
3. ADD ADDITIVES (PER SOIL TEST ANALYSIS) & ROTOTILL.
4. LAY & ROLL SOD. WATER THOROUGHLY.
5. THE GENERAL CONTRACTOR WILL PROVIDE GRADES TO (+/- .10) OF A FOOT OF PROPOSED GRADES.

BIORETENTION PLANTING SOIL MIX SPECIFICATIONS

1. THE PLANTING SOIL SHALL BE A UNIFORM MIX, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN ONE-HALF INCH IN DIAMETER. NO OTHER MATERIALS OR SUBSTANCES SHALL BE MIXED OR DUMPED WITHIN THE BIORETENTION AREA THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. THE PLANTING SOIL SHALL BE FREE OF BERMUDA GRASS, JOHNSON GRASS, QUACK GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADA THISTLE, OR OTHER NOXIOUS WEEDS.
2. THE MEDIA SHALL BE A HOMOGENOUS SOIL MIX ENGINEERED MEDIA BLEND WITH APPROXIMATE VOLUMES OF:
   A. 75% TO 85% MEDIUM TO COARSE WASHED SAND (ASTM C33, AASHTO M6/M80, ASTM C330, AASHTO M195, OR APPROVED EQUIVALENT)
   B. 8% TO 15% FINES (SILT AND CLAY, PASSING #200 SIEVE)
   C. 5% TO 10% ORGANIC MATTER
3. THE P-INDEX OF THE MEDIA SHALL NOT EXCEED 30.
4. THE FOLLOWING TEST FREQUENCIES SHALL APPLY TO THE ABOVE SOIL CONSTITUENTS: ALL BIORETENTION AREAS SHALL HAVE A MINIMUM OF ONE TEST PER 200 CUBIC YARDS. EACH TEST SHALL CONSIST OF BOTH THE STANDARD SOIL TEST FOR MIX COMPOSITION AND PHOSPHORUS. A TEXTURAL ANALYSIS IS REQUIRED FROM THE SITE STOCKPILED BIORETENTION SOIL.
   NOTE: SINCE DIFFERENT LABS CALIBRATE THEIR TESTING EQUIPMENT DIFFERENTLY, ALL TESTING RESULTS SHALL COME FROM THE SAME TESTING FACILITY.
5. AFTER INSTALLATION OF THE MEDIA, AN INFILTRATION TEST SHALL BE PERFORMED. THE MINIMUM INFILTRATION RATE OF THE INSTALLED MEDIA IS 1.5 IN/HR.
6. THE MEDIA SHALL NOT BE MECHANICALLY COMPACTED. IT IS RECOMMENDED TO EITHER WATER OR WALK ON THE MEDIA AS IT IS PLACED.
7. IF BIORETENTION AREA IS TO BE PLANTED WITH VEGETATION OTHER THAN SOD ALONE, TRIPLE SHREDDED HARDWOOD MULCH OR STONE MULCH SHALL BE USED FOR THE BIORETENTION AREA. MULCH SHALL BE UNIFORMLY PLACED TWO TO FOUR INCHES DEEP.

COMPACTION OF THE BIORETENTION AREA

1. CONTRACTOR SHALL MINIMIZE THE COMPACTION OF BOTH THE BASE OF THE BIORETENTION AREA AND THE REQUIRED BACKFILL. WHEN POSSIBLE, CONTRACTOR SHALL USE EXCAVATION HOES TO REMOVE THE ORIGINAL SOIL. IF THE BIORETENTION AREA IS EXCAVATED USING A LOADER, THE CONTRACTOR SHALL USE WIDE TRACK OR MARSH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TURF TYPE TIRES. COMPACTION AT THE BASE OF THE BIORETENTION AREA SHALL BE DONE BY USING A PRIMARY TILLING OPERATION SUCH AS A CHISEL PLOW, RIPPER, OR SUBSOILER. THESE TILLING OPERATIONS ARE TO REFRACTURE THE SOIL PROFILE THROUGH THE 12 INCH COMPACTION ZONE. SUBSTITUTE METHODS MUST BE APPROVED BY THE ENGINEER. ROTOTILLERS DO NOT TILL DEEP ENOUGH TO REDUCE THE EFFECTS OF COMPACTION FROM HEAVY EQUIPMENT.
2. ROTOTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENTION FACILITY BEFORE BACKFILLING THE REQUIRED DRAINAGE STONE. PUMP ANY PONDED WATER BEFORE PREPARING (ROTOTILLING) BASE.
3. WHEN BACKFILLING THE BIORETENTION AREA, PLACE SOIL IN LIFTS OF 12 INCHES TO 18 INCHES. DO NOT USE HEAVY EQUIPMENT WITHIN THE BIORETENTION AREA. HEAVY EQUIPMENT CAN BE USED AROUND THE PERIMETER TO SUPPLY SOILS AND SAND. GRADE BIORETENTION MATERIALS WITH LIGHT EQUIPMENT SUCH AS A COMPACT LOADER OR A DOZER/LOADER WITH MARSH TRACKS.



BIORETENTION FACILITY 'R' LANDSCAPE PLAN
1"=20'

GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

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PHOENIX, AZ 85016
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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048204 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-R
CHECKED BY	EAM
DRAWN BY	OVI
SCALE	1" = 20'
DATE	12. 22. 2022

SHEET
STORMWATER CONTROL MEASURE 'R' LANDSCAPE PLAN
C9.23

M:\Projects\SS\C\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-R.dwg, 7/3/2024 3:18:52 PM, Zach Lee

STORMWATER CONTROL MEASURE 'S' CONSTRUCTION SPECIFICATIONS

GENERAL NOTES

1. PRIOR TO CONSTRUCTION, ANY DISCREPANCIES IN THE PLANS AND NOTES SHALL BE BROUGHT TO THE DESIGN ENGINEER'S ATTENTION IMMEDIATELY.
2. THE PROJECT WILL MEET ALL OF THE REQUIREMENTS RELATIVE TO BEST MANAGEMENT PRACTICES AND ENGINEERED STORMWATER CONTROL STRUCTURES AS OUTLINED IN THE TOWN OF KNIGHTDALE LAND DEVELOPMENT ORDINANCE. (CHAPTER 6, PART 4, UDO)
3. THE FINAL CERTIFICATION FOR THIS FACILITY WILL INCLUDE A CERTIFICATION BY THE ON-SITE GEOTECHNICAL ENGINEER THAT THE PROJECT WAS CONSTRUCTED PER THE APPROVED PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE ON-SITE GEOTECHNICAL ENGINEER FOR OBSERVATION AND TESTING SUCH THAT THE ON-SITE GEOTECHNICAL ENGINEER CAN CERTIFY THE CONSTRUCTION OF THE DAM EMBANKMENT AND SPILLWAY. THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY.
4. ALL CONSTRUCTION ACTIVITY RELATED TO THE PROPOSED STORMWATER CONTROL MEASURE SHALL BE PER THE DETAILS AND SPECIFICATIONS SHOWN IN THESE DRAWINGS. SOILS, COMPACTION, AND OTHER MISCELLANEOUS DETAILS AND SPECIFICATIONS MAY BE MODIFIED PER THE RECOMMENDATIONS OF THE ON-SITE GEOTECHNICAL ENGINEER. HOWEVER, PRIOR TO IMPLEMENTATION, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATION FROM THESE DESIGN DRAWINGS, INCLUDING SHOP DRAWINGS FOR ANY PROPOSED MODIFICATION.
5. DURING THE INITIAL STAGES OF CONSTRUCTION, THE STORMWATER CONTROL MEASURE MAY BE USED AS A SEDIMENT BASIN FOR EROSION CONTROL PURPOSES. IF SO, THE CONTRACTOR SHALL FOLLOW THE GENERAL CONSTRUCTION SEQUENCE BELOW:
   A. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE.
   B. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE.
   C. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED AND THE EROSION CONTROL INSPECTOR APPROVES THE REMOVAL OF THE SEDIMENT BASIN (SEE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE, NOTE 14.1-14.5), THE CONTRACTOR SHALL REMOVE THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) AND CLEAN OUT THE BASIN. ALL SEDIMENT, TRASH, ETC. SHALL BE DISPOSED OF PROPERLY (I.E. - PLACED IN A LANDFILL) AND NOT STOCKPILED IN AN AREA WHERE WATER QUALITY COULD BE ADVERSELY AFFECTED.
   D. ONCE THE BASIN IS CLEANED OUT, AND ALL EROSION CONTROL DEVICES REMOVED, THE CONTRACTOR SHALL CONSTRUCT THE INTERIOR GRADING SHOWN ON THIS SHEET.
   E. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER CONTROL MEASURE PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
   F. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER CONTROL MEASURE PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER CONTROL MEASURE PLANTING PLAN.
6. ALL OSHA REQUIREMENTS FOR EXCAVATIONS (SHORING, DEPTH, ETC.) ARE THE RESPONSIBILITY OF THE CONTRACTOR. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE AN EXCAVATION PLAN TO BE SEALED BY A NC P.E. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE IF AN EXCAVATION PLAN IS REQUIRED. THE JOHN R. MCADAMS COMPANY ASSUMES NO RESPONSIBILITY FOR ANY EXCAVATION DESIGN RELATED TO SAFETY OR OSHA REQUIREMENTS.
7. ON-SITE GEOTECHNICAL ENGINEER TO DETERMINE IF IN-SITU SOILS ENCOUNTERED WOULD MAINTAIN A STORMWATER CONTROL MEASURE PERMANENT POOL AT DESIGN ELEVATION. IF HIGHLY PERMEABLE SOILS ARE ENCOUNTERED THAT WOULD NOT MAINTAIN THE PERMANENT POOL ELEVATION AS DESIGNED, A CLAY LINER MAY BE REQUIRED TO MAINTAIN A PERMANENT POOL OF WATER IN THE STORMWATER CONTROL MEASURE. FINAL DETERMINATION IF A CLAY LINER IS NEEDED SHALL BE THE RESPONSIBILITY OF THE ON-SITE GEOTECHNICAL ENGINEER. UPON DETERMINATION OF HIGHLY PERMEABLE SOIL CONDITIONS, ON-SITE GEOTECHNICAL ENGINEER WILL INFORM THE DESIGN ENGINEER AND RECOMMEND LINER SPECIFICATIONS.
8. IT IS ANTICIPATED THAT DEWATERING WILL BE NECESSARY IN THE EXCAVATION AREAS (E.G. - EMBANKMENT SUB GRADE, INTERIOR PORTIONS OF THE STORMWATER CONTROL MEASURE, KEY TRENCH, ETC.). THEREFORE, THE CONTRACTOR SHALL FURNISH, INSTALL, OPERATE, AND MAINTAIN ANY PUMPING EQUIPMENT, ETC. NEEDED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE STORMWATER CONTROL MEASURE SITE. DURING PLACEMENT OF FILL WITHIN THESE AREAS, THE CONTRACTOR SHALL KEEP THE WATER LEVEL BELOW THE BOTTOM OF THE EXCAVATION / CONSTRUCTION AREAS. THE MANNER IN WHICH THE WATER IS REMOVED SHALL BE SUCH THAT THE EXCAVATION BOTTOM AND SIDE SLOPES ARE STABLE, WITH NO SEDIMENT DISCHARGED FROM THE SITE (I.E. PUMPED WATER MAY NEED TO BE DIRECTED TO AN APPROVED EROSION CONTROL DEVICE SUCH AS A DIRT BAG (ACF ENVIRONMENTAL), OR ENGINEER APPROVED EQUIVALENT, PRIOR TO DISCHARGE).
9. THE GRADES SHOWN ON THIS PLAN ARE FINISHED GRADES. IF THE EXISTING SOIL LAYER AFTER CONSTRUCTION / COMPACTION IS NOT DETERMINED SUITABLE BY A LANDSCAPE PROFESSIONAL FOR THE WETLAND PLANTINGS, THEN THE CONTRACTOR SHALL AMEND THE PLANTING AREA OF THE WETLAND AS DIRECTED BY A LANDSCAPE PROFESSIONAL.
10. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2"-3" OF THE BERM SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3"-4" ON THE DAM EMBANKMENT AND WETLAND. PLEASE NOTE THE TOPSOIL SHALL BE AMENDED, AS DIRECTED BY A LANDSCAPE PROFESSIONAL, PRIOR TO INSTALLATION ON THE EMBANKMENT AND WETLAND.
11. THE CONTRACTOR SHALL REFER TO THE LANDSCAPE PLAN FOR THE PERMANENT PLANTING PLAN/SCHEDULE FOR THIS FACILITY. CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION. PLEASE NOTE THAT NO TREES/SHRUBS OF ANY TYPE MAY BE PLANTED ON THE PROPOSED DAM EMBANKMENT (FILL AREAS).

OUTLET STRUCTURE MATERIAL SPECIFICATIONS

1. THE 18"Ø RCP OUTLET BARREL SHALL BE CLASS III RCP, MODIFIED BELL AND SPIGOT, MEETING THE REQUIREMENTS OF ASTM C76-LATEST. THE PIPES SHALL HAVE CONFINED O-RING RUBBER GASKET JOINTS MEETING ASTM C-443-LATEST. THE PIPE JOINTS SHALL BE TYPE R-4.
2. THE STRUCTURAL DESIGN FOR THE 4' X 4 ' (INTERNAL DIMENSIONS) RISER BOX WITH EXTENDED BASE SHALL BE BY OTHERS. PRIOR TO ORDERING THE STRUCTURES, THE CONTRACTOR SHALL PROVIDE, TO THE DESIGN ENGINEER FOR REVIEW, SHOP DRAWINGS AND SUPPORTING STRUCTURAL CALCULATIONS SEALED BY A P.E. REGISTERED IN NORTH CAROLINA DEMONSTRATING THE PERTINENT VERTICAL LOADS ARE SUPPORTED BY THE CONCRETE RISER STRUCTURE.
3. THE RISER BOX OUTLET STRUCTURE SHALL BE PROVIDED WITH STEPS 16" ON CENTER. STEPS SHALL BE PROVIDED ON THE INNER WALL OF THE RISER BOX. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66. PLEASE REFER TO SHEET C9.25 FOR LOCATION OF THE RISER STEPS. NOTE THE STEPS SHALL LINE UP WITH THE ACCESS HATCH OF THE TRASH RACK.
4. THE CONCRETE ANTI-FLOTATION BLOCK SHALL BE CAST-IN-PLACE. STEEL REINFORCEMENT AND CONNECTION TO THE RISER SHALL BE PROVIDED IN ACCORDANCE WITH THE DETAIL ON SHEET C9.26. THE CONTRACTOR SHALL ENSURE THE WEIGHT OF THE ENTIRE RISER STRUCTURE IS GREATER THAN OR EQUAL TO 4,662 LBS. IN LIEU OF CAST-IN-PLACE, THE CONTRACTOR MAY OPT FOR A PRECAST ANTI-FLOTATION BLOCK. SHOP DRAWINGS FOR THE PRECAST BLOCK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE PRECAST ANTI-FLOTATION BLOCK SHALL HAVE A SHIPPING WEIGHT OF 9,088 LBS.
5. THE RISER BOX JOINTS SHALL BE SEALED USING BUTYL RUBBER SEALANT CONFORMING TO ASTM-C990-LATEST. IF NECESSARY, THE CONTRACTOR SHALL INCORPORATE A WATERSTOP INTO THE RISER BOX JOINT TO ENSURE A WATERTIGHT CONNECTION. THE CONTRACTOR SHALL PARGE JOINTS ON BOTH THE INSIDE AND OUTSIDE WITH NON-SHRINK GROUT AND INSTALL GALVANIZED STEEL STRAPS PER DETAIL ON SHEET C9.25.
6. PRIOR TO ORDERING, THE CONTRACTOR SHALL SUBMIT TRASH RACK SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. CONTRACTOR SHALL ENSURE THAT AN ACCESS HATCH IS PROVIDED WITHIN THE TRASH RACK (SEE DETAIL FOR LOCATION) THAT WILL ALLOW FOR FUTURE MAINTENANCE ACCESS. CONTRACTOR SHALL ALSO PROVIDE A CHAIN AND LOCK FOR SECURING THE ACCESS HATCH. NOTE THE ACCESS HATCH SHALL LINE UP WITH THE ACCESS STEPS AFTER INSTALLATION.
7. ALL POURED CONCRETE SHALL MEET THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE NOTED:

   -MINIMUM 3000 PSI (28 DAY)
   -SLUMP = 3" - 5"
   -ENTRAINED AIR = 5% - 7%

   PLEASE NOTE NO CONCRETE SHALL BE POURED WHEN THE AMBIENT AIR TEMPERATURES ARE EXPECTED TO BE ABOVE 85°F OR BELOW 40°F. CAST-IN-PLACE CONCRETE SHALL BE "WET CURED" AFTER FINISHING FOR A MINIMUM OF 48 HOURS.

   ON-SITE GEOTECHNICAL ENGINEER TO ENSURE AND CERTIFY ALL POURED CONCRETE MEETS THE ABOVE SPECIFICATIONS.
8. GEOTEXTILE FABRIC FOR THE 18"Ø CLASS IV RCP OUTLET BARREL JOINTS SHALL BE MIRAFI 180N OR ENGINEER APPROVED EQUAL (NON-WOVEN FABRIC).
9. STORMWATER CONTROL MEASURE EMERGENCY DRAW DOWN IS VIA AN 6"Ø PLUG VALVE. THE VALVE SHALL BE A M&H STYLE 1820 ECCENTRIC VALVE OR APPROVED EQUAL. THIS VALVE IS IN ACCORDANCE WITH AWWA C-517, AND SHALL BE OPERABLE FROM TOP OF OUTLET STRUCTURE VIA A HAND WHEEL (SEE DETAIL SHEET C9.25). THE CONTRACTOR SHALL PROVIDE A REMOVABLE VALVE WRENCH WITH A HAND WHEEL ON TOP FOR OPERATION OF THE 6"Ø PLUG VALVE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

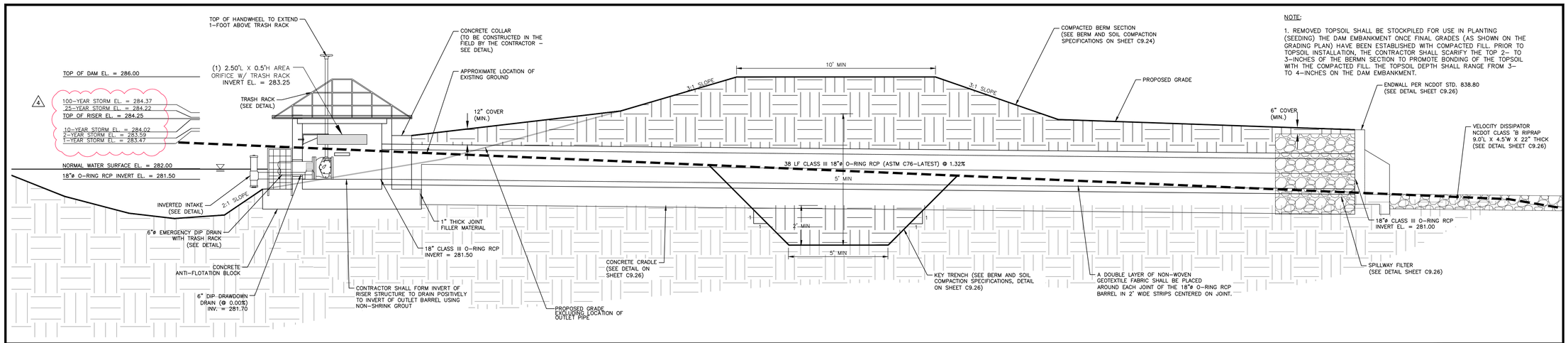
GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

CONSTRUCTION SEQUENCE

1. PRIOR TO CONSTRUCTION, THE OWNER SHALL OBTAIN A LAND DISTURBING (GRADING) PERMIT AND AN "APPROVAL TO CONSTRUCT" FROM THE TOWN OF KNIGHTDALE AND ALL OTHER NECESSARY PERMITS FROM APPLICABLE AGENCIES (E.G. 404 / 401 PERMITS)
2. INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES PER THE APPROVED SEDIMENT AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL MAINTAIN ALL APPROVED SEDIMENT AND EROSION CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT, AS REQUIRED. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE EROSION CONTROL INSPECTOR, AS REQUIRED BY GOVERNING AGENCIES, PRIOR TO ANY CLEARING.
3. CLEAR AND GRUB AREA WITHIN THE LIMITS OF THE PROPOSED DAM CONSTRUCTION. ALL TREES AND THEIR ENTIRE ROOT SYSTEMS MUST BE REMOVED FROM THE DAM FOOTPRINT AREA AND BACKFILLED WITH SUITABLE SOIL MATERIAL. THE BACKFILLED AREAS SHALL BE COMPACTED TO THE SAME STANDARDS AS THE DAM EMBANKMENT. THE REMAINING AREA OF THE EMBANKMENT SHALL BE STRIPPED TO A SUITABLE DEPTH AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER. ANY RESIDUAL SOILS TO BE LEFT IN PLACE MUST BE WELL SCARIFIED TO PROMOTE BONDING OF THE NEW EMBANKMENT FILL. NO EMBANKMENT MATERIAL SHALL BE PLACED FOR THE DAM OR KEY TRENCH UNTIL APPROVAL OF THE DAM SUBGRADE IS OBTAINED FROM THE ON-SITE GEOTECHNICAL ENGINEER.
4. EXCAVATE FOR THE NEW KEY TRENCH ALONG THE CENTERLINE OF THE PROPOSED DAM EMBANKMENT. THE TRENCH SHALL EXTEND A MINIMUM OF 5 FT BELOW EXISTING GRADE OR 2 FT BELOW THE 18"Ø RCP OUTLET BARREL AND SHALL HAVE A MINIMUM BOTTOM WIDTH OF 5 FEET. THE KEY TRENCH SIDESLOPES SHALL BE A MINIMUM OF 1:1 (H:V). WHEN EXCAVATING THE KEY TRENCH, IF ANY DEBRIS IS ENCOUNTERED TO AN EXTENT THAT SUCH DEBRIS MAY EXIST IN OTHER INSITU PORTIONS OF THE DAM EMBANKMENT, IT SHOULD ALSO BE REMOVED. THE KEY TRENCH SHALL BE COMPACTED TO THE SAME SPECIFICATION LISTED IN ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." DEPENDING UPON ON-SITE SOIL CONDITIONS ENCOUNTERED DURING EXCAVATION, THE ON-SITE GEOTECHNICAL ENGINEER MAY VARY THE DEPTH AND DIMENSIONS OF THE KEY TRENCH AS DEEMED NECESSARY. THE ON-SITE GEOTECHNICAL ENGINEER SHALL RETAIN DOCUMENTATION OF ANY VARIATION FOR FUTURE AS-BUILT SUBMITTALS TO THE TOWN OF KNIGHTDALE.
5. BEGIN PLACEMENT OF BACKFILL WITHIN THE KEY TRENCH. THE KEY TRENCH SHALL BE COMPACTED TO THE SPECIFICATIONS LISTED ITEM 4 OF THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS." THE KEY TRENCH SHALL BE TESTED PER THE SPECIFICATIONS LISTED IN THAT SECTION.
6. PRIOR TO INSTALLATION, SUBGRADE CONDITIONS ALONG THE SPILLWAY PIPES SHOULD BE EVALUATED BY THE ON-SITE GEOTECHNICAL ENGINEER TO ASSESS WHETHER SUITABLE BEARING CONDITIONS EXIST AT THE SUBGRADE LEVEL. SHOULD SOFT OR OTHERWISE UNSUITABLE CONDITIONS BE ENCOUNTERED ALONG THE PIPE ALIGNMENTS, THESE MATERIALS SHOULD BE UNDERCUT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE UNDERCUT MATERIALS SHALL BE REPLACED WITH ADEQUATELY COMPACTED STRUCTURAL FILL, LEAN CONCRETE OR FLOWABLE FILL AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.
7. IN ORDER TO HELP PROTECT THE SOIL SUBGRADE FROM DETERIORATION (DUE TO EXPOSURE, RAINFALL, SEEPAGE, AND RUNOFF) BEFORE THE CRADLE CAN BE POURED, IT IS STRONGLY RECOMMENDED THAT A 3" TO 4" THICK CONCRETE MUD MAT BE POURED OVER THE SUBGRADE ONCE IT IS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE MUD MAT WILL ALSO PROVIDE BEARING FOR THE BLOCKS THAT TEMPORARILY SUPPORT THE SPILLWAY PIPE UNTIL THE CRADLE CAN BE POURED. THE METHOD OF BLOCK SUPPORT FOR THE PIPE PROPOSED BY THE CONTRACTOR SHOULD BE SUBMITTED TO THE JOHN R. MCADAMS COMPANY FOR REVIEW.
8. BEGIN CONSTRUCTION OF THE NEW EMBANKMENT. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS PRIOR TO COMPACTION, UNLESS DIRECTED OTHERWISE BY THE ON-SITE GEOTECHNICAL ENGINEER. FILL LIFTS SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. IF IT IS NECESSARY, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO FINAL GRADE IN ORDER TO ACHIEVE PROPER COMPACTION.
9. AS CONSTRUCTION OF THE EMBANKMENT MOVES FORWARD, IT WILL BE NECESSARY TO INSTALL THE CONCRETE CRADLE. SEE NOTE ON CRADLE DETAIL (SHEET C9.26). THIS MAY BE CONSTRUCTED USING ONE OF THE FOLLOWING METHODS:
   A. IF THE PROPOSED STRUCTURAL FILL MATERIAL IS UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN THE STRUCTURAL FILL SHOULD BE INSTALLED AND COMPACTED UP TO THE TOP OF CONCRETE CRADLE ELEVATION. ONCE THE STRUCTURAL FILL REACHES THE NEXT DOWNSTREAM JUNCTION BOX OR HEADWALL AND IS COMPACTED TO THE ELEVATION OF THE TOP OF THE CONCRETE CRADLE, EXCAVATE THE CONCRETE CRADLE TRENCH PER THE PROVIDED DETAILS AND CONSTRUCT THE CONCRETE CRADLE AS PER THE PROVIDED CONCRETE CRADLE DETAIL.
   B. IF THE PROPOSED STRUCTURAL FILL IS NOT UTILIZED AS THE FORMWORK FOR THE CONCRETE CRADLE, THEN PRIOR TO CONSTRUCTING THE STRUCTURAL FILL EMBANKMENT, THE FORMWORK FOR THE CONCRETE CRADLE SHOULD BE INSTALLED ON EXISTING GROUND AND/OR THE MUD MAT. THE CONCRETE CRADLE SHALL BE CONSTRUCTED PER THE PROVIDED DETAILS
10. AS AN ALTERNATE TO A CONCRETE CRADLE UNDER THE BARREL PIPE (SEE SHEET C9.26), THE CONTRACTOR MAY CHOOSE TO ELIMINATE THE CONCRETE CRADLE AND USE COMPACTED BACKFILL IF THE ON-SITE GEOTECHNICAL ENGINEER WILL PROVIDE A NC PE SEALED LETTER CERTIFYING THAT THE COMPACTION UNDER, AROUND, AND ABOVE THE BARREL MEETS THE SPECIFICATIONS OF THE EMBANKMENT COMPACTION REQUIREMENTS AND MOISTURE CONTENT. THIS CERTIFICATION LETTER MUST BE SUBMITTED TO THE DESIGN ENGINEER PRIOR TO BACKFILL. THIS SEPARATE CERTIFICATION MUST BE SPECIFIC TO THE BARREL PIPE FOR THE FACILITY, AND MUST CLEARLY STATE THAT ALL SOIL MATERIAL UNDER, AROUND, AND ABOVE THE BARREL PIPE MEETS THE BERM AND SOIL COMPACTION SPECIFICATIONS ON THIS SHEET. THIS CERTIFICATION IS TO INCLUDE REFERENCE TO BOTH MATERIAL AND COMPACTION, AND MUST STATE THAT ALL MATERIALS UNDER, AROUND, AND ABOVE THE BARREL HAVE BEEN COMPACTED PER THE BERM MATERIAL SPECIFICATIONS (AT LEAST 95% OF MAXIMUM DRY DENSITY USING ASTM D698 STANDARD PROCTOR) WITH NO VOID SPACES PRESENT. THE CONTRACTORS INTENT TO UTILIZE THIS ALTERNATIVE MUST BE STATED PRIOR TO CONSTRUCTION TAKING PLACE. THIS CONTRACTORS CERTIFICATION MUST BE PRESENTED TO THE DESIGN ENGINEER BEFORE AN AS-BUILT CERTIFICATION CAN BE ISSUED FOR THIS FACILITY.
11. INSTALL RISER / BARREL ASSEMBLY, ALONG WITH THE EMERGENCY DRAIN SYSTEM. INSTALL 18" RCP OUTLET BARREL SPILLWAY FILTER FROM THE DETAILS SHOWN ON SHEET C9.26.
12. CONSTRUCT EMBANKMENT PER SPECIFICATIONS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS" AND REQUIREMENTS OF THE ON-SITE GEOTECHNICAL ENGINEER. ALL CHARACTERISTICS OF THE EMBANKMENT FILL MATERIAL SHALL MEET THE STANDARDS SET FORTH IN "BERM AND SOIL COMPACTION SPECIFICATIONS", INCLUDING COMPACTION AND MOISTURE REQUIREMENTS. IF NECESSARY TO ACHIEVE PROPER COMPACTION, THE EMBANKMENT FILL MATERIAL WILL BE OVERBUILT IN HORIZONTAL LIFTS AND CUT BACK TO PROPER FINAL GRADE. ANY HAND COMPACTION ACTIVITIES AROUND SPILLWAY OR DRAIN STRUCTURES SHALL BE CONDUCTED IN 4-INCH LOOSE LIFTS AND BE TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT. ALL COMPACTION AND MOISTURE TESTING SHALL BE CARRIED OUT AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER AND AS LISTED IN THE SECTION TITLED "BERM AND SOIL COMPACTION SPECIFICATIONS".
13. UPON COMPLETION OF DAM EMBANKMENT, PROMPTLY STABILIZE AND SEED DAM EMBANKMENT PER SEEDING SCHEDULE. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER THE PERMANENT SEEDING SCHEDULE FOUND ON SHEET C9.27.
14. THE CONTRACTOR SHALL CONSTRUCT THE ENTIRE FACILITY (PERMANENT OUTLET STRUCTURE, DAM, ETC.) WITH THE EXCEPTION OF THE INTERIOR FINE GRADING FOR THE FACILITY. THE INTERIOR FINE GRADING WILL BE CONSTRUCTED ONCE THE EROSION CONTROL PHASE IS COMPLETE. THE TEMPORARY DRAW DOWN RISER (OR SKIMMER) SHALL BE CONNECTED TO THE PERMANENT 6"Ø DIP DRAIN PIPE. ONCE THE UPSTREAM DRAINAGE AREA IS STABILIZED THE REQUIRED TOWN OF KNIGHTDALE SCM BASIN REMOVAL SEQUENCE MUST BE FOLLOWED.
   14.1. SCHEDULE A SITE MEETING WITH THE TOWN OF KNIGHTDALE EROSION CONTROL INSPECTOR TO DETERMINE IF A BASIN CAN BE REMOVED. INSTALL SILT FENCING OR OTHER TEMPORARY EROSION CONTROL MEASURES AS NEEDED PRIOR TO REMOVAL OF THE BASIN.
   14.1. CONTACT NCDEQ - RALEIGH REGIONAL OFFICE (919) 791-4200 TO DETERMINE THE DIVISION OF ENERGY, MINERAL AND LAND RESOURCES CONTACT PERSON TO RECEIVE DEWATERING NOTIFICATIONS. AT LEAST 10 DAYS PRIOR TO BEGINNING DEWATERING ACTIVITY, SEND EMAIL TO NCDEQ-DEMLR CONTACT PERSON AND COPY ENVIRONMENTAL CONSULTANT THAT MET YOU ONSITE. THE EMAIL SHOULD INCLUDE E&SC JURISDICTION: TOWN OF KNIGHTDALE, TOK PROJECT: NAME, NUMBER, AND LOCATION (CITY/TOWN), ENVIRONMENTAL CONSULTANT NAME, AND ADDRESS THE FOLLOWING: A) REASON FOR CONVERSION, B) BASIN #, C) DEWATERING METHOD, AND D) ALL OTHER NECESSARY INFO FROM PART II, SECTION G, ITEM 4 OF THE NCG01. (KEEP EMAIL FOR YOUR NPDES MONITORING DOCUMENTATION
   14.2. AFTER RECEIVING POSITIVE CONFIRMATION FROM NCDEQ-DEMLR THAT YOU MAY REMOVE THE BASIN OR ON > DAY 11, WHICHEVER IS SOONER. REMOVE BASIN(S) AND ASSOCIATED TEMPORARY DIVERSION DITCHES. IF PIPES NEED TO BE EXTENDED, PERFORM THIS OPERATION AT THIS TIME. FINE GRADE AREA IN PREPARATION FOR SEEDING.
   14.3. PERFORM SEEDBED PREPARATION, SEED, MULCH AND ANCHOR ANY RESULTING BARE AREAS IMMEDIATELY USING NON-CLUMPING TURF GRASS (CENTIPEDE / HYBRID BERMUDA)
   14.4. INSTALL VELOCITY DISSIPATORS AND/OR LEVEL SPREADERS AS REQUIRED ON THE EROSION CONTROL PLAN.
   14.5. WHEN SITE IS FULLY STABILIZED, CALL EROSION CONTROL INSPECTOR FOR APPROVAL OF REMOVING REMAINING TEMPORARY EROSION CONTROL MEASURES AND ADVICE ON WHEN SITE CAN BE ISSUED A CERTIFICATE OF COMPLETION. NOTE: A MEETING SHOULD ALSO BE SCHEDULED WITH THE EROSION CONTROL INSPECTOR AND STORMWATER TECHNICIAN TO DETERMINE WHEN A BASIN MAY BE CONVERTED FOR STORMWATER USE.
15. SCHEDULE A FINAL AS-BUILT INSPECTION AND AS-BUILT SURVEY WITH THE ENGINEER AND SURVEYOR. AN AS-BUILT INSPECTION AND SURVEY SHALL BE SCHEDULED BEFORE IMPOUNDING WATER IN THE FACILITY AND A MINIMUM OF 60 DAYS PRIOR TO THE ANTICIPATED DATE OF CERTIFICATION APPROVAL. ANY COMMENTS OR DEFICIENCIES IN THE SCM CONSTRUCTION MUST BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND OWNER BEFORE CERTIFICATION SHALL BE GRANTED.

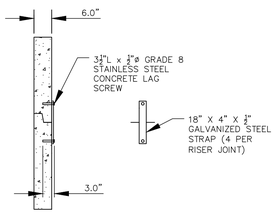
BERM AND SOIL COMPACTION SPECIFICATIONS

1. PRIOR TO CONSTRUCTION, THE ON-SITE GEOTECHNICAL ENGINEER SHALL IDENTIFY BORROW / FILL AREAS AND VERIFY THEIR SUITABILITY FOR USE WITHIN THE DAM EMBANKMENT. ALSO, THE ON-SITE GEOTECHNICAL ENGINEER SHALL PERFORM STANDARD PROCTORS ON THE PROPOSED BORROW MATERIAL TO ENSURE THAT OPTIMUM MOISTURE CONTENT AND COMPACTION CAN BE ACHIEVED / CONTROLLED DURING CONSTRUCTION.
2. ALL FILL MATERIALS TO BE USED FOR THE DAM EMBANKMENT SHALL BE TAKEN FROM BORROW AREAS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER. THE FILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL. THE FOLLOWING SOIL TYPES ARE SUITABLE FOR USE AS FILL WITHIN THE DAM EMBANKMENT AND KEY TRENCH: ML AND CL. ALL FILL MATERIALS SHALL BE APPROVED BY THE ONSITE GEOTECHNICAL ENGINEER FOR THE INTENDED USE.
3. FILL PLACEMENT FOR THE EMBANKMENT SHALL NOT EXCEED A MAXIMUM 8" LIFT (UNCOMPACTED). EACH LIFT SHALL BE CONTINUOUS FOR THE ENTIRE LENGTH OF EMBANKMENT. BEFORE PLACEMENT OF FILL FOR THE BERM SECTION, ALL UNSUITABLE MATERIAL SHALL BE REMOVED AND THE SURFACE PROPERLY PREPARED FOR FILL PLACEMENT. FILL MATERIAL ADJACENT TO ALL SPILLWAY AND DRAINAGE STRUCTURES SHALL BE PLACED IN 4-INCH (UNCOMPACTED) LIFTS AND HAND-COMPACTED TO THE SAME COMPACTION AND MOISTURE REQUIREMENTS AS THE ENTIRE EMBANKMENT.
4. ALL FILL SOILS USED IN THE EMBANKMENT CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). THE FILL SOILS SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN -1 TO +3 PERCENT OF ITS OPTIMUM MOISTURE CONTENT. COMPACTION TESTS SHALL BE PERFORMED BY THE ON-SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO VERIFY THAT THE PROPER COMPACTION LEVEL HAS BEEN REACHED. THE FILL SHOULD BE COMPACTED USING A SHEEPSFOOT TYPE COMPACTOR. IN ORDER TO PREVENT DAMAGE TO THE PIPE, NO COMPACTION EQUIPMENT SHALL CROSS ANY PIPE UNTIL MINIMUM COVER IS ESTABLISHED ALONG THE PIPE.
5. THE DESIGN ENGINEER SHALL BE PROVIDED WITH REPORTS AND CERTIFICATION, BY THE ON-SITE GEOTECHNICAL ENGINEER, THAT THE GEOTECHNICAL ASPECTS OF THE FACILITY HAVE BEEN CONSTRUCTED PER PLAN . THIS CERTIFICATION MUST ADDRESS THE TESTING FOR MATERIALS AND COMPACTION OF THE DAM EMBANKMENT AND SPILLWAY. THESE REPORTS AND CERTIFICATION WILL BE NEEDED DURING THE AS-BUILT CERTIFICATION PROCESS FOR THIS STORMWATER CONTROL MEASURE. THEREFORE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE TESTING AND OBSERVATION WITH THE ON-SITE GEOTECHNICAL ENGINEER.
6. TESTING OF THE NEW FILL MATERIALS SHALL BE PERFORMED TO VERIFY THAT THE RECOMMENDED LEVEL OF COMPACTION IS ACHIEVED DURING CONSTRUCTION. THEREFORE, ONE DENSITY TEST SHALL BE PERFORM



NOTE:

1. REMOVED TOPSOIL SHALL BE STOCKPILED FOR USE IN PLANTING (SEEDING) THE DAM EMBANKMENT ONCE FINAL GRADES (AS SHOWN ON THE GRADING PLAN) HAVE BEEN ESTABLISHED WITH COMPACTED FILL. PRIOR TO TOPSOIL INSTALLATION, THE CONTRACTOR SHALL SCARIFY THE TOP 2– TO 3–INCHES OF THE BERMN SECTION TO PROMOTE BONDING OF THE TOPSOIL WITH THE COMPACTED FILL. THE TOPSOIL DEPTH SHALL RANGE FROM 3– TO 4–INCHES ON THE DAM EMBANKMENT.



RISER JOINT CONNECTION DETAIL

N.T.S.

NOTES:

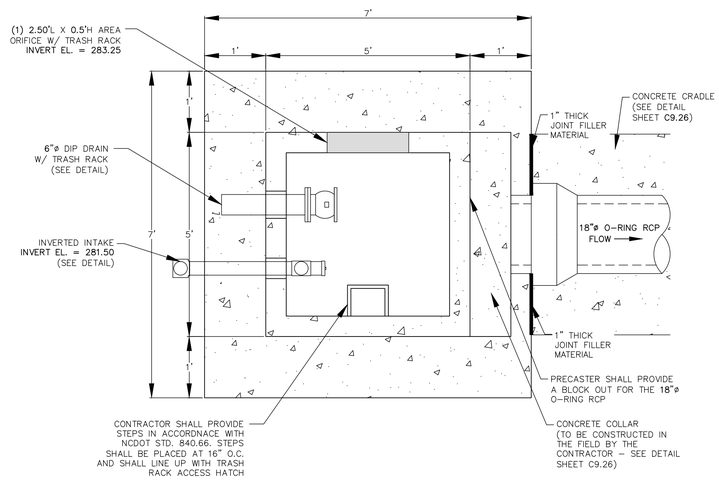
1. CONCRETE ANTI-FLOTATION BLOCK TO BE PROVIDED WITH MINIMUM TEMPERATURE AND SHRINKAGE STEEL REINFORCEMENT.

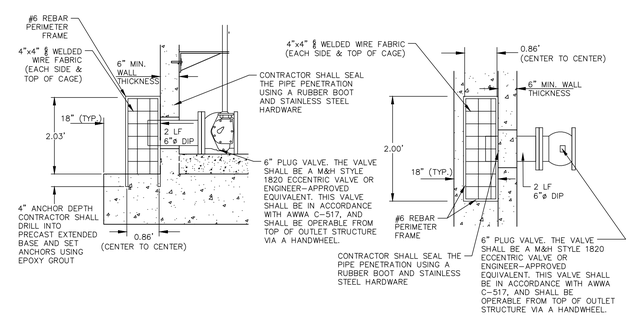
2. TRASH RACKS NOT SHOWN FOR CLARITY.

3. THE NUMBER OF GUIDES FOR THE VALVE STEM SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. THE VALVE STEM MUST BE OPERABLE FROM THE TOP OF THE RISER VIA THE HANDWHEEL WITH AN INSIGNIFICANT AMOUNT OF PLAY IN THE VALVE STEM.

4. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

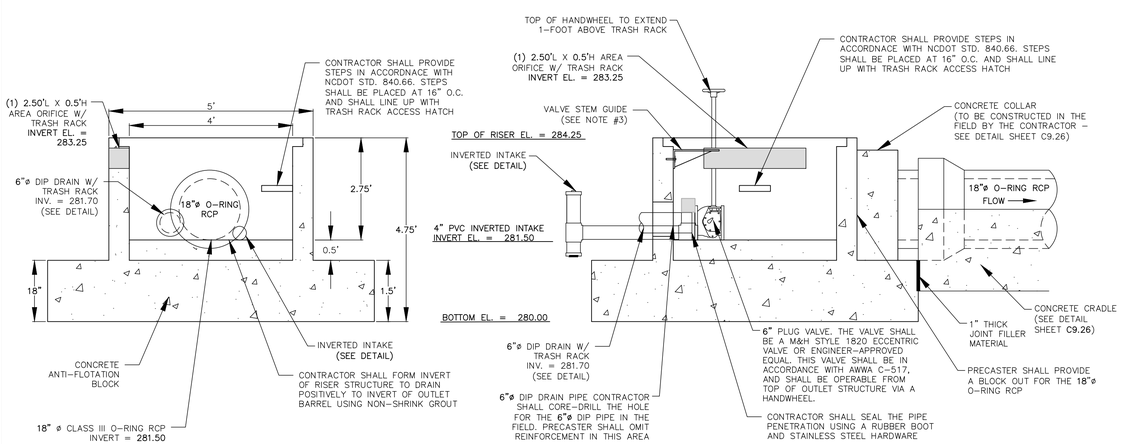
5. A JOINT SHALL ALIGN WITH THE EDGE OF THE ANTI-FLOAT BLOCK.





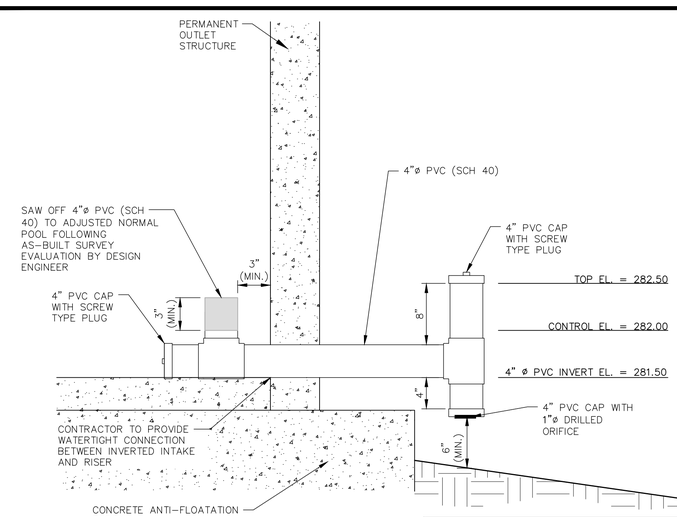
6"ø EMERGENCY DIP DRAIN TRASH RACK DETAILS

N.T.S.



PERMANENT OUTLET STRUCTURE DETAILS

N.T.S.



INVERTED INTAKE DETAIL (RISER)

N.T.S.

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-S
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'S' DETAILS

C9.25

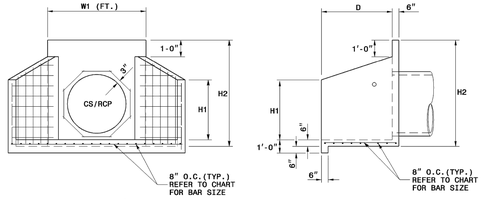
M:\Projects\SU\2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawing\Current Drawing\2020110062-SW-S.dwg, 7/3/2024 3:22:41 PM, Zach Lee

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

7-06

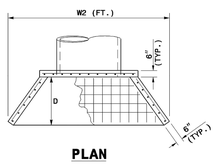
ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80



ELEVATION

SIDE



PLAN

NOTES:

- THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARDS: 838.21, 838.27, 838.33 AND 838.39.
- INSTALL PRECAST ENDWALLS WITH WINGS AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
- USE 4000 PSI CONCRETE.
- PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 WITH 2" MIN. CLEARANCE.
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- PIPE TO BE GROUTED INTO HEADWALL AT JOB SITE BY CONTRACTOR
- ALL ELEMENTS PRECAST TO MEET ASTM C913.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
- CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

NOTE: THE MINIMUM BAR SIZE SHALL BE #5 BARS AT 8" CTS.THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.

ENDWALL DIMENSIONS

FT.	MINIMUM	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.	MIN./MAX.
PIPE DIA.	BAR SIZE	H1(FT.)	H2(FT.)	D (FT.)	W1	W2
1.0	#5 @ 8"	1.25/2.00	2.00/3.75	1.25/1.75	3.00/3.75	5.50/6.00
1.25	#5 @ 8"	1.25/2.00	3.00/3.75	1.25/2.00	3.50/3.75	6.50/6.75
1.50	#5 @ 8"	1.25/2.00	3.00/4.25	1.50/2.50	3.50/3.75	6.50/6.75
2.0	#5 @ 8"	1.50/2.50	4.00/4.75	1.75/2.50	4.00/4.25	7.50/8.25
2.5	#5 @ 8"	2.50/3.50	4.00/6.00	2.00/3.00	4.50/5.50	10.00/11.50
3.0	#5 @ 8"	3.00/3.50	5.00/6.00	2.75/3.50	5.25/5.75	11.50/11.75
3.5	#5 @ 8"	3.25/4.50	6.00/6.75	3.25/3.50	6.00/6.75	12.00/13.25
4.0	#5 @ 8"	3.50/4.50	6.50/7.00	3.25/3.50	6.50/6.75	13.00/13.25
4.5	#5 @ 8"	4.00/5.00	6.50/8.50	3.25/4.00	7.00/9.25	13.50/15.75
5.0	#5 @ 8"	4.50/5.00	7.00/8.50	3.25/4.00	7.25/9.25	13.75/15.75
5.5	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.25/9.25	14.00/15.75
6.0	#5 @ 8"	4.50/5.00	7.50/8.50	3.25/4.00	7.75/9.25	14.75/16.75

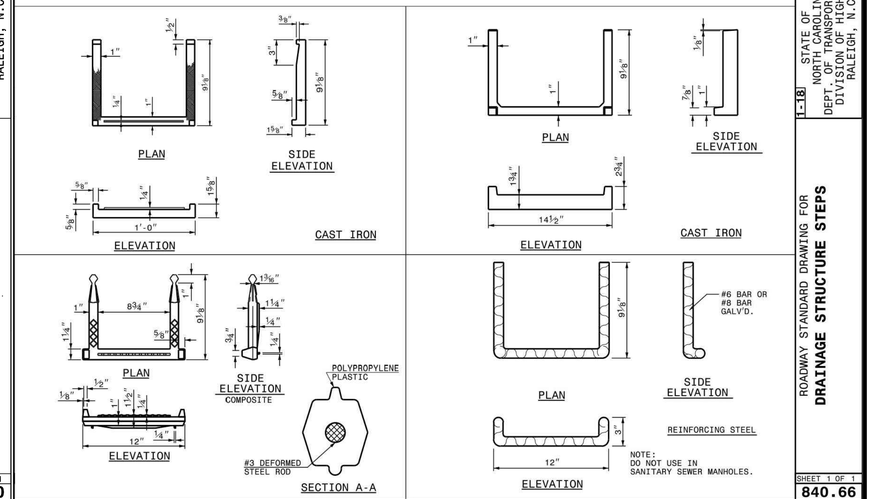
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW

SHEET 1 OF 1
838.80

NOTES:
INSTALL ALL STEPS PROTRUDING 4" FROM INSIDE FACE OF STRUCTURE WALL.
STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS OF THE PROPOSED STEPS AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.



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

1-18

ROADWAY STANDARD DRAWING FOR
DRAINAGE STRUCTURE STEPS

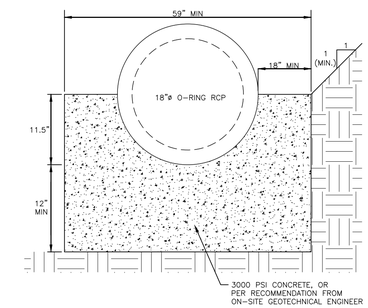
SHEET 1 OF 1
840.66

NOTE:

1. CONTRACTOR SHALL PROVIDE A JOINT IN THE OUTLET BARREL NO MORE THAN 5-FT FROM THE RISER.

BARREL PIPE CONCRETE CRADLE CONSTRUCTION SEQUENCE

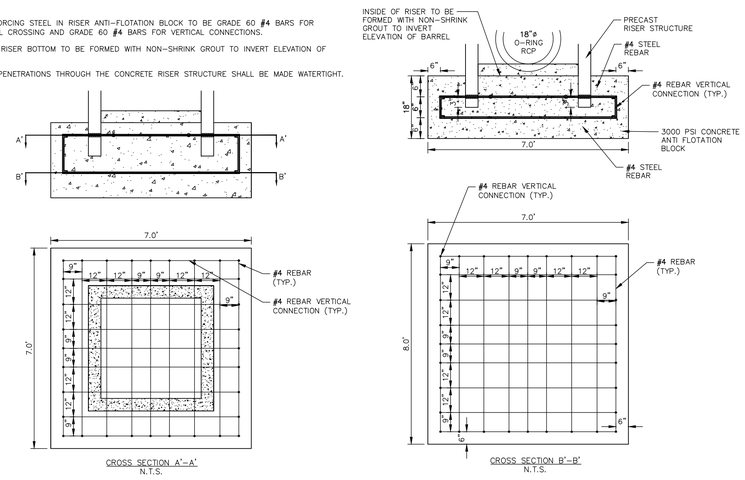
1. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN BRING GRADE OF DAM EMBANKMENT TO SPRINGLINE OF PIPE ELEVATION. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN CONSTRUCT FORMWORK FOR CONCRETE CRADLE ON EXISTING GRADE.
2. IF OPTION A IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, THEN EXCAVATE TRENCH FOR CRADLE AND BARREL PER DIMENSIONS ON DRAWINGS. IF OPTION B IS CHOSEN FROM NOTE 9 OF THE OUTLET STRUCTURE MATERIAL SPECIFICATIONS, PROCEED TO STEP 3 BELOW.
3. PLACE BARREL PIPE ON CONCRETE BLOCKS TO GRADE. AT THIS STEP, CONTRACTOR SHALL WRAP A DOUBLE LAYER OF NON-WOVEN GEOTEXTILE FABRIC AROUND EACH JOINT OF THE 18"ø O-RING RCP BARREL IN 2' WIDE STRIPS CENTERED ON JOINT.
4. PLACE CONCRETE FOR CRADLE FOR EACH SECTION FROM ONE SIDE OF THE TRENCH. ALLOW CONCRETE TO FILL ENTIRE AREA UNDER PIPE AND PIPE HAUNCHES AS TO LEAVE NO VOIDS UNDER THE PIPE BEFORE PLACING CONCRETE ON THE OPPOSITE SIDE OF THE TRENCH. PLACE ENTIRE CRADLE AS ONE LIFT (VERTICALLY) PER DRAWINGS.
5. ALLOW CRADLE TO CURE FOR A MINIMUM OF 7 DAYS BEFORE ANY VIBRATING COMPACTION EQUIPMENT IS USED IN THE VICINITY OF THE BARREL PIPE.
6. TRENCH TO BE BACKFILLED IN 5" LIFTS WHEN COMPACTION IS BY HAND. BACKFILL IS IN 8" LIFTS WHEN CONDUCTED BY MACHINE. MINIMUM OF 2 FEET COVER MUST BE PRESENT ON 18"ø RCP BEFORE DRIVING OVER WITH HEAVY EQUIPMENT.



18" CONCRETE CRADLE DETAIL
N.T.S.

NOTES:

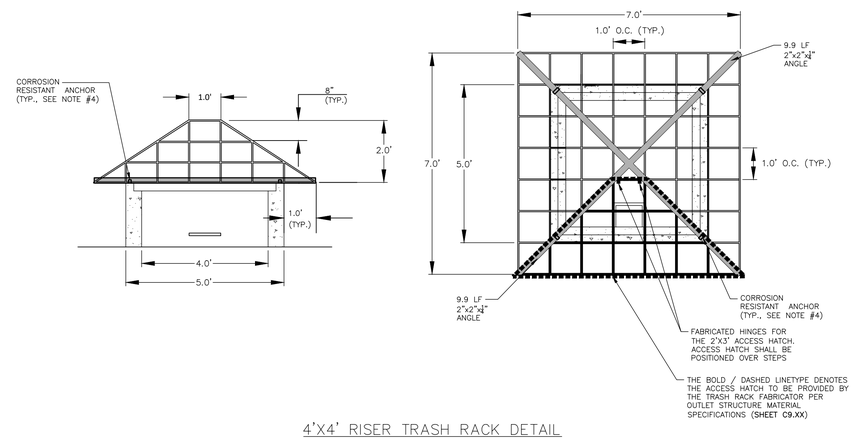
1. ALL REINFORCING STEEL IN RISER ANTI-FLOTATION BLOCK TO BE GRADE 60 #4 BARS FOR HORIZONTAL CROSSING AND GRADE 60 #4 BARS FOR VERTICAL CONNECTIONS.
2. INSIDE OF RISER BOTTOM TO BE FORMED WITH NON-SHRINK GROUT TO INVERT ELEVATION OF BARREL.
3. ALL PIPE PENETRATIONS THROUGH THE CONCRETE RISER STRUCTURE SHALL BE MADE WATERTIGHT.



RISER/ANTI-FLOTATION BLOCK CONNECTION
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. ALL REBAR AND ANGLES TO BE HOT-DIPPED GALVANIZED AND BE PROVIDED WITH AN EPOXY COATING.
3. THE HOT-DIPPED, GALVANIZED 2"x2"x1/4" ANGLES SHALL BE WELDED TO THE REBAR TRASH RACK. ONCE WELDED, THE ENTIRE ASSEMBLY SHALL BE PLACED ONTO THE RISER WITH ANGLES SITTING DIRECTLY ON TOP OF RISER.
4. TRASH RACK IS TO BE SECURELY FASTENED TO THE SPILLWAY RISER WITH A MINIMUM OF FOUR CORROSION-RESISTANT ANCHORS.
5. ACCESS HATCH SHALL ALIGN WITH STEPS IN RISER.



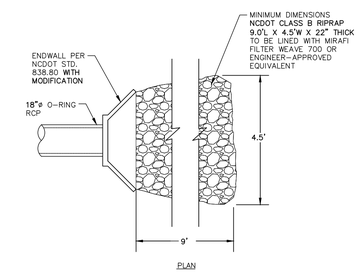
4'X4' RISER TRASH RACK DETAIL
N.T.S.

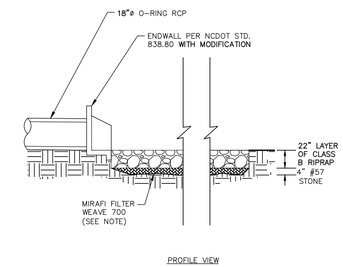
NOTES:

1. A FILTER BLANKET IS TO BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION. THE FILTER BLANKET WILL CONSIST OF A MINIMUM 4" THICK LAYER OF STONE (NCDOT #57) UNDERLAIN WITH MIRAFI FILTER WEAVE 700 OR ENGINEER-APPROVED EQUIVALENT.

ADDITIONAL NOTE TO INCLUDE IF OUTLETTING TO A CHANNEL:

1. RIPRAP TO EXTEND TO TOP OF CHANNEL WITH 2:1 SIDE SLOPES THROUGHOUT THE EXTENT OF CHANNEL.

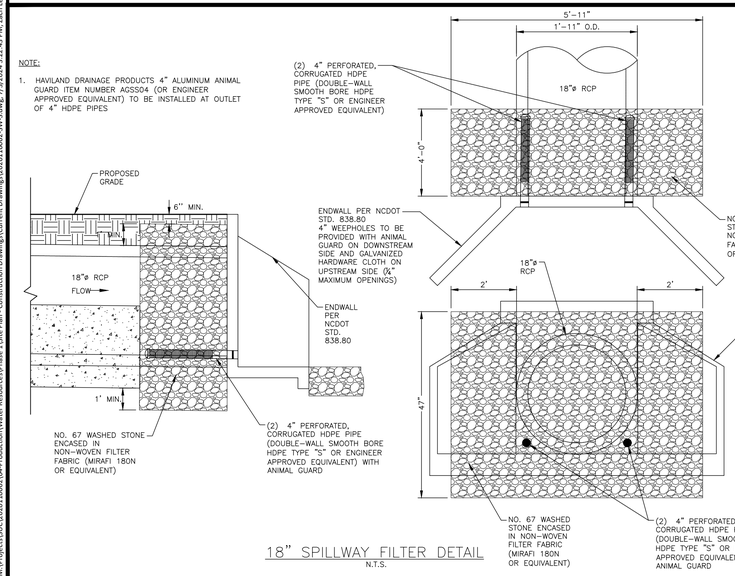




OUTLET BARREL VELOCITY DISSIPATER
N.T.S.

NOTE:

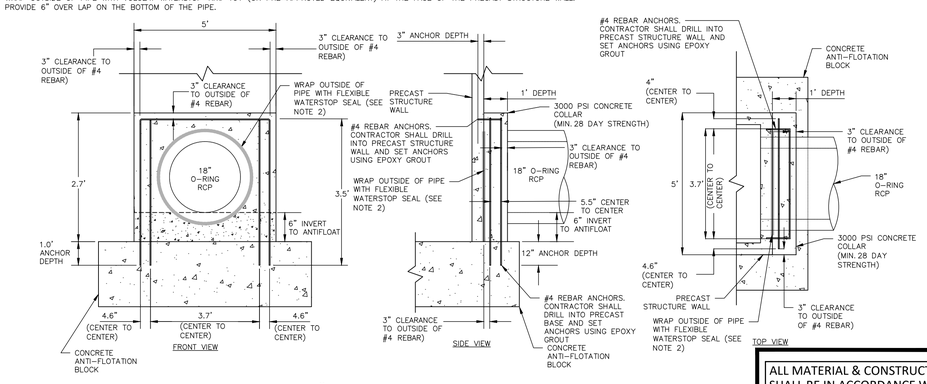
1. HAVILAND DRAINAGE PRODUCTS 4" ALUMINUM ANIMAL GUARD ITEM NUMBER AGSS04 (OR ENGINEER APPROVED EQUIVALENT) TO BE INSTALLED AT OUTLET OF 4" HDPE PIPES



18" SPILLWAY FILTER DETAIL
N.T.S.

NOTES:

1. ALL REBAR TO BE #4 REBAR.
2. WRAP OUTSIDE OF PIPE WITH VOLCLAY WATERSTOP-RX® 101 (OR PRE-APPROVED EQUIVALENT) AT THE FACE OF THE PRECAST STRUCTURE WALL. PROVIDE 6" OVER LAP ON THE BOTTOM OF THE PIPE.



18"ø CONCRETE COLLAR DETAIL
N.T.S.

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Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

MCADAMS
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Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

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CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT VALID WITHOUT ORIGINAL SEAL OR SIGNATURE

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-S
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET

STORMWATER CONTROL MEASURE 'S' DETAILS

C9.26

M:\Projects\SU\C2020110062\04-Production\Water Resources\Phase 1\Site Plan - Construction Drawings\Current Drawings\2020110062-SW-S.dwg, 7/3/2024 3:22:43 PM, Zach Lee

STORMWATER CONTROL MEASURE 'S' PLANTING PLAN SPECIFICATIONS

LEGEND

QTY.	SYM.	SCIENTIFIC NAME	COMMON NAME	HATCH	TYPE	SPACING	% OF TOTAL AREA	PROVIDED AREA
LOW MARSH (SHALLOW WATER, TOTAL AREA = 2,098 SF)								
175	AC	ACORUS CALAMUS	SWEETFLAG		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 32%	490 SF
173	PP	PONTEDERIA PECTINATUS	PICKEREL WEED		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	521 SF
180	NL	NUPHAR LUTEA SSP. ADVENA	YELLOW POND-LILY		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	522 SF
HIGH MARSH (SHALLOW LAND, TOTAL AREA = 2,002 SF)								
165	SC	SAURURUS CERNUUS	LIZARD'S TAIL		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 30%	541 SF
172	HA	HELENIUM AUTUMNALE	SNEEZEWEED		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 34%	613 SF
164	CG	CHELONE GLABRA	WHITE TURTLEHEAD		4-INCH CONTAINER	24" O.C.	PROVIDED PERCENTAGE = 35%	628 SF
EMBANKMENTS								
			HYBRID BERMUDA					

SEEDBED PREPARATION

1. CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3-4 INCHES DEEP OVER ADVERSE SOIL CONDITIONS. TOPSOIL SHOULD BE INCORPORATED INTO THE FINAL GRADING OF THE BASIN SIDE SLOPES AND SHALLOW LAND AND SHALLOW WATER AREAS. CONTRACTOR SHOULD SCARIFY THE TOP 3-4 INCHES OF THE COMPACTED FILL TO PROMOTE BONDING WITH TOPSOIL.
2. RIP THE ENTIRE AREA TO 6 INCHES DEPTH.
3. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM.
4. PER ONE TIME ONLY, APPLY AGRICULTURAL LIME, FERTILIZER, AND SUPERPHOSPHATE UNIFORMLY AND MIX WITH SOIL.
5. CONTINUE TILLAGE UNTIL A WELL-PULVERIZED, FIRM REASONABLY UNIFORM SEEDBED IS PREPARED 4 TO 6 INCHES DEEP.
6. SEED ON A FRESHLY PREPARED SEEDBED AND COVER.
7. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.
8. INSPECT ALL SEEDED AREAS AND MAKE NECESSARY REPAIRS OR RESEEDINGS WITHIN THE PLANTING SEASON, IF POSSIBLE. AFTER PERMANENT COVER IS ESTABLISHED.
9. CONSULT CONSERVATION INSPECTOR ON MAINTENANCE TREATMENT.

TEMPORARY SEEDING SCHEDULE

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
JAN 1 - MAY 1	RYE (GRAIN)	120 LBS/AC
	KOBE LESPEDEZA	50 LBS/AC
MAY 1 - AUG 15	GERMAN MILLET	40 LBS/AC
AUG 15 - DEC 30	RYE (GRAIN)	120 LBS/AC

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER (FROM AUG 15 - DEC 30, INCREASE 10-10-10 FERTILIZER TO 1000 LB/AC).

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
JAN 1 - AUG 15: REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

AUG 15 - DEC 30: REPAIR AND REFERTILIZE DAMAGED AREAS IMMEDIATELY. TOP DRESS WITH 50 LB/AC OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/AC KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

NOTE: USE THE TEMPORARY SEEDING SCHEDULE ONLY WHEN DATE IS NOT CORRECT TO USE THE PERMANENT SEEDING SCHEDULE.

PERMANENT SEEDING SCHEDULE (DAM EMBANKMENTS)

SEEDING DATE	SEEDING MIXTURE OPTIONS (CHOOSE ONE)	APPLICATION RATE
MARCH 1 - JUNE 31	HYBRID BERMUDA GRASS	1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)
SEPT 1 - OCT 31		1 LBS/1,000 SF (OR MANUFACTURER SPECIFICATIONS)

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/AC GROUND AGRICULTURE LIMESTONE AND 1000 LB/AC 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/AC STRAW. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK WITH BLADES SET NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR; USE SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

NOTE: PERMANENT SEEDING SCHEDULE IS FOR SLOPES OF THE BASIN AND TOP OF BERM. SEE REQUIRED TOWN OF KINIGHTDALE SCM BASIN REMOVAL SEQUENCE NOTE 14 ON SHEET C9.24 FOR PERMANENT SEEDING CONSTRUCTION SEQUENCE.

TOWN OF KNIGHTDALE SCM INSPECTION NOTES

WHEN SCHEDULING INSPECTIONS, PLEASE CALL THE PUBLIC WORKS ADMINISTRATIVE ASSISTANT AT (919) 217-2250.

PLEASE NOTE: THE FOLLOWING PERSONNEL MUST BE PRESENT AT ALL INSPETIONS:
1. SITE SUPERVISOR
2. GEOTECH
3. AS-BUILT CERTIFYING ENGINEER OR SOMEONE UNDER THEIR SUPERVISION

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SCM WITH DAM:
1. KEY TRENCH EXCAVATION
2. PRINCIPAL SPILLWAY PIPE AND ASSOCIATED COMPONENTS:
   A. CONCRETE CRADLE
   B. ANTI-SEEP COLLAR
   C. SEEPAGE DIAPHRAGM
3. OUTLET STRUCTURE
4. ANTI-FLOTATION BALLAST
5. ANY SITE-CONSTRUCTED REINFORCED CONCRETE STRUCTURES

THE FOLLOWING ITEMS MUST BE INSPECTED BY TOK STAFF DURING THE INSTALLATION OF ANY SAND FILTERS OR BIORETENTION DEVICES:
   A. SUBRADE OR CONSTRUCTED FOUNDATION
   B. OUTLET OR RISER IN COMBINATION WITH CONNECTING UNDERDRAINS
   C. FILTER MEDIA
   D. DAM ITEMS ON PREVIOUS LIST IF APPLICABLE

GEOTECHNICAL TESTING AND CERTIFICATION
ALL REPORTS ARE TO BE SUBMITTED WITHIN 30-DAYS OF DAM COMPLETION
REQUIRED GEOTECHNICAL RECORDS INCLUDE:
1. DAM EMBANKMENT MATERIAL COMPOSITION AND DENSITY TESTING
2. MAP THAT LABELS ALL POINTS WHERE THE DAM AND DAM FOUNDATION AREAS WERE TESTED
3. DIGITAL PHOTOS SHOWING THE DAM FOUNDATION AREAS, THE RISER, THE PRINCIPAL SPILLWAY PIPE, THE CONCRETE CRADLE, THE SEEPAGE DIAPHRAGM, RELIEF DRAINS, ETC., BEING INSTALLED.

PLANTING INSTRUCTIONS

PLANTING TECHNIQUES
A. INSURE THAT ROOTS, ONCE REMOVED FROM POT, ARE STRAIGHTENED AND FACE DOWNWARD.
B. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
C. PLACE PLANTS IN PIT INSURING ROOTS ARE FACING COMPLETELY DOWNWARD.
D. HEEL IN SOIL AROUND PLANT AND PROCEED TO NEXT PLANTING LOCATION.
E. NEWLY PLANTED PLANTS NEED TO BE FASTENED TO THE SUBSTRATE FOR THE ESTABLISHMENT OF NEW ROOTS.
F. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITION. ALL BROKEN OR FRAYED ROOTS HALL BE CUT OFF CLEANLY.
G. THE DIAMETER OF THE PITS FOR ALL VEGETATIVE STOCK SHALL BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. PLANT PIT WALL SHALL BE SCARIFIED PRIOR TO PLANT INSTALLATION.
H. SET THE PLANTS UPRIGHT, IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
I. PLACE THE BACKFILL AROUND THE BASE AND SIDES OF THE ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
J. BROKEN OR DAMAGED PARTS WILL BE CUT BACK TO UNDAMAGED TISSUE, LEAVING AS MUCH GREEN BASAL TISSUE AS POSSIBLE ABOVE THE ROOTS. IF MORE THAN FIFTY PERCENT (50%) OF THE PLANT IS DAMAGED THEN CONTRACTOR SHALL REPLACE THE PLANT.

CONTAINER STOCK / BARE ROOT
A. STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
B. CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS.
C. BARE ROOT PLANTS ARE FOR IMMEDIATE PLANTING, OTHERWISE SEE D) BELOW.
D. IF BARE ROOTS SPECIMENS ARE NOT TO BE PLANTED WITHIN FOUR (4) DAYS, TEMPORARY HOLDING OF BARE ROOT SPECIMENS ARE TO BE COVERED ENTIRELY BY A SUITABLE MEDIUM (ETC. SOIL, SAWDUST, MULCH OR THE LIKE) AND WATERED REGULARLY SO AS TO NOT DRY OUT.

PLANT LOCATIONS
A. NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON PLAN EXCEPT WHERE CHANGES HAVE BEEN MADE IN PROPOSED CONSTRUCTION.
B. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.

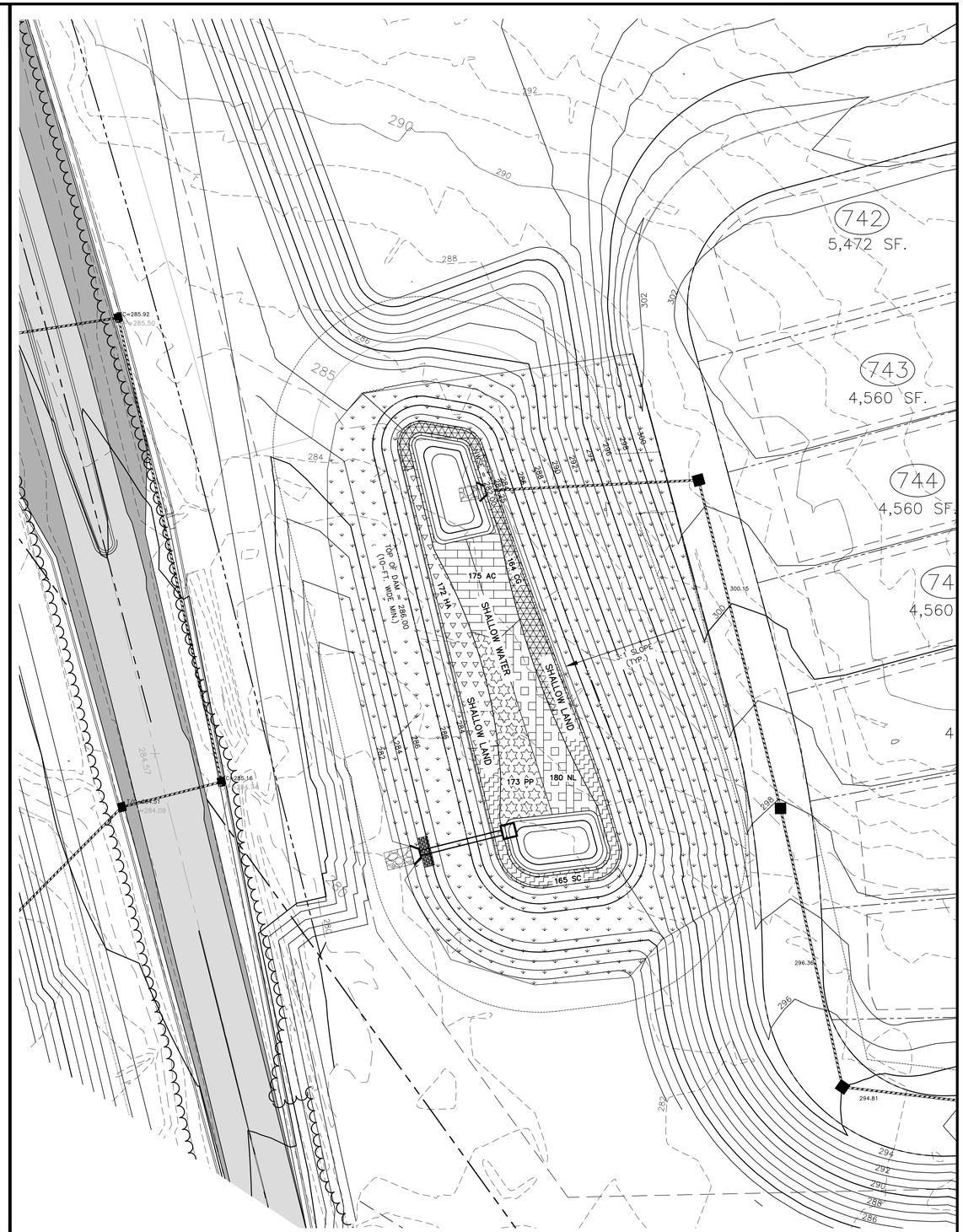
WATER
WATER SHALL BE POTABLE AND SHALL NOT CONTAIN ELEMENTS TOXIC TO PLANT LIFE.

PLANTING SCHEDULE

1. ONCE THE GRADING IS COMPLETE, THE CONTRACTOR SHALL REQUEST AN ON-SITE INSPECTION AND AN AS-BUILT SURVEY PRIOR TO INSTALLATION OF THE STORMWATER MANAGEMENT FACILITY PLANTS. IF THE CONTRACTOR PLANTS THE PROPOSED VEGETATION PRIOR TO AN AS-BUILT SURVEY (AND SUBSEQUENT APPROVAL), ANY CHANGES TO THE GRADING / RE-PLANTING OF PLANTS WILL BE AT THE CONTRACTOR'S EXPENSE.
2. ONCE THE ENGINEER HAS APPROVED THE AS-BUILT GRADING, THE CONTRACTOR SHALL PLANT THE PROPOSED STORMWATER MANAGEMENT FACILITY PLANTS SHOWN ON THE LANDSCAPE PLAN FOR THE FACILITY. AFTER COMPLETION OF THE PLANTING, THE LANDSCAPE CONTRACTOR SHALL PROVIDE A LETTER TO THE ENGINEER CERTIFYING THAT THE PLANTS HAVE BEEN INSTALLED PER THE APPROVED STORMWATER MANAGEMENT FACILITY PLANTING PLAN. 90% GERMINATION REQUIRED OF NON-CLUMPING TURF GRASS PRIOR TO FINAL CERTIFICATION.
3. OPTIMAL PLANTING PERIODS RANGE APPROXIMATELY FROM APRIL 15TH THRU JUNE 30TH AND SEPTEMBER 1ST THRU OCTOBER 31ST. FOR FINAL DETERMINATION OF THE SITE'S PLANTING PERIOD, THE CONTRACTOR SHALL COORDINATE WITH A LANDSCAPE PROFESSIONAL REGARDING SCHEDULING FOR PLANT INSTALLATION.
4. IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PREVENT WILDLIFE FROM DAMAGING OR CONSUMING WETLAND PLANTINGS.

TOWN OF KNIGHTDALE SCM PLANTING NOTES

1. THE DAM STRUCTURE, INCLUDING FRONT AND BACK EMBANKMENT SLOPES, OF THE POND SHALL BE VEGETATED WITH NON-CLUMPING TURF GRASS OR SOD. (CENTIPEDE/HYBRID-BERMUDA) 90% GERMINATION OF NON-CLUMPING TURF WILL BE REQUIRED PRIOR TO FINAL CERTIFICATION FORM THE TOWN.
2. THE VEGETATED SHELF SHALL BE PLANTED WITH A MINIMUM OF THREE DIVERSE SPECIES OF HERBACEOUS, NATIVE VEGETATION AT A MINIMUM DENSITY OF 50 PLANTS PER 200 FEET OF SHELF AREA.
3. CONTRACTOR TO WORK WITH SOILS SCIENTIST TO ENSURE SOILS ARE ADEQUATE TO SUPPORT PROPER ESTABLISHMENT AND GROWTH OF THE AQUATIC PLANTINGS. CONTRACTOR TO AMEND SOILS AND INSTALL SOILS IN PLANT, SHRUB, AND TREE AREAS PER DETAILS, SOIL SPECIFICATIONS. NCDENR SPECIFICATION, AND SOIL SCIENTIST RECOMMENDATIONS.
4. ALL AQUATIC PLANTINGS ARE TO BE INSTALLED DURING THE APPROPRIATE TIME OF YEAR TO ENSURE SURVIVABILITY. (LAST SPRING FROST AND THE FIRST FALL FROST)
5. ALL DISTURBED AREAS AROUND THE OUTSIDE OF THE DEVICE SHALL BE SEEDED WITH A LAWN AREA SEED MIX (PER SEEDING SPECIFICATIONS) NATIVE GRASSES, LEGUMES, CLOVERS, AND WILDFLOWERS.
6. IF THE DEVICE WAS USED DURING CONSTRUCTION AS A SEDIMENT BASIN OR TRAP, THE BASIN MUST BE CLEANED OUT, GRADED, APPROPRIATE AREAS COVERED WITH 4" OF TOPSOIL AS SPECIFIED IN NOTE #2 ABOVE, AND VEGETATED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. CONTRACTOR SHALL WATER ALL VEGETATION AND GRASS ON A WEEKLY BASIS AS NEEDED TO ENSURE GRASS AND PLANT SURVIVAL UNTIL AFTER THE SCM IS CERTIFIED AND ACCEPTED BY THE TOWN.



STORMWATER CONTROL MEASURE 'S' LANDSCAPE PLAN VIEW
1" = 20'

GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

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1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 048394 ENGINEER JEREMY K. WOOSTER
NOT FOR CONSTRUCTION

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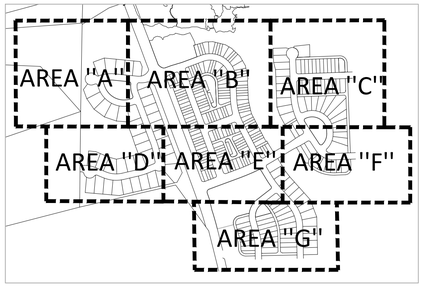
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-SW-S
CHECKED BY	EAM
DRAWN BY	OVL
SCALE	AS NOTED
DATE	12. 22. 2022

SHEET
STORMWATER CONTROL MEASURE "S" LANDSCAPE PLAN
C9.27

M:\Projects\SU\2020110062\04-Production\Water Resource\Phase 1\Site Plan - Construction Drawings\Current Drawing\2020110062-SW-S.dwg, 7/3/2024 3:23:19 PM, Zach Lee



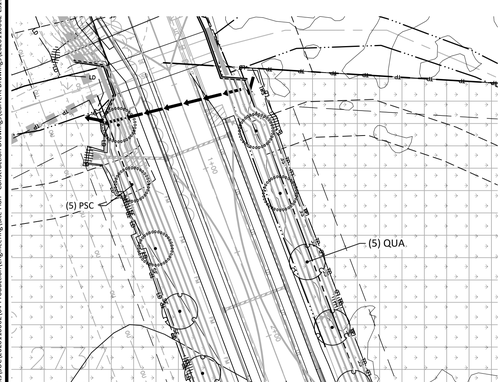
PLANT SCHEDULE SHEET L5.01

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	PSC	Chinese Pistache	Pistacia chinensis	STREET/OLD CREWS BUFFER
	QUA	Sawtooth Oak	Quercus acutissima	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET
UNDERSTORY TREES	**CODE**	**COMMON NAME**	**BOTANICAL NAME**	**REMARKS**
	ACB	Trident Maple	Acer buergerianum	STREET/VUA
SHRUBS	**CODE**	**COMMON NAME**	**BOTANICAL NAME**	**REMARKS**
	DIST	Blue Cascade Distylium	Distylium x 'PIIDIST-II' TM	MEDIAN
	ILVN	Dwarf Yaupon Holly	Ilex vomitoria 'Nana'	OLD CREWS BUFFER
	LRDF	Dark Fire Fringe Flower	Loropetalum chinense rubrum 'Dark Fire'	MEDIAN/OLD CREWS BUFFER/VUA
	RHDA	Pink Lady Indian Hawthorn	Rhaphiolepis indica 'Pink Lady'	MEDIAN

TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- XX — PARKING SPACE COUNT
- TYPE A, TYPE B, TYPE C — ACCESSIBLE RAMPS
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- 20' TYPE B BUFFER
- EXISTING BUFFER WITH TREE PROTECTION FENCING
- TREE CONSERVATION AREA



INSET MATCHLINE - SEE THIS SHEET

INSET MATCHLINE - SEE THIS SHEET

MAYNARD, WILLIAM D
MAYNARD, CATHERINE H
PIN: 1755067644
ZONING: RR1, RURAL RESIDENTIAL
D.B.6125, PG.78

P.M. 2006, PG. 760
P.N. 1755-15-5783

FLOODWAY BOUNDARY PER FEMA FLOOD INSURANCE RATE MAP 3720175500J DATED MAY 2, 2006

FLOODWAY

(14) PSC

(7) QUA

EXISTING
OLD CREWS ROAD
(VARIABLE WIDTH PUBLIC R/W)

100 YEAR FLOOD PLAIN

TREE CONSERVATION AREA #3 (3.26 AC)

TREE CONSERVATION AREA #4 (7.95 AC)

20' TYPE "B" PERIMETER BUFFER

PAIR, H STEPHEN
PIN: 1755066398
ZONING: RR1, RURAL RESIDENTIAL
D.B.13451, PG.713

6' PRIVACY FENCE

50' CITY OF RALEIGH SANITARY SEWER EASEMENT

REGIONAL PUMP STATION

749 10,958 SF.
750 10,962 SF.
751 9,375 SF.
752 9,375 SF.
753 8,909 SF.

(29) ILVN

PUBLIC SD EASEMENT

(17) QUA

40' CITY OF RALEIGH SANITARY SEWER EASEMENT

STREET "V"
(54' PUBLIC R/W)

20' TYPE "B" PERIMETER BUFFER #6

PUBLIC SD EASEMENT

773 9,976 SF.

LIGHT POLE (TYP.)

6' PRIVACY FENCE

(2) ULP

(25) LRDF

(5) PSC

754 8,201 SF.

STREET "DD"
(54' PUBLIC R/W)

20' TYPE "B" PERIMETER BUFFER

PUBLIC SD EASEMENT

TREE CONSERVATION AREA #5 (0.34 AC)

774 11,196 SF.

(24) ASM

6' PRIVACY FENCE

(12) QUA

(8) ULP

755 8,245 SF.

(27) ILVN

NGO, CAI
NGO, LYNN
PIN: 1755055916
ZONING: RR1, RURAL RESIDENTIAL
D.B.18482, PG.795

775 11,228 SF.

PUBLIC SD EASEMENT

LIGHT POLE (TYP.)

STREET "W"
(54' PUBLIC R/W)

756 8,250 SF.

776 11,058 SF.

777 11,058 SF.

778 10,415 SF.

(25) LRDF

(7) PSC

757 8,250 SF.

STORMWATER CONTROL MEASURE "M"

STORMWATER ACCESS & MAINTENANCE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT 1640 JULIE G. YOUNG
FOR REVIEW ONLY NOT FOR CONSTRUCTION

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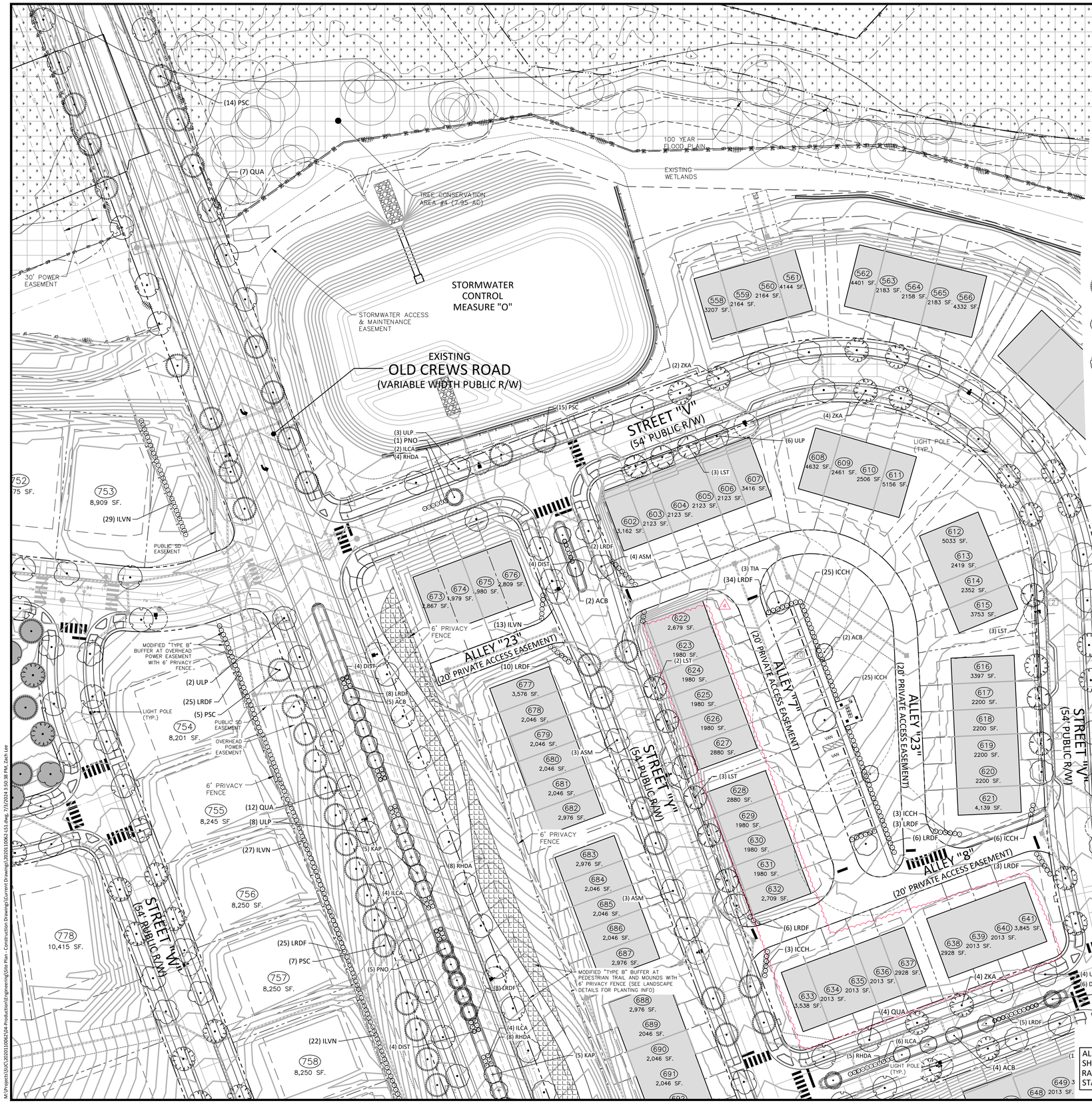
PLAN INFORMATION

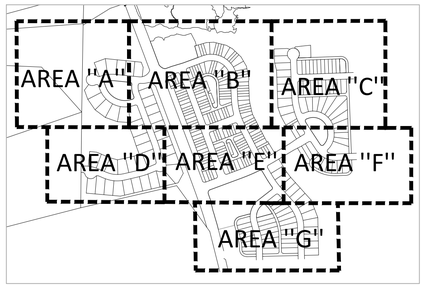
PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

LANDSCAPE PLAN AREA "A"

L5.01





PLANT SCHEDULE SHEET L5.02

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	PSC	Chinese Pistache	Pistacia chinensis	STREET/OLD CREWS BUFFER
	QUA	Sawtooth Oak	Quercus acutissima	STREET
	TIA	American Linden	Tilia americana	VUA
	ULP	Lacebark Elm	Ulmus parvifolia	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET

UNDERSTORY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ACB	Trident Maple	Acer buergerianum	STREET/VUA
	KAP	Golden Rain Tree	Koelreuteria paniculata	MEDIAN
	LST	Natchez Crape Myrtle	Lagerstroemia indica x fauriei 'Natchez'	MEDIAN
	PNO	Okame Flowering Cherry	Prunus x 'Okame'	MEDIAN

SHRUBS	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	DIST	Blue Cascade Distylium	Distylium x 'PIIDIST-II' TM	MEDIAN
	ICCH	Carissa Chinese Holly	Ilex cornuta `Carissa`	VUA
	ILCA	Heler Japanese Holly	Ilex crenata 'Helleri'	MEDIAN
	ILVN	Dwarf Yaupon Holly	Ilex vomitoria 'Nana'	OLD CREWS BUFFER
	LRDF	Dark Fire Fringe Flower	Loropetalum chinense rubrum 'Dark Fire'	MEDIAN/OLD CREWS BUFFER/VUA
	RHDA	Pink Lady Indian Hawthorn	Rhaphiolepis indica 'Pink Lady'	MEDIAN

TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- XX — PARKING SPACE COUNT
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- 20' TYPE B BUFFER
- EXISTING BUFFER WITH TREE PROTECTION FENCING
- TREE CONSERVATION AREA

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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

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.
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Town Engineer
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By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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#180 BILTMORE PARK
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PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL LANDSCAPE ARCHITECTURE 690 JULIE G. YOUNG
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

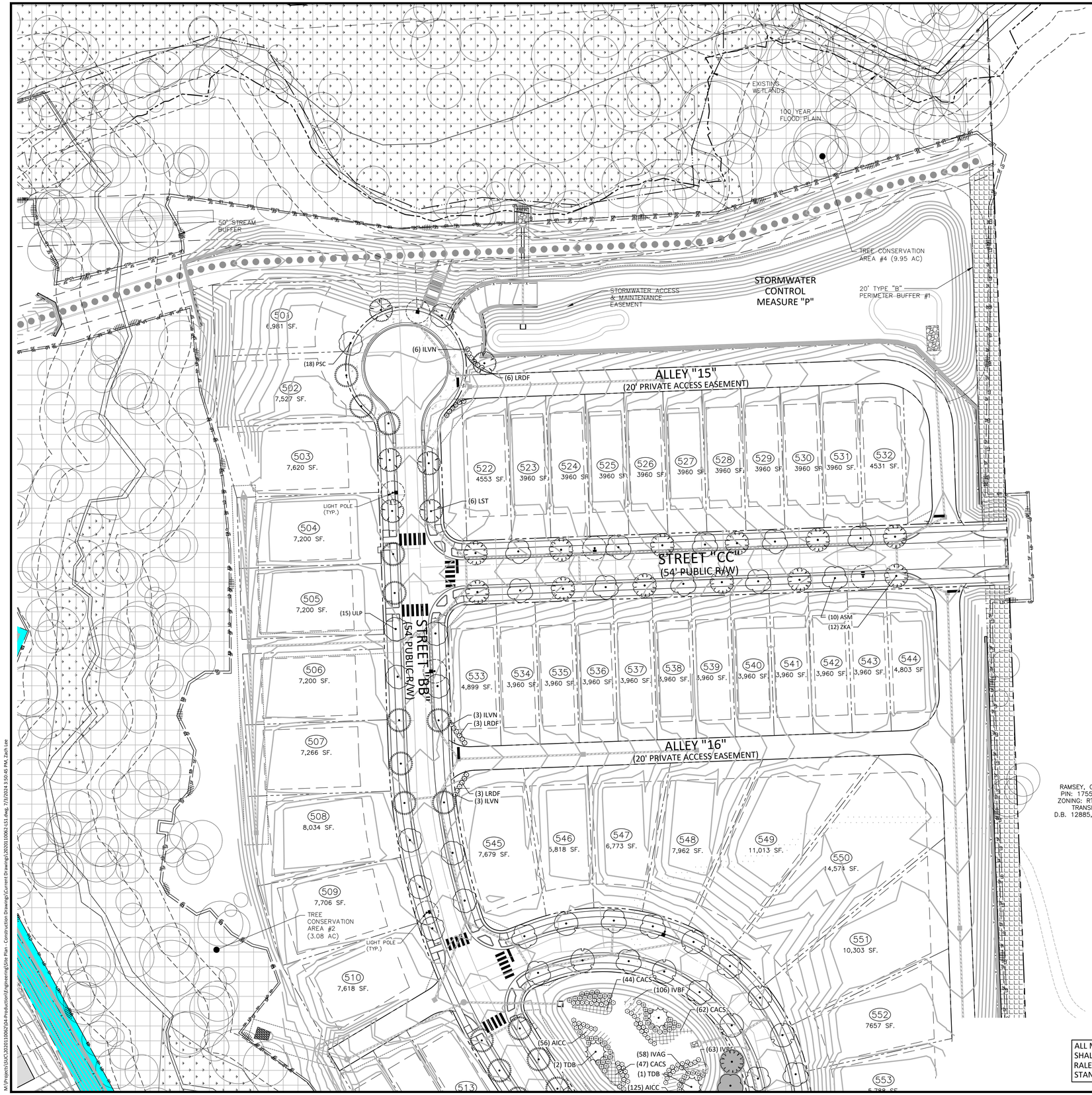
PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

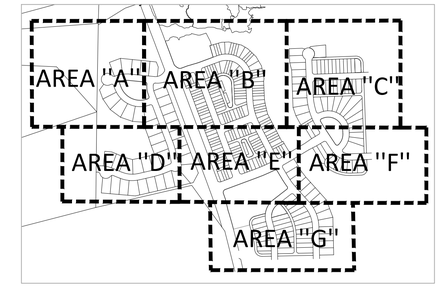
SHEET

LANDSCAPE PLAN AREA "B"

L5.02

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-LS1.dwg, 7/3/2024 3:50:38 PM, Zach Lee





PLANT SCHEDULE SHEET L5.03

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	PSC	Chinese Pistache	Pistacia chinensis	STREET/OLD CREWS BUFFER
	ULP	Lacebark Elm	Ulmus parvifolia	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET
		TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)		

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- (XX) — PARKING SPACE COUNT
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- 20' TYPE B BUFFER
- EXISTING BUFFER WITH TREE PROTECTION FENCING
- TREE CONSERVATION AREA

N

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL LANDSCAPE ARCHITECT 640 JULIE G. YOUNG
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4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

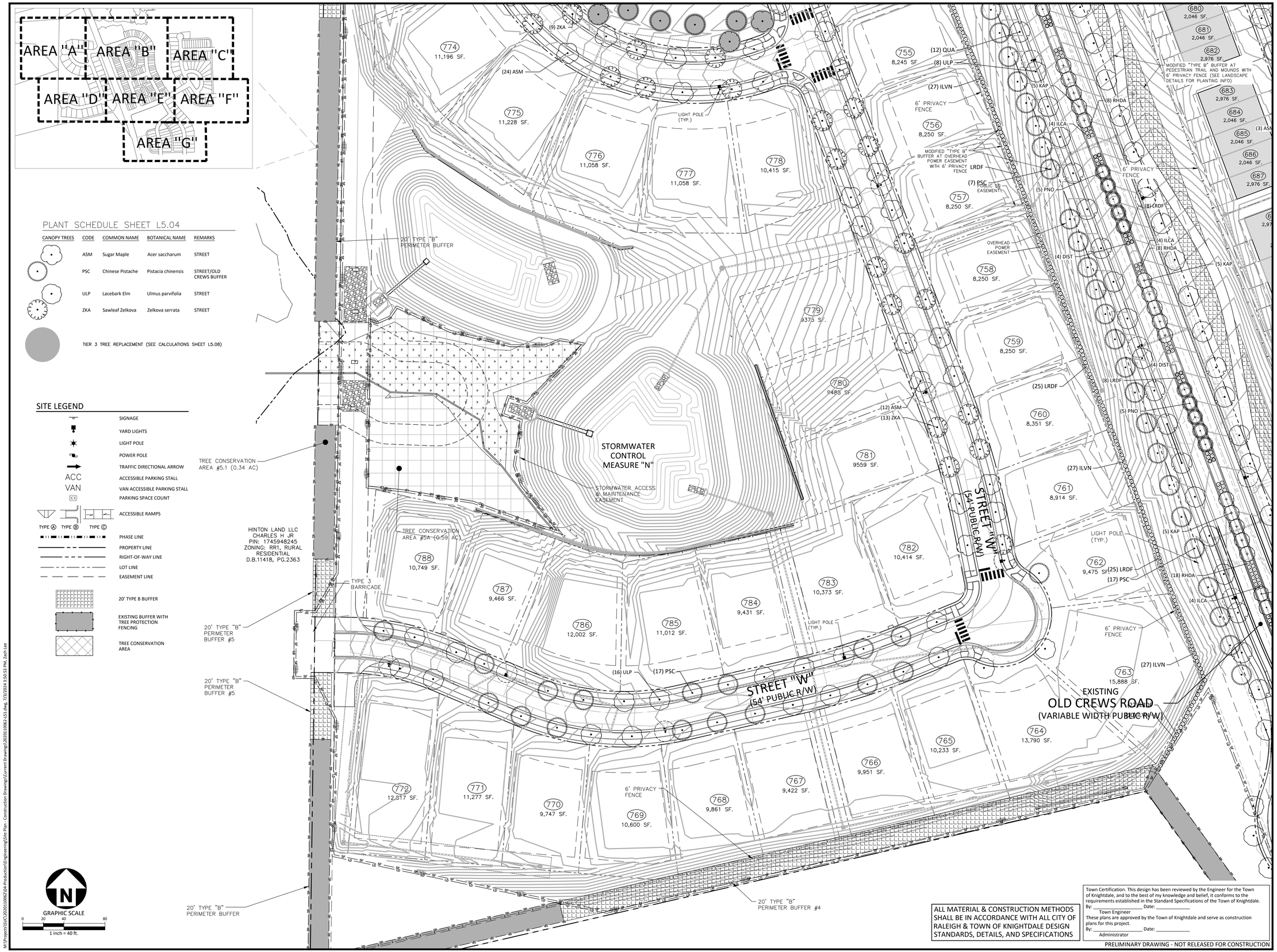
PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

LANDSCAPE PLAN AREA "C"

L5.03

M:\Projects\US\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-LS1.dwg, 7/3/2024 3:50:45 PM, Zach Lee



PLANT SCHEDULE SHEET L5.04

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	PSC	Chinese Pistache	Pistacia chinensis	STREET/OLD CREWS BUFFER
	ULP	Lacebark Elm	Ulmus parvifolia	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET
		TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)		

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- (XX) — PARKING SPACE COUNT
- TYPE Ⓐ TYPE Ⓑ TYPE Ⓒ — ACCESSIBLE RAMPS
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- 20' TYPE B BUFFER
- EXISTING BUFFER WITH TREE PROTECTION FENCING
- TREE CONSERVATION AREA

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NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT 640 JULIE G. YOUNG
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REVISIONS

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5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

LANDSCAPE PLAN AREA "D"

L5.04

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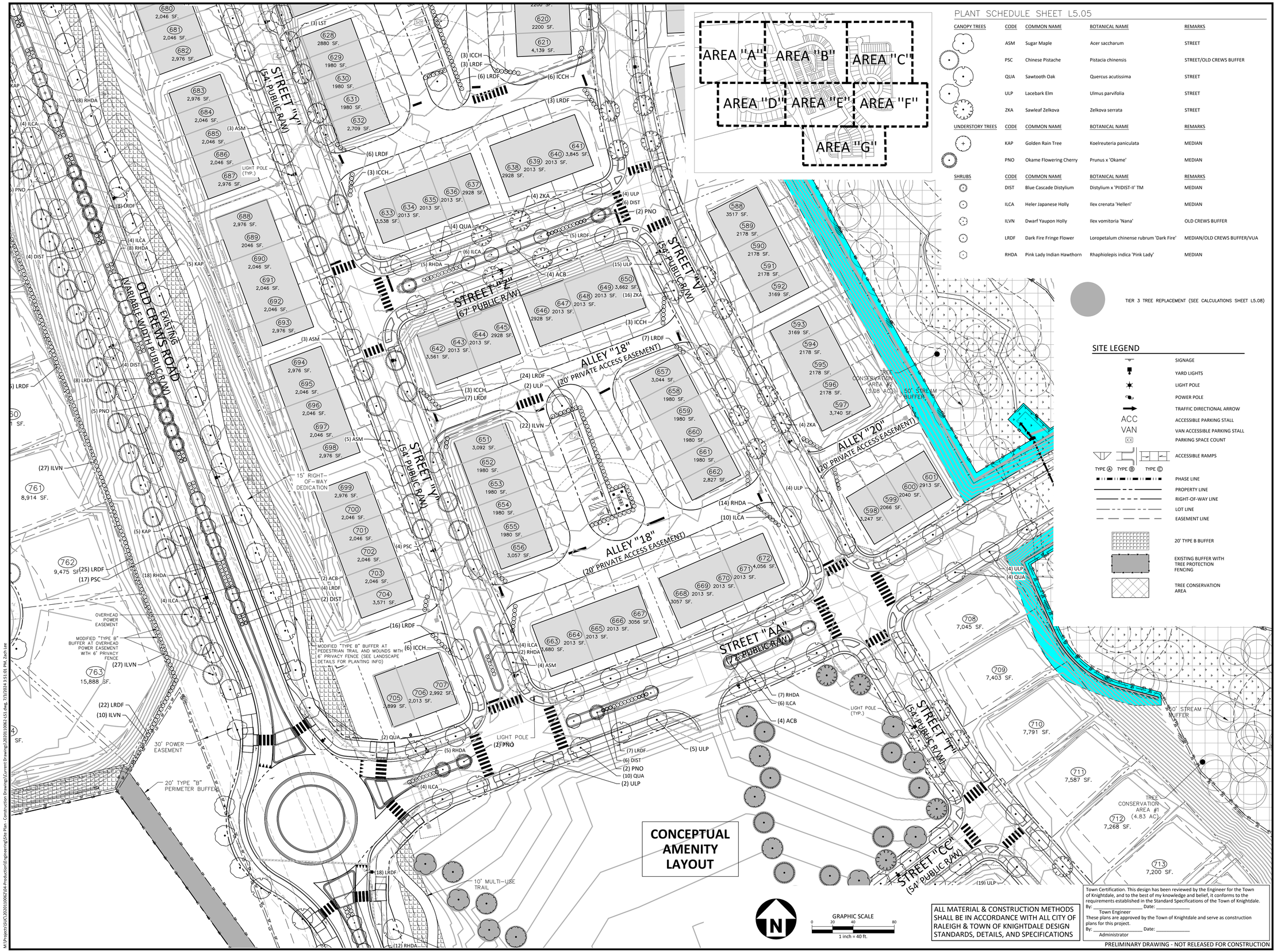

PLANT SCHEDULE SHEET L5.05

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	PSC	Chinese Pistache	Pistacia chinensis	STREET/OLD CREWS BUFFER
	QUA	Sawtooth Oak	Quercus acutissima	STREET
	ULP	Lacebark Elm	Ulmus parvifolia	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET
UNDERSTORY TREES	**CODE**	**COMMON NAME**	**BOTANICAL NAME**	**REMARKS**
	KAP	Golden Rain Tree	Koelreuteria paniculata	MEDIAN
	PNO	Okame Flowering Cherry	Prunus x 'Okame'	MEDIAN
SHRUBS	**CODE**	**COMMON NAME**	**BOTANICAL NAME**	**REMARKS**
	DIST	Blue Cascade Distylium	Distylium x 'PIIDIST-II' TM	MEDIAN
	ILCA	Heler Japanese Holly	Ilex crenata 'Helleri'	MEDIAN
	ILVN	Dwarf Yaupon Holly	Ilex vomitoria 'Nana'	OLD CREWS BUFFER
	LRDF	Dark Fire Fringe Flower	Loropetalum chinense rubrum 'Dark Fire'	MEDIAN/OLD CREWS BUFFER/VUA
	RHDA	Pink Lady Indian Hawthorn	Rhaphiolepis indica 'Pink Lady'	MEDIAN

TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)

SITE LEGEND

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- LOT LINE
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- EXISTING BUFFER WITH TREE PROTECTION FENCING
- TREE CONSERVATION AREA

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SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT 640 JULIE G. YOUNG
FOR REVIEW ONLY
NOT FOR CONSTRUCTION

REVISIONS

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3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

LANDSCAPE PLAN AREA "E"

L5.05

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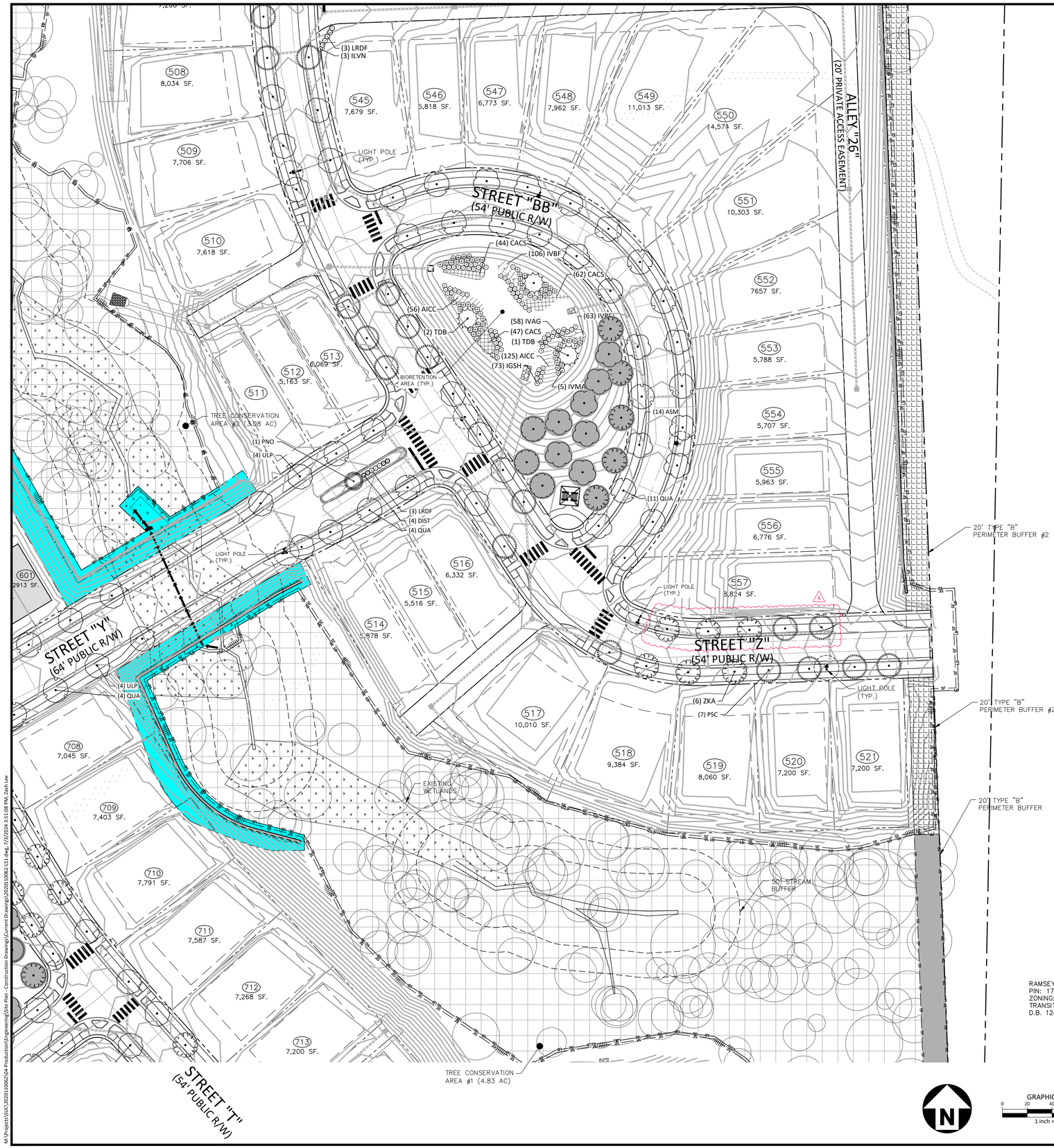

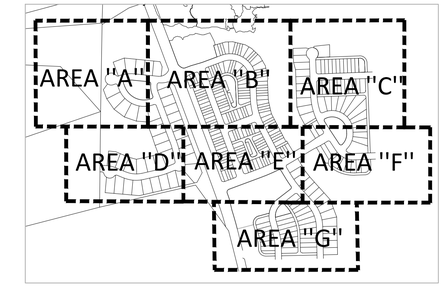

PLANT SCHEDULE SHEET L5.06

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	PSC	Chinese Pistache	Pistacia chinensis	STREET/OLD CREWS BUFFER
	QUA	Sawtooth Oak	Quercus acutissima	STREET
	TDB	Bald Cypress	Taxodium distichum	BIORETENTION
	ULP	Lacebark Elm	Ulmus parvifolia	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET

SHRUBS	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	DIST	Blue Cascade Distylium	Distylium x 'PIIDIST-II' TM	MEDIAN
	IGSH	Shamrock Inkberry Holly	Ilex glabra 'Shamrock'	BIORETENTION
	IVAG	Afterglow Winterberry	Ilex verticillata 'Afterglow'	BIORETENTION
	IVMA	Male Winterberry	Ilex verticillata 'Male'	BIORETENTION
	LRDF	Dark Fire Fringe Flower	Loropetalum chinense rubrum 'Dark Fire'	MEDIAN/OLD CREWS BUFFER

GROUND COVERS	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	AICC	Cinderella Swamp Milkweed	Asclepias incarnata 'Cinderella'	BIORETENTION
	CACS	Creek Sedge	Carex amphibola	BIORETENTION
	IVBF	Blue Flag Iris	Iris virginica	BIORETENTION

TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
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- EASEMENT LINE
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- EXISTING BUFFER WITH TREE PROTECTION FENCING
- TREE CONSERVATION AREA

GRAPHIC SCALE
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1 inch = 40 ft.

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NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 640 JULIE G. YOUNG
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REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
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PLAN INFORMATION

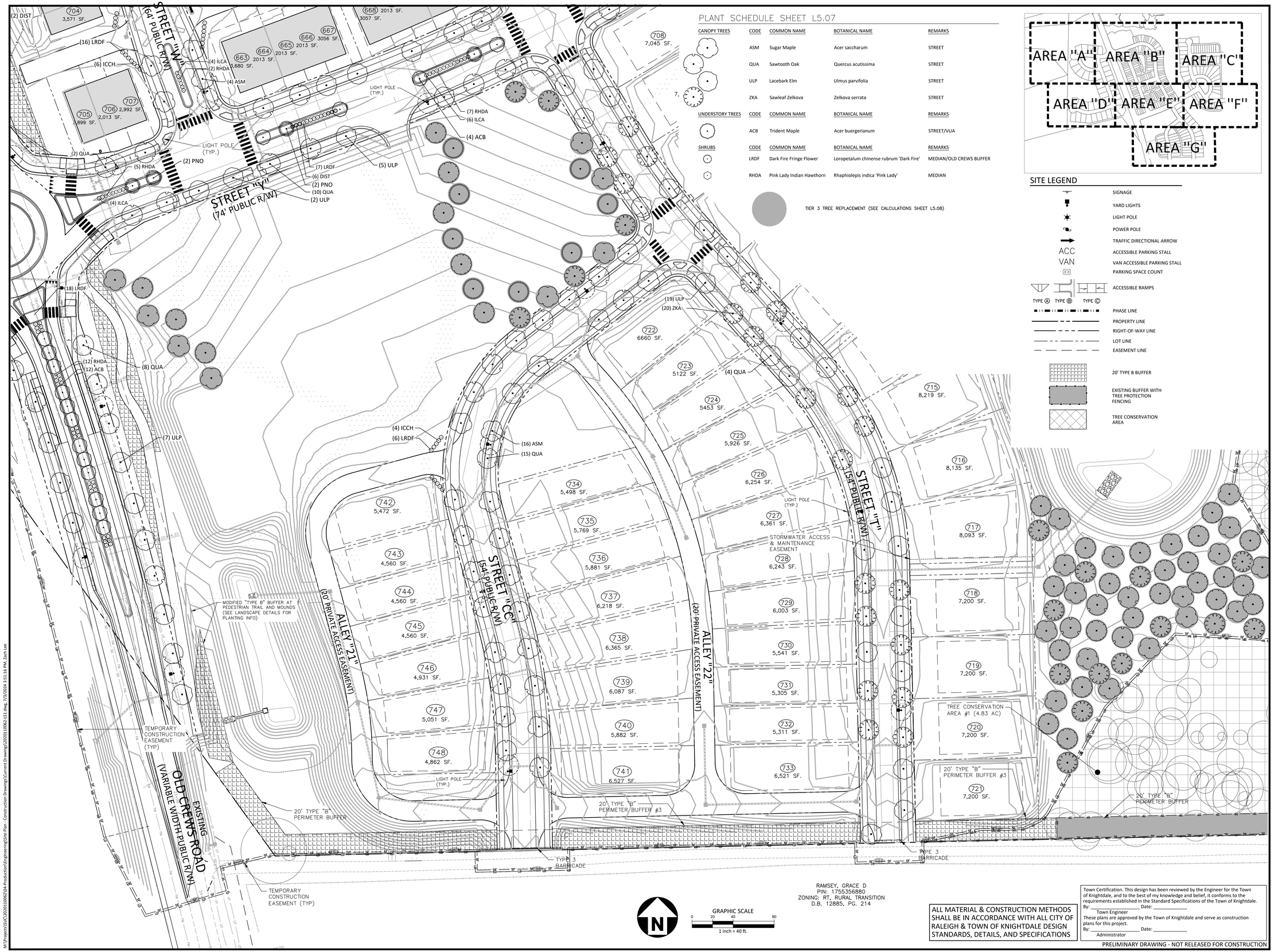
PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

LANDSCAPE PLAN AREA "F"

L5.06

M:\Projects\SUC\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-LS1.dwg, 7/3/2024 3:51:08 PM, Zach Lee



PLANT SCHEDULE SHEET L5.07

CANOPY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ASM	Sugar Maple	Acer saccharum	STREET
	QUA	Sawtooth Oak	Quercus acutissima	STREET
	ULP	Lacebark Elm	Ulmus parvifolia	STREET
	ZKA	Sawleaf Zelkova	Zelkova serrata	STREET

UNDERSTORY TREES	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	ACB	Trident Maple	Acer buergerianum	STREET/VUA

SHRUBS	CODE	COMMON NAME	BOTANICAL NAME	REMARKS
	LRDF	Dark Fire Fringe Flower	Loropetalum chinense rubrum 'Dark Fire'	MEDIAN/OLD CREWS BUFFER
	RHDA	Pink Lady Indian Hawthorn	Rhaphiolepis indica 'Pink Lady'	MEDIAN

TIER 3 TREE REPLACEMENT (SEE CALCULATIONS SHEET L5.08)

AREA "A" AREA "B" AREA "C" AREA "D" AREA "E" AREA "F" AREA "G"

SITE LEGEND

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- LIGHT POLE
- POWER POLE
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- VAN — VAN ACCESSIBLE PARKING STALL
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PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=40'
DATE	12. 22. 2022

SHEET

LANDSCAPE PLAN
AREA "G"

L5.07

M:\Projects\SA\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-LS1.dwg, 7/3/2024 3:51:16 PM, Zach Lee

LANDSCAPE CALCULATIONS, cont.

STREET "S" — 1,762 LF
CANOPY TREES
REQUIRED: 44 (1/40 LF)
PROVIDED: 44

STREET "T" — 5,285 LF
CANOPY TREES
REQUIRED: 132 (1/40 LF)
PROVIDED: 132

STREET "V" — 2,620 LF
CANOPY TREES
REQUIRED: 66 (1/40 LF)
PROVIDED: 66

STREET "W" — 1,760 LF
CANOPY TREES
REQUIRED: 44 (1/40 LF)
PROVIDED: 44

STREET "X" — 456 LF
CANOPY TREES
REQUIRED: 12 (1/40 LF)
PROVIDED: 12

STREET "Y" — 1,442 LF
CANOPY TREES
REQUIRED: 36 (1/40 LF)
PROVIDED: 36

STREET "Z" — 2,089 LF
CANOPY TREES
REQUIRED: 52 (1/40 LF)
PROVIDED: 52

STREET "AA" — 880 LF
CANOPY TREES
REQUIRED: 22 (1/40 LF)
PROVIDED: 22

STREET "BB" — 936 LF
CANOPY TREES
REQUIRED: 24 (1/40 LF)
PROVIDED: 25

STREET "CC" — 1,160 LF
CANOPY TREES
REQUIRED: 29 (1/40 LF)
PROVIDED: 31

STREET "DD" — 730 LF
CANOPY TREES
REQUIRED: 18 (1/40 LF)
PROVIDED: 19

OLD CREWS RD — 3,760 LF
CANOPY TREES
REQUIRED: 94 (1/40 LF)
PROVIDED: 94

PARKING LOT LANDSCAPING

PARKING AREA 'C' — 20 SPACES
CANOPY TREES
REQUIRED: ALL SPACES WITHIN 60' OF CANOPY TREE
PROVIDED: 3

TREE REPLACEMENT

ALL TREES GREATER THAN 24" DBH TO BE REPLACED AT A RATE OF 1 TREE PER 12" DBH AND SHOULD BE INCORPORATED INTO OPEN SPACE AMENITIES WHEREVER POSSIBLE (UDO SEC 7.4.H.1). SEE PLAN SHEETS FOR LOCATION OF REPLACEMENT TREES.

- EXISTING TREES GREATER THAN 24" DBH: 63 TREES (1,512" TOTAL DBH)
- REPLACEMENT TREES: 126 TREES (1 FOR EVERY 12" DBH)

GENERAL LANDSCAPE NOTES:

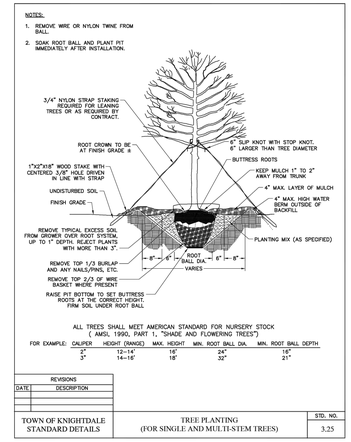
1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE TOWN OF KNIGHTDALE AND THE STATE OF NORTH CAROLINA STANDARDS AND SPECIFICATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR THE SITE INSPECTION BEFORE LANDSCAPE CONSTRUCTION AND INSTALLATION IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS.
3. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES BEFORE BEGINNING DEMOLITION OR INSTALLATION.
4. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN THE NOTES, SPECIFICATIONS, DRAWINGS OR SITE CONDITIONS FOR RESOLUTION PRIOR TO INSTALLATION.
5. ANY DAMAGE TO UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
6. VERIFICATION OF TOTAL PLANT QUANTITIES AS SHOWN IN THE PLANT SCHEDULE SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR. ANY DISCRPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT.
13. SUBSTITUTIONS OF SPECIFIC PLANTS CAN ONLY OCCUR WITH PRIOR WRITTEN PERMISSION OF BOTH OWNER AND LANDSCAPE ARCHITECT.
14. CONTRACTOR TO ENSURE PROPER STABILIZATION AND SEEDING OF THE SITE IN ACCORDANCE WITH APPLICABLE REGULATIONS.
15. LANDSCAPE MATERIAL SHALL BE WELL FORMED, VIGOROUS, GROWING SPECIMENS WITH GROWTH TYPICAL OF VARIETIES SPECIFIED AND SHALL BE FREE FROM DAMAGE, INSECTS AND DISEASES. MATERIAL SHALL EQUAL OR SURPASS #1 QUALITY AS DEFINED IN THE CURRENT ISSUE OF "AMERICAN STANDARD FOR NURSERY STOCK" AS PUBLISHED BY AMERICAN HORT - AMERICANHORT.ORG.
16. ALL PLANT MATERIAL IS TO BE CAREFULLY HANDLED BY THE ROOT BALL, NOT THE TRUNK, BRANCHES AND/OR FOLIAGE OF THE PLANT. MISHANDLED PLANT MATERIAL MAY BE REJECTED BY THE LANDSCAPE ARCHITECT.
17. ALL PLANT MATERIAL IS TO BE WELL ROOTED, NOT ROOT BOUND, SUCH THAT THE ROOT BALL REMAINS INTACT THROUGHOUT THE PLANTING PROCESS. DEFICIENT PLANT MATERIAL MAY BE REJECTED BY THE LANDSCAPE ARCHITECT OR OWNER.
18. ALL PLANTS TO BE A MINIMUM OF WHAT IS SPECIFIED IN THE PLANT SCHEDULE. ANY CHANGES OR SUBSTITUTIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT AND GOVERNING JURISDICTION PRIOR TO ANY HOLE BEING DUG.
19. ALL TREES MUST BE PLANTED AFTER OCTOBER 1 AND BEFORE MARCH 31.
20. CONTRACTOR TO COORDINATE WITH OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT TO ESTABLISH THE EXTENTS OF MULCH/SEED/SOD IF NOT SPECIFICALLY SHOWN ON PLANS.
21. CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE IN ALL PLANTING AREAS.
22. PROPOSED TREES TO BE PLANTED A MINIMUM 10 FEET FROM ANY LIGHT POLE AS MEASURED FROM TRUNK OF THE TREE TO THE POLE.
23. PROPOSED TREES TO BE PLANTED A MINIMUM 5 FEET FROM ANY FIRE HYDRANT AS MEASURED FROM TRUNK OF THE TREE TO THE HYDRANT.
24. ALL TREE PLANTINGS SHALL BE MULCHED WITH 3 INCHES OF SHREDDED BARK OR 4 INCHES OF PINE STRAW IN A 3 FOOT RADIUS AROUND THE TREE, OR TO THE DRIPLINE, WHICHEVER IS GREATER. THE MULCH SHALL BE FREE OF TRASH AND MAINTAINED WEED FREE THEREAFTER. MULCH SHALL NOT COVER THE ROOT COLLAR.

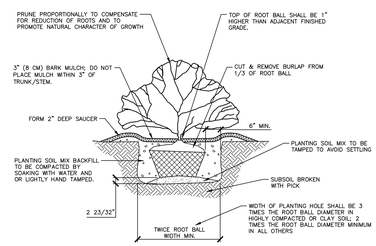
MAINTENANCE NOTES:

1. WARRANTY: INSTALLER SHALL REPAIR OR REPLACE ANY PLANTINGS THAT FAIL IN MATERIALS, WORKMANSHIP, OR GROWTH WITHIN ONE YEAR AFTER THE DATE OF SUBSTANTIAL COMPLETION. FAILURES INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   - DEATH AND UNSATISFACTORY GROWTH, EXCEPT FOR DEFECTS RESULTING FROM LACK OF ADEQUATE MAINTENANCE, NEGLECT, ABUSE BY OWNER, OR INCIDENTS THAT ARE BEYOND CONTRACTOR'S CONTROL.
   - STRUCTURAL FAILURES INCLUDING PLANTINGS FALLING OR BLOWING OVER.
2. THE OWNERS OF PROPERTY SHALL BE RESPONSIBLE FOR ALL NATURAL AND PHYSICAL FEATURES REQUIRED BY CODE AND SHALL PRESERVE AND MAINTAIN THESE FEATURES IN HEALTHY GROWING CONDITIONS, REPLACE THEM WHEN NECESSARY, AND KEEP THE AREAS AROUND THEM FREE OF REFUSE AND DEBRIS IN A MANNER THAT PREVENTS REFUSE AND DEBRIS FROM WASHING ONTO PUBLIC RIGHTS-OF-WAY. FAILURE TO MAINTAIN ALL PLANTINGS IN ACCORDANCE WITH THIS PLAN MAY CONSTITUTE A VIOLATION OF THIS ORDINANCE AND MAY RESULT IN FINES. THE OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE VEGETATION, INCLUDING BUT NOT LIMITED TO:
   - FERTILIZATION
   - PRUNING WITHIN LIMITS
   - PEST CONTROL
   - MULCHING
   - MOWING
   - PROTECTION OF THE ROOT ZONES FROM EQUIPMENT, CONSTRUCTION AND RELATED MATERIALS, ETC.
   - METHOD OF IRRIGATION
   - OTHER CONTINUING MAINTENANCE OPERATIONS

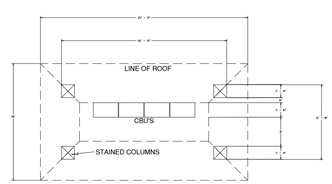
RESIDENTIAL LANDSCAPING NOTES:

1. EACH SINGLE-FAMILY OR DUPLEX LOT SHALL CONTAIN A MINIMUM OF ONE CANOPY TREE FOR EVERY 2,000 SF OF LOT AREA OR FRACTION THEREOF UP TO 20,000 SF IN LOT AREA. ANY PORTION OF THE RESIDENTIAL LOT OCCUPIED BY A RECORDED UTILITY EASEMENT SHALL NOT BE INCLUDED AS PART OF THE TOTAL LOT AREA. THE LOCATION OF PLANTING TO ACCOUNT FOR PHYSICAL CONDITIONS MAY BE ADJUSTED BY THE ADMINISTRATOR.
2. THE USE OF EXISTING TREES MEETING THE FOLLOWING STANDARDS TO SATISFY THIS REQUIREMENT IS ENCOURAGED. EXISTING LARGE SHADE TREES MEASURING MORE THAN 6 INCHES IN DBH MAY BE COUNTED TOWARDS FULFILLING THIS REQUIREMENT.
3. REQUIRED STREET TREES MAY NOT BE COUNTED TOWARDS THE FULFILLMENT OF THE RESIDENTIAL LANDSCAPING REQUIREMENT. APART FROM REQUIRED STREET TREES, ALL OTHER TREES REQUIRED FOR RESIDENTIAL LANDSCAPING SHALL BE PLANTED WITHIN THE PRIVATE LOT.
4. FOUNDATION PLANTINGS CONSISTING OF EVERGREEN SHRUBS SHALL BE INSTALLED ALONG THE ENTIRE FOUNDATION WALL OF THE BUILDING. PLANT INSTALLATION SHALL BE A MINIMUM OF TWO FEET IN HEIGHT PLANTED AT FOUR FOOT INTERVALS.
5. ALL RESIDENTIAL LOTS 60' IN WIDTH OR GREATER SHALL HAVE A 3" CALIPER TREE PLANTED IN THE FRONT YARD PER REQUIRED ZONING CONDITIONS.



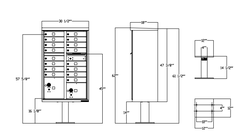


01 SHRUB INSTALLATION
SCALE: 3/8"=1'-0"

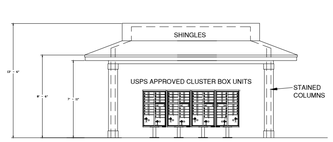


PLAN

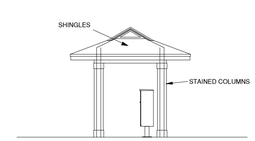
NOTE:
COLUMNS AND ROOF TO MATCH ARCHITECTURAL ELEMENTS OF HOMES. REQUIRES SEPARATE BUILDING PERMIT.



TYPICAL CBU



FRONT ELEVATION



SIDE ELEVATION

02 MAIL KIOSK STRUCTURE - DESIGNED BY OTHERS FOR REFERENCE ONLY
SCALE: NTS

PLANT SCHEDULE OVERALL

UNDERSTORY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	ACB	31	Trident Maple	Acer buergerianum	2" min	8` min	STREET/VUA
	CCF	119	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	BUFFER
	KAP	15	Golden Rain Tree	Koelreuteria paniculata	1.5"	6` min	MEDIAN
	LST	17	Natchez Crape Myrtle	Lagerstroemia indica x fauriei 'Natchez'	1.5"	8` min	STREET/MEDIAN
	MGL	101	Little Gem Dwarf Southern Magnolia	Magnolia grandiflora `Little Gem`	2" min	8` min	BUFFER
	PNO	18	Okame Flowering Cherry	Prunus x 'Okame'	1.5"	6` min	MEDIAN

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	ASM	132	Sugar Maple	Acer saccharum	2" min	8` min	STREET
	LTG	130	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	37	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
	PSC	127	Chinese Pistache	Pistacia chinensis	2" min	8` min	STREET
	QUA	128	Sawtooth Oak	Quercus acutissima	2" min	8` min	STREET
	TDB	3	Bald Cypress	Taxodium distichum	2.5"	8` min	BIORETENTION
	TIA	3	American Linden	Tilia americana	2" min	8` min	VUA
	ULP	132	Lacebark Elm	Ulmus parvifolia	2" min	8` min	STREET
	ZKA	113	Sawleaf Zelkova	Zelkova serrata	2" min	8` min	STREET

SHRUBS	CODE	QTY	COMMON NAME	BOTANICAL NAME	CONT	HEIGHT	REMARKS
	AIFM	372	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	DIST	34	Blue Cascade Distylium	Distylium x 'PIIDIST-II' TM	5 gallon min.	18" Min.	MEDIAN
	ICCH	53	Carissa Chinese Holly	Ilex cornuta `Carissa`	3 gallon min.	18" Min.	VUA
	ILCA	44	Heler Japanese Holly	Ilex crenata 'Helleri'	5 gallon min.	36" Min.	MEDIAN
	IGSH	73	Shamrock Inkberry Holly	Ilex glabra 'Shamrock'	3 Gal	18"	BIORETENTION
	IVAG	58	Afterglow Winterberry	Ilex verticillata 'Afterglow'	3 Gal	12" Min.	BIORETENTION
	IVMA	5	Male Winterberry	Ilex verticillata 'Male'	3 Gal	18"	BIORETENTION
	ILVN	196	Dwarf Yaupon Holly	Ilex vomitoria 'Nana'	5 gallon min.	36" Min.	OLD CREWS BUFFER
	IPFG	351	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER
	LRDF	321	Dark Fire Fringe Flower	Loropetalum chinense rubrum 'Dark Fire'	5 gallon min.	18`` min.	MEDIAN
	RHDA	83	Pink Lady Indian Hawthorn	Rhaphiolepis indica 'Pink Lady'	5 gallon min.	18`` min.	MEDIAN

GROUND COVERS	CODE	QTY	COMMON NAME	BOTANICAL NAME	CONT	SPACING	
	AICC	181	Cinderella Swamp Milkweed	Asclepias incarnata 'Cinderella'	1 gal	18" o.c.	BIORETENTION
	CACS	153	Creek Sedge	Carex amphibola	1 gal	24" o.c.	BIORETENTION
	IVBF	169	Blue Flag Iris	Iris virginica	1 gal	15" o.c.	BIORETENTION

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713
phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187
www.mcadamsco.com

CLIENT
SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT 640 JULIE G. YOUNG
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

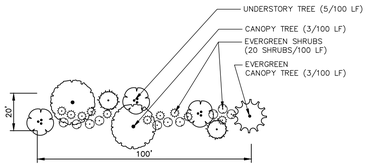
PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET
LANDSCAPE NOTES AND DETAILS
L5.08

M:\Projects\SU\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-LS1.dwg, 7/3/2024 3:24:58 PM, Zach Lee

TYPE 'B' BUFFER DETAIL



PLANTING PERFORMANCE STANDARDS:

TYPE 'B' BUFFER
CREATE A SEMI–OPAQUE BUFFER FROM THE GROUND TO A HEIGHT OF 6' AND INTERMITTENT VISUAL OBSTRUCTION FROM A HEIGHT OF 6' UP TO A HEIGHT OF 30'. SHALL CONTAIN HORIZONTAL OPENINGS NO GREATER THAN 20" IN WIDTH FOR INTERMITTANT VISUAL OBSTRUCTION AND NO GREATER THAN 5' IN WIDTH FOR SEMI–OPAQUE SCREEN UPON THE PLANT'S MATURITY.

MODIFIED TYPE 'B' BUFFER (OLD CREWS ROAD)

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

MODIFIED TYPE 'B' BUFFER (OLD CREWS ROAD EAST) 1,454 LF
WITH 10' WIDE PEDESTRIAN TRAIL

CANOPY TREES
REQUIRED: 44 (3/100 LF)
PROVIDED: 44

UNDERSTORY TREES
REQUIRED: 73 (5/100 LF)
PROVIDED: 75

SHRUBS
REQUIRED: *146 (10/100 LF)
PROVIDED: *168

SHRUB TOTAL HAS BEEN REDUCED PER KNIGHTDALE UDO CHAPTER 8 SECTION 6 PART C. WHICH ALLOWS A 50% SHRUB REDUCTION WITH INCLUSION OF FENCE

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE OLD CREWS TRAIL BUFFER

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	34	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	10	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	45	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	JVB	30	Brodie Eastern Redcedar	Juniperus virginiana 'Brodie'	5" min		BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	89	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	79	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

TYPE 'B' BUFFER #1

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

TYPE 'B' BUFFER #1 300 LF
20' TYPE B BUFFER

CANOPY TREES
REQUIRED: 9 (3/100 LF)
PROVIDED: 9

UNDERSTORY TREES
REQUIRED: 15 (5/100 LF)
PROVIDED: 15

SHRUBS
REQUIRED: 60 (20/100 LF)
PROVIDED: 60

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE BUFFER 1

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	6	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	3	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	8	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	JVB	7	Brodie Eastern Redcedar	Juniperus virginiana 'Brodie'	5" min		BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	30	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	30	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

TYPE 'B' BUFFER #2

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

TYPE 'B' BUFFER #2 755 LF
20' TYPE B BUFFER

CANOPY TREES
REQUIRED: 23 (3/100 LF)
PROVIDED: 23

UNDERSTORY TREES
REQUIRED: 38 (5/100 LF)
PROVIDED: 44

SHRUBS
REQUIRED: 150 (20/100 LF)
PROVIDED: 154

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE BUFFER 2

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	15	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	8	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	19	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	MGL	25	Little Gem Dwarf Southern Magnolia	Magnolia grandiflora `Little Gem`	2" min	8` min	BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	79	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	75	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

TYPE 'B' BUFFER #3

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

TYPE 'B' BUFFER #3 746 LF
20' TYPE B BUFFER

CANOPY TREES
REQUIRED: 23 (3/100 LF)
PROVIDED: 23

UNDERSTORY TREES
REQUIRED: 38 (5/100 LF)
PROVIDED: 40
SHRUBS
REQUIRED: 150 (20/100 LF)
PROVIDED: 156

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE BUFFER 3

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	17	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	6	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	22	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	MGL	18	Little Gem Dwarf Southern Magnolia	Magnolia grandiflora `Little Gem`	2" min	8` min	BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	80	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	76	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

TYPE 'B' BUFFER #4

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

TYPE 'B' BUFFER #4 584 LF
20' TYPE B BUFFER

CANOPY TREES
REQUIRED: 18 (3/100 LF)
PROVIDED: 18

UNDERSTORY TREES
REQUIRED: 30 (5/100 LF)
PROVIDED: 30

SHRUBS
REQUIRED: 118 (20/100 LF)
PROVIDED: 118

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE BUFFER 4

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	12	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	6	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	17	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	JVB	13	Brodie Eastern Redcedar	Juniperus virginiana 'Brodie'	5" min		BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	59	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	59	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

TYPE 'B' BUFFER #5

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

TYPE 'B' BUFFER #5 121 LF
20' TYPE B BUFFER

CANOPY TREES
REQUIRED: 4 (3/100 LF)
PROVIDED: 4

UNDERSTORY TREES
REQUIRED: 6 (5/100 LF)
PROVIDED: 6
SHRUBS
REQUIRED: 24 (20/100 LF)
PROVIDED: 27

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE BUFFER 5

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	2	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	2	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	3	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	MGL	3	Little Gem Dwarf Southern Magnolia	Magnolia grandiflora `Little Gem`	2" min	8` min	BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	15	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	12	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

TYPE 'B' BUFFER #6

LANDSCAPE CALCULATIONS

PROPOSED PERIMETER BUFFERS

TYPE 'B' BUFFER #6 195 LF
20' TYPE B BUFFER

CANOPY TREES
REQUIRED: 6 (3/100 LF)
PROVIDED: 6

UNDERSTORY TREES
REQUIRED: 10 (5/100 LF)
PROVIDED: 10
SHRUBS
REQUIRED: 39 (20/100 LF)
PROVIDED: 40

BUFFER PLANTS TO BE INSTALLED PER STANDARD DETAILS PER SHEET L5.08.

EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED FOR BUFFER TO MEET TYPE B BUFFER OPACITY STANDARDS.

PLANT SCHEDULE BUFFER 6

CANOPY TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT	REMARKS
	LTG	4	Glen Gold Tulip Poplar	Liriodendron tulipifera 'Glen Gold'	2" min	8` min	BUFFER
	MGB	2	Bracken's Beauty Southern Magnolia	Magnolia grandiflora 'Brackens Brown Beauty'	2" min	8` min	BUFFER
UNDERSTORY TREES	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CAL**	**HEIGHT**	**REMARKS**
	CCF	5	Forest Pansy Eastern Redbud	Cercis canadensis 'Forest Pansy'	2" min	6` min	OLD CREWS/PERIMETER BUFFER
	JVB	5	Brodie Eastern Redcedar	Juniperus virginiana 'Brodie'	5" min		BUFFER
SHRUBS	**CODE**	**QTY**	**COMMON NAME**	**BOTANICAL NAME**	**CONT**	**HEIGHT**	**REMARKS**
	AIFM	20	Formosa Indica Azalea	Azalea indica 'Formosa'	5 gallon min.	36" Min.	BUFFER
	IPFG	20	Forest Green Anise Tree	Illicium parviflorum 'Forest Green'	5 gallon min.	36" min.	BUFFER

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

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

MCADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

SUNCREST REAL ESTATE & LAND
2701 EAST CAMELBACK ROAD
#180 BILTMORE PARK
PHOENIX, AZ 85016
PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO - PHASE 1
CONSTRUCTION DRAWINGS
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL LANDSCAPE ARCHITECTURE 760 JULIE G. YOUNG
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 06. 2023	RESPONSE TO TOK COMMENTS
2	07. 10. 2023	RESPONSE TO TOK COMMENTS
3	09. 11. 2023	RESPONSE TO TOK COMMENTS
4	12. 29. 2023	RESPONSE TO TOK COMMENTS
5	07. 02. 2024	RESPONSE TO TOK COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-LS1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	NTS
DATE	12. 22. 2022

SHEET

LANDSCAPE NOTES AND DETAILS

L5.09

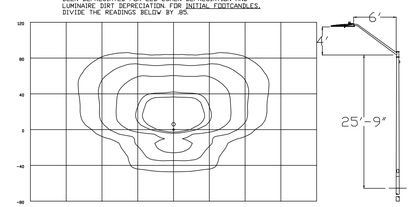
M:\Projects\Sa\C\2020110062\04-Production\Engineering\Site Plan - Construction Drawings\Current Drawings\2020110062-LS1.dwg, 7/3/2024 3:25:02 PM, Zach Lee

ISOFOOTCANDLE CURVES

FIXTURE: LED 150 - AEL
MOUNTING HEIGHT: 30 FT
LIGHT SOURCE: 40 LED'S, 4000K, 70 CRI
LUMENS - 16192
PATTERN: TYPE III, B3-U0-G3(zero light at or above 90 degrees)

ASSY# LFIX-RW-LED-150-GRAY-III-MULTIV-___-P
POLE ASSY# LPOLE-DB-FG-30FT-GRAY-___-P (GRAY)

NOTE: THE FOOTCANDLE READINGS BELOW ARE MAINTAINED AND HAVE BEEN DEPRECIATED FOR LED LUMEN DEPRECIATION AND LUMINAIRE DIRT DEPRECIATION FOR INITIAL FOOTCANDLES. DIVIDE THE READINGS BELOW BY .85.



LEGEND (OUTER to INNER): 0.10 , 0.25 , 0.50 , 1.00 , 1.25

Schedule						
Symbol	Label	Quantity	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor
	150A	XX	LED 150w Roadway - Type III - 4000K	1	16192	0.85

GRAPHIC SCALE
0 150 300 600
1 inch = 300 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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PHONE: 602. 698. 8655

SUNCREST Real Estate & Land

BRIO
MASTER PLAN
1700 OLD CREWS ROAD
KNIGHTDALE, NORTH CAROLINA

Xref X:\CAD

REVISIONS

NO.	DATE	
1	04. 29. 2022	PER TOWN COMMENTS
2	07. 01. 2022	PER TOWN COMMENTS

PLAN INFORMATION

PROJECT NO.	2020110062
FILENAME	2020110062-LI1
CHECKED BY	RCA
DRAWN BY	RLU
SCALE	1"=300'
DATE	03. 28. 2022

SHEET

LIGHTING PLAN

L6.00

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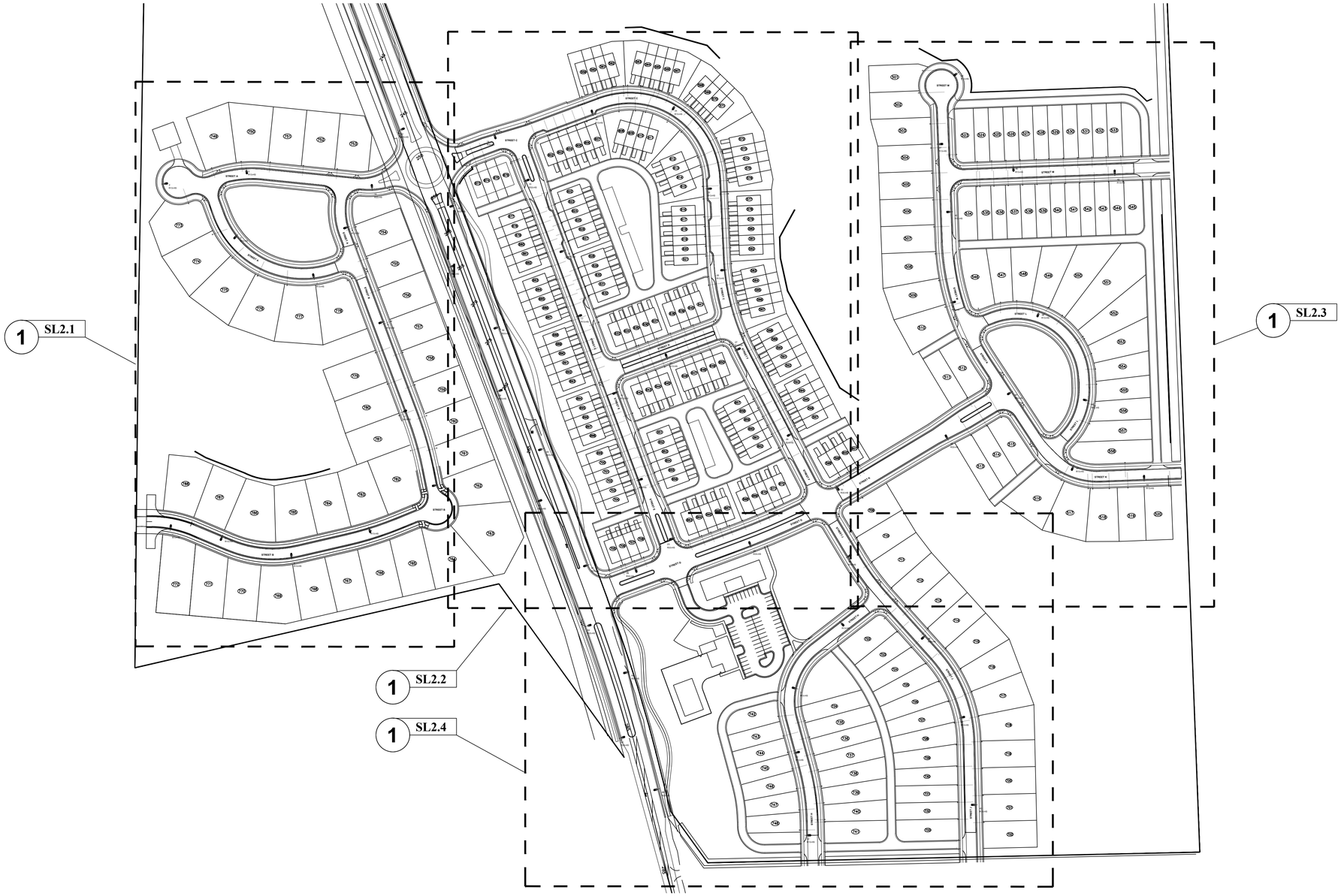

1 **PROPOSED PHOTOMETRIC PLAN**
SCALE: 1"= 120'-0"

N 0' 120' 240'

CALCULATION SUMMARY

Label	CalcType	Units	Avg	Max	Min	Avg/Min	# Pts
All Points at Grade 25' x 25'	Illuminance	Fc	0.3	3.5	0.0	N.A.	2277
Property Line 25' Spacing Left 1	Illuminance	Fc	0.0	0.9	0.0	N.A.	131
Property Line 25' Spacing Right1	Illuminance	Fc	0.0	0.3	0.0	N.A.	210
Old Crews Road	Illuminance	Fc	1.6	3.5	0.1	16.1	156
Street A	Illuminance	Fc	0.5	2.7	0.1	4.6	42
Street B	Illuminance	Fc	0.4	0.7	0.1	3.8	52
Street C	Illuminance	Fc	0.7	2.5	0.1	6.5	64
Street D	Illuminance	Fc	0.4	0.6	0.1	3.5	11
Street E	Illuminance	Fc	0.8	2.7	0.1	8.1	13
Street F	Illuminance	Fc	0.3	0.6	0.1	3.1	13
Street G	Illuminance	Fc	1.0	2.4	0.2	5.0	35
Street H	Illuminance	Fc	0.4	0.6	0.1	4.1	21
Street J	Illuminance	Fc	0.4	0.6	0.1	3.6	30
Street K	Illuminance	Fc	0.8	2.7	0.1	7.8	48
Street L	Illuminance	Fc	0.3	0.6	0.1	3.4	17
Street M	Illuminance	Fc	0.4	0.6	0.1	3.8	38

NOTE: ALL STREET LIGHTING TO BE:
- FULL CUT-OFF - 4000K LED
- MIN COLOR RENDERING INDEX (CRI) VALUE OF 70 OR BETTER IS REQUIRED. (SEC 7.7.D.3.a)
- POLES TO BE FIBERGLASS ROUND TAPERED WITH 35'-0" AFG

CODE:
- POLE MOUNTED LIGHTS SHALL BE MOUNTED NO GREATER THAN 37'-0" TALL (SEC 7.7.D.5)
- AVERAGE MAXIMUM SPACING IS 250' BETWEEN STREETLIGHTS (SEC 7.7.E.1.a.i)
- MINIMUM INITIAL DELIVERED LUMENS: (SEC 7.7.E.1.b)
  - ---- LOCAL STREETS - 4800
  - ---- COLLECTOR STREETS - 12,500
- BUG RATING: (SEC. 7.7.E.1.c)
  - ---- LOCAL STREETS - B1-U1-G2
  - ---- COLLECTOR STREETS - B2-U2-G3
- LIGHTS SHALL BE STAGGERED ON BOTH SIDES OF THE STREET,
- PLACED AS FAR FROM STREET TREES AS POSSIBLE, AND
- PROMOTE PEDESTRIAN SAFETY (SEC 7.7.E.1.d)

LUMINAIRE SCHEDULE

Symbol	Label	Qty	Arrangement	LLF	Description	Lum. Watts	Lum. Lumens	BUG Rating
	R13-HS	41	SINGLE	0.900	AEL LIGHTING ATB0 P201 R3 4000K HSS- 35'-0 AFG FIBERGLASS POLE	36	5167	B1-U0-G1
	R23-HS	12	SINGLE	0.900	AEL LIGHTING ATB0 P453 R2 4K HSS 35'-0 AFG FIBERGLASS POLE	159	19964	B3-U0-G3
	R33-HS	9	SINGLE	0.900	AEL LIGHTING ATB0 P303 R2 4000K-HSS 35'-0 AFG FIBERGLASS POLE	106	14285	B2-U0-G2

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By: _____ Date: _____
Town Engineer
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By: _____ Date: _____
Administrator

BASED ON THE INFORMATION PROVIDED, ALL DIMENSIONS AND LUMINAIRE LOCATIONS SHOWN REPRESENT RECOMMENDED POSITIONS. THE ENGINEER AND/OR ARCHITECT **MUST** DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING OR FUTURE FIELD CONDITIONS.

THE LIGHTING PATTERN REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER THE CONTROLLED CONDITIONS UTILIZING CURRENT INDUSTRY STANDARD LAMP RATINGS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS.

FOR ADDITIONAL LIGHTING INFORMATION CONTACT:
On-Site Lighting & Survey, LLC
PH: 763.684.1548

On-Site Lighting & Survey, LLC
1111 HIGHWAY 25 NORTH
SUITE 201
BUFFALO MN 55313
PH:763.684.1548
FAX:763.682.9048

PROPERTY OWNER: MCADAMS CO
2905 MERIDIAN PKWY
DURHAM, NC 27713

PROJECT INFO: BRIO
KNIGHTDALE, NC

ENGINEER INFO:

ENGINEER SEAL:

REVISIONS

#	DATE	INIT	DESCRIPTION
1	03.08.2023	CDH	ADDRESS CITY COMMENTS
2	09.08.2023	CDH	ADDED NOTE RE CODES
3	12.21.2023	CDH	ADDED TOWN CERTIFICATION TO ALL SHEETS
4			
5			
6			

SHEET DESCRIPTION: **PROPOSED PHOTOMETRIC PLAN**

PROJECT #: 2212122

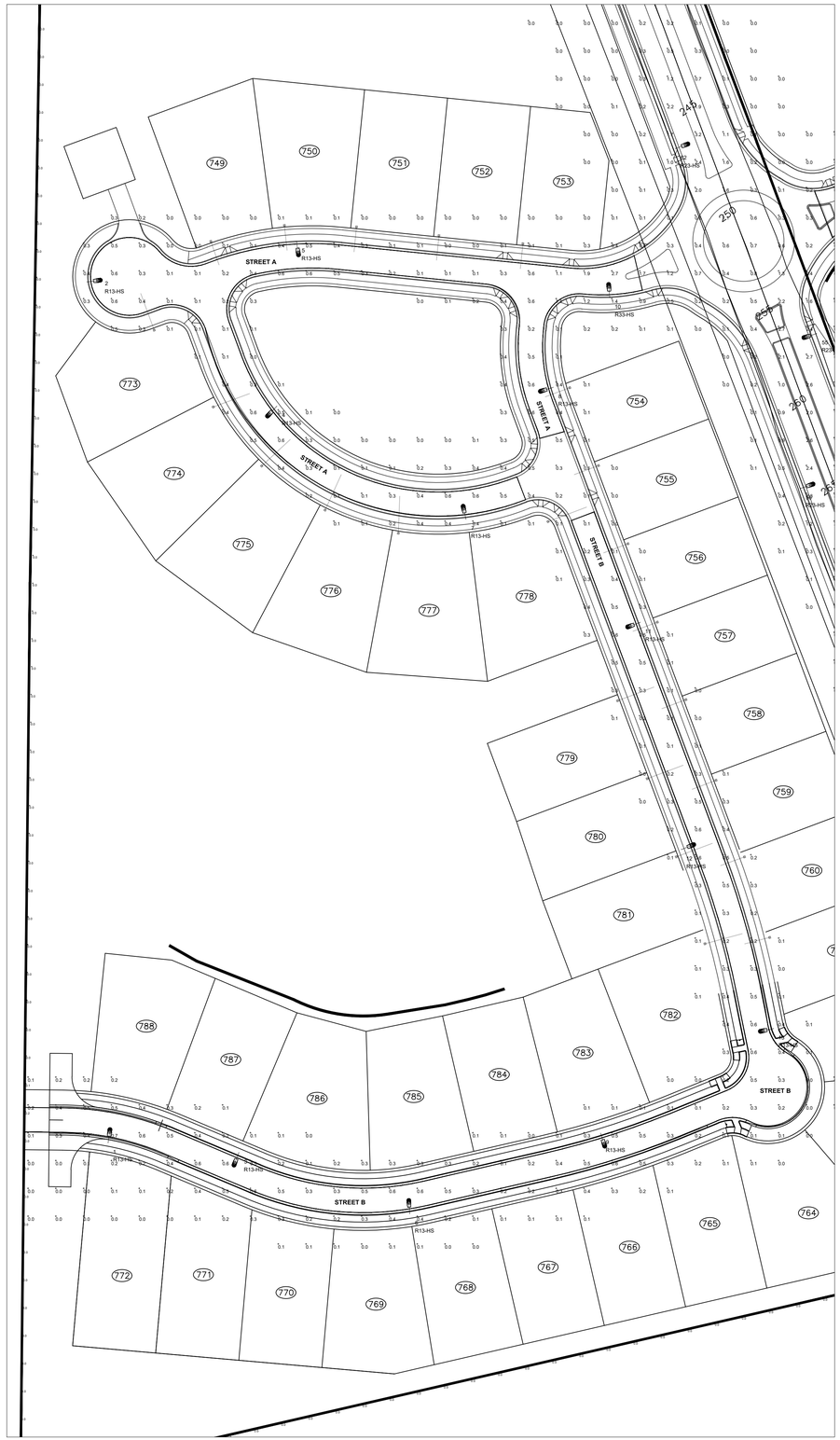
ISSUE DATE: 12.12.2022

DESIGN LEVEL: N.A.

AGI: C.D.HEANER

CAD: C.D.HEANER

SHEET#: SL2.0 REV #: 3



1 **PHOTOMETRIC PLAN - STREETS A & B**
SCALE: 1"= 60'-0"

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1111 HIGHWAY 25 NORTH
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BUFFALO MN 55313
PH:763.684.1548
FAX:763.682.9048

PROPERTY OWNER: **MCADAMS CO 2905 MERIDIAN PKWY DURHAM, NC 27713**

PROJECT INFO: **BRIO**
KNIGHTDALE, NC

ENGINEER INFO:

ENGINEER SEAL:

REVISIONS

#	DATE	INIT	DESCRIPTION
1	03.08.2023	CDH	ADDRESS CITY COMMENTS
2	09.08.2023	CDH	ADDED NOTE RE CODES
3	12.2.2023	CDH	ADDED TOWN CERTIFICATION TO ALL SHEETS
4			
5			
6			

SHEET DESCRIPTION: **PROPOSED PHOTOMETRIC PLAN**

PROJECT #: **2212122**

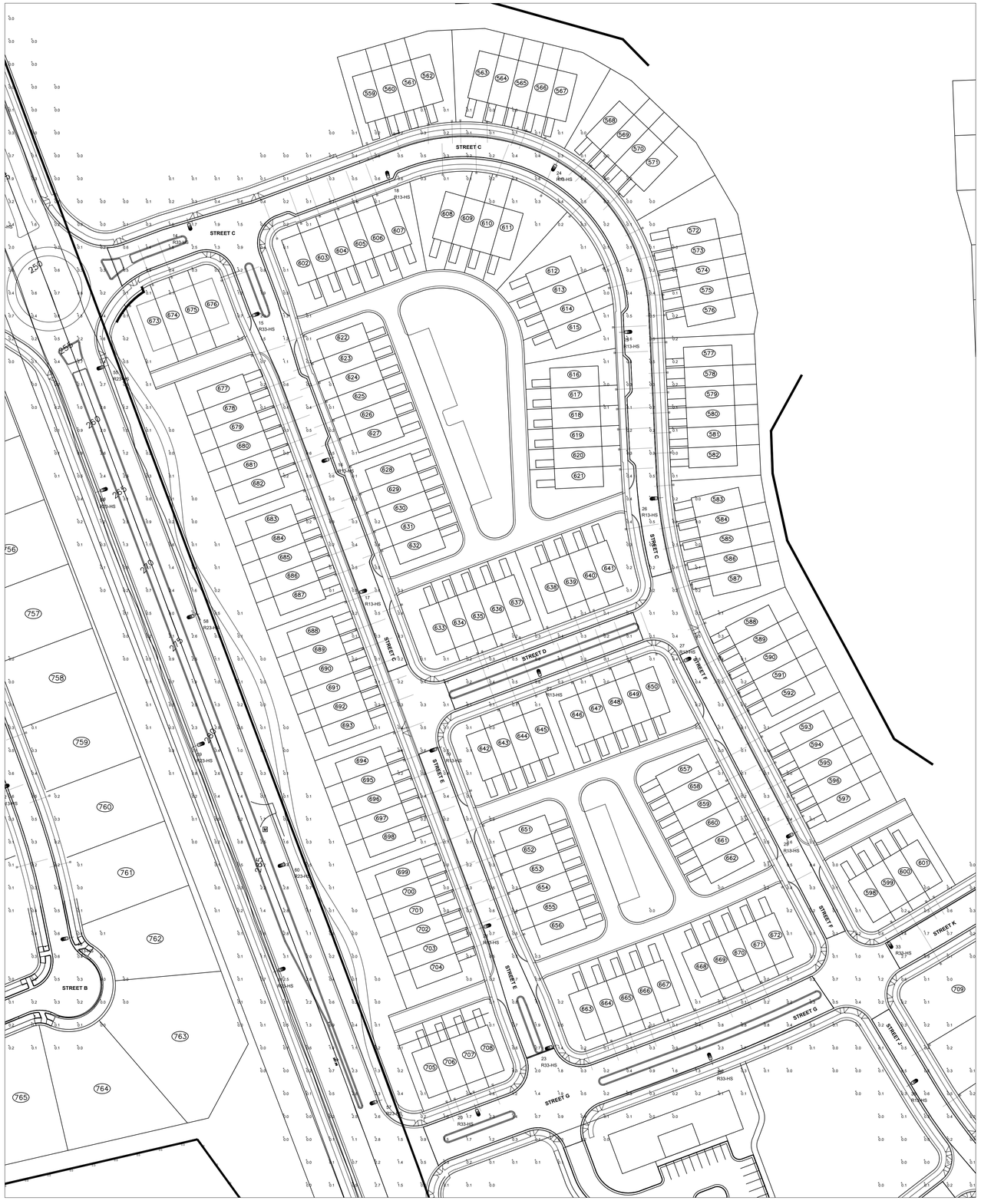
ISSUE DATE: **12.12.2022**

DESIGN LEVEL: **N.A.**

AGI: **C.D.HEANER**

CAD: **C.D.HEANER**

SHEET#: **SL2.1** REV #: **3**



1 **PHOTOMETRIC PLAN**
SCALE: 1"= 60'-0"

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BUFFALO MN 55313
PH:763.684.1548
FAX:763.682.9048

PROPERTY OWNER: **MCADAMS CO 2905 MERIDIAN PKWY DURHAM, NC 27713**

PROJECT INFO: **BRIO**
KNIGHTDALE, NC

ENGINEER INFO:

ENGINEER SEAL:

REVISIONS

#	DATE	INIT	DESCRIPTION
1	03.08.2023	CDH	ADDRESS CITY COMMENTS
2	09.08.2023	CDH	ADDED NOTE RE CODES
3	12.2.2023	CDH	ADDED TOWN CERTIFICATION TO ALL SHEETS
4			
5			
6			

SHEET DESCRIPTION: **PROPOSED PHOTOMETRIC PLAN**

PROJECT #: **2212122**

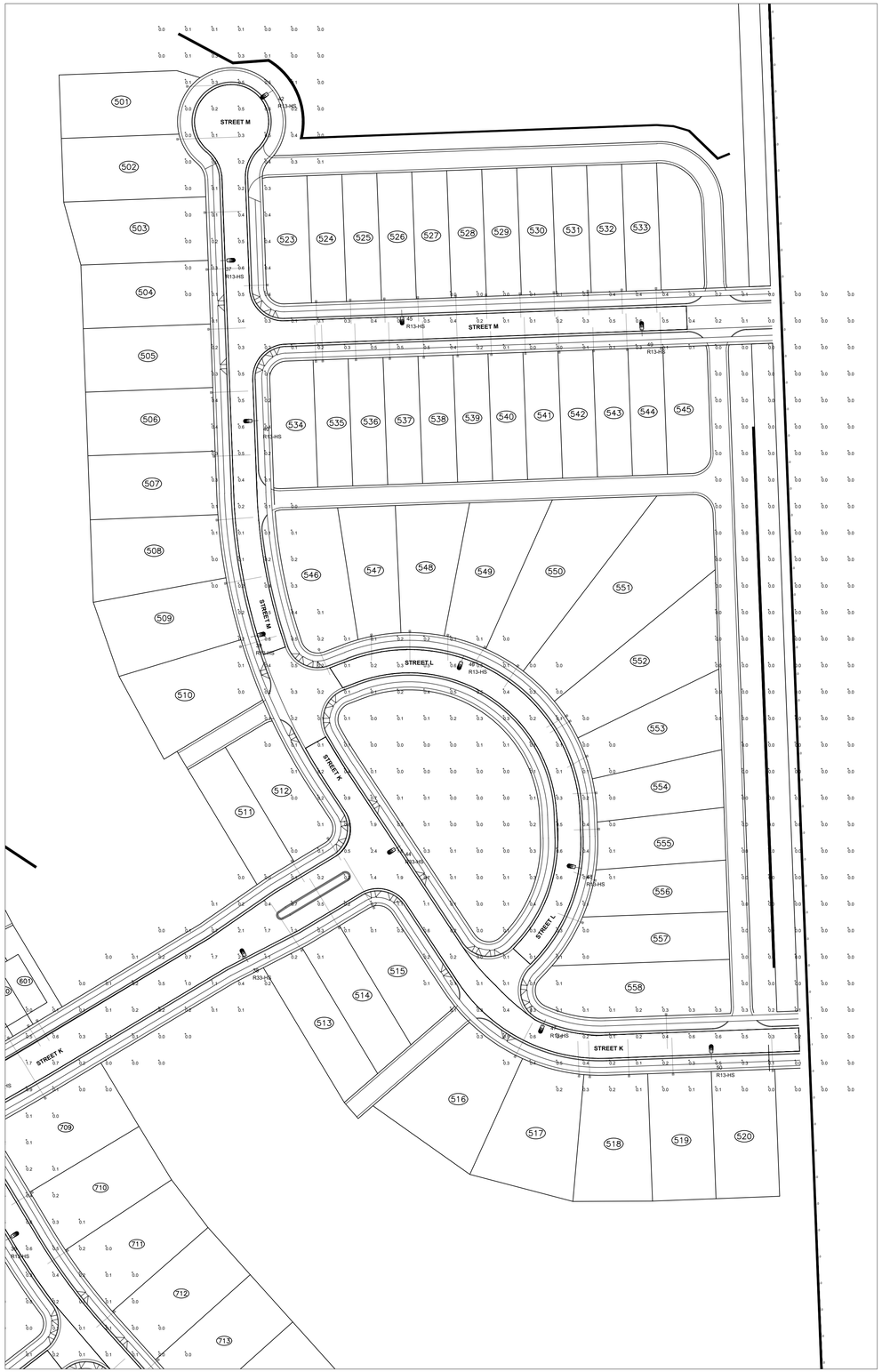
ISSUE DATE: **12.12.2022**

DESIGN LEVEL: **N.A.**

AGI: **C.D.HEANER**

CAD: **C.D.HEANER**

SHEET#: **SL2.2** REV #: **3**



1 **PHOTOMETRIC PLAN**
SCALE: 1"= 60'-0"

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SUITE 201
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PH:763.684.1548
FAX:763.682.9048

PROPERTY OWNER	MCADAMS CO 2905 MERIDIAN PKWY DURHAM, NC 27713
PROJECT INFO	BRIO KNIGHTDALE, NC
ENGINEER INFO	
ENGINEER SEAL	

REVISIONS

#	DATE	INIT	DESCRIPTION
1	03.08.2023	CDH	ADDRESS CITY COMMENTS
2	09.08.2023	CDH	ADDED NOTE RE CODES
3	12.21.2023	CDH	ADDED TOWN CERTIFICATION TO ALL SHEETS
4			
5			
6			

SHEET DESCRIPTION	PROPOSED PHOTOMETRIC PLAN
PROJECT #	2212122
ISSUE DATE	12.12.2022
DESIGN LEVEL	N.A.
AGI	C.D.HEANER
CAD	C.D.HEANER
SHEET#:	SL2.3
REV #:	3

1 **PHOTOMETRIC PLAN**
SCALE: 1"= 60'-0"

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By: _____ Date: _____
Administrator

BASED ON THE INFORMATION PROVIDED, ALL DIMENSIONS AND LUMINAIRE LOCATIONS SHOWN REPRESENT RECOMMENDED POSITIONS. THE ENGINEER AND/OR ARCHITECT **MUST** DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING OR FUTURE FIELD CONDITIONS.

THE LIGHTING PATTERN REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER THE CONTROLLED CONDITIONS UTILIZING CURRENT INDUSTRY STANDARD LAMP RATINGS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS.

FOR ADDITIONAL LIGHTING INFORMATION CONTACT:
On-Site Lighting & Survey, LLC
PH: 763.684.1548

On-Site Lighting & Survey, LLC
1111 HIGHWAY 25 NORTH
SUITE 201
BUFFALO MN 55313
PH:763.684.1548
FAX:763.682.9048

PROPERTY OWNER: **MCADAMS CO 2905 MERIDIAN PKWY DURHAM, NC 27713**

PROJECT INFO: **BRIO**
KNIGHTDALE, NC

ENGINEER INFO:

ENGINEER SEAL:

REVISIONS

#	DATE	INIT	DESCRIPTION
1	03.08.2023	CDH	ADDRESS CITY COMMENTS
2	09.08.2023	CDH	ADDED NOTE RE CODES
3	12.21.2023	CDH	ADDED TOWN CERTIFICATION TO ALL SHEETS
4			
5			
6			

SHEET DESCRIPTION: **PROPOSED PHOTOMETRIC PLAN**

PROJECT #: **2212122**

ISSUE DATE: **12.12.2022**

DESIGN LEVEL: **N.A.**

AGI: **C.D.HEANER**

CAD: **C.D.HEANER**

SHEET#: **SL2.4** REV#: **3**

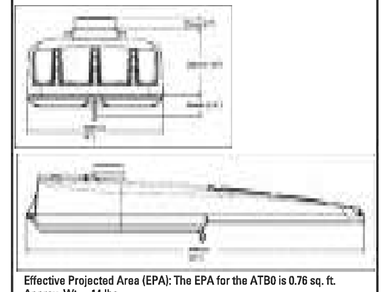
Autobahn Series ATB0
Roadway Lighting

Consistent with LEED® goals & Green Globes™ criteria for light pollution reduction
NIGHTTIME FRIENDLY

PRODUCT OVERVIEW

Applications:
- Roadways
- Off ramps
- Residential streets
- Parking lots

DIMENSIONS



Effective Projected Area (EPA): The EPA for the ATB0 is 0.76 sq. ft.
Approx. Wt. = 14 lbs.

Features: Type R-13-HS

OPTICAL

The Autobahn's new molded silicone optics provide exceptional performance. Silicone optics are superior to other polymeric materials in the areas of; optical efficiency, thermal performance, and reduction in dirt accumulation, all of which can lead to long term lumen degradation and a shift in optical distribution. Also, because silicone allows for the molding of fine details as well as thick sections, it produces the most crisp, clean and well-defined lighting distributions available. Silicone optics paired with modern LED's allow the Autobahn to take full advantage of both technologies.

Same Light: Performance is comparable to 100 - 400W HPS roadway luminaires.

White Light: Correlated color temperature - 4000K, or optional 2700K, 3000K or 5000K, all 70 CRI minimum.

Unique IP66 rated LED light engines provided 0% uplight and restrict backlight to within sidewalk depth, providing optimal application coverage and optimal pole spacing. Available in Type II, III, IV, and V roadway distributions.

ELECTRICAL

Expected Life: LED light engines are rated >100,000 hours at 25°C, L70. Electronic driver has an expected life of 100,000 hours at a 25°C ambient.

Lower Energy: Saves an expected of 40-60% over comparable HID luminaires.

Robust Surge Protection: Two different surge protection options provide a minimum of ANSI C136.2 10kV/5kA protection. 20kV/10kA protection is also available.

Luminaire ships with a 0-10v dimmable driver. Luminaire is continuous and step dimming capable via AO option or controls installed on P7 photocontrol receptacle option.

MECHANICAL

Includes standard AEL lineman-friendly features such as tool-less entry, 3 station terminal block and quick disconnects. Bubble level located inside the electrical compartment for easily leveling at installation.

Rugged die-cast aluminum housing and door are polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 7 (per ASTM D1654) after over 5000 hours exposure to salt fog chamber (operated per ASTM B117).

Mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8" O.D.) diameter. Provides a 3G vibration rating per ANSI C136.31

Wildlife shield is cast into the housing (not a separate piece).

STANDARDS

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

Color temperatures of ≤ 3000K must be specified for International Dark-Sky Association certification.

Rated for -40°C to 40°C ambient
CSA Certified to U.S. and Canadian standards
Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

CONTROLS

NEMA 3 pin photocontrol receptacle is standard, with the Acuity designed ANSI standard 7 pin receptacle optionally available.

Premium solid state locking style photocontrol - PCSS (10 year rated life) Extreme long life solid state locking style photocontrol - PCLL (20 year rated life).

Optional onboard Adjustable Output module allows the light output and input wattage to be modified to meet site specific requirements, and also can allow a single fixture to be flexibly applied in many different applications.

Note: Specifications subject to change without notice. Actual performance may differ as a result of end-user environment and application.

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AEL American Electric Lighting®

Autobahn Series ATB0
Roadway Lighting

ORDERING INFORMATION

Series
ATB0 Autobahn LED Roadway

Performance Packages
- P201 5,369 lumens nominal[6]
- P202 6,943 lumens nominal[6]
- P203 10,056 lumens nominal
- P204 12,176 lumens nominal
- P205 13,767 lumens nominal
- P301 10,367 lumens nominal
- P302 12,185 lumens nominal
- P303 15,351 lumens nominal
- P304 17,714 lumens nominal
- P305 19,893 lumens nominal
- P451 16,320 lumens nominal
- P452 19,087 lumens nominal
- P453 23,592 lumens nominal
- P454 25,070 lumens nominal
- P455 27,091 lumens nominal
- P456 28,347 lumens nominal
- P457 29,715 lumens nominal

Voltage
- MVOLT Multi-volt, 120-277V
- 347 347V[5]
- 480 480V[5]
- XVOLT[7] 277V-480V

Optics
- R2 Roadway Type II
- R3 Roadway Type III
- R4[3] Roadway Type IV
- R5 Roadway Type V

Options

Color Temperature (CCT)
- (Blank) 4000K CCT, 70 CRI Min.
- 27K 2700K CCT, 70 CRI Min.
- 3K 3000K CCT, 70 CRI Min.
- 5K 5000K CCT, 70 CRI Min.

Paint
- (Blank) Gray (Standard)
- BK Black
- BZ Bronze
- DDB Dark Bronze
- GI Graphite
- WH White
- GN Green

Surge Protection
- (Blank) Standard 20kV/10kA SPD[4]
- MP MOV Pack 10kV/5kA

Terminal Block
- (Blank) Terminal Block (Standard)
- T2 Wired to L1 & L2 Positions

Misc.
- BL External Bubble Level
- HSS House-Side Shield
- NL Nema Label
- XL Not CSA Certified

- UMR-XX 8" Horizontal Arm for Round Pole, Painted to match Fixture
- UMS-XX 8" Horizontal Arm for Square Pole, Painted to match Fixture
- UMR-GALV 8" Horizontal Arm for Round Pole, Galvanized
- UMS-GALV 8" Horizontal Arm for Square Pole, Galvanized

Controls
- (Blank) 3 Pin NEMA Photocontrol Receptacle (Standard)
- P7[2] 7 Pin Photocontrol Receptacle (Dimmable Driver Included)
- NR No Photocontrol Receptacle
- AO Field Adjustable Output
- PCSS[1] Solid State Lighting Photocontrol (120-277V)
- PCLL Solid State Long Life Photocontrol
- SH Shorting Cap

Packaging
- (Blank) Single Unit (Standard)
- JP Job Pack (42/Pallet)

Accessories:
House Side Shields for field installation
- ATB0P20XR2/R5HSS for use with P201 - P205, R2 & R5 distributions
- ATB0P20XR3/R4HSS for use with P201 - P205, R3 & R4 distributions
- ATB0P30XR2/R5HSS for use with P301 - P305, R2 & R5 distributions
- ATB0P30XR3HSS for use with P301 - P305, R3 distribution
- ATB0P30XR4HSS for use with P301 - P305, R4 distribution
- ATB0P45XR2/R5HSS for use with P451 - P457, R2 & R5 distributions
- ATB0P45XR3HSS for use with P451 - P457, R3 distribution

Notes
1. Not available in 347 or 480V.
2. Not available with NR.
3. Not available with P451 - P457 performance packages
4. Not available with P201 performance package + 347V or 480V
5. Not available with P456 or P457 performance package options
6. Not available with XVOLT option
7. XVOLT option only available with P452, P453 and P454 performance packages

AEL American Electric Lighting®
AEL Headquarters, 3825 Columbus Road, Granville, OH 43023
www.americanelectriclighting.com
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Warranty Five-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/resources/terms-and-conditions
Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.
Please contact your sales representative for the latest product information.

Autobahn Series ATB0
Roadway Lighting

PERFORMANCE PACKAGE

ATB0	Distribution	Input Watts	2700K Lumens	2700K LPW	3000K Lumens	3000K LPW	4000K/5000K Lumens	4000K/5000K LPW
P201	R2	36	4,983	137	5,473	151	5,488	150
	R3		4,952	136	5,107	140	5,553	152
	R4		5,045	139	5,130	141	5,346	147
	R5		5,084	142	5,384	148	5,387	150
P202	R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R3		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R5		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P203	R2	70	9,005	130	10,050	144	10,150	147
	R3		8,951	129	9,471	134	10,260	148
	R4		9,494	137	9,673	139	10,060	145
	R5		9,188	134	9,784	142	9,736	142
P204	R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R3		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R5		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P205	R2	102	12,339	121	12,650	125	13,920	137
	R3		12,264	120	13,110	139	14,130	138
	R4		13,051	130	13,680	136	13,830	138
	R5		12,589	127	13,080	132	13,340	135
P301	R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R3		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R5		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P302	R2	83	11,118	135	11,790	142	12,300	149
	R3		11,050	134	12,290	150	12,520	152
	R4		11,589	140	12,720	153	12,280	148
	R5		11,343	137	12,120	147	12,020	145
P303	R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R3		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R5		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P304	R2	124	16,705	130	17,180	136	18,010	141
	R3		16,603	131	17,890	141	18,230	144
	R4		16,845	135	18,160	145	17,850	143
	R5		17,043	137	17,670	142	18,060	145
P305	R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R3		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	R5		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

AEL American Electric Lighting® AEL Headquarters, 3825 Columbus Road, Granville, OH 43023 www.americanelectriclighting.com © 2014-2022 Acuity Brands Lighting, Inc. All Rights Reserved. ATB0 02/03/22
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Autobahn Series ATB0
Roadway Lighting

PERFORMANCE PACKAGE

LLD @ 25°C

ATB0	R2, R3 Distributions 3000K & 4000K CCT 50k Hours	75k Hours	100k Hours	R2, R3 Distributions 2700K & 5000K CCT* 50k Hours	75k Hours	100k Hours	R4 & R5 Distributions Any CCT 50k Hours	75k Hours	100k Hours
P201	0.96	0.95	0.94	0.92	0.88	0.85	0.92	0.88	0.85
P202	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P203	0.96	0.95	0.93	0.91	0.88	0.85	0.91	0.88	0.85
P204	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P205	0.96	0.95	0.93	0.91	0.87	0.83	0.91	0.87	0.83
P301	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P302	0.96	0.95	0.93	0.92	0.88	0.85	0.92	0.88	0.85
P303	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P304	0.96	0.95	0.93	0.91	0.87	0.83	0.91	0.87	0.83
P305	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P451	0.96	0.94	0.93	0.92	0.88	0.85	0.92	0.88	0.85
P452	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P453	0.96	0.94	0.93	0.91	0.87	0.83	0.91	0.87	0.83
P454	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P455	0.96	0.94	0.93	0.9	0.85	0.81	0.9	0.85	0.81
P456	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P457	0.94	0.93	0.91	0.88	0.83	0.79	0.88	0.83	0.79

* Also includes any custom (non-catalog) CCT

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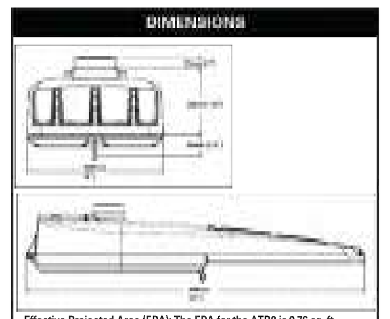
Warranty Five-year limited warranty. … Please contact your sales representative for the latest product information.

1 POLE MOUNT FIXTURE TYPE R13-HS
SPECIFICATION SHEET

Autobahn Series ATB0
Roadway Lighting
PRODUCT OVERVIEW



Features: Type R-33-HS

OPTICAL … ELECTRICAL … MECHANICAL … STANDARDS … CONTROLS (product overview text repeated as above)
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ORDERING INFORMATION (repeated as above; selections marked: P303, R2)
PERFORMANCE PACKAGE (repeated as above; P303 marked)
PERFORMANCE PACKAGE LLD @ 25°C (repeated as above; P303 marked)

1 POLE MOUNT FIXTURE TYPES R33-HS
SPECIFICATION SHEET

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: ____________________ Date: _____________
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: ____________________ Date: _____________
Administrator

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4			
5			
6			

SHEET DESCRIPTION: SPECIFICATION SHEETS

PROJECT #: 2212122

ISSUE DATE: 12.12.2022

DESIGN LEVEL: N.A.

AGI: C.D.HEANER

CAD: C.D.HEANER

SHEET#: SL2.5 REV #: 3

Autobahn Series ATB0
Roadway Lighting

Consistent with LEED® goals & Dark Sky® values for light pollution reduction

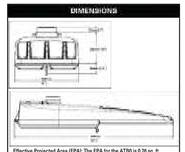
PRODUCT OVERVIEW

Features: Type R-23-HS

Applications:

Roadways
Off ramps
Residential streets
Parking lots

DIMENSIONS



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The Autobahn's new molded silicone optics provide exceptional performance. Silicone optics are superior to other polymeric materials in the areas of; optical efficiency, thermal performance, and reduction in dirt accumulation, all of which can lead to long term lumen degradation and a shift in optical distribution. Also, because silicone allows for the molding of fine details as well as thick sections, it produces the most crisp, clean and well-defined lighting distributions available. Silicone optics paired with modern LEDs allow the Autobahn to take full advantage of both technologies.

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Lower Energy: Saves an expected of 40-60% over comparable HID luminaires.

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Luminaire ships with a 0-10v dimmable driver. Luminaire is continuous and step dimming capable via A0 option or controls installed on P7 photocontrol receptacle option.

MECHANICAL

Includes standard AEL lineman-friendly features such as tool-less entry, 3 station terminal block and quick disconnects. Bubble level located inside the electrical compartment for easily leveling at installation.

Rugged die-cast aluminum housing and door are polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 7 (per ASTM D1654) after over 5000 hours exposure to salt fog chamber (operated per ASTM B117).

Mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8" O.D.) diameter. Provides a 3G vibration rating per ANSI C136.31

Wildlife shield is cast into the housing (not a separate piece).

CONTROLS

NEMA 3 pin photocontrol receptacle is standard, with the Acuity designed ANSI standard 7 pin receptacle optionally available.

Premium solid state locking style photocontrol - PCSS (10 year rated life) Extreme long life solid state locking style photocontrol - PCLL (20 year rated life).

Optional onboard Adjustable Output module allows the light output and input wattage to be modified to meet site specific requirements, and also can allow a single fixture to be flexibly applied in many different applications.

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www.americanelectriclighting.com
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Roadway Lighting

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- **P451** 16,320 lumens nominal
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- **P453** 23,592 lumens nominal
- **P454** 25,070 lumens nominal
- **P455** 27,081 lumens nominal
- **P456** 28,347 lumens nominal
- **P457** 29,715 lumens nominal

Voltage
- **MVOLT** Multi-volt, 120-277V
- **347** 347V[1]
- **480** 480V[1]
- **XVOLT** 277V-480V

Optics
- **R2** Roadway Type II
- **R3** Roadway Type III
- **R4[2]** Roadway Type IV
- **R5** Roadway Type V

Options

Color Temperature (CCT)
- **(Blank)** 4000K CCT, 70 CRI Min.
- **27K** 2700K CCT, 70 CRI Min.
- **3K** 3000K CCT, 70 CRI Min.
- **5K** 5000K CCT, 70 CRI Min.

Paint
- **(Blank)** Gray (Standard)
- **BK** Black
- **BZ** Bronze
- **DDB** Dark Bronze
- **GI** Graphite
- **WH** White
- **GN** Green

Surge Protection
- **(Blank)** Standard 20kV/10kA SPD[4]
- **MP** MOV Pack 10kV/5kA

Terminal Block
- **(Blank)** Terminal Block (Standard)
- **T2** Wired to L1 & L2 Positions

Misc.
- **BL** External Bubble Level
- **HSS** House-Side Shield
- **NL** Nema Label
- **XL** Not CSA Certified

- **UMR-XX** 8' Horizontal Arm for Round Pole, Painted to match Fixture
- **UMS-XX** 8' Horizontal Arm for Square Pole, Painted to match Fixture
- **UMR-GALV** 8' Horizontal Arm for Round Pole, Galvanized
- **UMS-GALV** 8' Horizontal Arm for Square Pole, Galvanized

Controls
- **(Blank)** 3 Pin NEMA Photocontrol Receptacle (Standard)
- **P7[7]** 7 Pin Photocontrol Receptacle (Dimmable Driver Included)
- **NR** No Photocontrol Receptacle
- **A0** Field Adjustable Output
- **PCSS[5]** Solid State Lighting Photocontrol (120-277V)
- **PCLL** Solid State Long Life Photocontrol
- **SH** Shorting Cap

Packaging
- **(Blank)** Single Unit (Standard)
- **JP** Job Pack (42/Pallet)

Accessories:
House Side Shields for field installation
- **ATB0P20XR2/RSHSS** for use with P201 - P205, R2 & R5 distributions
- **ATB0P20XR3/R4HSS** for use with P201 - P205, R3 & R4 distributions
- **ATB0P30XR2/RSHSS** for use with P301 - P305, R2 & R5 distributions
- **ATB0P30XR3HSS** for use with P301 - P305, R3 distribution
- **ATB0P30XR4HSS** for use with P301 - P305, R4 distribution
- **ATB0P45XR2/RSHSS** for use with P451 - P457, R2 & R5 distributions
- **ATB0P45XR3HSS** for use with P451 - P457, R3 distribution

Notes
1 Not available in 347 or 480V.
2 Not available with NR.
3 Not available with P451 - P457 performance packages
4 Not available with P201 performance package + 347V or 480V
5 Not available with P456 or P457 performance package options
6 Not available with XVOLT option
7 XVOLT option only available with P452, P453 and P454 performance packages

AEL Headquarters, 3825 Columbus Road, Granville, OH 43023
www.americanelectriclighting.com
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Warranty Five-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/resources/terms-and-conditions
Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Please contact your sales representative for the latest product information.

Autobahn Series ATB0
Roadway Lighting

PERFORMANCE PACKAGE

ATB0	Distribution	Input Watts	2700K Lumens	2700K LPW	3000K Lumens	3000K LPW	4000K/5000K Lumens	4000K/5000K LPW
P451	R2	105	14,827	138	15,760	148	16,570	154
	R3		14,737	137	16,790	157	16,640	155
	R5		15,128	144	17,150	162	16,030	153
P452	R2	129	18,277	142	19,230	149	19,370	155
	R3		18,198	140	19,630	153	19,870	156
	R5		18,589	146	19,140	153	19,760	147
P453	R2	159	22,227	139	23,570	143	23,900	150
	R3		22,092	139	24,090	151	23,550	148
	R5		22,677	141	23,920	148	24,030	149
P454	R2	178	24,545	144	25,190	133	25,080	141
	R3		24,698	142	26,340	148	24,920	140
	R5		25,364	141	25,360	140	26,580	150
P455	R2	187	25,732	138	25,270	136	26,750	143
	R3		25,576	137	27,430	145	27,020	145
	R5		26,254	143	27,720	149	27,020	152
P456	R2	209	27,477	135	28,980	138	28,430	136
	R3		27,313	134	29,930	142	28,980	143
	R5		27,908	140	30,140	146	30,490	151
P457	R2	211	27,856	131	27,270	130	28,900	137
	R3		27,488	130	29,790	142	29,890	140
	R5		28,217	137	29,790	146	29,900	145

Note: Individual fixture performance may vary.

ATB0 LLD Multiplier	15C	20C	25C	30C	35C	40C
	1.02	1.01	1.00	0.99	0.98	0.97

To calculate the LLD for a temperature other than 25°C, multiply the LLD @ 25°C (shown in the performance package table) by the LLD multiplier for the selected temperature.

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Autobahn Series ATB0
Roadway Lighting

PERFORMANCE PACKAGE

ATB0	R2, R3 Distributions 3000K & 4000K CCT			R2, R3 Distributions 2700K & 5000K CCT*			R4 & R5 Distributions Any CCT		
	50k Hours	75k Hours	100k Hours	50k Hours	75k Hours	100k Hours	50k Hours	75k Hours	100k Hours
P201	0.96	0.95	0.94	0.92	0.88	0.85	0.92	0.88	0.85
P202	0.96	0.95	0.93	0.92	0.88	0.85	0.92	0.88	0.85
P203	0.96	0.95	0.93	0.91	0.88	0.85	0.91	0.88	0.85
P204	0.96	0.95	0.93	0.91	0.88	0.85	0.91	0.88	0.84
P205	0.96	0.95	0.93	0.91	0.87	0.83	0.91	0.87	0.83
P301	0.96	0.95	0.93	0.92	0.88	0.85	0.92	0.88	0.85
P302	0.96	0.95	0.93	0.92	0.88	0.85	0.92	0.88	0.85
P303	0.96	0.95	0.93	0.92	0.88	0.84	0.92	0.88	0.84
P304	0.96	0.95	0.93	0.91	0.87	0.83	0.91	0.87	0.83
P305	0.96	0.94	0.93	0.9	0.86	0.82	0.9	0.86	0.82
P451	0.96	0.94	0.93	0.92	0.88	0.85	0.92	0.88	0.85
P452	0.96	0.94	0.93	0.91	0.88	0.84	0.91	0.88	0.84
P453	0.96	0.94	0.93	0.91	0.87	0.83	0.91	0.87	0.83
P454	0.96	0.94	0.93	0.9	0.86	0.82	0.9	0.86	0.82
P455	0.96	0.94	0.93	0.9	0.85	0.81	0.9	0.85	0.81
P456	0.94	0.93	0.91	0.89	0.84	0.79	0.88	0.84	0.79
P457	0.94	0.93	0.91	0.88	0.83	0.79	0.88	0.83	0.79

*** Also includes any custom (non-catalog) CCT**

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1 **POLE MOUNT FIXTURE TYPE R23-HS**
SPECIFICATION SHEET

Town Certification. This design has been reviewed by the Engineer for the Town of Knightdale, and to the best of my knowledge and belief, it conforms to the requirements established in the Standard Specifications of the Town of Knightdale.
By: _____ Date: _____
Town Engineer
These plans are approved by the Town of Knightdale and serve as construction plans for this project.
By: _____ Date: _____
Administrator

BASED ON THE INFORMATION PROVIDED, ALL DIMENSIONS AND LUMINAIRE LOCATIONS SHOWN REPRESENT RECOMMENDED POSITIONS. THE ENGINEER AND/OR ARCHITECT **MUST** DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING OR FUTURE FIELD CONDITIONS.

THE LIGHTING PATTERN REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER THE CONTROLLED CONDITIONS UTILIZING CURRENT INDUSTRY STANDARD LAMP RATINGS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS.

FOR ADDITIONAL LIGHTING INFORMATION CONTACT:
On-Site Lighting & Survey, LLC
PH: 763.684.1548

On-Site Lighting & Survey, LLC
1111 HIGHWAY 25 NORTH
SUITE 201
BUFFALO MN 55313
PH:763.684.1548
FAX:763.682.9048

PROPERTY OWNER: MCADAMS CO, 2905 MERIDIAN PKWY, DURHAM, NC 27713

PROJECT INFO: BRIO, KNIGHTDALE, NC

ENGINEER INFO:

ENGINEER SEAL:

REVISIONS

#	DATE	INIT	DESCRIPTION
1	03.08.2023	CDH	ADDRESS CITY COMMENTS
2	09.08.2023	CDH	ADDED NOTE RE CODES
3	12.21.2023	CDH	ADDED TOWN CERTIFICATION TO ALL SHEETS
4			
5			
6			

SHEET DESCRIPTION	SPECIFICATION SHEETS
PROJECT #	2212122
ISSUE DATE	12.12.2022
DESIGN LEVEL	N.A.
AGI	C.D.HEANER
CAD	C.D.HEANER
SHEET#:	SL2.6
REV #:	3